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Association Between Seropositivity of *Helicobacter pylori* Infection and Anaemia Amongst Children Aged 5-15 Years in Western Highlands of Kenya

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Abstract
Anaemia is a global health problem, whose development is influenced by several factors. *Helicobacter pylori* infection is among the factors associated with anaemia. Long term interruption of malaria transmission in the highland area of Kipsamoite led to an increase of haemoglobin levels in some few individuals. However, there are still reported cases of low Hb levels associated with anaemia. In studies that have been done on the role of *H. pylori* infections on anaemia, researchers hold varied views on whether or not *H. pylori* infections play a role in iron deficiency anaemia. This study investigated the association between *H. pylori* infections and anaemia in children aged 5-15 years in Western highland region of Kenya. The study adopted a case-control design and purposive sampling technique was used in selection of subjects. Haemoglobin levels and *H. pylori* occurrence were measured and entered into Microsoft excel. These data was summarized into descriptive statistics. Chi-square was used in hypotheses testing. A total of 105 participants were enrolled, 35 were cases and 70 were the controls. The mean haemoglobin level was found to be statistically significantly ($p<0.00$), haemoglobin of cases was lower (11.05 ± 1.726) than that of controls (13.01 ± 1.897). The proportion of anaemic children among the cases was 77.1% (27) while the non-anaemic were 22.9% (8). The Chi-square showed positive statistical significant difference ($p<0.05$) between cases and controls. The study concluded that there was a great association between *H. pylori* infection and occurrence of anaemia in Western region of Kenya.

Keywords: Anaemia, Case, Controls, *Helicobacter pylori*

1. Introduction

Anaemia is still a public health problem globally. According to Benoist, Mclean, Egii, Cogswell (2008), about 293.1 million children under five years are suffering from anaemia with 29 percent being from sub-Sahara Africa. In tropical and developing countries, aneamia is particularly more than 50% prevalent among pre-school

children and pregnant women who are either moderately or severely anaemic. Furthermore the main causes of anaemia in tropical countries include: malnutrition, parasitic, bacterial infections, viral infections, inherited haemoglobinopathies, glucose 6 phosphate deficiency and obstetrical complications that result in blood loss (Monica, 2000)In addition, anaemia can be categorized as either, iron deficiency anaemia, megaloblastic anaemia, haemolytic anaemia, anaemia of chronic diseases or a plastic anaemia. According to WHO (2011), iron deficiency anaemia is the most prevalent type of anaemia globally.

Moreover, gastrointestinal bleeding and malabsorption are also factors considered to be contributing to iron deficiency anaemia. Bacteria *Helicobacter pylori,*is an important microorganism which has been associated with gastrointestinal bleeding and malabsorption and hence considered an important bacterium in iron deficiency anaemia.

H. pylori is a spiral shaped bacterium propelled by flagella, lives in the stomach and small intestines of the host (Monica,2000).Most physicians often overlook these bacteria, even when patients complain of symptoms that are classic for *H. pylori* infection, which include stomach pain, nausea, acid reflux, intestinal discomfort and halitosis (IDI, 2002).*H. pylori* needs iron to survive and has been characterized has one of the microorganisms capable of getting heme in hemoglobin and from iron bound to lactoferrin normally found in human secretions such as saliva, tears and gastrointestinal fluids. With an adequate supply of iron, *H. pylori* can thrive and proliferate to the extent of causing stomach cancer (IDI, 2002). *H. pylori* utilizes iron for its survival and that is why most studies done, associate this bacterium with iron deficiency.

It has been speculated that *H. pylori* contribute to iron deficiency anaemia by competing with the host for iron. In addition, Kearney, (2005), points out that colonization of *H. pylori* in the gastrointestinal tract impairs the absorption of iron and hence affects the ferritin stores causing iron deficiency anaemia without necessarily destroying the gastrointestinal mucosa. The epidemiological studies which have been done have shown that *H. pylori* is highly prevalent in developing countries than in developed countries.

2. MATERIALS AND METHODS

The study was carried out in Nandi County, Mosop Sub-County, Sangalo location specifically Kipsamoite sub-location. This highland area has an altitude of 2319M above the sea level, located at latitude of 0.33265N and longitude of 34.99659E. This area experiences low and seasonal malaria transmission within the year, with peaks of malaria outbreaks between the months of May and August. This is influenced by the general climate which comprises of fluctuation in the amount of rainfall between the years and the change in temperature patterns. The area receives high rainfall between the months of March and November with the highest rainfall recorded in the month of August. In different months the changes in minimum and maximum temperature is observed with the highest temperature being noted in the months of January and February. Soil is fertile and supports production of various crops such as maize, potatoes, beans, millet and horticultural crops with tea being the main cash crop. Livestock farming is also practiced for both beef and dairy.

Respiratory tract infections are commonly experienced in this area according to unpublished clinic records. More importantly anaemia, malaria and other bacterial infections are among the recorded and unpublished reports.

The study adopted a retrospective case-control research design involving the study of cases with *H. pylori* infection compared to controls without *H. pylori* infection. In addition a cross-sectional study was also adopted, focusing on children between the ages of 5-15 years.

The target population involved children between the age of 5-15 years which presented signs and symptoms of *H. pylori* infection. Inclusion criteria involved Children who presented with signs and symptoms of *H. pylori* infections whereas children with an obvious case of blood loss such as active or recent gastrointestinal hemorrhage, those with known chronic hematological diseases other than anaemia, children on antibiotics treatment and those who did not consent to the study were excluded. A total of 105 participants , 35 cases and 70 controls were involved in the study. Sample size was determined using the Kesley formula (Kesley, Whittemore, Evams, Thompson, 1996).

Purposive sampling technique was used to select cases-by testing for *H. pylori* infection in those individuals with signs and symptoms of *H. pylori* infections, and positive individuals were treated as cases. The controls of the study were obtained, from the participants with signs and symptoms and tested negative for *H. pylori* infection. Adapting Crimes and Schulz (2005) information, the study recruited 2 controls per case to increase the power of the study.

Collection of Blood Samples involved cleaning the finger with 70% alcohol swab and allowed to dry before being punctured using sterile lancets to enable blood specimen collection.

After collection of blood specimen, Hb level testing was done using photometry (hemocontrol machine) and the readings recorded. Hb levels values was adjusted by -0.8 g/dl for altitude as per World Health Organization recommendation (2011). In addition, the cut off for anaemia was done in relation to the age of the children and this was done as follows: age 5-11.9 years was 11.5g/dl and age 12-15 was 12g/dl. Those children who were found to be anaemic and with *H. pylori* infections were referred to the health centre clinician for further evaluation and treatment. Serum specimens were collected from the study participants and qualitative detection of IgG antibodies against *H. pylori* infections was carried out and the results recorded. Children with IgG antibodies were referred back to the clinician for further evaluation.

2.1 Data Analysis

Data was entered into Microsoft excel transferred into stata data editor. Descriptive statistics was used, summarized into frequencies (%) and mean (+SD) as appropriate. Chi square test were used in the analysis of the data. Stata (statase14) software was used.

2.2 Ethical Considerations

This study commenced after ethical approval by ethical review committee of the University of Eastern Africa Baraton (UEAB/12/9/2017). In addition, permission to conduct the study was obtained from the health centre administration. Further, written informed consent was obtained from the guardian or the parent of each participant and the results were kept confidential. Any result that was necessary for the child was communicated to the physicians for appropriate management.

3. RESULTS

3.1 Demographic characteristics of cases and control groups

Table 1. The characteristics of the study population

Variables	Case (n=35)	Control (n=70)	p-value
Number of male (M)	14 (40%)	37 (52.86%)	0.00018
Number of female (F)	21 (40%)	33(52.86%)	0.0002
Number of 5-11.9 years	16 (45.71%)	30 (42.86%)	0.00012
Number of 12-15 years	19 (54.29%)	40 (57.14%)	0.0002
Age mean ±sd	11.59±3.66	11.41±3.39	0.8126
Age median	13	12	
Age inter-quartile	7	4	

In this study there were 105 study participants (35 were cases while 70 were the controls). Among 35 cases 21 (60%) were female and 14 (40 %) were males. 16(45.71%) were between the ages of 5-11.9 years while 19(54.29%) were between the ages of 12-15 years (Table 1). On the control groups 37 (52.86%) were male and 33 (47.14 %) were female. 30 (42.86%) were between the ages of 5-11.9 years while 40 (57.14 %) were between the ages of 12-15 years (Table 1). The mean age of cases was 11.586 ±3.7 and that of the controls were 11.41± 3.4. The median age of case and controls were 13 and 12 respectively (Table 1).

Table 2: Comparison of the Hb levels of the cases and controls using Wilcoxon rank test

Parameter	cases n=35	controls n=70
Minimum Hb levels	6.6	8.6
25% percentile	10.20	11.45
Median	11.10	13.35
75% percentile	11.50	14.30
Maximum Hb levels	15.40	16.30

*p-value < 0.0001

The median of the Hb of the controls was 13.35g/dl while that of the cases was 11.1g/dl (Table 2). The lowest Hb levels between cases and controls were 6.6g/dl and 8.6g/dl respectively (Table 2).

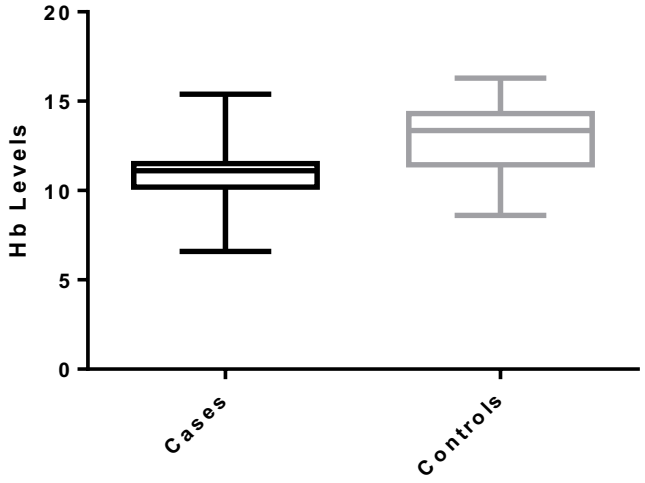

Figure1: Box plot of the comparison of the Hb levels of the cases and controls

The data values range from 6 g/dl to 16g/dl for both cases and controls (Fig 1). The data of both cases and controls were symmetric. The inter-quartile range of the controls was 3 while the inter-quartile range of the cases was 2 (Fig 1)

3.2 Association between *H. pylori* infection and occurrence of anemia in areas of low malaria transmission.

Table 2. The association between anaemia and *H.pylori* infection.

Aneamia	controls	cases	total
No	51	8	59
Yes	19	27	46
Total	70	35	105

Pearson chi-square 23.6966, p-value 0.00

In 70 controls, 51 had no anaemia while 19 were aneamic, while in 35 cases 8 were non-anaemic and 27 were anaemic (Table 2). Using pearson chi-square a significance difference was noticed (23.6966, p-value=0.00)

4. Discussion

Anaemia is one of the public health problems among the children globally. Understanding various factors contributing to development of aneamia helps the clinicians and policy developers to put in place measures on how to deal with anaemia. This study was carried out in area of low malaria transmission with prolonged interruption of malaria transmission in 2008, significant number of cases of anaemia with unknown cause was

still being reported even with unreported cases of malaria. The results of this study showed that those children with *H. pylori* infections had lower Hb levels compared to those children with IgG negative for *H. pylori* infection. The low Hb levels observed in this study could be due to coupled rapid growth of children and the *H. pylori* infection. The rapid growth of children requires high amount of iron to sustain their growth (Choe, Kim, Hong, 2000). The development of Hb molecule requires iron and hence any interference of iron affects the Hb levels. Choe *et al.,* (2000) proposed that *H. pylori* infection affects the iron metabolism and iron absorption and exacerbate the iron deficient. Different researchers have demonstrated various mechanisms which *H. pylori* could be using to interfere with iron metabolism and iron absorption causing anaemia. The current study postulated that hemorrhagic gastritis associated with *H. pylori* infection could be a possible mechanisms causing gastrointestinal bleeding causing excess iron loss. Yip, Limburg, Ahlquist *(*1998) reported that hemorrhagic gastritis associated with *H. pylori* infection as a possible cause of occult bleeding and therefore iron loss experience in Alaska population.

Secondly, the malabsorption of non-haeminic iron reduces the amount of iron in the circulation affecting the haemopoesis process and hence affecting the level of Hb concentration. Perri *et al.,* (1997) and Windle, Kelleher,Crabtree,(2007) showed that hypochloryhydria in which *H. pylori* infection is associated with iron deficiency and anaemia, decreases the absorption of non-haeminic iron absorption.

Thirdly, Yokota *et al.,* (2008) reported that *H. pylori* strains in iron deficiency anaemia patients showed ferric ion uptake and a fast-iron dependent growth when compared with strains from patients without iron deficiency. The current study therefore hypothesized that the mechanisms revealed by Yokota *et al.,* (2008) could be another possible mechanism used by *H. pylori* infection in this population to cause anaemia. In the *H. pylori* positive children in this, 77.1% had anaemia while 22.9% of the infected children did not have anaemia. This shows that certain strains of *H. pylori* are iron dependent while other strains are non-iron dependent. That could be the main reason why 77.1% had anaemia while 22.9% did not experience the development of anemia. Interference of iron metabolism and iron absorption, affects the haemopoesis process and hence interferes with Hb levels. Iron is an important complement in the development of Hb. This study noted that the *H. pylori* infection may have contributed to the low Hb levels in children in this population by interfering with iron absorption and iron metabolism.

Eato Brooks, Morgan, Krakowa, (1991) highlighted that urease production which helps the *H. pylori* bacteria in overcoming the acidic environment of the stomach is one of the mechanisms which affects the iron metabolism and iron absorption. In addition, the absorption of iron is also interfered with by the destruction of the stomach cell membrane by *H. pylori* infection. Asahi *et al.,* (2003), noted that the binding of VacA to specialized membrane, functional domain have an implication on cell signaling. Tegtmeyer, Zabler, Schmidt, (2009), noted that VacA inhibited the activation of epidermal growth factor receptor (EGFR) and HER2/Neu, and Erk1/2MAP kinase which play an important role for cell elongation and cell scattering. The above mechanism induced by *H. pylori* infection interferes with cell membrane structure affecting the iron absorption and hence affects the Hb levels.

Our findings agreed with several studies done elsewhere, Baggett Parkinson, Muty, Gold, Gessner, (2006), assessed an association of *H. pylori* infection and ID among children of the age of 7-11 years and found a great association after age confounding was done. A strong association in children between the age of 9 years and above was noticed. The current study differs with the above study in that after stratification of age groups this study no statistical significance among the age groups was found. In addition the changes in the gastric physiology and its histology in children caused by *H. pylori* infections were investigated by Baysoy *et al.,* (2004). This study found that the destruction of the gastric physiology and its histology by *H. pylori* infections affects the serum iron levels. On the same note, a study done in Germany which was a cross-sectional study (n=1806) noticed 17% decrease in serum ferritin concentration in *H. pylori* IgG positive individuals than in *H. pylori* IgG negative individuals (Berg Bode, Blettner, Boing, Brenner, 2001). Moreover, in Korean children a positive statistical significance of *H. pylori* infections and low mean serum ferritin levels ($p<0.001$) was noticed (Choe, Kim, Hong, 2003). Furthermore, in Australia a study involving women showed high statistical significance of *H. pylori* infected women and low serum ferritin levels compared with *H. pylori* negative women even with the same diet intake of iron (Peach, Bath, Farish, 1998). The current and the above study done in

Australia were done in children and women respectively. On the same note the current study agrees that there was an association between *H. pylori* infection and low Hb levels and the Australian study agreeing that *H. pylori* infection and low serum ferritin levels was statistically significant, meaning that the role of *H. pylori* infection on Hb levels is felt across the gender group and across all ages.

In a study done in Korean adolescents (n=937), a significant association between *H. pylori* seropositivity and anaemia was noticed. In addition in a study done by Darvishi, Katayoun, Hussein, Kamyab ,(2015) in Iran found out that the serological investigation for *H. pylori* infection revealed that 52 (81.3%) patients with IDA and 10 (14.3%) non-anaemic controls were positive for specific IgG *H. pylori* antibodies and the difference between the two groups were statistically significant ($p<0.0001$).

Similarly, a study done in Ethiopia by Taye *et al.,* (2015) which upto 6.5 years of *H. pylori* infected children was associated with higher prevalence of anaemia and reduction of Hb level and red cell indices.

In another study done in Iran, by Darvishi *et al.,* (2015), a case-control study in children under six years, found a strong relationship between *H. pylori* infection and iron deficiency anaemia. This study strongly agrees with our findings in that both studies uses the same diagnostic method of IgG antibodies and were on the agreement that, there is association between anaemia and seropositivity of *H. pylori* infection. However, the difference was that Darvishi *et al.,*(2015) did an investigation in children under 6 years of age while this study focused on children between the ages of 5-15 years. This study proves that the association between *H. pylori* infection and anaemia is statistically significant in both older and younger children.

However, there are still controversies among various studies regarding the association between *H. pylori* infection and anaemia. Some authors believe that variation in *H. pylori* species is one of the possible factors for disagreement with the findings in the literature.A cross-sectional study done among Israel-Arab children found a great association between low serum ferritin and CagA-positive strain (Muhsen *et al.,* 2009).In double-blind randomized trial on non iron deficient in 3-10 years old children in Elpaso Texas reported that eradication of *H. pylori* infection by CagA negative strains was associated with a larger serum ferritin increase (Cardenas *et al.,* 2011). On contrary, a German study involving a large population based study could not find any association between the low serum ferritin and the seropositivity of *H. pylori* CagA strains (Berg *et al.,* 2001). On same findings Ciacci *et al.,* (2004) reported a negative association between *H. pylori* infected adults with CagA positive strains and iron absorption impairment. However, with above controversies, the current study believes that different strains of *H. pylori* infection associate differently with anaemia. This is due to the fact that 77.1% of *H. pylori* infected children had anaemia while 22.9% did not develop anaemia, postulating that this could be due to different strains of *H. pylori* infection. The study concludes that there is astrong association between *H. pylori* infection and anaemia and recommends that children with low Hb level should be subjected to *H. pylori* diagnostic tests and treated if found positive.

5. Conclusion

In conclusion, our findings indicated that seropositivity of H.pylori infection is highly associated with the occurrence of anaemia. Children with unexplained cause of anaemia should be tested for H. pylori infection and treated if found positive.

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References

Asahi, M., Tanaka, T., Izumi, Y., Ho, K., Naiki, D., Kersulyte, K., Tsujikawa, M., Saito, K., Sada, S., Yanagi, A., Fujikawa, M., Noda, and Hokawa, Y. (2003). "*Helicobacter pylori* CagA containing ITAM-like sequences localized to lipid rafts negatively regulates VacA-induced Signaling Invivo". *Helicobacter,* Vol. 8; pp 1-14.

Baggett, H.C., Parkinson, A.J., Muth, P.T., Gold, B.D., Gessner, B.D., (2006). "Endemic iron Deficiency associated with *Helicobacter pylori* infection among school –aged children in Alaska." *Pediatric* Vol. 117 pp 396-404.

Baysoy, G., Ertem, D., Ademoglu, E., Kotiloglu, E., Keskin, S., Pehlivanoglu, E., (2004). "Gastrichistopathology, iron status and iron deficiency anaemia in children with *Helicobacter pylori* infection." *Journal of pediatric Gastroenterology and Nutrition*. Vol.38, pp 146-151.

Benoist .B., Mclean .E., Egii .I., Cogswell .M.,(2008).Worldwide prevalence of anaemia 1993-2005, *WHO global database on anaemia*. Geneva World Health Organization

Berg, G., Bode ,G., Blettner,M., Boing, H., Brenner, H., (2001). "*Helicobacter pylori* infection and Serum ferritin." A population-Based study Among 1806 Adults in Germany. *American Journal of Gatroenterology* Vol. 96 pp 1015-1018.

Choe, Y., Kim, S., Hong,YC., (2000). "*Helicobacter pylori* infection with iron deficiency Anaemiaand sub normal growth at puberty."*Arch Dis Child* Vol. 82 pp 136-140. Downloaded from *http.adc.bmj.com/* on 1st August 2018.

Choe, YH., Kim, SK., Hong, YC., (2003). "The relationship between *Helicobacter pylori* infection and iron deficiency seroprevalence study in 937 pubescent children." *Arch Dis child* Vol. 88 pp 178.

Cardenas, VM., Prieto-Jimenez, CA., Mulla, ZD., Rivera, JO., Dominguez, DC., Graham, DY., Ortiz, M., (2011). "Helicobacter pylori eradication and change in markers of iron stores among non- iron deficient children in Elpaso, Texas." An etiological intervention study. *Journal of pediatric Gastroenterology and Nutrition* Vol. 52 pp 326-332

Ciacci, C., Sabbatini, F., Cavallaro, R., Castiglione, F., Bella, S., Iovino, P., Palumbo, A., Tortora, R.,Amoruso, D., Mazzacca, G., (2004). "*Helicobacter pylori* impairs iron absorption in infectedindividuals." *Dig Liver Dis* Vol. 36 pp 455-460.

Crimes, D., and Schulz,K.,(2005)."Compared to what? Finding controls for cases-control studies." *Lancet* Vol. 365 pp 1429-1433.

Darvishi, M., Katayoun, Z., Hossein , M., Kamyab , A., (2015). "Association between *H.pylori* Infections and Iron Deficiency Anaemia among children under six years in Iran."*AJA. Uni. of medical sc, Tehran Iran*

Eaton, K A., Brooks, C.L., Morgan, D.R., Krakowa, S., (1991). "Essential role of Urease In pathogenesis of gastritis induced by *Helicobacter pylori* in gnotobiotic piglets." *Infectious Immunology* Vol. 59 pp 2470-2475.

IDI (2002). *Helicobacter:* "*H. pylori* a common bacterium often overlooked by physicians." *Idinsight-spring/summer*

Kearney, D. J. (2005). "*Helicobacter pylori* Infections and Iron Deficiency Anaemia: Accumulating Evidence in support of real Association". *IndiaJournal of. Gastroenterology* Vol 24 pp 147-148

Kesley, J.L., Whittemore, A.S., Evans, A.S., Thompson, W.D.,(1996). "Methods in observational Epidemiology". *Oxford University press*

Monica . C. (2000). District Laboratory Practice in Tropical Countries. *Cambridge University Press,* UK

Muhsen, KH., Barak, M., Shifnaidel, L., Nir, A., Bassal, R., Cohen, D., (2009). "*Helicobacter pylori* infection is associated with low serum ferritin levels in Israeli Arab Children; a seroepidemiologic study." *Journal Pediatric Gastroenterology and Nutrition*. Vol. 49 pp 262-264.

Peach, HG., Bath, NE., Farish, SJ., (1998). "Helicobacter pylori infection: an added stressor on Iron states of women in the community." *Medical Journal ofAustrilia*Vol. 169 pp 188-190.

Perri, F., Pastore, M., Leandro, G., Clemente, R.., Ghoost peters, M., Annese, V., Quitadamo, M., Latiano A, Rutgeerts P, Andrinilli A (1997). "*Helicobacter pylori* infection and growth delay in older children." *Archs Dis child* Vol. 77 pp 46-49.

Taye. B., Enquselassie. F., Tsegaye. A., Medhin. G., Fogarty.A., Robinson. K., Davey. G., (2015). " Effect of early and current Helicobacter pylori on the risk of anaemia in 6.5 years-old Ethiopian children." *BMC infectious diseases* Vol 15:270. https//doi.org/10.1186/s12879-015-1017-Y

Tegmeyer, N., Zabler, D., Schmidt,D.,(2009). "Importance of EGF receptor, HER2/Neu and Erk/2 kinase signaling for host cell elongation and scattering induced by the *Helicobacter pylori*CagA protein, antagonistic effects of the vacuolating cytotoxinVacA." *Cell microbiology* Vol. 11 pp 488-505.

WHO (2011). Haemoglobin concentration for the diagnosis of anaemia and assessment of severity. Vitamin and mineral nutrition information system. Geneva. WHO/NMH/MNM/11 http.//.www.who.int/vmnis/indicators/haemoglobin.pdf 12/07/2017

Windle, H.J., Kelleher, D., Crabtree, J.E., (2007). "Childhood *Helicobacter pylori* infection and growth impairment in developing countries."*Pediatrcis* Vol. 119 pp 754-759.

Yip, R., Limburg, P., Ahlquist, DA., (1998). "Pervasive occult gastrointestinal bleeding in an Alaska native population with prevalent iron deficiency." *JAMA* Vol. 277 pp 1135-1139.

Yokota, S., Konno, M., Mino, E., Sato, K., Takahashi, M., Fujii,N.,(2008). "Enhanced Fe ion-uptake activity in *Helicobacter pylori* strains isolated from patients with iron-deficiency anaemia." *Clinical infectious Diseases* Vol. 46 pp 31-33.

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Frequency of Correct Findings of Abdominal Ultrasonography Compared with CT Scan in Detection of Solid Intra-Abdominal Visceral Injuries

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Abstract
Background: Blunt abdominal trauma (BAT) is very common, the prevalence being 12–15%. Evaluation of patients with BAT is a challenge. This study aimed to compare the USG & CT with regards the frequency of correct findings in the detection of solid intra-abdominal injuries. Objectives: To determine the frequency of correct findings of abdominal ultrasonography compared with CT scan in the detection of solid intra-abdominal visceral injuries. Methods: The study was carried out at Radiology Department Nishtar Hospital, Multan & Children Hospital Multan, Pakistan, for a duration of six months with Eighty-eight patients selected using non-probability purposive sampling technique. Results: Mean age of the patients was 35.83±14.02 years. There were 75(85.2%) male and 13(14.8%) female in the present study, respectively. Ultrasonography detected abdominal injury in 49(55.7%) patients while it was detected in 59(67%) patients by computed tomography scan. Abdominal injury detected by both ultrasonography and computed tomography was 48 patients (true positive). Ultrasound sensitivity was revealed 81.36%, specificity 96.55%, diagnostic accuracy 86.36%, Positive predictive value 97.95%, and Negative predictive value 71.79%. Conclusion: CT scan is the gold standard modality for blunt abdominal trauma, whereas ultrasound can be used as the first-line modality in the patients of blunt abdominal trauma.

Keywords: Intra-Abdominal Visceral Injuries, Ultrasonography, Computed Tomography Scan

Introduction

Because of its large surface area, the abdomen is one of the most commonly injured regions of the body (Khan JS, Iqbal N, Gardezi JR, 2006). Blunt abdominal trauma (BAT) is very common, and the prevalence of intra-abdominal injury has been reported to be as high as 12–15% (Kendall JL, Kestler AM, Whitaker KT, Adkisson MM, Haukoos JS, 2011). The mechanisms resulting in abdominal injuries were motor vehicle collision (73%), motorcycle collision (7%), auto-pedestrian collision (6%), and fall (6%) or during sports (Kendall JL, Kestler

AM, Whitaker KT, Adkisson MM, Haukoos JS, 2011, GM Khan Baluch, 2001). Other likely causes are recreational or industrial etiologies.

Prevalence of intra-abdominal injuries (IAI) varies widely, ranging from 7.7% to 65% (Brown CK, Dunn KA, Wilson K, 2000). Among the most commonly injured organs that may be affected are the spleen, liver, retroperitoneum, kidneys, small bowel, bladder, colon, diaphragm, and pancreas. The frequency has been reported as the spleen (40-55%), liver (35-45%), pancreas (29%), kidneys (11%) and small bowel loops (5-10%) (Weishaupt D, Grozaj AM, Willmann JK, Roos JE, Hilfiker PR, Maricenk B, 2003).

Assessment of patients who've sustained abdominal trauma may pose a good-sized diagnostic assignment to the most seasoned trauma surgeon to decide the extent of an abdominal injury and the want for surgical intervention on the premise of clinical presentation alone (Khan JS, Iqbal N, Gardezi JR, 2006). Speedy diagnosis is essential (Richards JR, Knopf NA, Wang L, McGahan JP, 2002) and accurately prioritizing diagnostic workup and treatment is vital to ensure affected person's survival (Shafiq M, Khokhar RA, 2001) especially for people with volatile hemodynamics, the avoidance of needless surgical procedures with its invasiveness and complications must additionally be considered. The morbidity and mortality may also increase drastically in case of blunt abdominal trauma if there is any delay in early diagnosis and prompt treatment. It can result in 25–35% deaths if no longer diagnosed and treated early.

Ultrasonography (US) is taken into consideration as the number one modality of choice for assessment of intra abdominal injuries due to blunt abdominal trauma. Other diagnostic modalities consist of computed tomography (CT) and diagnostic peritoneal lavage (DPL) (Fienstein AJ, McKenney MG, Cohn SM, 2004). Plane X-ray abdomen in the supine position is highly sensitive (85%) in the detection of pneumoperitoneum, which shows gastrointestinal perforation (Sahu SK, Husain M, Sachan PK, 2008). However, radiography isn't feasible in all instances of BAT. Moreover, in pregnant women; radiation exposure might prove teratogenic (Ghaffar A, Siddiqui TS, Haider H, Khatri H, 2008).

Ultrasonography is a noninvasive, speedy, accurate, portable, rather in the inexpensive examination, serial examinations can be executed, and it can be carried out in unstable patients at some point of resuscitation. It may rapidly be done on the bedside even without interrupting resuscitation (Moriwaki Y, Sugiyama M, Toyoda H, kosuge T, Arata S, Iwashia M, 2009). Limitations of ultrasonography include its dependence on operator’s competencies, its usage in obese patients wherein it is able to be difficult for adequate evaluation of organ parenchyma and its limited ability to locate bowel and mesenteric injury (Pathan A, 2005). It is also beneficial as a preliminary rapid screening procedure in abdominal injuries for surgeon decision making during resuscitation (Naeem M, Syed A, Razwan Q, Panazai AM, Ahmed J). USG has been described as an accurate technique for the detection of hemoperitoneum in adults (Richards JR, Knopf NA, Wang L, McGahan JP, 2002). Overall, sonography has sensitivity among 71% and 88%, specificity between 92% and 97%, and is 91% to 96% accurate (Brenchley J, Walker A, Sloan JP, Hassan TB, Venables H, 2006).

In hemodynamically stable patients of blunt abdominal trauma, the diagnostic modality of choice is CT, which is considered gold standard radiographic modality having a sensitivity of 100%.

Ultrasonography is a rapidly expanding modality in our country and has been widely used in the evaluation of the abdominal trauma patients as focused abdominal sonography (Amer MS, Ashraf M, 2008). The advent of newer imaging techniques with high-resolution Computerized Tomography (CT) scanners has enabled the clinicians to exactly diagnose the extent of the intra-abdominal injuries. This study aimed to find the frequency of correct findings of ultrasonography in the detection of solid intra-abdominal injuries. This would help to establish USG as an aid in early triage of patients for speedy management decision-saving time and reducing patient mortality as well as cost.

Methods

It was a cross-sectional comparative study carried out in Radiology Department Nishtar Hospital, Multan & Children Hospital Multan, Pakistan, for six months during the period of 1st July 2018 to 31st December 2018.

Eighty-eight subjects were selected by non-probability purposive sampling on the basis of history and clinical examination. Subjects included both male and female gender, age 16-70 years. Post-operative, pregnant females were excluded. TOSHIBA XARIO (Model: SSA-660) and ALOKA SSD-3500 were used for sonography using 2.5–5.0 MHz convex probe and CT scans of the abdomen were done on spiral CT scan (Model: TOSHIBA, AQUILION, 4,16 and 64 slices taking (> 200 ml) free fluid in the peritoneal cavity as a positive finding. Descriptive statistics were calculated for the patient's age. Frequencies and percentages were calculated for gender and correct findings of USG in the detection of intra-abdominal injury. Sensitivity, specificity, diagnostic accuracy, positive and negative predictive values were calculated taking CT as the gold standard.

Results

Mean age of the patients was 35.83±14.02 years. Most frequent age group was 15–30 years having 36(40.9%) subjects. There were 29(33%) patients of the age of 31–45 years. There were 19(21.6%) subjects of the age of 46–60 years followed by 4(4.5%) subjects of the age of 61 and above as (Table No.1). There were 75(85.2%) male and 13(14.8%) female in the study, respectively (Figure No.1).

Abdominal injury detected by ultrasonography was in 49(55.7%) patients while it was in 59(67%) patients as detected by computed tomography. (Table No. 2 & 3).

Type of injury detected by ultrasound was depicted as kidney 5(10.2%), liver 15(30.6%), pancreas 10(20.4%), small bowel 3(6.1%), spleen 16(32.7%). While the type of injury as revealed by computed tomography was kidney 7(11.9%), liver 24(40.7%), pancreas 10(16.9%), small bowel 3(5.1%) and spleen 15(25.4%) as mentioned in Table No. 4 & 5.

Sonographic scans detected abdominal injuries in 17(35.4%) patients between 15–30 years, followed by 15(31.3%) patients between 31–45 years of age. There were 13(27.0%) patients in 46–60 years age group and 3(6.3%) patients having age 61 years and above (Table No. 6). Ultrasonography scans revealed 43(89.6%) males and 5(10.4%) females with abdominal trauma out of 48 trauma patients (Table No. 7).

There were 48 True positives, 1 false positive, 11 false negatives, and 28 true negative cases. This study revealed ultrasound sensitivity 81.36%, specificity 96.55%, diagnostic accuracy 86.36%, Positive predictive value 97.95%, and Negative predictive value 71.79%.

Table 1. Age Distribution of Patients Presented with Abdominal Trauma

Age (in years)	No. of Patients	Percentage (%)
15 — 30	36	40.9
31 — 45	29	33.0
46 — 60	19	21.6
61 and above	4	4.5
Total	**88**	**100.0**

Figure 1: Gender Distribution of Patients Presented with Abdominal Trauma

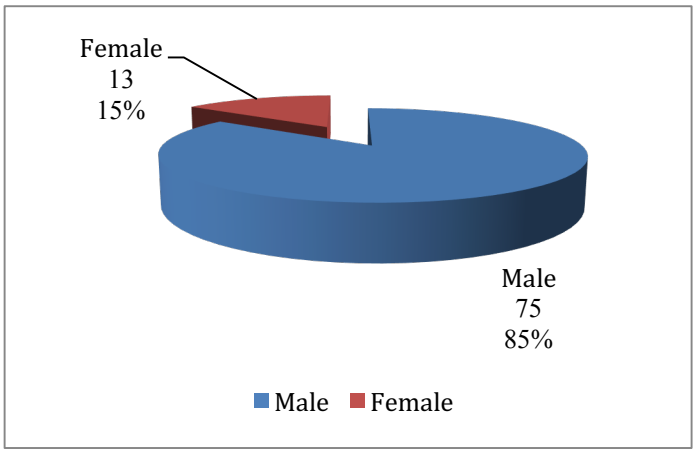

Table 2. Abdominal Injury Detected on Ultrasound in Patients Presented with Abdominal Trauma

Presence of Abdominal Injury	No. of Patients	Percentage (%)
Yes (free fluid > 200 ml)	49	55.7
No	39	44.3
Total	**88**	**100.0**

Table 3. Abdominal Injury Detected on Computed Tomography in Patients Presented with Abdominal Trauma

Presence of Abdominal Injury	No. of Patients	Percentage (%)
Yes (free fluid > 200 ml)	59	67.0
No	29	33.0
Total	**88**	**100.0**

Table 4. Types of Injury Detected in the US in Patients Presented with Abdominal Trauma

Type of Injury	No. of Patients	Percentage (%)
Kidney	5	10.2
Liver	15	30.6
Pancreas	10	20.4
Small bowel	3	6.1
Spleen	16	32.7
Other	0	0.0
Total	**49**	**100.0**

Table 5. Types of Injury Detected on Computed Tomography Scan in Patients Presented with Abdominal Trauma

Type of Injury	No. of Patients	Percentage (%)
Kidney	7	11.9
Liver	24	40.7
Pancreas	10	16.9
Small bowel	3	5.1
Spleen	15	25.4
Other	0	0.0
Total	**59**	**100.0**

Table 6. Age Distribution in Relation to Outcome on Ultrasound in Patients with Abdominal Trauma

Age (in years)	No. of Patients with Abdominal Injury (TP)	Percentage (%)
15 — 30	17	35.4
31 — 45	15	31.3
46 — 60	13	27.0
61 and above	3	6.3
Total	**48**	**100.0**

Table 7. Gender Distribution in Relation to Outcome on Ultrasound in Patients with Abdominal Trauma

Sex	No. of Patients with abdominal injury (TP)	Percentage (%)
Male	43	89.6
Female	5	10.4
Total	**48**	**100.0**

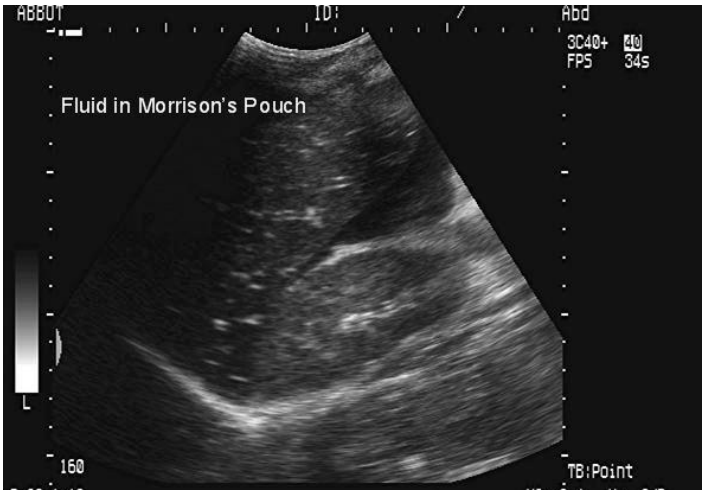

Figure 1. Blunt abdominal trauma. Free fluid in Morison pouch.

Figure 2. Blunt abdominal trauma. Free fluid in splenorenal recess.

Figure 3. Blunt abdominal trauma. CT shows right kidney injury with blood in perirenal space. The injury resulted from a high-speed motor vehicle collision.

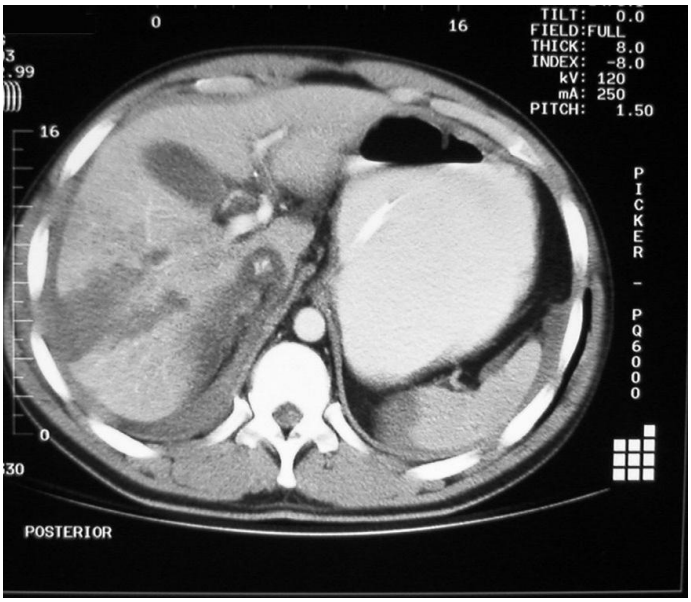

Figure 4. Tomography shows blunt abdominal trauma with a liver laceration.

Discussion

Trauma is the most common reason of death within the populace between the ages of 1 & 40 years globally. Abdominal trauma ranks third as a cause of traumatic deaths, after head and chest injuries. The majority of abdominal injuries are because of blunt trauma (Kudera JS, Aanning HL, 2004). The choice of the right approach on the proper time is vital in the treatment of patients with blunt abdominal trauma. A dependable, bedside, monetary, and rapidly performed screening test can be pivotal. Diagnosis of abdominal trauma patients possesses a clinical problem due to the reality that maximum patients have more than one organ injuries. Modifications visible within the degree of consciousness further complicate this problem. This requires the need of repeated assessment of the patient, along with a trauma screen including X-ray abdomen and chest, abdominal ultrasound (US) to see free fluid in the peritoneum (Styner JK, 2006). The use of screening sonography for abdominal trauma has had encouraging results in recent years. Sonography is a quickly performed, rapidly interpreted, noninvasive, inexpensive, and portable (or even handheld) tool. Sonography does not interfere with resuscitation efforts and, very important, will not influence subsequent CT. Emergency physicians, trauma surgeons, and radiologists can detect very small amounts of hemoperitoneum near the site of bleeding and within the dependent peritoneal spaces (Paajnen H, Lahti P, Nordback I, 1999).

The present study was designed to determine the frequency of correct findings of abdominal ultrasonography compared with CT scan in the detection of solid intra-abdominal visceral injuries. The results of the present study coincide with local and international literature. In the present study, an ultrasound revealed a sensitivity of 81.36%, specificity 96.55%, diagnostic accuracy 86.36%, Positive predictive value 97.95%, and Negative predictive value 71.79%.

In a similar study comparing USG and CT scan conducted by Mohsin et al (Mohsin N, Jesrani A, Mahmud R, Nizamani WM, Ali M, 2018), blunt abdominal trauma was diagnosed by ultrasound scan in 72 (72%) [37 males & 35 females] patients (p=0.844) and by CT scan in 74 (74%) [41 males & 33 females] patients (p=0.250). As per comparison of ultrasound findings, 68 (68%) [35 males & 33 females] patients had true positive, 22 (22%) [9 males & 13 females] had true negative diagnosis, 04 (4%) [2 males & 2 females] had false-positive diagnosis and 06 (6%) [6 males] patients had false-negative diagnosis of blunt abdominal trauma, as compared to the CT scan (p=0.084). The sensitivity of ultrasonography in the diagnosis of injuries in blunt abdominal trauma was 91.9%, specificity was 84.6%, positive predictive value was 94.4%, negative predictive value was 78.6%, and accuracy was 90% in the diagnosis of injuries in blunt abdominal trauma.

Nirav Patel et al. have reported overall sensitivity 57.48%, specificity 97.77%, positive predictive value 88.9125, negative predictive value 97.185, and accuracy of 90.75% of US in the detection of intra-abdominal injuries. CT

scan showed the highest sensitivity of 95.35%, specificity of 100%, the positive predictive value of 100%, negative predictive value 77.78% and accuracy 96% (Patel N, Domadia N, Konark, 2015).

Cheung Kent Shek et al determined diagnostic accuracy of Focused Abdominal Sonography for Trauma in blunt abdominal trauma patients and found sensitivity, specificity, positive PV, negative PV, positive LR, negative LR and accuracy of USG were 50.0%, 97.3%, 87.0%, 84.6%, 18.8, 0.51 and 85.0% respectively (Shek CK, Tai WH, Pong LL, Chi TT, Kit LGK, 2012).

Saira Hamid et al diagnostic accuracy of ultrasound of visceral injury in blunt abdominal trauma and analyzed sensitivity of ultrasound was 93.5%, specificity was 84.8%, Positive predictive value was 82.8%, Negative predictive value was 94.3% while diagnostic efficacy was 88.65% (Hamid S, Rasheed N, Rani F, 2014).

Atif Latif and Associates in a local study, evaluated the diagnostic value of USG in abdominal injuries. USG examinations were positive in 34 patients. True-positive findings were seen in 28(82.35%) of these on CT and/or laparotomy. There were two false-negative cases. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of USG in detecting intra-abdominal injury were 93.3%, 85.0%, 82.3%, 94.4%, and 88.5%, respectively (Latif A, Farooq MA, Azhar MA, 2008).

Nizamuddin Memon et al. determined the role of USG & CT scan in blunt abdominal trauma. Ultrasonography was found to be 96.97% sensitive and 100% specific in detecting haemoperitoneum, whereas it was 82.47% sensitive and 100% specific in diagnosing visceral injuries. They concluded that ultrasound and CT scan play an important role in making appropriate decision to select management option for patients with blunt abdomen trauma (BAT) and can reduce negative laparotomy rate (Memon N, Sheeba A, Memon K, 2009).

Mohapatra et al. found that abdominal ultrasonography had a sensitivity of 89%, the specificity of 100%, and accuracy of 100% in diagnosing abdominal solid visceral injuries (Mohapatra S, Pattanayak SP, Rao KRRM, 2003).

Saleh M. Al-Salamah et al. in a study at Saudi Arabia evaluated the role of ultrasonography, computed tomography, and diagnostic peritoneal lavage in abdominal trauma. Sensitivity and accuracy of all 3 examinations, DPL, USG, and CT were comparable (98%, 96%, 98% and 92%, 95%, 99%) respectively (Al-Salamah SM, Mirza SM, Ahmad SN, Khalid K, 2002).

Ravindernath ML and Reddy GM while comparing the efficacy of CT scan and ultrasound in patients with blunt abdominal trauma determined 49 patients (87.5%) were detected by ultrasound, and 7 (12.5%) were missed. However, only 1 case (1.8%) was missed by CT scan, thereby having a sensitivity of 98.2% (Ravindernath ML, Reddy GM, 2017).

The variations in results of ultrasound in these studies are due to several factors, including the examination technique and extent of sonography, the operator's experience, and the reference tool used (patient's course, diagnostic peritoneal lavage, or CT and laparotomy).

Conclusion

CT scan is the gold standard modality for blunt abdominal trauma, whereas ultrasound can be used as the first-line modality in the patients of blunt abdominal trauma.

References

Al-Salamah SM, Mirza SM, Ahmad SN, Khalid K. Role of ultrasonography, computed tomography, and diagnostic peritoneal lavage in abdominal blunt trauma. Saudi Med J. 2002;23:1350-5.

Amer MS, Ashraf M. Role of FAST and DPL in assessment of blunt abdominal trauma. Professional Med J. 2008;15:200-4.

Baluch GM. Diagnostic value of ultrasound in blunt abdominal trauma. J Surg Pakistan. 2001;6:23-5.
Brown CK, Dunn KA, Wilson K. Diagnostic evaluation of patients with blunt abdominal trauma: a decision analysis. Acad Emerg Med. 2000;7:385-96.
Brenchley J, Walker A, Sloan JP, Hassan TB, Venables H. Evaluation of focused assessment with sonography in trauma (FAST). Emerg Med J. 2006;23:446-8.
Ghaffar A, Siddiqui TS, Haider H, Khatri H. Postsurgical pneumoperitoneum – comparison of abdominal ultrasound findings with plain radiography. Journal of the College of Physicians and Surgeons Pakistan 2008;18:477-480.
Fienstein AJ, McKenney MG, Cohn SM. Evaluating an ultrasound algorithm for patients with blunt abdominal trauma. 16-18 Aug 2004. RTO-MP-HFM-109; P6-1-10.
Kendall JL, Kestler AM, Whitaker KT, Adkisson MM, Haukoos JS. Blunt abdominal trauma patients are at very low risk for intraabdominal injury after emergency department observation. West J Emerg Med 2011;12(4):496–504.
Khan JS, Iqbal N, Gardezi JR. Pattern of visceral injuries following blunt abdominal trauma in motor vehicular accidents. J Coll Physicians Surg Pak.2006;16:645-7.
Latif A, Farooq MA, Azhar MA. Diagnostic value of ultrasonography in evaluation of blunt abdominal trauma. Rawal Med J. 2008;33(2):154-8.
Kudera JS, Aanning HL. Damage control for blunt hepatic trauma: case presentation and historical review. S D J Med 2004; 57:449-53.
Mazhar Naeem, Anjum Syed, Qazi Razwan, Amin Muhammad Panazai, Jamil Ahmed. Role of Ultrasonography in blunt abdominal injury. Mother & Child 1999;37: 27-31.
Memon N, Sheeba A, Memon K. Role of ultrasonography & CT scan in blunt abdominal trauma (BAT). J Liaqat Uni Med Health Sci 2009;08:41-5.
Mohapatra S, Pattanayak SP, Rao KRRM. Options in the management of solid visceral injuries from blunt abdominal trauma. Indian J Surg 2003;65:263–8.
Mohsin N, Jesrani A, Mahmud R, Nizamani WM, Ali M. Evaluation of Injuries in Patients with Blunt Abdominal Trauma by Ultrasonography taking Computerized Tomography as Gold Standard Imaging Modality-Experience at Liaquat National Hospital. J Liaquat Uni Med Health Sci. 2018;17(01):42-6.
Moriwaki Y, Sugiyama M, Toyoda H, kosuge T, Arata S, Iwashia M, et al. Ultrasonography for the Diagnosis of Intraperitoneal Free Air In Chest-Abdominal -Pelvic Blunt Abdominal and Critical Acute Abdominal Pain. Arch Surg 2009;144: 137-41.
Nirav Patel, Niket Domadia, Konark Assessment with Sonography for Trauma (FAST) and CT scan in abdominal trauma: Radiologist's perspective. IAIM, 2015; 2(6): 123-35.
Paajnen H, Lahti P, Nordback I. Sensitivity of transabdominal ultrasonography in detection of intraperitoneal fluid in humans. Eur Radiol 1999;9:1423–5.
Pathan A. Role of ultrasound in the evaluation of blunt abdominal trauma. J Liaquat Uni Med Health Sci. 2005;4(1):23-8.
Ravindernath ML, Reddy GM. Comparison of efficacy of CT scan and ultrasound in patients with blunt abdominal trauma. Int J Adv Med 2017;4:370-4.
Richards JR, Knopf NA, Wang L, McGahan JP. Blunt abdominal trauma in children: evaluation with emergency US. Radiology 2002;222:749-54.
Sahu SK, Husain M, Sachan PK. Spontaneous Pneumoperitoneum: A Surgeon's Dilemma. The Internet Journal of Surgery 2008;15:2.
Saira Hamid, Noreen Rasheed, Fouzia Rani. Diagnostic Accuracy of Ultrasound in Detection of Visceral Injury in Blunt Abdominal Trauma. P J M H S VOL. 8 NO.4 OCT – DEC 2014. 959-62.
Shafiq M, Khokhar RA. Blunt abdominal trauma: diagnostic modalities and management. J Surg 2001;23-24:4-9.
Shek CK, Tai WH, Pong LL, Chi TT, Kit LGK. Diagnostic accuracy of FocusedAbdominal Sonography for Trauma in blunt abdominal trauma patients in a trauma centre of Hong Kong. Chin J Traumatol 2012;15(5):273-278.
Styner JK. The birth of advance trauma life support (ATLS) Surgeon. 2006;4:163-5.
Weishaupt D, Grozaj AM, Willmann JK, Roos JE, Hilfiker PR, Maricenk B. Traumatic injuries: imaging of abdominal and pelvic injuries. In: Baert AL, Gourtsoyannis N, editors. Categorical course ECR. Vienna, Australia: European Congress of Radiology; 2003. p.123-39.

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High Emotionality and Pulsional Substrate: The Transgenerational Aspect in Schizophrenia

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Abstract
Motivation behind choosing the subject: The present case is an attempt to highlight the affective dimension of a paranoid schizophrenia, ie, the presentation of a patient with a delusion of relationship as a central symptom, as well as the loss of the boundaries of the Ego, but in which the emotional nature of the experiences calls into question the differential diagnosis with affective schizophrenia. Objective: We wish to present the case from a psychiatric perspective, clinical psychology, as well as psychodynamic, this way trying to highlight one's functioning through the main defenses mechanisms used. Hypothesis: Paranoid schizophrenia can overlap high emotionality, lability, the richness of the affective life being supported by the nature of the delusional idea. Results: The patient presents psychotic functioning, in which the oedipus complex, the phantasy sexual abuse, the similarity, the narcissistic binding of the self, and the mother support the delusional idea. One can identify the loss of the boundaries of the Ego, the delusional idea of relationship, pursuit, and persecution, negative phenomenology, matched by masochistic feelings and the need to be rejected, in direct harmony with the incapacity of self-care. Conclusions: The social functioning of the patient is affected by the experience of being driven away, exhibiting self-isolation behavior, loneliness, dromomania, vagabondage, promiscuous sexual life due to mental deficiency.

Keywords: Paranoid Schizophrenia, Fantasy Sexual Abuse, High Emotionality, Masochistic Feelings, Negative Phenomenology

1. Introduction

1.1. General description of the case:

Personal information: A., female, is born in Timisoara, 27 years of age, Romanian nationality, mother of a 7-year-old boy whom she gave up for adoption when he was 6 months old, separated from the Roma father of the child, currently in a relationship with another Roma partner. She states that she worked as a waiter abroad.

Heredo – collateral history: she had primary relatives with psychiatric problems, the deceased biological mother of the patient being diagnosed with paranoid schizophrenia.

Personal history: From the patient's story at the time of admission in the presence of a psychiatrist, she claims her father sexually abused her at the age 16 (there is no evidence to prove the truth of this). She called Child Protection Services, who did not take any action, in this case, the patient claiming that the father bribed the competent legal bodies. She says that while she was a child in his care, he proposed to give her a full-body a massage, concluding that the father wanted to abuse it physically.

As a personal pathological history, we highlight her articular rheumatism arising because of her job as a waiter (done abroad) and maintained by the fact that on her return to the country, she lived on the streets, sleeping on the cement in apartment buildings. Consumption of toxic substances: the patient did not mention anything about consuming toxic substances.

1.2. Personal history

A., born in a city on the Western side of the country, is part of a disorganized family, the natural parents divorced, and she was entrusted to her father because her mother had a psychiatric history, being diagnosed with paranoid schizophrenia. No data is known about the current status of the parents. "The existence of a sick parent causes a 10 to 15% risk of childhood disease. The transmission of disease predisposition is conditioned poligenically and correlates with dopaminergic and serotoninergic neurotransmission. Another role in the person's vulnerability is maternal viral infections in the second trimester of pregnancy. It was found that an important part of those who subsequently get schizophrenia is born (in the northern hemisphere) in January-April "(Nevid, Rathus and Greene, 2014).

She states that the father began to "ruin" her childhood when she was in the second grade. The natural mother suffered a cardiac arrest from which she died. The natural father remarried, noting that at the death of the mother, the two parents were already divorced. The stepmother, according to the patient, is a rhythmic gymnastics coach.

The patient completed 10 classes. "I also know psychology, I have failed pretty much every subject"; "My head explodes as far as I know." There is an inconsistency between the patient saying that she has a lot of knowledge and her grades from school, which do not certify it. The patient confesses that she has had a hard time finishing her high school education, and she cries while recalling that the stepmother was beating her because she was not good at mathematics. Professionally, A. claims that she has been working since the age of 16 as a clothing salesperson.

Two and a half months after the divorce she went abroad to work. She spent two and a half years in Italy, two months in Austria and another few months in Cyprus and Greece. Asked by the psychiatrist if she worked in Germany, the patient completely denied it (in a strange way, suggesting an illogical construction). She worked as a waiter, the fact that she is convinced to have caused rheumatism, at the time of the talk saying she cannot work and that she will want to work as a housekeeper in the future. She says that she has worked without a contract abroad and that she is currently receiving a disability pension.

Since returning to the country she has been living on the streets, she does not keep in touch with her biological father. She feels alone, which is something that eases the appreace of an illness. She meets another Roma person with whom she is in a relationship. She claims she loves God and has no close friends. She is interested in the zodiac and thinks she can recognize the month in which one is born depending on their voice. She tells the psychiatrist that she is born in November, and when affirmatively answered, the patient says she could tell from the voice.

The future plan of the one in question is to engage as a housekeeper, continuing her relationship with her current boyfriend, whom hse met two months ago and who says, "he is like a child, he only talks stupid things, and he marvels at everything."

1.3. Case history

The first admission to psychiatry occurred when the patient was 23 years old, two and a half years ago at the time of the presentation. She motivates admission by returning to the country and not feeling alone in the house: "That is how my illness began!" She states that she has had at most four psychiatric admissions and that "she has never heard voices."

At age 16, when she was at the Child Protection Services to denounce her father for physical abuse, she was not consulted by any psychologist or psychiatrist. Then the father would have defended himself in front of Child Protection Services by saying that a doctor had told him that at the age of five, the daughter would be triggered by the mother's inherited illness. Child Protection Services have taken no action in relation to the denunciation made. This is the moment that causes the patient to split from the family (currently does not keep in touch with them).

While she was being monitored by a psychiatrist, she was prescribed Haloperidol. As the patient says, this medicine did not do well because it caused micturition difficulties. "Haloperidol is a classic neuroleptic, which works by blocking subcortical D2 dopaminergic receptors and noradrenergic α2 receptors. Among the main positive effects, we mention: reduction of productive symptomatology, diminishing psychomotor agitation, and psychotic anxiety. To break down the positive symptoms, the therapeutic algorithm proposes the administration of a one classical neuroleptic with increased potency - Haloperidol, 5-20 mg/day, along with a classic low potency neuroleptic - Clopromazina, 300-1000 mg/day (Trifu, Udangiu, and Tilea, 2013).

At a previous admission, in another psychiatric hospital, she was diagnosed with paranoid schizophrenia. She received Risperidone as a medication, which made her sick. Later, it was changed with Haloperidol and Olanzapine to relieve the negative symptoms. Diazepam was prescribed, but she does not want to take any medications with a miorelaxant effect because she believes they make her faint. The reasons for the admission show the presence of erotic delusion symptoms. According to Kay and Tasman (2006), atypical antipsychotics have been reported to be more effective than those typical for treating schizoaffective disorder. Olanzapine is more effective on psychosis, mania, and depression. "This class of atypical antipsychotics acts on all types of symptomatology: positive, negative, depressive, cognitive, without determining the extrapyramidal side effects of classical neuroleptics. Rarely, adverse reactions may occur. "(Trifu, Udangiu, and Tilea, 2013).

Case history: The current boyfriend of the patient claims that he gave her a plane ticket to her hometown and that she had refused it. He is concerned about the condition of the patient and the fact that she is angry. From what has been said, we can conclude that the lover's involvement is the emotional support A needs.

The reason for the current hospitalization: The patient was hospitalized nonvoluntarily following psychotic manifestations, mentioned both in the grounds of admission and in the examination of the present mental state.

2. Materials and methods

Initial psychological evaluation, as well as the progressive one, the structured and unstructured clinical interview, the life map, psychoanalytic psychotherapy cure, periodical psychiatric evaluation and treatment monitoring, analysis of transference and countertransference dynamics, psychoanalytic interpretations, explanatory models of psychodynamic orientation, patient reporting to his own unconscious, the analysis of his social functioning, the study of works, the transgenerational analysis, psychological monitoring and psychiatric treatment.

3. Results

3.1. Examination of the present mental state

Clothing: Neat at the time of the interview. A. lived and slept in the staircase of apartment buildings for a while. She mentions that during that period, he was the first time she was dirty. Now she likes to be clean and says the

nurses are stubborn and do not let her wash. Activities such as washing follow the negative phenomenology, the patient realizing that he has come to live on the streets without the possibility of washing, and is now compulsively trying to change this. As a treatment, Olanzapine, which she says works well, works on negative symptoms. She began to analyze the fact that washing had become a ritual. This behavior leads to regression in a symbolic sense, just like the kindergarten children who follow exactly the phrase I have to do this. By the action of washing, the one in question assures somehow that she will never live on the streets again. She finds a connection between the current moment and the childhood: "They cannot stand me sweaty and dirty"; "When I was young, I often changed my intimate lingerie and washed often."

Spatio-temporal orientation: appropriate. "Orientation is the capacity of a person to adapt or integrate into all situations of life, general or particular, in relation to time, space, and his own person. Orientation is a mental aptitude related to thinking, memory, learning, and consciousness "(Enăchescu, 2005). In other words, following the findings at the time of the clinical interview, the patient did not draw attention to an indicative dysfunction in space and time, which determines us to mark this observation as a positive aspect in the evolution of the disease.

Perception: As an affiliation with the diagnosis of affective schizophrenia, we sought to find out if A. has any kind of hallucinations or pseudohalucinations. In order to establish the existence of such a perception disorder, we make a review of the meaning of the terms. „Hallucinations - defined by Ball and H. Ey - are perceptions without an object to be perceived. " A first classification distinguishes the following types of hallucinations: psychosensory, hallucinations, psychic hallucinations. Psychic hallucinations or pseudohalucinations are defined by G. Petit as "aperceptive self-representations, characterized by incoercitivity, automatism, and exogenity" (Trifu, 2015). The patient denies the existence of perceptual disturbances in the past, but currently says she "does not hear voices, nor does she see unusual things," and "has no other disturbance on this level."

Thinking: It is disorganized, the discourse does not have a natural flow, and the weakening of logical associates can be observed - jumps from one idea to another. At the time of the consultation, the speech seems coherent, while the patient still denies hallucinations. "The degree of cognitive deficit seems to be strongly associated with the degree of severity of negative symptoms, such as disorganization. The use of atypical antipsychotics improves motor function (motor speed, reaction time), especially Olanzapine "(Kay and Tasman, 2006). During the dialogue, delusions of sexual nature (centered on intimate life) can be observed, and the patient said that she was a victim of sexual abuse by her father. She claims that "at the age of 16 he wanted to massage my bottom", the father is characterized by this as being able to persuade and manipulate: "He can deceive people." A. finds a similarity between the jealousy manifested by the father and that of the former husband.

Talking about another episode, where someone wanted to kill her in Italy by running her over with a car, she concludes that "men are envious of women, in the way they look." A. presents disguised pseudohallucinations, but consistent with delusional, paranoid convictions, delusional ideas of persecution and grandeur: "People follow me, they are curious because I am good and nice, I am not bragging"; "I'm good with psychology." Other types of delusional ideas encountered in the patient's speech: of reference ("They are watching me with the world's eyes, I am not saying I do not like it! They are all attentive to me!"), the phenomena of listening to thoughts ("I have no intimacy, they listen to everything that I speak, they stop when I pass by and listen to me! ") delusional ideas of persecution:"They bother me at work! " The delusional ideas of grandeur are not consistent with the patient's mood. Allport - "I am me, what is not me, maybe other mes, maybe, but for myself I'm non-me" - describes very well the integration of the patients' dissociated parts, some are integrated, and others are not. Pathology defies the area of thought, but it is not experienced with joy (the verbal and nonverbal levels lead to depression, there is a division between the area of emotion and thought). "The delusional ideas of persecution are common but not specific to schizophrenia. Uncommon, but with greater diagnostic value, are delusional ideas of relationship and control, as well as those of possessing (mastery) thinking. "(Gelder, Gath, and Mayou, 1994).

The patient feels disorganized, says, "I have beautiful eyes, but they look empty," which is a characteristic of psychotic eyes, a sign of schizophrenia, emphasizing the dimension of flattening. In popular interpretation, the eyes are the mirror of the soul, which causes uncertainty in the perception of personal identity in this patient's case.

Since she was hospitalized and her boyfriend is visiting, she does not like to be kissed by him because other patients and nurses are envious, considering she will be "punished" with pills. This type of prevalent interpretation is also supported by the patient's exaggerated belief in the zodiac and the search for explanations and meanings of a philosophical nature in the mythological dimension. Finding coincidences and offering hidden meanings to banalities of life (for example, interpreting the fact that she was born on the same day as her son and believing that people in Scorpio's sign have problems with the nasopharyngeal region) leads us to see a destruction of personality and at the same time the presence of an inferiority complex. Patient beliefs can be interpreted as defense mechanisms, which can protect and help to deal with their own disorganization.

Memory: There are no significant changes, but memories seem to have no coherence through a chronological prism. We can not say at the moment about the type of memory dysfunctionality, but we suspect that this chronological discrepancy in remembrance may be a kind of paramnesia. According to Kraepelin, "Paramnesia is characterized by evoked deteriorations in terms of reality from a chronological point of view. These are divided into two groups: disturbances of immediate memory synthesis, also called memory illusions and disturbances of remembrance of past or allomnesia." (Trifu, 2015). "In schizophrenia, orientation is normal. Disturbance of attention and concentration are frequent and can cause apparently evocative impairment, although memory is unaffected. Sometimes the so-called delusional memories appear. "(Gelder, Gath, and Mayou, 1994). The patient has a moderate concentration and attention deficit disorder, and the psychiatrist has to ask the same question before receiving a response repeatedly.

Affectivity: Affective flattening in regards to her parents and her own child is noticeable. She behaves as if she were not a mother. The attitude that masks the complex of inferiority leads to a defense mechanism that aims to cancel the state of fact, a mechanism that fails at the time of the consultation. "Anomalies of mood are common and consist of three main types. First, persistent abnormalities of mood, such as anxiety, depression, irritability, and euphoria. Second, a flattening in affectivity, sometimes known as affective flattening. This essentially consists of a marked and persistent emotional indifference or diminished emotional response. Third, the incongruity of affections. Here the emotion is not necessarily diminished, but it does not match the mood that would normally be expected. For example, the patient can laugh when she talks about mourning. It is often considered that this third anomaly is characteristic of schizophrenia, although many disagree with this view. "(Gelder, Gath, and Mayou, 1994). "Affective disorders are usually associated with pathological changes in the sphere of motor activity and ideative. They are extremely varied and show differences when it comes to the age of the patient. "(Enăchescu, 2005).

Interpersonal relationships: Low ability to initiate and support social engagement. The sickness was apparently caused by loneliness and the fear of abandonment: "I have no one to love me." When she returned to the country, she felt the lack of emotional support, resorted to various defense mechanisms, and built a psychotic delusional bubble. The tendency of social withdrawal has led to the development of abstract concerns, such as philosophy, astrology (recognizes the person's zodiacal sign), the attribution of exaggerated importance to signs and coincidences.

According to Kay and Tasman (2006), it is not uncommon for patients with schizophrenia to be depressed (especially patients with a history of high pre-morbid function) or indifferent, seeming to have no emotional response to a particular situation. A. does not show deficiencies in the initiative, motivation, or in terms of executive functions. She has increased interest in continuing the relationship that she is in today. She is geared towards finding a stable job as a housekeeper.

3.2. Psychological tests

Elective Luscher projection:

Desired Goals / Behavior Dictated by the Goals:

Look for a relationship that is affectionate, to give her fulfillment and happiness. She is capable of a strong emotional, but sterile enthusiasm (To mine a rey ryp !!!), more form than substance, without a finality concretized in action, enjoying a state of fact, without substance. If necessary, she is willing to adapt to make the affective connections she desires (to mimic relationships, schizotypal structure, who once learned patterns of a

relationships). She wants the same consideration and understanding on the part of others. She moves easily and quickly to anything that stimulates and activates her. She is concerned about intense things, either erotic stimulation or something else. She wants to be seen as an exciting and arousing personality that impresses and thrills others. She uses intelligent tactics to avoid jeopardizing the chances of success or to make others trust her. She performs robotically what she is told, mimes hysteria to have the attention of others.

Existing situation / Behavior dictated by the existing situation:
Engage promptly in things that enable her to stimulate or excite, activate. She transmits intense sexual fantasies. She strives to be cheerful and pleased (mimics a role in the same robotic manner). Deeply, she is not sure of herself, and she is looking for stability, emotional security and an environment that will provide her with more comfort and fewer problems, but can not and does not want to make an effort to do so.

Retained characteristics/behavior inappropriate for the existing situation:
She feels she can not do much about the problems and difficulties that exist today and that she has to deal with things as they are, in the best possible way. She senses that she does not receive what she deserves (sensitivism, sensitivity to rejection, which she projects in others and in the way she asks her father to relate to shame and to experiencing shame as well as experiencing humiliation). She feels she is not well understood and not properly appreciated. She feels compelled to conform while she does not participate emotionally in close relationships. She has reached the stage where they need to comply is a pleasure and wants to give the current boyfriend the same mechanism to function.

Characteristics repressed or loaded with anxiety / Behavior dictated by repressed characteristics:

Physiological Interpretation:
Susceptibility to external stimuli.

Psychological Interpretation:
She wants to overcome her own sense of void (emptiness) and fails to make the most of every opportunity offered to her. That's why she pursues her personal goals with a strong intensity and is ready to mimic profound participation. She feels fully competent in any field she is going to engage in, although sometimes others think she's too involved in everything. The need for control exists, using the denial mechanism: Do not believe how much I like control. She is on the paranoid side, the situation in which she lives sustains his development on the dimension of sensitivism (I am not good enough and how to make myself accept this).

The current issue, stress-induced behavior:
She wants to achieve a stable and quiet situation (after having gone through all the other desires of the type I want the symbolic phallus from my father to protect me, I got the abuse, I want the phallus from my ex-husband, I got abandonment, I want to feel accomplished by having a child, but I was forced to give it for adoption), allowing her to escape from the anxiety that prevents her from getting all the things she wants. She has structural anxiety that prevents her from heading into the situation.

She is afraid she can be stopped from doing the things she wants. This will make her use her own personal charm to convince others, hoping that it will make it easier for her to achieve her goals.

Szondi pulsion test:
s4e5d6
k1p1
h0hy0m0

Cd + pulse class: latent researchers and seekers. Rivals with anyone who has or has had success. She is ready to change love partners often, as well as the workplace; often changes her center of interest. The cause of this eternal rivalry probably resides in the hypertrophy of the primary ideal represented by the person which embodies success (perhaps one of the parents, together with k +). This eternal rivalry makes the subject unstable and unfaithful to the "object." The pulsating danger is conditioned by the lack of satisfaction of the need to

conquer the primary object. Subjects are permanently searching for the lost object. The need to cling to the primary object is spasmodic and impossible to satisfy. There is an exaggeration of the value of the lost object, the subject being tortured by its ideal image. The return of aggression to her own person, the need for tenderness cannot be satisfied. If the socialized subject has the need to conquer the object in a latent state, we have before us the "eternal rival" or the "humanized subject and willing to renounce."

d6e5s4 - debilitating decompensated asteno excitatory structure.

k1p1 - The abandoned self has taken inside it the object that caused its sadness. The abandoned (passive) dualist partner tries to get out of the awkward situation he is in, either by transforming into the Ego the object of inflationary aspirations or by having possession of it, or by searching for a new object and living in such a narcissistic prophecy to the dualistic union.

h0hy0m0 - incest, abuse, homosexual pulsion, hysterical structure.

S = +, -: passive, feminine sexuality, which abandons herself. "Artistic" perception. Ancient (Hellenistic) humanization. Humanized subjects are devoured by the inner fire of their spirit. Waiver, passivity, retreat in the past, artistic sensitivity.

h +: individual tenderness in relation to one person; the need of femininity; maternal instinct.

s-: chivalrous spirit in relation to the community; civilizational spirit; return of aggression to herself; inactivity; masochism

P = + -, -: isteriform obsession, close to panic. An Abel that lets feelings accumulate (because it does not have discharge valves). The pre-illness fobic.

e ±: ambivalence: Do I have to be an angel or a demon? Abel or Cain? Good or bad? (e +: inner censorship, ethical scruples, desire to be Abel,

e-: accumulation of brutal feelings: anger, hatred, desire for vengeance, jealousy, desire to be Cain).
hy-: shyness; repulsion to getting attention; imaginary, unreal world; severe moral censorship (of an external nature).

Sch = +, + -: The self which accepts through femininity, abandoned ego. She is fighting the feelings of abandonment, (k +), the image of the abandoning partner. The first step towards the adult Ego. Good prognosis.
k +: the ideal of possession: "Here's what I want to have!"; The self which takes a position; selfishness; egocentrism; autism; narcissism; imaging formation; introjection; formal logic; rational thinking; frequency in "bad moods" in depression.

p±: one of the tendencies rises to consciousness, the other remains unconscious;

C = +, + -: Searching for a new object, although still clinging to the old one. Infidelity in relationship, bi-objectual. Depression. Attention is directed to several directions, but it is immature.

d +: tendency towards depression (d + / k + / s-); searching for a new object; the need to purchase object values; greedyness; the tendency of rivalry; (waste);

m ±: ambivalence: do I have to detach myself or continue clinging to the old object? Crisis of connection; unlucky connection and without joy. Clinically: Appears in obsessive neurosis and depression.

3.3. Establishing the diagnosis

Paranoid schizophrenia - The patient has previously been diagnosed with this type of schizophrenia. It is worth mentioning that her mother also had the same type of mental illness. A. claims that the first hospitalization took place at the age of 23, not mentioning when she was diagnosed. Currently, she continues to have delusional ideas of persecution and delusional interpretations (paranoid), but they are not predominant. The ICD 10 Criteria for Paranoid Schizophrenia are: The presence of persecutory auditory hallucinations frequently; The existence of paranoid delusional ideas; The manifestation of a tense and cautious behavior, marked by exaggerated suspicion. There is no predominance: incoherence, weakening of associations, disorganized speech, or flattened affection.

In the present case, A. partially and tangentially fulfills these characteristics. The difference between depression (as an episode in an affective schizophrenia) and paranoid schizophrenia is that paranoid schizophrenia contaminates less in countertransference than in depression. It is possible that the part of the abuse is a fixation to the paternal image (she does not say that someone else tried to rape her, there is no evidence attached to the file). The jealousy intensifies the pathology: "I received a yellow tulip from my father," which suggests the originally planned Oedipus desire, then transformed into affective inversion, which in turn migrates to pathological incest. The patient wanted to physically separate from this relationship (by distance and choosing to go abroad) but could not separate from the psychologically.

There is also the dimension of humility ("she is submissive and docile in front of men"). Having been sent away from home, she has three possibilities: either she struggles or succeeds (resilience), or becomes a homeless person, the latter being the choice the patient made. This amplifies her anger and revolt, feelings which she has developed over time with men. Paranoid schizophrenia is characterized by a lack of initiative, which A. does not feel, as she intends to get a job and continue the relationship she has at the moment.

Affective schizophrenia - reviewing the current psychiatric, we opt for this diagnosis - given that our attention is attracted to the way the patient associates her illness with loneliness, attributing it a dispositional causality. Although studies have shown that the risk of developing affective schizophrenia is minimal, given the mother's diagnosis of the paranoid schizophrenia, we consider the depressed mood of Mrs. A. when she returned to the country, incongruent with the delusional idea of grandeur.

Fear of abandonment and loneliness depress the patient, reducing her interest and energy to stabilize psycho-emotionally. She refuses to contact the father and flattens affectionately. From what she has said, one can notice the victim-aggressor game in which A. is the injured party, and the two male figures (father and former husband) are "aggressors." It is worth noting the affective inversion directed towards the father and the attribution of pathological jealousy to him, a fact supported by the interpretation of the yellow tulips received at the wedding, as a symbol of jealousy.

The DSM 5 diagnostic criteria for schizoaffective disorder are:
A. An uninterrupted period of illness in which major dispositional episodes (major depression or anger) coexist with A criteria for schizophrenia (delirium, hallucination, disordered speech, abnormal psychomotor behavior, negative symptoms - alogia (speech poverty), (anhedonia lack of pleasure), lack of willingness to form social relationships (asociality), lack of motivation. Major depressive episodes should include criteria A1: depressive disposition.
B. Hallucinations or delirium for two or more weeks in the absence of major episodes (depressive or manic).
C. Symptoms that meet the criteria for the major disposition are present in a large proportion of the total duration of the active and residual portions of the disorder.
D. Existence of major dispositions which are not an effect of substance use (e.g., abuse of substances, drugs) or other medical conditions. On the basis of the presence of criterion C, diagnosis is differentiated between schizophrenia and schizoaffective disorder, and based on criterion B, and differentiation is made between schizoaffective disorder and depressive or bipolar disorder.

An argument in favor of criterion B is supported by the fact that when returning to the country, the patient realizes that she is alone (separated from her husband, does not keep in touch with her father, and the child was given up for adoption). This situation makes her "ill," although she reminds us that in Italy she had been

followed by known and unknown people because she is a good person ("Everyone is following me around in order to listen to me!"), the persecution and grander delirium being present ever since A. was abroad.

"A person diagnosed with the schizoaffective disorder should have an uninterrupted period of illness (diagnosis of schizophrenia) during which, at some point, he has specific symptoms for major depressive episode diagnosis, manic episode or mixed episode" (Kay and Tasman, 2006).

According to criterion C, if disposition symptoms are present for a relatively short period of time from the total duration of the active and residual phases of the disorder, the diagnosis will be schizophrenia, not the schizoaffective disorder.

In the case of schizoaffective disorder, workplace and social function are often affected, but they are not a stand-alone criterion, as with paranoid schizophrenia. The same happens with the self-care process, which in the schizoaffective disorder makes the negative symptoms less severe and less persistent than those encountered in schizophrenia. A. No apathy in the register of speech (allogony), but lack of pleasure (anhedonia) is felt. This defied the field of thought, and no action can be experienced with joy. These things mark a discrepancy between what the patient thinks and what the patient feels. Lack of desire and inability to form social relationships (asociality), along with a lack of motivation (avulia), are often associated. A. Demands the continuation of the relationship she is currently involved in and is expected to work. At present, difficulties in self-care are not present (due to treatment), this symptom not being a diagnostic criterion.

According to Carpenter et al. (1988), an additional distinction is needed in the case of negative symptoms. "The authors have noted that certain forms of social withdrawal, flat emotionality and apparent poverty of thought may, in fact, be secondary to anxiety, depression, environmental deprivation, or the effect of drugs, and these manifestations should not be labeled as negative symptoms because they have a short duration and are secondary. "(Gabbard, 2007).

"To the extent that the disease exhibits symptoms for depressive disorder and schizophrenia, theoretically one of them offers a relatively better prognosis of schizophrenia and a poorer prognosis for depressive disorder. The following variables are unfavorable to predict a prognosis of schizoaffective disorder: a poor premorbid history; an insidious debut; absence of precipitation factors; a predominance of psychotic symptoms, especially negative or deficit; debut at an early age; a non-remic cycle; family history of schizophrenia. "(Kay and Tasman, 2006).

Many patients diagnosed with affective schizophrenia are also diagnosed with mental disorders, particularly with anxiety disorders and substance abuse, and none of the two disorders are present in A.'s case (DSM 5, 2013). Affective and emotional disturbance is evident when the patient recalls when she gives her baby up for adoption: "I was not even allowed to hold my baby for the last time ...", the mechanism put in play is probably dissociation. According to Freud's theory, "schizophrenia is characterized by the dis-investment in objects" (Gabbard, 2007), whether it is aimed at withdrawing emotional investment or whether the social retreat is targeted. At the time of the consultation, A. appears as if she were not a mother. Although psychiatric diagnosis at first admission is paranoid schizophrenia, we consider that at present, the case is more structured in the area of emotional schizophrenia.

4. Discussion

4.1. Defense mechanisms

In Vaillant's view, defense processes are intended to regulate and maintain mental homeostasis. Depending on the context that requires adaptation, he classified "defenses" into 4 categories: "psychotic (delusional projection, distortion of reality and psychotic refusal); immature; neurotic or intermediate; mature "(Vaillant, 1977).

In case of patient A, we identified the following defense mechanisms: the dissociation of the representations from affections ("I was not allowed to walk my baby for the last time with the stroller"), psychotic denial (although she claims she wants to see her hometown, when he receives a flight ticket from her boyfriend, she

vehemently refuses to leave. An explanation would be that she associates her native hometown with the trauma of abuse and her accused father, which is why she secures herself using different mechanisms of circumvention). The psychotic patient's unconscious is close to "the surface," so we can easily see the Oedipus complex, the cancellation of the generation gap, the gemelarity, functionality based on the similar and identical, along with the denial of the reality of time ("I was born 300 years ago"). Sexual abuse in the childhood is fantasmatic, and the use of the projective mechanism is found. The patient's emotions are "visible," and key places are easily identified, such as "church," "jail," "being locked in a house." We note the masochistic feelings ("I wanted to be their slave"), as well as the dromomania generated by the inner tension and the unknown motivations ("I wanted to take the train, to go somewhere").

A. works on delusional interpretation and coincidence, along with childhood nostalgia. Masochist conduct is found in the use of the verbs "swear," "take advantage," "cry." The emotion of separation denied at the time of the event, returns as a boomerang with the appearance of a schizophrenic form of affection ("I was not even allowed to take my baby for a walk with the stroller. And it was the last time ...").

Currently, incestuous feelings are transformed into affective inversion, while A. lives in a laundry place inside an apartment building in a desire for self-punishment: "They chased me away, but I stayed there, I slept on concrete." Thoughts dissipate, while the whole emotional and ideological flow is disorganized. A. says, "I did not have the disease anymore, and I felt very lonely," an authentic fact both in real and in metaphorical terms. A. Fears of transmitting the transgenerational pulsation potential with a genetic impact: "Since I was 5 years old, I was told that my mother's inheritance would be triggered."

Over the years, there have been times when the patient's symptoms had a higher somatic resonance, and she experienced generalized anguish as well as periods in which she interpreted deliciously any minimal change in her inner world: "My eyes change for good, otherwise they look empty "; "They do not follow me because of the men, but because of me, others are very curious about me, watching me with the eyes of the world"; "I'm not saying I like it, because I do not have intimacy; they listen to me". She receives suggestions easily, living in an immature world with a tendency to philosophy and inclination to "learn at the college of life." One can identify the loss of the boundaries of the Ego as well as the delusional idea of relationship: "I do not feel followed, but naturally followed, that is, in my intimacy"; "The idea is that they don't follow me too much, they talk about the past."

A. raises anything ordinary to philosophical rank, the speech becoming generalized and absolute, while even the memories are disorganized. She is concerned with morality, as well as provoking envy in others and receiving her punishment. She takes everything personally, fighting for survival. She unconsciously seeks for "bruises" and "pain," while from a psychiatric point of view, negative phenomenology is very present.

She is depressed, suspicious, without criticism of the illness, with fleeing ideas and the disorganization of thought, delirious interpretation, delusional ideation of persecution. She associates emotional lability that determines in the counter transfer the experience of being impressed. On her own loneliness, she has a sexual perspective due to mental deficiency. She never received family support and has a paranoid view on it. The imaginary sexual abuse centered on the Oedipus complex pushed her to masochistic feelings in her relationship with her first husband, later in Italy and Cyprus, leaving the impression of having been sexually used. The option of spending time with gypsies seems to be a choice of sexual potency and the potential of desire.

A.'s acute need for money can be interpreted as a profound demand to know how much she is worth, which has led her to overcompensate financial issues throughout her life. The present episode occurred on the background of fatigue and inability to contain. "I remain alone" brings together the punishment with the sadness. A. has the intuition of being beautiful, as well as the intuition of attraction feelings which he generates and attracts envy. We ask ourselves in whose head the incest really is, while A. runs away from the family to repeat the survival and to realize the self-fulfilled prophecy of being schizophrenic, like her mother. The one in question did not have her father, so she linked him to herself for life, to a fixation that in return, has a void and emotional flattening of the current state. Sometimes she seems manipulative in her desire to obtain approval and affection, to have them in order to be emotionally nourished.

4.2. The diathesis-stressss model

Diathesis is loaded by the genetic vulnerability of the patient for developing schizophrenia, having a similar case in the family, her mother. Having the background of stressors (environment, biological factors, social factors), diathesis activates and leads to the expression of a clinical nature.

4.3. Conclusions and prognostic factors

The patient presents the consciousness of the disease and accepts the diagnosis of paranoid schizophrenia (diagnosis at first admission, which was subsequently preserved). She can have a good prognosis because she shows compliance with treatment on the background of a good therapeutic alliance, motivation to increase her income, and has emotional support from her boyfriend.

It seems that Olanzapine (atypical antipsychotic) has worked well in relieving negative symptoms and has acted on the ability to care, increasing the social adaptability of the patient concerned. In the case of A., psychosocial interventions would be useful to help her train her abilities and solve her conflicts.

"Patients with schizoaffective disorders have a better prognosis than those with schizophrenia of other types and less well than patients with mood disorders. Schizoaffective patients respond more frequently to lithium and have a lower probability of deterioration than patients with paranoid schizophrenia. The treatment suggested by the two psychiatrists is to administer antidepressants or anti-manic drugs as well as antipsychotics to control acute psychosis "(Kaplan and Sadock, 2001). Another view of the effectiveness of Litium in affective schizophrenia is directly proportional to the inclination of symptomatic manifestations, so that: "The more the patient's symptoms resemble that of affective disorders, the lithium is more effective" (Trifu, 2017).

References

American Psyhiatric Association. (2013), Diagnostic and Statistical Manual of Mental Disorders: DSM-5 - fifth edition, Washington DC

Enăchescu C. (2005), Tratat de Psihopatologie, Ediţia a II-a, Bucureşti, Editura Tehnică

Gabbard, G., O. (2007), Tratat de psihiatrie psihodinamică, Bucureşti, Editura Trei

Gelder M., Gath D., & Mayou R. (1994), Tratat de psihiatrie Oxford, Editura A.P.L.R., Geneva Initiative Publishers

Kaplan & Sadock. (2001), Manual de buzunar de psihiatrie clinică, ediţia a III-a , Editura Medicală

Kay, J. & Tasman, A. (2006), Essentials of Psychiatry, John Wiley & Sons. Ltd.

Nevid, J. S., Rathus, S. A. & Greene, B. (2014), Abnormal Psychology in a Changing World: Ninth Edition, Pearson Education, Inc.

Organizaţia Mondială a Sănătăţii (1998). Clasificarea ICD 10 de Clasificare a Tulburărilor Mentale şi de Comportament - simptomatologie şi diagnostic clinic, Bucureşti, Editura ALL

Trifu S., Carp, E.G., Nadoleanu, A. (2017). Alcohol as a substitute, mask of depression and "antidote" of narcissism. European Proceedings of Social and Behavioural Sciences. Vol. 31. 986-994. DOI: 10.15405/epsbs.2017.10.94

Trifu, S., Carp, E.G., Braileanu, D., Eugenia, E., Ioana, B. (2015). Sensitivism, a Hyper Sensibility Extreme, in Relation with the Confirmation Need. Procedia Social and Behavioral Sciences. Vol. 203. 405-411. DOI: 10.1016/j.sbspro.2015.08.309

Vaillant, G. E. (1977), Adaptation to life, Boston, Little, Brown

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A Rare Etiology of Muscular Mass in Infant: A Case Report

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Abstract
The frequent localization of children echinococcosis is the lungs and then the liver. The muscular involvement of hydatidosis is unusual even in endemic countries because implantations at this site require passage through the filters of the liver and lung. In addition, the intramuscular growth of cysts is hindered by the muscle's contractility and lactic acid content. We report a primary solitary intramuscular hydatid was presented to an 8-year-old boy. The diagnosis was made preoperatively with magnetic resonance imaging. Patients were treated with surgical excision and subtotal pericystectomy.

Keywords: Hydatid Cyst, Muscular Mass, Infant

1. Introduction

Hydatid disease is most commonly due to Echinococcus granulosus and may affect several organs in the body. Any tissue can be infected by the disease (Dahniya MH et al. 2001). Musculoskeletal involvement is rare even in endemic zones, with an incidence of <2.5% of all cases (Garcia-Diez AI, Ros Mendoza LH, Villacampa VM, Cozar M, Fuertes MI. 2000; Benhaddouz. H, Margi.M, Kissra. M, Benhmamouche. M.N. 2010). A preoperative diagnosis is important for proper management and to avoid the risk of recurrence.

In this report, we describe a very rare case of muscular hydatid disease in a child.

2. Case Report

An 8-year-old boy presented with a painless mass that localized in his left thigh, and which had slowly growing over a period of 2 years. His history was not relevant with trauma or septic disease. The patient lives in a rural area, and he has contact with animals.

On examination, there was a 8× 6 cm mass at the posterior region of left thigh, with soft and intact overlying skin. The mass was freely mobile with no signs of localized inflammation. The patient had a full range of motion in the ipsilateral limb. The rest of the physical examination was normal.

The inflammatory biological test was negative. The serology test for hydatid cyst was within normal limits. Ultrasound examination revealed a deep intramuscular cystic lesion with a regular wall and vascularized septa (figure 1).

Figure 1. ultrasound showing cystic mass.

The origin was not clear. Magnetic resonance images (MRI) showed an oval cystic mass developed in the left semi-tendinous muscle about 84mm*46mm in size. The cyst is seen hyperintense in T2 with a low signal intensity of the wall. The lesion contained round-shaped daughter cysts and an intracystic membranous image with a low signal in T2 (figure 2).

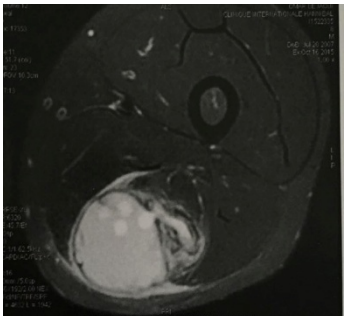

Figure 2. MRI showing the cystic lesion

MRI features were suggestive of ruptured hydatid cyst mass at the muscular body. Since the MR images were suggestive of hydatid cyst, further imaging studies were employed to detect the other sites of possible involvement. There was no other cyst in other parts of the body.

Based on the clinical and radiological finding, the patient has undergone surgery. The incision was done regarding the cyst. To reduce the risk of recurrence, the area of the incision was irrigated by a hypertonic saline solution. Then we practiced a subtotal pericystectomy preceded by aspiration and reinjection of hypertonic 3% saline. The incision was closed after inserting the suction drain. The diagnosis of a hydatid cyst was confirmed with histological examination.

Clinical, radiological, and serologic tests showed no recurrence after 4-year follow-up.

3.Discussion

Hydatid disease is a parasitic infection caused by Echinococcus granulosus. Humans are intermediate hosts in the parasite life cycle when they ingest eggs via contaminated food or water (Eckert. J, Deplazes. P. 2004; Golzari. S.E, Sokouti. M. Pericyst. 2014). In children, the most common involved sites are the liver and the lungs (Khan RA, Wahab S, Chana RS, Fareed R. 2010; Ayten Kayi Cangir et al. 2001).

Intramuscular hydatid cyst involvement is extremely rare, and there are only a few cases in children (Kerimoglu U, Kapicioglu S, Emlik D, Arazi M, Ural O. 2010). Muscular hydatidosis usually occurs as isolated lesions

without associated hepatic or pulmonary lesions. May occur primarily due to direct seeding of the oncospheres or secondarily via blood circulation (Raheef Alatassi, Saeed Koaban, Meshari Alshayie, Ismail Almogbil. 2018; Biagio M, Antonio P, Lorenzo M, Raffaele G, Angela N. 2010). In our case, there was no associated lesion.

Preoperative diagnosis is mandatory in order, especially in endemic areas, to prevent any rupture of the cyst during surgery so as to avoid anaphylactic shock and local recurrence (Hazem Al , Mohammad A, Monzer B. 2017). Primary muscular hydatid cysts are commonly asymptomatic for this the diagnosis highly dependent on imaging techniques to detect the cystic space-occupying lesion (Raheef Alatassi et al. 2018). These include X-ray radiography, taking into consideration that only 38% of patients will show soft tissue masses and calcification via X-ray radiography (Combalia, S. Sastre-Solsona. 2005; M.Y. Booz. 1993). Ultrasonography is considered the gold standard as well as the magnetic resonance imaging. MRI may show an intense rim which has been proposed as a characteristic sign of hydatid disease (Acar. A, Rodop. O, Yenilmez . E, Baylan. O, Oncül. O. 2009). Double-layer wall, daughter cysts, and water–lilly sign are the specific findings. The detachment of the germinative membrane from pericyst (water–lily sign) is considered to be pathognomonic and is reported in locations other than the liver and lung (Özgür C, Turgut A. 2015; Sanjay Marwah, Subramanian. P, Nisha Marwah, Rattan.K.N, Karwasra. R.K. 2005). In our case; hydatid cyst was determined by ultrasonography examination and MR image who objective the water-lily -sign.

Specific diagnosis of a hydatid cyst may be made by examination of fluids aspirated from the cyst. But this is not routinely recommended and should be discouraged due to the risks of leakage, spreading of the disease, and anaphylactic shock (Sanjay Marwah et al. 2005). The serologic hydatid tests are then typically used to confirm the diagnosis. Indirect immunofluorescence antibody test, ELISA, immunoelectrophoresis, and immunoblot test are the commonly used techniques but Up to 50% of cases may have a negative serology, and although specific antibodies are available, false-positive tests are common (Erol. B, Tetik. C, Altun. E, Soysal. A, Bakir. M. 2007). In our case, the serology was negative.

Complete surgical resection and medical therapy is the preferred treatment for isolated echinococcosis (Özgür C, Turgut A. 2015; Sanjay Marwah et al. 2005). Surgery can be performed either by resection of the cyst preceded by aspiration and reinjection of scoliocidal agents or by enucleation of the cyst. The surgical approach must be individualized depending on the cyst features. However the total excision of the cyst to avoid its rupture and spillage is the gold standard treatment (Raheef Alatassi et al. 2018) Percutaneous aspiration, infusion of scolicidal agents, and re-aspiration, under imaging guidance, can be used as an alternative to surgery in inoperable case (Samer Makki, Mohamed Al-Hakkak. 2018). However, this technique has not been solicited by other authors who preferred If it is impossible to excise a large cyst en bloc, the cyst has to be drained intra operatively, irrigated with a scolicidal agent such as hypertonic saline, and then excised (Erol. B et al. 2007).

Medical treatment preferably precede and follow the surgical treatment. It is used to reduce the rate of local recurrence after radical resection. Albendazole remains the gold standard drug administered in adjuvant therapy C, Turgut A. 2015; Samer Makki, Mohamed Al-Hakkak. 2018). In our case, the cyst was operated with mucinous pericystectomie without prescribing medical treatment.

4. Conclusion

Muscle hydatidosis is a very rare disease and that some sporadic cases are reported in the literature. But it should be considered in the differential diagnosis of soft-tissue tumors and cysts in regions where the disease is endemic. Imaging has an important role in diagnosis. The surgical treatment is the gold standard.

References

Dahniya MH, Hanna RM, Ashebu S, Muhtaseb SA, el-Beltagi A, Badr S, et al. (2001). The imaging appearances of hydatid disease at some unusual sites. Br J Radiol; 74: 283–89.

Garcia-Diez AI, Ros Mendoza LH, Villacampa VM, Cozar M, Fuertes MI (2000). MRI evaluation of soft tissue hydatid disease. Eur Radiol; 10:462–66.

Benhaddouz. H, Margi.M, Kissra. M, Benhmamouche. M.N(2010). Le kyste hydatique du muscle trapezius : une localisation inhabituelle. Archives de Pédiatrie; 17:263-65.

Eckert. J, Deplazes. P(2004). Biological, epidemiological, and clinical aspects of echinococcosis, a zoonosis of increasing concern. Clin. Microbiol Rev; 17:107–135.

Golzari. S.E, Sokouti. M. Pericyst(2014). The outermost layer of hydatid cyst. World J Gastroenterol; 20:1377.

Khan RA, Wahab S, Chana RS, Fareed R (2010). Isolated retroperitoneal hydatid cyst in a child: a rare cause of acute scrotal swelling. J Pediatr Surg; 45:1717–9.

Ayten Kayi Cangir, Ekber Sahin, Serkan Enon, Sevket Kavukcu, Hadi Akay, Iilker Okten, Sinasi Yavuzer(2001). Surgical Treatment of Pulmonary Hydatid Cysts in Children, Ankara, Turkey. J Pediatr Surg; 36:917-20.

Kerimoglu U, Kapicioglu S, Emlik D, Arazi M, Ural O(2010). Hydatid disease with water lily sign manifesting as a soft-tissue mass in the calf of a child. Radiology; 256:1007–10.

Raheef Alatassi, Saeed Koaban, Meshari Alshayie, Ismail Almogbil(2018). Solitary hydatid cyst in the forearm: A case report. International Journal of Surgery Case Reports; 51:419– 24.

Biagio M, Antonio P, Lorenzo M, Raffaele G, Angela N(2010). Giant primary muscular hydatid cyst with a secondary bone localization. Int J Infecti Dis; 14:192– 95.

Hazem Al, Mohammad A, Monzer B(2017). Multi-sited hydatid cystic disease with muscular involvement in a young female: A case report from Syria. Int J Surg Case Rep; 35: 73–76.

Combalia, S. Sastre-Solsona(2005). Hydatid cyst of gluteus muscle. Two cases. Review of the literature, Joint Bone Spine: Revue du Rhumatisme; 72:430–432.

M.Y. Booz(1993). The value of plain film findings in hydatid disease of bone. Clin Radiol; 47:265–268.

Acar. A, Rodop. O, Yenilmez . E, Baylan. O, Oncül. O(2009). Case report: primary localization of a hydatid cyst in the adductor Brevis muscle. Turkiye Parazitol Derg; 33:174–176.

Özgür C, Turgut A(2015). An unusual cause of mass localized on vastus lateralis muscle in childhood: Hydatid cyst. Int J Surg Case Rep; 6: 179– 81.

Sanjay Marwah, Subramanian. P, Nisha Marwah, Rattan.K.N, Karwasra. R.K(2005). Infected Primary Intramuscular Echinococcosis of Thigh. Indian J Pediatr; 72:799-800.

Erol. B, Tetik. C, Altun. E, Soysal. A, Bakir. M(2007). Hydatid Cyst Presenting as a Soft-Tissue Calf Mass in a Child. Eur J Pediatr Surg; 17:55–58.

Samer Makki, Mohamed Al-Hakkak(2018). Adductor Magnus muscle primary hydatid cyst rare unusual site: A case report. Int J Surg Case Rep; 51:379–384.

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Smoking, Wellbeing and Academic Attainment

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Abstract
The research described here examined associations between smoking, wellbeing and academic attainment of university students. Wellbeing was investigated using the Student Wellbeing Process Questionnaire (WPQ) and academic attainment was assessed using Grade Point Average (GPA) and perceptions of work efficiency. 923 university students (94 males, 829 females; approximately 10% smokers) participated in the study. Univariate analyses showed that smokers were less conscientious, had lower positive wellbeing and lower attainment scores. Smokers also reported greater exposure to stressors, more negative coping and higher negative outcome scores. When established predictors of wellbeing (positive personality; social support; exposure to stressors and negative coping) and attainment (being conscientious) were co-varied, smoking still had a significant effect on academic attainment but not the wellbeing outcomes.

Keywords: Smoking, Wellbeing, Academic Attainment

1. Introduction

Recent research on wellbeing has considered it as a process and measured it using the Wellbeing Process Questionnaire (WPQ - Williams & Smith 2012, 2016, 2018a, 2018b; Williams, Pendlebury & Smith 2017; Williams, Thomas & Smith 2017) or the Smith Wellbeing Questionnaire (SWELL – Smith & Smith 2017a, 2017b, 2017c; Fan & Smith 2017a, 2017b, 2018). Versions of these questionnaires have been developed for research with students (Williams, Pendlebury, Thomas & Smith, 2017; Alharbi & Smith, 2019; Nor & Smith, 2019) and a key feature of these measures has been that they consist of short scales which have been shown to be correlated with longer established measuring instruments. These short questionnaires have been shown to have good reliability and validity. They have been used extensively in cross-sectional research and the WPQ has also been used in longitudinal studies which provide a better indication of causality (Galvin 2016; Nelson 2017). The underlying model of wellbeing was based on occupational stress research and the development of the Demands-Resources-Individual Effects (DRIVE) model (Mark & Smith 2008, 2011, 2012, 2018a, 2018b). This model emphasised the importance of measuring potential negative characteristics such as exposure to stressors, resources that help one deal with challenges, such as control and support, and individual differences in coping style and personality. An important feature of the model was that it is relatively easy to add new variables. This has led to the study of positive outcomes, such as life satisfaction, positive affect and happiness (Smith 2011a, 2011b; Smith & Wadsworth 2011; Smith et al., 2011; Wadsworth et al., 2010). These positive outcomes are

generally referred to as wellbeing but our approach to wellbeing has been to include both positive and negative characteristics (e.g. demands, control and support), appraisals (perceived stress and life satisfaction), individual differences (e.g. positive personality and negative coping) and outcomes (anxiety/depression and happiness). Other variables that have been included in the model relate to burnout and work-life balance (Omosehin & Smith 2019), psychological contract fulfilment (Ahmad et al., 2018a, 2018b), ethnicity (Capasso et al., 2016a, 2016b, 2018; Zurlo et al., 2018), resilience, and training attitudes (Nor & Smith 2018).

One important area that needs to be included in the model relates to health-related behaviours. Sleep has been shown to be important, with day-time sleepiness predicting wellbeing and academic attainment (Howells & Smith, 2019). The aim of the present study was to examine whether smoking was associated with wellbeing and attainment outcomes when the established predictor variables were statistically controlled. There is a large literature showing that smoking is associated with lower academic attainment (e.g. Busch et al., 2017; Sabado et al., 2017; Orpinas et al., 2016; Reingle-Gonzalez et al., 2016; & Stiby et al., 2015), although it should be noted that some studies have not found this result (e.g. Radovanovic, Dimitrijevic & Jamborcic, 1983; Warburton, Wesnes & Revell, 1984). Much of the literature on smoking and wellbeing has examined mental health, with studies showing that smoking is associated with more mental health problems (e.g. Fidalgo et al., 2018; Lovell et al., 2018). Other research has focused on specific aspects of wellbeing (e.g. happiness – Stickley et al., 2015; life satisfaction – Rissanen et al., 2013) and the general conclusion has been that smoking is associated with reduced wellbeing. Indeed, low levels of wellbeing may be a factor that maintains smoking behaviour (Brook et al., 2011). A major problem with most of the previous research is that correlated attributes of wellbeing and smoking have not been controlled for. Established predictors of wellbeing include exposure to stressors, negative coping (wishful thinking, avoidance and self-blame), positive personality (self-efficacy, self-esteem and optimism) and social support. Conscientiousness is a well-established predictor of attainment. The present study initially examined univariate association between smoking and wellbeing and attainment. Following this the established predictors were co-varied to determine whether any associations with smoking were still significant.

2. Method

This study involved a survey of the well-being of university students using the Student WPQ. It was carried out with the informed consent of the volunteers and approval from the ethics committee, School of Psychology, Cardiff University. Students were asked to complete an online survey presented using Qualtrics software. They were given course credits for completing the survey.

2.1 Participants

The participants were 923 university students (94 males, 829 females; mean age: 19.25 years s.d. 2.2 years; approximately 50% in year 1 and year 2) of whom 90 were smokers. The smokers smoked an average of 3.6 cigarettes a day (range = 1-30).

2.2 Measures

The following measures were derived from the survey:

- Positive Personality (self-efficacy, self-esteem and optimism)
- Social Support
- Exposure to student stressors
- Negative coping
- Positive outcomes
- Negative outcomes
- Self-reported performance efficiency
- Self-reported course stress

Marks for coursework and exams were obtained and combined to give a grade point average (GPA).

2.3 Statistical analysis

Initial univariate analyses examined associations between smoking and the predictors of wellbeing as well as the wellbeing outcomes. Subsequent analyses examined smoking and the wellbeing and attainment outcomes while

controlling for the established predictors (positive personality, exposure to stressors, social support and negative coping).

3. Results

The initial analyses used a t-test to compare smokers on the wellbeing predictors and outcomes. The results are shown in Table 1 and there were significant effects with smokers being less conscientious, having lower positive outcome scores, lower attainment scores but higher stress, negative coping and negative outcome scores.

Table 1. Significant effects of smoking (scores are the means and s.e.s)

Variable	Smokers	Non-smokers	Significance (p value)
Conscientiousness	6.03 (0.18)	6.76 (0.06)	$p < 0.001$
Positive personality	18.37 (0.43)	19.06 (0.15)	n.s.
Negative coping	19.25 (0.50)	17.10 (0.16)	$p < 0.001$
Social support	32.90 (0.69)	33.75 (0.19)	n.s.
Stressors	38.20 (1.05)	34.95 (0.33)	$p < 0.005$
Negative outcomes	21.9 (0.71)	19.73 (0.23)	$p < 0.005$
Positive outcomes	18.75 (0.38)	19.70 (0.12)	$p < 0.05$
Course stress	7.00 (0.17)	7.00 (0.06)	n.s.
Work efficiency	5.10 (0.21)	6.17 (0.06)	$p < 0.001$
GPA (%)	60.40 (1.03)	63.10 (0.24)	$p < 0.05$

The next analysis involved a MANOVA with smoking as the independent variable, positive personality, social support, stressors, negative coping and conscientiousness as the covariates, and negative outcomes, positive outcomes, course stress, work efficiency and GPA as the dependent variables. The only significant effects of smoking were for GPA and work efficiency (see Table 2).

Table 2. Significant effects of smoking after adjustment of established predictors (adjusted means and s.e.s)

Variable	Smokers	Non-Smokers	Significance
GPA (%)	61.14 (0.76)	63.02 (0.25)	$p< 0.02$
Work efficiency	5.43 (0.19)	6.13 (0.06)	$p <0.001$

4. Discussion

The univariate results from the present study showed that smoking was associated with reduced wellbeing and poorer academic performance. However, smoking was also associated with established predictors of negative wellbeing (exposure to stressors and negative coping) and attainment (conscientiousness). When these variables were co-varied the effects of smoking on wellbeing were no longer significant. However, the association between smoking and GPA and working efficiency were still significant. These results demonstrate the importance of conducting multi-variate analyses and controlling for confounders. One limitation of the study was that it was cross-sectional and future research should be longitudinal, preferably with a smoking cessation intervention. Another limitation is that the present study does not inform on the underlying mechanisms linking smoking and poorer academic attainment. These mechanisms could take several forms. First, there are toxicological mechanisms related to inhalation of tobacco smoke that could influence the brain and behaviour. Nicotine withdrawal during periods of assessment may also reduce performance. Finally, there may other characteristics of smoking that have not been measured here that can account for the poor academic performance. Future research should address the underlying mechanisms and use a multi-variate longitudinal approach to assess the benefits of smoking cessation. There is also a need to examine other health-related behaviours as negative ones rarely occur in isolation and there is a need to examine combined effects of risk factors.

References

Ahmad, M. I., Firman, K., Smith, H., & Smith, A. P. (2018a). Short measures of organisational commitment, citizenship behaviour and other employee attitudes and behaviours: associations with well-being. *BMIJ, 6*(3), 516-550. https://doi.org/10.15295/bmij.v6i3.391

Ahmad, M. I., Firman, K., Smith, H., & Smith, A. P. (2018b). Psychological contract fulfilment and well-being. *Advances in Social Sciences Research Journal, 5*(12), 90-101. https://doi.org/10.14738/assrj.512.5758

Alharbi, E., & Smith, A. P. (2019). Studying-away strategies: A three-wave longitudinal study of the wellbeing of international students in the United Kingdom. *The European Educational Researcher, 2*(1), 59-77. https://doi.org/10.10.31757/euer.215

Brook, D. W., Rubenstone, E., Zhang, C., Morojele, N. K., & Brook, J. S. (2011). Environmental stressors, low well-being, smoking and alcohol use among South African adolescents. *Social Science & Medicine, 72*(9), 1447-1453. https://doi.org/10.1016/j.socscimed.2011.02.041

Busch, V., Laninga-Wijnen, L., Petrus Schrijvers, A. J., & De Leeuw, J. R. J. (2017). Associations of health behaviors, school performance and psychosocial problems in adolescents in The Netherlands. *Health Promotion International, 32*(2), 280-291. https://doi.org/10.1093/heapro/dav058

Capasso, R., Zurlo, M. C., & Smith, A. P. (2016a). Ethnicity, work-related stress and subjective reports of health by migrant workers: a multi-dimensional model. *Ethnicity and Health, 23*(2), 174-193. https://doi.org/10.1080/13557858.2016.1258041

Capasso, R., Zurlo, M. C., & Smith, A. P. (2016b). Ethnicity and work-related stress in Eastern European care workers for the elderly: an application of a proposed multi-dimensional model. *Diversity and Equality in Health and Care, 13*(2), 197-205. https://doi.org/10.21767/2049-5471.100052

Capasso, R., Zurlo, M. C., & Smith, A. P. (2018). Stress in factory workers in Italy: an application of the Ethnicity and work-related stress model in Moroccan factory workers. *Psychology and Developing Societies, 30*(2), 1-34. https://doi.org/10.1177/0971333618783397

Fan, J., & Smith, A. P. (2017a). Positive well-being and work-life balance among UK railway staff. *Open Journal of Social Sciences, 5*, 1-6. https://doi.org/10.4236/jss.2017.56001

Fan, J., & Smith, A. P. (2017b). The impact of workload and fatigue on performance. In L. Longo & M.C. Leva (Eds.), *Human Mental Workload: Models and Applications*. H-WORKLOAD 2017. Communications in Computer and Information Science (Vol. 726, pp. 90-105), Cham: Springer. https://doi.org/10.1007/978-3-319-61061-0_6

Fan, J., & Smith, A .P. (2018). The mediating effect of fatigue on work-life balance and positive well-being in railway staff. *Open Journal of Social Sciences, 6*, 1-10. https://doi.org/10.4236/jss.2018.66001

Fidalgo, T. M., Sanchez, Z. M., Caetano, S. C., Maia, L. O., Carlini, E. A., & Martins, S. S. (2016). The association of psychiatric symptomology with patterns of alcohol, tobacco, and marijuana use among Brazilian high school students. *The American Journal of Addictions, 25*(5), 416-425. https://doi.org/10.1111/ajad.12407

Galvin, J. (2016). *A multi-method approach to researching stress and mental health in two groups of healthcare students: nursing students and trainee clinical psychologists*. (PhD Thesis, Cardiff University, Cardiff). Retrieved from: http://orca.cf.ac.uk/98616

Lovell, M. E., Bruno, R., Johnston, J., Matthews, A., McGregor, I., Allsop, D. J., & Lintzeris, N. (2018). Cognitive, physical, and mental health outcomes between long-term cannabis and tobacco users. *Addictive Behaviors, 79*, 178-188. https://doi.org/10.1016/j.addbeh.2017.12.009

Mark, G. M., & Smith, A .P. (2008), Stress models: A review and suggested new direction. In J. Houdmont & S. Leka (Eds.), *Occupational health ssychology: European perspectives on research, education and practice* (pp. 111-144), Nottingham: Nottingham University Press.

Mark, G., & Smith, A. P. (2011). Effects of occupational stress, job characteristics, coping and attributional style on the mental health and job satisfaction of university employees. *Anxiety, Stress and Coping, 25*, 63-78. https://doi.org/10.1080/10615806.2010.548088

Mark, G., & Smith, A. P. (2012). Occupational stress, job characteristics, coping and mental health of nurses. *British Journal of Health Psychology, 17*, 505-521. https://doi.org/10.1111/j.2044-8287.2011.02051.x

Mark, G., & Smith, A. P. (2018a). A qualitative study of stress in university staff. *Advances in Social Sciences Research Journal, 5*(2), 238-247. https://doi.org/10.14738/assrj.52.4195

Mark, G., & Smith, A. P. (2018b). Coping and its relation to gender, anxiety, depression, fatigue, cognitive difficulties and somatic symptoms. *Journal of Education, Society and Behavioral Science, 25*(4), 1-22. https://doi.org/10.9734/jesbs/2018/41894

Nelson, K. (2017), Behind the frontlines: occupational stress and well-being in Jamaican police officers. (PhD Thesis, Cardiff University, Cardiff). Retrieved from: http://orca.cf.ac.uk/99877/

Nor, N. I. Z., & Smith, A. P. (2018). Attitudes to training and its relation to the well-being of workers. *Journal of Education, Society and Behavioural Science, 27*(2), 1-19. https://doi.org/10.9734/jesbs/2018/44445

Nor, N. I. Z., & Smith, A. P. (2019). Psychosocial characteristics, training attitudes and well-being of students: A longitudinal study. *Journal of Education, Society and Behavioral Science, 29*(1), 1-26. https://doi.org/10.9734/JESBS/2019/v29i130100

Omosehin, O., & Smith, A. P. (2019). Adding new variables to the Well-being Process Questionnaire (WPQ) – Further studies of workers and students. *Journal of Education, Society and Behavioral Science, 28*(3), 1-19. https://doi.org/10.9734/jesbs/2018/45535

Orpinas, P., Lacy, B., Nahapetyan, L., Dube, S. R., & Song, X. (2016). Cigarette smoking trajectories from sixth to twelfth grade: Associated substance us and high school dropout. *Nicotine & Tobacco Research, 18*(2), 156-162. https://doi.org/10.1093/ntr/ntv040

Radovanovic, Z., Eric, L., Dimitrijevic, L., & Jamborcic, V. (1983). Cigarette smoking among first-year medical students in Yugoslavia and their academic success. *Journal of American College Health, 31*(6), 253-255. https://doi.org/10.1080/07448481.1983.9939569

Reingle Gonzalez, J. M., Salas-Wright, C. P., Connell, N. M., Jetelina, K. K., Clipper, S. J., & Businelle, M. S. (2016). The long-term effects of school dropout and GED attainment on substance use disorders. *Drug and Alcohol Dependence, 158*, 60-66. https://doi.org/10.1016/j.drugalcdep.2015.11.002

Rissanen, T., Lehto, S. M., Hintikka, J., Honkalampi, K., Saharinen, T., Viinamaki, H., & Koivumaa-Honkanen, H. (2013). Biological and other health related correlates of long-term life dissatisfaction burden. *BMC Psychiatry, 13*, ArtID 202. https://doi.org/10.1186/1471-244x-13-202

Sabado, M. D., Haynie, D., Gilman, S. E., Simons-Morton, B., & Choi, K. (2017). High school cigarette smoking and post-secondary education enrollment: longitudinal findings from the NEXT Generation Health Study. *Preventive Medicine, 105*, 250-256. https://doi.org/10.1016/j.ypmed.2017.09.025

Smith, A. P. (2011a). A holistic approach to stress and well-being. *Occupational Health (At Work), 7*(4), 34-35.

Smith, A. P. (2011b). A holistic approach to stress and well-being. Part 2: Stress at work: models, practice and policy. *Occupational Health (At Work), 8*(1), 33-35.

Smith, A. P., & Smith, H. N. (2017a). An international survey of the wellbeing of employees in the business process outsourcing industry. *Psychology, 8*(1), 160-167. https://doi.org/10.4236/psych.2017.81010

Smith, A. P., & Smith, H. N. (2017b). Workload, fatigue and performance in the rail industry. In L. Longo & M. C. Leva (Eds.), *Human Mental Workload: Models and Applications*. H-WORKLOAD 2017. Communications in Computer and Information Science (Vol. 726, pp. 251-263), Cham: Springer. https://doi.org/10.1007/978-3-319-61061-0_17

Smith, A. P., & Smith, H. N. (2017c). A short questionnaire to measure wellbeing at work (Short-SWELL) and to examine the interaction between the employee and organisation. In R. Charles & J. Wilkinson (Eds.), *Contemporary Ergonomics and Human Factors 2017* (pp. 200-205). Chartered Institute of Ergonomics and Human Factors.

Smith, A. P., & Wadsworth, E. (2011). A holistic approach to stress and well-being. Part 5: what is a good job?, *Occupational Health (At Work), 8*(4): 25-27.

Smith, A. P., Wadsworth, E. J. K., Chaplin, K., Allen, P. H. and Mark, G. (2011). *The relationship between work/well-being and improved health and well-being*. Leicester: IOSH.

Stiby, A. I., Hickman, M., Munafo, M. R., Heron, J., Yip, V. L., & Macleod, J. (2015). Adolescent cannabis and tobacco use and educational outcomes at age 16: Birth cohort study. *Addiction, 110*(4), 658-668. https://doi.org/10.1111/add.12827

Stickley, A., Koyanagi, A., Roberts, B., Leinsalu, M., Goryakin, Y., & McKee, M. (2015). Smoking status, nicotine dependence and happiness in nine countries of the former Soviet Union. *Tobacco Control: An International Journal, 24*(2), 190-197. https://doi.org/10.1136/tobaccocontrol-2014-052092

Wadsworth, E. J. K., Chaplin, K., Allen, P. H., & Smith, A. P. (2010). What is a Good Job? Current Perspectives on Work and Improved Health and Well-being. *The Open Health & Safety Journal, 2*, 9-15. https://doi.org/10.2174/1876216601002010009

Warburton, D. M., Wesnes, K., & Revell, A. (1984). Smoking and academic performance. *Current Psychological Research & Reviews, 3*(3), 25-31. https://doi.org/10.1007/bf02686521

Williams, G. M., & Smith, A. P. (2012). A holistic approach to stress and well-being. Part 6: The Wellbeing Process Questionnaire (WPQ Short Form). *Occupational Health (At Work), 9*(1), 29-31.

Williams, G. M., & Smith, A. P. (2016). Using single-item measures to examine the relationships between work, personality, and well-being in the workplace. *Psychology: Special Edition on Positive Psychology, 7*, 753-767. https://doi.org/10.4236/psych.2016.76078

Williams, G. M., & Smith, A. P. (2018a). A longitudinal study of the well-being of students using the student well-being questionnaire (WPQ). *Journal of Education, Society and Behavioral Science, 24*(4), 1-6. https://doi.org/10.9734/jesbs/2018/40105

Williams, G. M., & Smith, A. P. (2018b), Diagnostic validity of the anxiety and depression questions from the Well-Being Process Questionnaire. *Journal of Clinical and Translational Research, 10*. https://doi.org/10.18053/jctres.04.201802.001

Williams, G. M., & Smith, A .P. (2018c). A practical method of predicting wellbeing at work: the Wellbeing Process Tool. *Advances in Social Sciences Research Journal, 5*(2), 86-93. https://doi.org/10.14738/assrj.52.4158

Williams, G., Pendlebury, H., Thomas, K., & Smith, A. P. (2017). The student wellbeing process questionnaire (Student WPQ). *Psychology, 8*, 1748-1761 https://doi.org/10.4236/psych.2017.811115

Williams, G., Pendlebury, H., & Smith, A. P. (2017). Stress and well-being of nurses: An Investigation using the Demands-Resources- Individual Effects (DRIVE) model and Well-being Process Questionnaire (WPQ). *Jacobs Journal of Depression and Anxiety, 1*, 1-8.

Williams, G., Thomas, K., & Smith, A. P. (2017). Stress and well-being of university staff: An investigation using the Demands-Resources- Individual Effects (DRIVE) model and Well-being Process Questionnaire (WPQ). *Psychology, 8*, 1919-1940. https://doi.org/10.4236/psych.2017.812124

Zurlo, M. C., Vallone, F., & Smith, A. P. (2018). Effects of individual differences and job characteristics on the psychological health of Italian nurses. *Europe's Journal of Psychology, 14*(1), 159-175. https://doi.org/10.5964/ejop.v14i1.1478

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No Clear Link with Diet and AMI: A Case - Control Study of Risk Factors of Acute Myocardial Infarction Patients in Trinidad

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Abstract
Objectives: Dietary risk factors are considered a major determinant of coronary artery disease. However, dietary components resulting in IHD have been mixed and inconsistent. The aim of this study was to determine traditional and dietary risks for acute myocardial infarction. Methodology: This case control study was conducted at a public health care institute. Confirmed AMI cases were matched against hospitalised age and sex matched non-IHD patients. Data collected from face to face interviews were analysed using SPSS version 21. Descriptive and analytic analyses comprising Pearson's chi squared test of association and conditional logistic regression were conducted. Results: Traditional risk factors such as ischemic heart disease, previous heart attack, diabetes mellitus, hypercholesterolemia, family history of IHD, hypertension, obesity and higher waist circumference increased the odds of AMI. Exercising (less than 4 times a week), alcohol use (frequently) and smoking (frequently) showed significant associations. Overall, there was no association with diet and AMI. However, there were associations identified in certain subgroups with respect to diet and AMI. Predictors of AMI overall were ischemic heart disease, previous heart attack and hypercholesterolemia. Indo-Trinidadians who exercised less than 4 times per week and males who ate less than 3 servings per week had an increased likelihood of having an MI (1.908 times and twice as likely respectively) to have an AMI. Conclusion: Overall, there is no association of diet and AMI. Traditional risk factors still largely determine AMI.

Keywords: AMI, Diet, Risks Factors, Sugar, Vegetables, Fats and Oil

Introduction

Traditional risks factors such as diabetes mellitus, hypertension, hypercholesterolemia, obesity, smoking, family history of IHD have contributed significantly to coronary artery disease (CAD). These have been widely and consistently reported. Dietary impact on CAD, however, resulted in inconsistent results over the decades

(Dehghan et al., 2017; Ahmad et al., 2018; Fung et al., 2009; American College of Cardiology, 2015). The widely accepted Mediterranean diet study and the diet recommended by the PURE study reports contrasting opinions on high fat diets. PURE study (Dehghan et al., 2017) reports no significant association between total fat, saturated and unsaturated fats with risk of myocardial infarction or cardiovascular disease (CVD) mortality, whereas the American Heart Association reports that, a reduction in dietary saturated fat, which is replaced by polyunsaturated and monounsaturated fats is significantly associated with lower CVD rates and mortality (Sacks et al., 2017).

Uncertainty remains as to what is the best diet for prevention of CAD, though a diet that is low in sugar and fat and high in vegetables and fruits is commonly accepted. Limitations of methodology or in obtaining an acceptable measure for diet to reflect the impact on atherosclerosis are extremely challenging. Few studies in the Caribbean have been attempted to determine the association and predictors of dietary components and CAD. CAD in the Caribbean and Latin America is expected to increase by more than 60% between 2000 and 2020, if preventative measures are not implemented (Barcelo, 2006). The aim of this study was to determine traditional and dietary risk factors for acute myocardial infarction (AMI) among patients in public health care institutions in Trinidad using a case – control type study design. A study of this type will assist in the management of ischemic heart disease patients. It will identify the gaps in dietary care and will guide health care providers and policy makers in refocusing their strategies to our local Trinidad and Tobago population.

Methods

This case-control study was conducted among AMI and controls at the San Fernando General Hospital (SFGH). The San Fernando General Hospital is one of the four hospitals providing tertiary care in Trinidad and Tobago. It is a public, 745-bed facility that serves half the population of Trinidad or approximately 600000 people. Annually, there are 46 785 admissions including 15 339 medical admissions (2010) (Ministry of Health, 2012). The incidence of AMI is 90.6 per 100 000 (Bahall, 2013). AMI cases were matched by age and gender with controls (non-CAD) recruited from a sample of 600 non-CAD patients in at least a ratio of 1:1. Suspected cases of AMI were obtained by checking the admission discharge registration books of the cardiac/medical wards. Confirmed AMI cases identified using the AMI criteria (Zimmerman et al., 1999) were approached by a research assistant and given a brief description of the study and asked whether they were willing to participate. The controls were selected from relatively healthy individuals with minor ailments and conditions who were admitted to any ward of the hospital; the majority coming from the medical wards. Consenting patients were recruited for the study in either the AMI or control group if the inclusion and exclusion criteria were met (Figure 1).

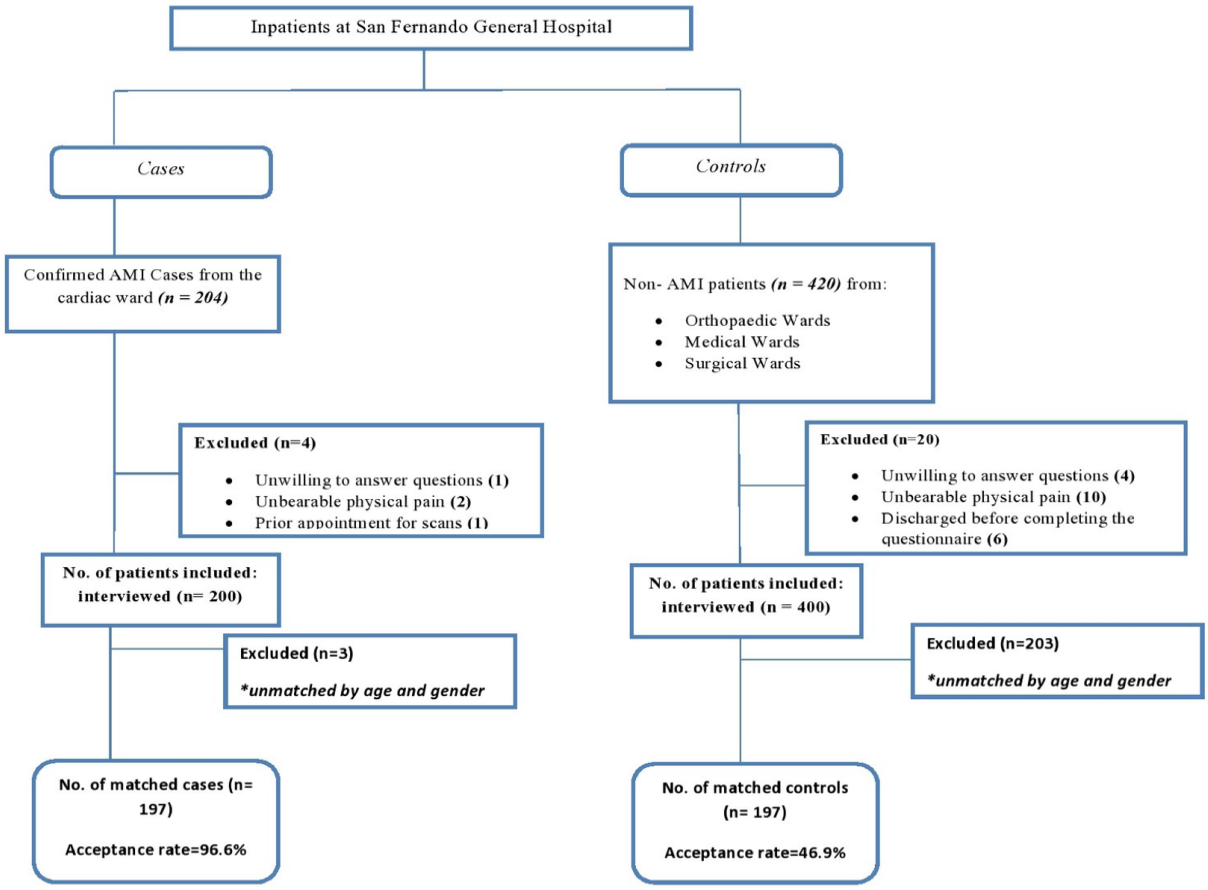

Figure 1. Selection of cases and controls

In keeping with the criteria of Rastogi et al. (2004) inclusion criteria consisted of adults aged over 21 years, who gave their consent and were able to communicate for at least 20 minutes. Patients were excluded if they were unable to communicate due to unbearable physical pain, being discharged before they could complete the questionnaire and whether they suffered from illnesses such as cancer, end stage renal disease, a recent viral infection, liver failure or any condition that would have impacted on their dietary intake. Following consent, face to face interviews was conducted on recruited cases using an 88-item questionnaire comprising of demographic data on age, sex, ethnicity, marital status, employment status, monthly income level, height, weight, waist circumference/ hip circumference, (9 questions); past medical history on ischemic heart disease, previous heart attack, diabetes mellitus, hypertension, renal insufficiency, family history of heart disease, hypercholesterolemia, smoking, alcohol and obesity(10 questions); lifestyle practices on exercise, alcohol, smoking, vitamins and alternative medicines (15 questions); dietary practices on fruits and vegetables, fats and oils, starch and carbohydrates, and sugars and salts, consumption of sugary foods, processed meats, added salts, seasoning, water, snacks, drinks, fruits, vegetables, fats/oils and dairy products (24 questions); eating habits and the frequency of consumption of snacks, drinks, fruits, vegetables, fats/oils and dairy products (16 questions). Mini demonstrations in the form of illustrations were used to show patients portions so they can be aware of the amount they eat, as well as to standardise different patient responses. Patients were asked specific questions and disclosed their dietary intake before admission to hospital. This included the type and frequency of food intake and in some cases, their content. Certain data were obtained from patient records such as weight, height and waist circumference and if unavailable, was done by the research assistant.

Data and Statistical analysis

Data was collected and entered in a secured database using SPSS version 21 which was accessible to the researchers and assistants. Descriptive and analytic analyses were made. Controls were compared with AMI cases using t tests for continuous variables, and chi squared tests for categorical variables. The Pearson's chi

square test was used to determine the existence of associations between risk factors and group status (MI/ Control). The chi square test of homogeneity was used to determine if differences existed between MI and control subjects on selected demographic variables. Logistic regression was used to determine the likelihood of MI based on significant risk factors determined by the Chi squared test.

Results

Section A

By the end of the data collection period, 197 confirmed AMI were selected, and 197 controls (acceptance rate – 96.6% and 46.9% respectfully).

Table 1: Demographic data of respondents

Variable	**Cases (AMI)**	**Control(non-AMI)**	**p-value**
Age	n=197	n=197	1.0
21-30	3 (1.5%)	3 (1.5%)	
31-40	13 (6.6%)	13 (6.6%)	
41-50	35 (17.8%)	35 (17.8%)	
51-60	44 (22.3%)	44 (22.3%)	
Over 60 years	102 (51.8%)	102 (51.8%)	
	n=197	n=197	
Sex			1.0
Male	118 (59.9%)	118 (59.9%)	
Female	79 (40.1%)	79 (40.1%)	
	n=197	n=196	
Ethnicity			0.101
African	16 (8.1%)	31(15.7%)	
Indian	163 (82.7%)	146 (74.1%)	
Mixed	18 (9.1%)	17(8.6%)	
Other	0 (0.0%)	2 (1.0%)	
	n=194	n=196	
Marital status			.002**
Single	24 (12.2%)	54 (27.4%)	
Married	115 (58.4%)	99 (50.3%)	
Divorced/Separated	7 (3.6%)	12 (6.1%)	
Common Law	14 (7.1%)	6 (3.0%)	
Widowed	33 (16.8%)	25 (12.6%)	
Other	1 (0.5%)	0 (0.0%)	
	n=192	n=191	
Employment Status			0.473
Employed	53 (26.9%)	63(32.0%)	
Unemployed	125(63.4%)	113(57.4%)	
Self-employed	14 (7.1%)	15(7.6%)	
	n=190	n=130	
Monthly Income Level			0.154
Under TT$ 2,660.00	51 (25.8%)	43(21.9%)	
TT$ 3,000.00- $5,000.00	101(51.2%)	58(29.4%	
TT$ 5,500.00-$8,000.00	20 (10.2%)	8 (4.1%)	
TT$ 8,500.00 - $10,000.00	10 (5.1%)	12 (6.1%)	
Over TT$10,000.00	8 (4.1%)	9 (4.6%)	

*Significant at alpha = 0.05 ** Significant at alpha = 0.01

There were no significant differences between cases and controls by sex, age, ethnicity, and employment status or monthly income level. Respondents were primarily males (AMI: 59.9%; non-AMI: 59.9%; overall: 59.9%),

Indo-Trinidadians (AMI: 82.7%; non-AMI: 74.1%; overall: 78.4%) and were aged >60 years (AMI: 51.8%; non-AMI: 51.8%; overall: 51.8%) (Table 1).

Diet and AMI

About 40.9% ate fruits and 56.1% ate vegetables more than 3 to 4 times per week. No associations were found between the frequencies of eating fruits ($X^2 = 4.196$, p = 0.241), vegetables ($X^2 = 4.082$, p = 0.395), using fat/oil when cooking at home ($X^2 = 0.635$, p = 0.888) and frequency of eating fried foods away from home ($X^2 = 3.726$, p = 0.293). However, the only significant association was found between frequency of eating food that is fried at home and group status ($X^2 = 15.867$, p < 0.01). Sugar consumption was similar for both MI and Control group participants with no significant difference. However, the usage of sugar was higher in the control group. This is seen for added sugar (for control group, mean = 1.10 tsp/day compared to 0.90 tsp/day among cases) and soft drink/ artificially flavored drinks (control group, mean = 0.90 days/week compared to 0.68 days/week among cases). Significant differences were noted in the consumption of soft drink/ artificially flavored drinks (p= 0.030) in favor of the control group. No significant difference was found in the frequency in consumption of sugar coated breakfast cereals (p = 0.117) or consumption of cakes, sweets, chocolates, biscuits (p = 0.172).

Traditional risk factors

Table 2: Comparison of risk factors for MI and control groups

Risk factor	**MI**	**Control**	**p-value**	**OR (95% CI)**
Ischemic heart disease (n = 60)	57 (28.9%)	3 (1.6%)	0.000	25.786 (7.913, 84.028)
Previous heart attack (n = 112)	85 (43.4%)	27(13.8%)	0.000	4.765 (2.905, 7.816)
Diabetes Mellitus (n = 171)	107 (54.3%)	64 (33.0%)	.000	2.415 (1.603, 3.639)
Hypertension (n = 194)	117 (59.7%)	77(39.7%)	.000	2.250 (1.501, 3.375)
Renal Insufficiency (n = 45)	28 (14.4%)	17(8.9%)	.098	1.706 (0.901, 3.233)
Family history of heart disease (n = 189)	118 (59.9%)	71(36.4%)	.000	2.609 (1.735, 3.922)
Hypercholesterolemia (n = 128)	93(47.7%)	35(18.2%)	0.000	4.090 (2.577, 6.490)
Smoking (n = 89)	42(21.3%)	47(24.1%)	.511	0.853 (0.532, 1.370)
Alcohol (n = 116)	55(27.9%)	61(31.3%)	.466	0.851 (0.551, 1.313)
Obesity (n = 56)	20 (10.3%)	36(18.6%)	0.021	0.504 (0.280, 0.908)

Note: Percentages calculated based on sample size for MI and Control.

Significant differences between MI and control subjects exist for ischemic heart disease, previous heart attack, diabetes mellitus, hypertension, family history of heart disease, hypercholesterolemia and obesity but not smoking and alcohol consumption (Table 2).

Table 3: Comparison of weight, waist circumference and hip circumference for MI and control samples

	MI			Control			t	p-value
Weight (lbs)	Mean = 169.65	SD = 41.030	n = 157	Mean = 159.30	SD = 35.059	n = 180	2.497	0.098
Waist circumference (inches)	Mean = 36.16	SD = 4.934	n = 174	Mean = 35.21	SD = 4.405	n = 173	1.874	0.004
Hip circumference (inches)	Mean = 39.3935	SD = 13.07469	n = 153	Mean = 37.8333	SD = 5.12847	n = 162	1.408	0.060

The mean waist circumference was significantly higher among AMI cases than the control group. No significant differences were found in weight and hip circumference (Table 3). Among males who reported their waist circumference (n = 223), 83.9% were considered 'Low' and 16.1% were considered 'High'. Among females who reported their waist circumference (n = 123), 43.1% and 56.9% of respondents were considered 'Low' and 'High', respectively.

Exercising (greater than or less than 4 times a week (p = 0.000), alcohol use (hardly ever or frequently (p = 0.000) and smoking (hardly ever or frequently (p = 0.000) were significantly associated with AMI. Persons who reported that they frequently smoked were 1.170 times more likely to have an MI than persons who hardly ever or never smoked.

Section B – Sub group analysis

Table 4: Significant associations based on demographic and lifestyle factors

Demographic group	Lifestyle factor	MI	Control	X^2	p-value
Males	*Vegetable consumption (n = 221)*			5.688	0.017*
	Less than 3	64	79		
	More than 3	48	30		
Females	*Consumption of fried foods at home (n = 81)*			4.307	0.038*
	Less than 4	31	47		
	More than 4	3	0		
Females	*Alcohol consumption (n =155)*			4.053	0.044*
	Hardly ever/never	77	74		
	Frequently	0	4		
More than 50 years old age group	*Consumption of fried foods at home (n = 179)*			10.600	0.001**
	Less than 4	71	100		
	More than 4	8	0		
Indo-Trinidadian	*Exercise (n = 307)*			6.364	0.012*
	Less than 4	108	114		
	More than 4	55	30		
Indo-Trinidadian	*Fruit consumption (n = 308)*			4.764	0.029*
	Less than 3	88	96		
	More than 3	75	49		

Afro-Trinidadian	*Fruit consumption (n =47)*			7.855	0.005**
	Less than 3	14	14		
	More than 3	2	17		

Subgroup analysis identified associations between lifestyle factors and CAD (Table 4). Among males, a significant association was found between vegetable consumption and group status (n = 221, X^2 = 5.688, p = 0.017). Among females, there was a significant association between eating fried foods at home and group status (n = 81, X^2 = 4.307, p = 0.038), and between alcohol consumption and group status (n = 155, X^2 = 4.053, p = 0.044). Among Indo-Trinidadians, significant associations were found between exercise and group status (n = 307, X^2 = 6.364, p = 0.012); and fruit consumption and group status (n = 308, X^2 = 4.764, p = 0.029). Among Afro-Trinidadians, a significant association was found between fruit consumption and group status (n = 47, X^2 = 7.855, p = 0.005). Among persons more than 50 years of age, a significant association was found between fat consumption and group status (n = 179, X^2 =10.600, p = 0.001) (Table 4).

Section C – Predictors of AMI

Table 5: Result of logistic regression for traditional risk factors

Risk factor	**B**	**S.E**	**Wald**	**p-value**	**Exp (B) (95% CI)**
Ischemic heart disease	2.650	.652	16.527	.000	14.150 (3.944, 50.767)
Previous heart attack	1.163	.311	14.021	.000	3.199 (1.741, 5.880)
Diabetes Mellitus	.184	.275	.449	.503	1.202 (.701, 2.062)
Hypertension	.101	.276	.133	.715	1.106 (.644, 1.899)
Family history of heart disease	1.133	.253	20.084	.000	3.105 (1.892, 5.097)
Hypercholesterolemia	1.020	.286	20.084	.000	2.773 (1.583, 4.858)
Obesity	-.931	.385	5.839	.016	.394 (.185, .839)

Logistic regression was used to determine the likelihood of AMI. Factors which were found to be significantly associated with AMI were IHD, previous heart attack, family history of heart disease, hypercholesterolemia and obesity (Table 5).The regression model for traditional risk factors was statistically significant while the regression model for dietary factors was not statistically significant.

The results for traditional risk factors are reported in Table 5. The regression model used explained 32.6% of the variance in MI (Nagelkerke R^2 = .326) and correctly classified 71.5% of cases. Ischemic heart disease, previous heart attack, family history of heart disease, hypercholesterolemia and obesity increased the likelihood of AMI by 14.150, 3.199, 3.105, 2.773 and 0.394 respectfully. However, diabetes mellitus and hypertension were not found to significantly affect the likelihood of MI (Table 5).

Table 6: Lifestyle among sub-groups

Demographic group	**Lifestyle factor**	**B**	**S.E**	**Wald**	**p-value**	**Exp (B)**
Males	Vegetable consumption	0.681	0.287	5.618	0.018	1.975 (0.381, 1.448)
Indo-Trinidadians	Exercise	0.660	0.264	6.267	0.012	1.935 (1.154, 3.245)

Subgroup analysis, revealed otherwise. Indo-Trinidadians who exercised less than 4 times per week had an increased likelihood of having an MI (1.908 times) than those who exercised more than 4 times per week). Males who consume less than 3 servings per week were nearly twice as likely to have an AMI (Table 6).

Discussion

This study reveals significant associations with traditional risk factors and lifestyles factors in selected subgroups, and AMI. Traditional risk factors for CAD remain as consistent risks for CAD. The odds of developing an AMI were higher among IHD patients, previous AMI, hypercholesterolemia, followed by diabetes and hypertension. This is in keeping with other studies (V. Rao, P. Rao, Carvalho, 2014; Saleheen & Frossard, 2004). Waist circumference was significantly higher among the AMI group than in the control group as was found in other studies (Siddiqui, Gulati, Tauheed , Pervez, 2014). However, there was no statistical difference with respect to weight although the mean weight was higher in the AMI group. While obesity is a known risk factor, it has also been identified as having a protective effect, often referred to as "obesity paradox" in other studies (Wang, M. Yang, Zhu, Zhang, Shao, 2014; Bechlioulis et al., 2013).

AMI patients compared to non-AMI patients or the control group gave varying results compared to other studies with respect to lifestyles. There was no difference in the frequency of smoking, exercising and alcohol usage for both groups. This contrasts with the findings of Teo et al. (2006) who found the prevalence of smoking to be 45.2% (AMI cases) and 26.8% (controls) and daily exercise was 14.3% (AMI cases) and 19.3% (controls). Smoking, excess alcohol and sedentary lifestyle leads to increased risk of CAD (American Heart Association, 2018). The lack of difference may imply the overall similarity in lifestyle between groups or under-reporting of lifestyles practices in AMI patients.

Diet: fruits and vegetables

Fruits and vegetables un-expectantly had no association unlike other studies (Guo et al., 2013). This may be related to the lack of use of significant amounts of fruits and vegetables required to make this change. The study reveals 42.6% of MI patients and 39.1% of controls report consuming fruits greater than 3 times per week. Regular or daily consumption of fruit is necessary to make meaningful changes to CAD (Saita, Kondo, Momiyama, 2014). In general fruits and vegetables are associated with a lower risk of AMI (Iqbal et al., 2008). The lack of consistency in this finding in all subgroups reflects other confounding factors or limitations resulting from this methodology. This contrasts with studies done by Dauchet, Amouyel, Hercberg and Dallongeville (2006) which reveal that the consumption of fruits and vegetables is inversely associated with the risk of CHD. In their study, it was observed that the risk of CHD decreased by 4% [RR (95% Cl): 0.96 (0.93-0.99), P= 0.0001] for each additional portion per day of fruit and vegetable intake and by 7% [0.93 (0.89-0.96), P<0.0001] for fruit intake. Liu et al. (2000) also found that higher fruit and vegetable intake was associated with a lower risk of MI, with an adjusted RR of 0.62 for extreme quintiles (95% Cl: 0.37, 1.04; P for trend = 0/07). In this study, vegetable servings of less than 3/week is associated with an increased prevalence of AMI (OR: 1.975). Vegetables are helpful in protecting patients from coronary disease. (Liu et al., 2000). Several studies alluded to the decreased prevalence among vegetable users. In a study by Joshipura et al., (2001) it was found that each 1-serving/d increase in the intake of fruits or vegetables was associated with a 4% lower risk for coronary heart disease (relative risk, 0.96 [Cl, 0.94 to 0.99]; P =0.01, test for trend). Green leafy vegetables (relative risk with 1-serving/d increase, 0.77 [Cl, 0.64 to 0.93]), and vitamin C-rich fruits and vegetables (relative risk with 1-serving/d increase, 0.94 [Cl, 0.88 to 0.99]) had the highest contribution to the apparent protective effect of total fruit and vegetable intake. Bazzano et al., (2002) concluded that there was an inverse association of fruit and vegetable intake with the risk of cardiovascular disease in the US population. The study found that consuming fruit and vegetables >3 times/d was associated with a 27% lower stroke incidence, a 24% lower ischemic heart disease mortality, a 27% lower cardiovascular disease mortality and a 15% lower all-cause mortality after adjustment for established cardiovascular disease risk factors. The protective effect may result from a number of mechanisms such as anti-inflammatory benefits (Johnston, 2009). The blood pressure-lowering effect of potassium is a major mechanism which may contribute to a reduction in CHD risk with an increased fruit and vegetable consumption, because they are rich sources of potassium (He, Nowson, Lucas, MacGregor, 2007; Appel et al., 1997). Fruits and vegetables contain high levels of folate which is a determinant of plasma

homocysteine level and many studies link high plasma homocysteine levels with CHD risk. Folate lowers plasma homocysteine levels and may reduce the risk of CHD (Wald, Law, Morris, 2002).

Diet: Sugars

There are no significant differences in usage between MI and control groups, although the mean use of sugars was higher in the control group. One study showed that MI patients consumed a slightly higher intake of sugar in their hot drinks, and had a slightly higher consumption of refined sugars overall in comparison to control patients. However, the differences seen were not statically significant (Burns-Coxt, Dollt, Ball, 1969). The lack of significant differences in the use of sugars may reflect the population eating habits are the same. The average daily requirement for sugar according to the ACC is 150 calories per day (37.5 grams or 9 teaspoons) for men and 100 calories per day (25 grams or 6 teaspoons) for women (Heart.org, 2018). Sugars are being recognised as independent risk factors for inflammation and CAD development (Q. Yang et al., 2014). Sugars are commonly used as added sugars, sugar coated breakfast, artificially flavoured drinks, chocolate biscuits etc. However, Rippe and Angelopoulos (2016) concluded that singling out added sugars as unique culprits for diseases like cardiovascular disease appears inconsistent with modern evidence. While added sugars should be consumed in moderation, the reduction in diet without other reductions of caloric sources wouldn't yield any significant benefit. However, a number of studies have identified sugar as a major cardiovascular risk, where a significant relationship has been identified between sugar consumption and increasing CVD mortality risk (Q. Yang et al., 2014; Yudkin, 1986). Trinidad and Tobago's sugar consumption per capita reached 51.6 kg in 2013 (HelgiLibrary, n.d. -a). Chocolate, carbonated, drinks, candy, cakes, ice cream, snow cones, and traditional sweets like sugar cake, barfi, kurma etc. are some examples of sugars consumed on a regular basis. Trinidad and Tobago was found to have the highest average consumption of sugar sweetened beverages (SSBs) at 2.5 servings/day (95%UI: 1.5, 4.0) across 187 countries (Singh et al., 2015). Trinidad and Tobago's centrifugal sugar human domestic consumption in 1990 was 62 (1000MT) and in 2017, it increased to 75 (1000MT) (Indexmundi, n.d.). The contribution of carbohydrates in total dietary consumption for Trinidad and Tobago from 1990-2002 was 66% and from 2015-2007, it was 65% (ChartsBin, n.d. -a).

Diet: fat

There were no significant differences in terms of cooking with oil and eating fried food at home or outside the home. No differences were found in use of fats and oil except the use of fried food which is more common among the AMI group. There is a greater association with the use of fried food consumption at home in the AMI group. There is however, no association with fat use and AMI. The recent PURE study found no association and this emphasis on reducing fat to reduce AMI may not be appropriate (Dehghan et al., 2017). The PURE study reports that total fat and types of fat were not associated with cardiovascular disease, myocardial infarction, or cardiovascular disease mortality (Dehghan et al., 2017). Similarly, another study suggested that the association between saturated fat intake and non-fatal myocardial infarction may be non-existent among women (Kim, 2016). This contrast with other findings, where Zong et al., (2016) found that increased dietary intakes of major saturated fatty acids does have an association with an increased risk of CHD. One study found an association between consuming hydrogenated fats and full-fat yoghurt with a higher risk (OR = 2.12 (1.23-3.64) and 2.35 (1.32-4.18), respectively (Amani, Noorizadeh, Rahmanian, Afzali, Haghighizadeh, 2010). Trinidad and Tobago's dietary fat consumption was 70g/person/day between 1990-1992, 71g/person/day between 1995-1997, 75g/person/day between 2000-2002 and 76g/person/day between 2005-2007 (ChartsBin , n.d. -b). Total animal fat consumption reached 5.07 kilotons in 2013 in Trinidad and Tobago (HelgiLibrary, n.d. -b). WHO recommends that total fat shouldn't exceed 30% of total energy, (World Health Organization, n.d.) which means that Trinidad and Tobago's fat intake lies at the upper end of WHO recommendations.

Limitations

This is a single centre study with a catchment that is relatively poor and predominantly Indo - Trinidadian. Extrapolation may not be reasonable in developed countries. There is difficulty in documenting data because of recall problems and reproducible responses. Patients' rely on recall of their dietary practices and consumption patterns over the last 3 months can be very challenging. Disclosure of frequency may be a challenge because of

wide variation in doses. To avoid changes in quantity, patients were demonstrated the size of various portions so they can be aware of the amount they eat as well as to standardise different patient responses.

The methodology for diet is challenging because diet taken at the time of study, is a snapshot of an individual's overall diet at that point in time, which doesn't fully reflect their food consumption pattern over years whose cumulative impact determines the extent of CAD and the development of AMI.

Conclusion

Traditional risk factors are still the most reliable associations and predictors of CAD. Dietary factors though important has produced inconsistent results as was found in the literature. No associations were found with vegetables and fruits, added sugar and fatty food products. However subgroup analysis identified males and vegetable consumption; females and fat; females and alcohol consumption; more than 50 years of age and fat consumption; Indo-Trinidadian and exercise; Indo-Trinidadian and fruit consumption and Afro-Trinidadian and fruit consumption as associated factors. However, predictors of AMI were males who consumed less than 3 servings of vegetables and Indo-Trinidadians who exercised less than 4 times per week. More novel markers are needed to identify cumulative use of different types of diet to determine the contribution to CAD.

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References

Ahmad , S., Moorthy, M. V., Demler, O. V., Hu, F. B., Ridker, P. M., Chasman, D. I. (2018). Assessment of Risk Factors and Biomarkers Associated With Risk of Cardiovascular Disease Among Women Consuming a Mediterranean Diet. *JAMA Netw Open, 1.* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6324327/

Amani, R., Noorizadeh, M., Rahmanian, S., Afzali, N., Haghighizadeh, M. H. (2010). Nutritional Related Cardiovascular Risk Factors in Patients with Coronary Artery Disease in IRAN: A case-control study. *Nutrition Journal 9*, 70. https://nutritionj.biomedcentral.com/track/pdf/10.1186/1475-2891-9-70

American College of Cardiology. (2015). *Mediterranean Diet cuts Heart Disease Risk by Nearly Half.* Retrieved from: www.sciencedaily.com/releases/2015/03/150304190222.htm

American Heart Association. Coronary Artery Disease - Coronary Heart Disease. (n.d.) Retrieved from: http://www.heart.org/HEARTORG/Conditions/More/MyHeartandStrokeNews/Coronary-Artery-Disease---Coronary-Heart-Disease_UCM_436416_Article.jsp#.Wz-jldVKiM8

Appel, L, J., Moore, T. J., Obarzanek, E., Vollmer, W. M., Svetkey, L. P., Sacks, F. M., … Karanja N. (1997). A Clinical Trial of The Effects of Dietary Patterns on Blood Pressure. DASH Collaborative Research Group. *N Engl J Med, 336,* 1117–1124. http://www.nejm.org/doi/pdf/10.1056/NEJM199704173361601

Bahall M. Epidemology of Acute Myocardial Infarction in South Trinidad. (2013). *WIMJ* Open, 3, 1-6. Doi:10.7727/wimjopen.2013.215.

Barcelo, A. Cardiovascular diseases in Latin America and the Caribbean. (2006). *Lancet,* 368: 625–6. DOI:10.1016/S0140-6736(06)69223- 4.

Bazzano, L., He, J., Ogden, L., Loria, C., Vupputuri, S., Myers, L., … Whelton, P. K. (2002). Fruit and Vegetable Intake and Risk of Cardiovascular Disease in US adults: The First National Health and Nutrition Examination Survey Epidemiologic Follow-up Study. *The American Journal of Clinical Nutrition, 76,* 93-9. http://realhealthanswers.com/docs/Journal-Articles/MiscFruit/TheAmericanJournalofClinicalNutrition-FruitandCardioDisease2.pdf

Bechlioulis, A., Vakalis, K., Naka, K. K., Bourantas, C. V., Papamichael, N. D., Kotsia, A., … Michalis, L. K.. (2013). Paradoxical Protective Effect of Central Obesity in Patients with Suspected Stable Coronary Artery Disease. *Obesity (Silver Spring), 21,* 314-21. https://www.ncbi.nlm.nih.gov/pubmed/23592684

Burns-Coxt, C. J., Dollt, R., Ball, K. P. (1969). Sugar Intake and Myocardial Infarction Brit. *Heart, 31*. https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC487524&blobtype=pdf

ChartsBin. (n. d. -a). Contribution of carbohydrates in total dietary consumption.Retrieved from: http://chartsbin.com/view/1154

ChartsBin. (n. d.-b). Daily fat intake per capita. Retrieved from: http://chartsbin.com/view/1156

Dauchet, L., Amouyel, P., Hercberg, S., Dallongeville, J. (2006). Fruit and Vegetable Consumption and Risk of Coronary Heart Disease: A Meta-Analysis of Cohort Studies. *The Journal of Nutrition, 136*. http://jn.nutrition.org/content/136/10/2588.full

Dehghan, D., Mente, A., Zhang, X., Swaminathan, S., Li, W., Mohan, V., …Yusuf, S. (2017). Associations of Fats and Carbohydrate Intake with Cardiovascular Disease and Mortality in 18 Countries from Five Continents (PURE): A Prospective Cohort Study. *Lancet. 390,* 2050–62. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32252-3/abstract

Fung, T. T., Rexrode, K. M., Mantzoros , C. S., Manson , J. E., Willett, W. C., Hu, F. B. (2009). Mediterranean Diet and Incidence of and Mortality From Coronary Heart Disease and Stroke in Women. *Circulation,* 119:1093–1100. https://doi.org/10.1161/CIRCULATIONAHA.108.816736Circulation. https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.108.816736

Guo, J., Li, W., Wang, Y., Chen, T., Teo, K., Liu, L. S., … Yusuf, S. (2013). Influence of Dietary Patterns on the Risk of Acute Myocardial Infarction in China population: The INTERHEART China Study. *Chin Med J (Engl), 126,* 464-70. https://www.ncbi.nlm.nih.gov/pubmed/23422108

He, F., Nowson, C., Lucas, M., MacGregor, G. (2007). Increased Consumption of Fruit and Vegetables is related to a Reduced Risk of Coronary Heart Disease: Meta-analysis of Cohort Studies. *Journal of Human Hypertension , 21,* 717-728. https://www.ncbi.nlm.nih.gov/pubmed/17443205

Heart.org . (n. d.). Added sugars. Retrieved from: http://www.heart.org/HEARTORG/HealthyLiving/HealthyEating/Nutrition/Added-Sugars_UCM_305858_Article.jsp#.WcZ_q7KGOM8

HelgiLibrary (n. d. -a). Sugar consumption per capita in Trinidad and Tobago. Helgilibrary.com. Retrieved from: http://www.helgilibrary.com/indicators/sugar-consumption-per-capita/trinidad-and-tobago/

HelgiLibrary. (n. d. -b). Animal fat consumption (total) in Trinidad and Tobago [Internet]. Helgilibrary.com. Retrieved from: http://www.helgilibrary.com/indicators/animal-fat-consumption-total/trinidad-and-tobago/

Indexmundi . (n. d.). Trinidad and Tobago centrifugal sugar human domestic consumption by year (1000 MT). Indexmundi.com. Retrieved from: https://www.indexmundi.com/agriculture/?country=tt&commodity=centrifugal-sugar&graph=human-domestic-consumption

Iqbal, R., Anand, S., Ounpuu, S., Islam, S., Zhang, X., Rangarajan, S., … Yusuf, S. (2008). Dietary Patterns and the Risk of Acute Myocardial Infarction in 52 Countries Results of the INTERHEART Study. Circulation. http://circ.ahajournals.org/content/118/19/1929

Johnston, C. (2009). Functional Foods as Modifiers of Cardiovascular Disease. *American Journal of Lifestyle Medicine, 3,* 39S-43S. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2847297/pdf/nihms134930.pdf

Joshipura, K., Hu, F., Manson, J., Stampfer, M., Rimm, E., Speizer, F., … Willett, W. C. (2001). The Effect of Fruit and Vegetable Intake on Risk for Coronary Heart Disease. *Ann Intern Med, 134,* 1106-1114. https://www.researchgate.net/profile/Kaumudi_Joshipura/publication/11928111_The_Effect_of_Fruit_and_Vegetable_Intake_on_Risk_for_Coronary_Heart_Disease/links/55808bb408ae47061e5f32fe/The-Effect-of-Fruit-and-Vegetable-Intake-on-Risk-for-Coronary-Heart-Disease.pdf

Kim, J. I. (2016). Saturated Fatty Acid Intakes and the Risk of Myocardial Infarction in Women: A Prospective Cohort. https://www.google.com/search?q=Saturated+fatty+acid+intakes+and+the+risk+of+myocardial+infarction+in+women%3A+a+prospective+cohort+Jung+Im%2C+Kim&rlz=1C1VFKB_enTT650TT650&oq=Saturated+fatty+acid+intakes+and+the+risk+of+myocardial++infarction+in+women%3A+a+prospective+cohort++Jung+Im%2C+Kim&aqs=chrome..69i57&sourceid=chrome&ie=UTF-8

Liu, S., Manson, J., Lee, I., Cole, S., Hennekens, C., Willett, W., … Buringet, J. E. (2000). Fruit and Vegetable Intake and Risk of Cardiovascular Disease: The Women's Health Study. *The American Journal of Clinical Nutrition, 72.* http://ajcn.nutrition.org/content/72/4/922.full

Ministry of Health. (2012).Trinidad. Utilisation Report of the Medical Records Department. South West Regional Health Authority.

Rao, V., Rao, P., Carvalho, N. (2014). Risk factors for Acute Myocardial Infarction in Coastal Region of India: A Case-control Study. *Heart India 2,* 70-5. http://www.heartindia.net/text.asp?2014/2/3/70/140229

Rastogi, T., Reddy, K. S., Vaz, M., Spiegelman, D., Prabhakaran, D., Willett, W. C., … Ascherio, A. (2004). Diet and Risk of Ischemic Heart Disease in India. *Am J Clin Nutr 79,* 582–92. https://www.ncbi.nlm.nih.gov/pubmed/15051601

Rippe, J., Angelopoulos, T. (2016). Relationship between Added Sugars Consumption and Chronic Disease Risk Factors: Current Understanding. *Nutrients, 8,* 697. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5133084/pdf/nutrients-08-00697.pdf

Sacks, F. M., Lichtenstein, A. H., Wu, J. H. Y. (2017). Dietary Fats and Cardiovascular Disease: A Presidential Advisory. *The American Heart Association* , *136*, e1–e23. https://doi.org/10.1161/CIR.0000000000000510Circulation. https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000510

Saita, E., Kondo, K., Momiyama, Y. (2014). Anti-Inflammatory Diet for Atherosclerosis and Coronary Artery Disease: Antioxidant Foods. *Clin Med Insights Cardiol, 8,* 61–65. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4519361/

Saleheen, D., Frossard, P. CAD risk factors and acute myocardial infarction in Pakistan. *Acta Cardiol, 59,* 417-24. https://www.ncbi.nlm.nih.gov/pubmed/15368804

Siddiqui, A. H., Gulati, R., Tauheed, N., Pervez, A. (2014). Correlation of Waist-to-hip Ratio (WHR) and Oxidative Stress in Patients of Acute Myocardial Infarction (AMI). *Journal of Clinical and Diagnostic Research 8,* 4-7. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3939583/pdf/jcdr-8-4.pdf

Singh, G., Micha, R., Khatibzadeh, S., Shi, P., Lim, S., Andrews, K., … Mozaffarian, D. (2015). Global, Regional, and National Consumption of Sugar-Sweetened Beverages, Fruit Juices, and Milk: A Systematic Assessment of Beverage Intake in 187 Countries. PLOS ONE, 10. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4526649/

Teo, K. K., Ounpuu, S., Hawken, S., Pandey, M.R., Valentin, V., Hunt, D., …Yusuf, S. Tobacco use and risk of myocardial infarction in 52 countries in the INTERHEART study: a case-control study. (2006). *Lancet, 368,* 647–58. https://www.ncbi.nlm.nih.gov/pubmed/16920470

Wald, D. S., Law, M., Morris, J. K. (2002). Homocysteine and Cardiovascular Disease: Evidence on Causality from a Meta-analysis. *BMJ, 325, 1202–1206.* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC135491/pdf/1202.pdf

Wang, J., Yang, Y. M., Zhu, J., Zhang, H., Shao, X. H. Obesity Paradox in Patients with Atrial Fibrillation and Heart Failure. (2014). *Int J Cardiol, 176,* 1356-8. https://www.ncbi.nlm.nih.gov/pubmed/25129300

World Health Organization. (n. d.). Healthy diet. Retrieved from: http://www.who.int/mediacentre/factsheets/fs394/en/

Yang, Q., Zhang, Z., Gregg, E., Flanders, W., Merritt, R., Hu, F. (2014). Added Sugar Intake and Cardiovascular Diseases Mortality Among US Adults. *JAMA Internal Medicine, 174,* 516. http://jamanetwork.com/journals/jamainternalmedicine/fullarticle/1819573

Yudkin, J. (1986). Pure, white and deadly. http://www.teethforlife.co.za/images/Pure,%20White%20and%20Deadly%20-%20%20John%20Yudkin.pdf

Zimmerman, J., Fromm, R., Meyer, D., Boudreaux, A., Wun, C. C., Smalling, R., … Roberts, R. Diagnostic Marker Cooperative Study for the Diagnosis of Myocardial Infarction. (1999). *Circulation, 99,* 1671-7.

Zong, G., Li, Y., Wanders, A. J., Alssema, M., Zock, P. L., Willett, W. C., … Sun, Q. (2016). Intake of Individual Saturated Fatty Acids and Risk of Coronary Heart Disease in US Men and Women: Two Prospective Longitudinal Cohort Studies. *BMJ, 355*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5121105/

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Health-Related Quality of Life of Dentists in Public Dental Healthcare in Brazil

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Abstract
This cross-section study aimed to evaluate the health-related quality of life in 230 dentists working in public dental healthcare service in Bahia, Brazil. The 36-Item Short Form Health Survey and a questionnaire were used covering work and socio-demographic information. Descriptive and multiple linear regression analysis were performed. Dentists had higher scores in Vitality (51,49) and Physical Functioning (51,35) domains; lower scores in General Health (43,25) and Social Functioning (47,78). Better Physical Component Summary was associated with Post-graduation in Public Health, absence of children, greater autonomy in work and contribution of work to the society, patients' access to the service and relationship with the patients ($P<0.05$). Higher scores in Mental Component Summary were associated with white ethnicity, absence of children and satisfaction with the relationship with patients, self-evaluation of work, and courses and training offered ($P<0.05$). The results alerts to the importance of work environment in personal life and occupational health.

Keywords: Quality of Life, Occupational Health, Dentists

Introduction

In Brazil, the first National Conference of workers health, in 1986 set workers health as: decent living conditions; full employment; stable and well-paid work; opportunity of leisure; autonomy and representation; access to health services; among others. More recently, the Ministry of Health established the National Worker Health Policy, which sets the strategy of actions of the unified health system (SUS).

In dentistry, several policies were formulated and contributed strongly to the growth of the dental category in the public healthcare. The inclusion of Oral health teams in the family health program in 2000, and the National Oral health Policy, in 2004, promoted new job opportunities for dental professionals, the expansion and reorganization of the Basic Attention Healthcare and the insertion of Specialized Attention in public assistance,

with changes in traditional practices carried - among them: population subscription; completeness of reference and joint assistance; cross-reference to medium and high complexity services; humanization of care; multidisciplinary approach; stimulation of health promoting actions, social participation and professional´s permanent education.

The effectiveness of this new form of care has as challenge the fact that the oral health team have received an education focused on biological issues, and healing techniques, with little emphasis on socioeconomic and psychological factors of the health-disease process, which hinders the achievement of relevant practices to the strategy, such as home visits and meetings with the spanning community for the development of prevention and promotion of health.

In addition, work in the public sector faced many problemn, such as: low wages; several types of employment relationship; infrastructure conditions and lack of intersectional initiatives to develop actions in the health sector itself that can be used as reference in several successful and innovative experiences for legitimating the importance of public action in the field. Since the risks at work consist, by one hand, in the interaction between work, satisfaction through it, and its organization conditions, on the other, the capabilities of the worker, their needs and culture, perceptions and experiences in the work environment can influence the yield and the quality of life.

The health related quality of life can be defined as the well-being level derived from the evaluation people make of various aspects of their life, considering the impact it has on their health. For Ebrahim (1995), the purpose of the measurements in health related quality of life are to monitor the health of the population, to evaluate the effect of social and health policies, invest resources in relation to needs and diagnose nature, severity, prognosis of disease and evaluate the effects of treatment. Currently, the most widely used form of evaluation has been the 36-Item *Short Form* Health Survey (SF-36), which gives emphasis to functional capacity and sense of wellbeing related to the health condition. The SF-36 provides a generic, subjective measure functional health and mental health from the individual point of view.

The aim of this study was to investigate the health-related quality of life of dentists working in the public health service of a large municipality, as well as to identify factors associated with it.

Methods

A cross-sectional study with dentists in Salvador, Bahia, Brazil, conducted from in 2017. The inclusion criteria was the universe of active professionals of the municipality of Salvador operating in primary and secondary attention municipal health services, which include basic health units (UBS); family health Units (USFS); Dental specialties centers (CEO's), emergency room units (UPA`s) and emergency dental treatment unities (UAO`s). Exclusion criteria were: employees assigned to State and federal agencies and those who were not active in the period of data collection, that is to say, inactive, on vacation or away for licenses.

Out of the 374 dentists in the city of Salvador, 16 were deleted for exercising administrative functions and 18 for being away or serving licenses, corresponding to an eligible population of 340 professionals. An objective questionnaire was used, structured with 71 multiple choice questions, divided into three blocks: participant's characterization (socio-demographic and occupational aspects), work process evaluation and health related life quality evaluation. The measurement of this came through the 36-Item Short Form Health Survey (SF-36) which is a generic tool for the evaluation of health-related quality of life, composed of 36 items included in eight scales. The eight scales – functional capacity (PF), Physical (RP), pain (BP), General State of health (GH), Vitality (VT), social aspects (SF), emotional aspects (RE) and Mental Health (MH) and two health summaries (Summary of Contents Health and physical health Mental) were generated by Quality Metric Health Scoring 4.5 Software OutcomesTM. Subsequently, the raw scores were normalized, based on an average of 50 and a standard deviation of 10, leading to the general population of the United States as a reference. Standardized scores allow you to compare schedules and summaries of each other components.

The data was collected through the instrument response without interference of the researcher in the following strategies: visit to the health units with Dental Service in the municipality of Salvador; district health team

meetings; education meetings and virtual questionnaire filling by professionals who had no opportunity to do it in person. The continuous variables were analyzed descriptively, with the presentation of the measures of central tendency and dispersion, and the absolute and relative frequency of categorical variables. For the modeling process, we used multiple linear regression, the saturated model by the method of backward, keeping to the template variables that presented <0.05 p-value and contributed to the adjustment of the model. The adjustment was calculated using the analysis of variance of the waste and the R-set to identify the percentage of adjustment model. This study was approved by the Research Ethics Committee of the medical school of Bahia opinion number 955.707.

Results

Out of a universe of 340 dentists in the city of Salvador, 230 responded to the survey, representing a response rate of 67.65% of the population. In the socio-demographic and occupational profile, it comprised 60.43% of people aged less than or equal to 39 years, white/yellow or other (53.91%) and 65.22% of married people or with a stable relationship. The majority of individuals who participated in the survey had children (56.52%), totaled more than 10 years of a bachelor degree in dentistry (64.35%) and had a work journey of 40 hours per week (52.61%). Prevailed (98.26%) permanent professionals who had graduated in public institutions (83.04%) and 30.87% had a graduate degree in Collective health, Public Health or Family health care. 52.61% acted at the same time in the private sector and 53.91% had 06 years or more of experience in public service.

The scores of the SF-36 domains were close to the average. The pain (BP), general state of health (GH), social aspects (SF), emotional aspects (RE) and Mental Health (MH) scores were low, showing a bad quality of life in these areas. Only the domains functional capacity (PF), pysical (RP) and vitality (VT) had above-average scores, representing good health-related quality of life. The most affected was the GH (43.25 ± 1.71) that along with PF, RP, BP contributes substantially to the construction of the measure of Physical Component summarized (PCS), also low (48.97 ± 6.01). The measure summarized for the Mental Component (MCS) (48.57 ± 9.90) that is composed mainly by VT, SF, MH and RE indicates a bad health related quality of life of the dentists in the city (Table 1).

Table 1 SF-36 normalized scores (mean ±SD) of dentists in public health system from Salvador, Bahia, Brazil, 2017. (n=)

SF-36 Domain/ Component Summary	Normalized Score	Crude Score
Physical Function (PF)	51,35 ±6,58	86,20±15,71
Role Physical (RP)	50,37 ± 9,02	79,24±31,88
Bodily Pain (BP)	48,48 ± 8,96	66,67±20,93
General Health (GH)	43,25 ± 1,74	55,67±3,72
Vitality (VT)	51,49± 8,92	60,15±18,86
Social Functioning (SF)	46,78 ± 11,06	76,14±25,47
Role Emotional (RE)	49,84 ± 9,79	82,61±30,95
Mental Health (MH)	48,46 ± 9,33	72,50±16,43
Physical Component Summary (PCS)	48,97 ±6,01	71,94 ±13,78
Mental Component Summary (MCS)	48,57± 9,9	72,85 ±18,53

Potential socio-demographic and occupational variables have been worked and those that were statistically significant (p <0.05) for the PCS of the SF-36 were: individuals with graduate degrees in Public Health and Family health care had a higher score; the dissatisfaction with the acess type of patients to health unit (organized

or spontaneous demand) influenced negatively the result; professionals who judged to have autonomy in worker process had the highest score. Those who were dissatisfied with the relationship with patients had lower score while those who were satisfied with the work contribution to society had a higher score for PCS (Table 2).

Table 2 Multiple linear regression of the Physical Component Summary (SF-36) with socio-demographic and occupational characteristics of dentists in public health system from Salvador, Bahia, Brazil, 2017. (n= 230)

Variable	**n(%)**	coefficient	**Pvalue**
Have children		-1,46	0,05
Yes	130 (56,52)		
No	100 (43,48)		
Post-graduation in Public Health		1,53	**0,03**
Yes	71 (30,87)		
No	159 (69,13)		
Cooperation between the hierarchical levels		-1,48	0,06
satisfied	92 (40)		
dissatisfied	138 (60)		
Patient access to oral health care		-3,28	**0,00**
satisfied	95 (41,3)		
dissatisfied	135 (58,7)		
Autonomy at Work		2,21	**0,01**
satisfied	93 (40,43)		
dissatisfied	137 (59,57)		
Relationship with patients		-1,99	**0,04**
satisfied	178 (77,39)		
dissatisfied	52 (22,61)		
Contribution to society		1,97	**0,03**
satisfied	150 (65,22)		
dissatisfied	80 (34,78)		

In relation to the MCS of the SF-36 in this population, the variables that were statistically significant ($p < 0.05$) on the final modeling were: white individuals, as well as those who did not have children. In relation to the labor process, satisfaction with the relationship with patients, with the self-evaluation of the work, the labor capacity and with courses and training provided showed positive influence (Table 3).

Table 3 Multiple linear regression of the Physical Component Summary (SF-36) with socio-demographic and occupational characteristics of dentists in public health system from Salvador, Bahia, Brazil, 2017. (n= 230)

Variable	n (%)	coefficient	P value
Skin color		2,50	**0,03**
Black or brown	106 (46,09)		
Others	124 (53,91)		
Have children		2,92	**0,02**
Yes	130 (56,52)		
No	100 (43,48)		
Relationship with patients		4,92	**0,00**
satisfied	178 (77,39)		
dissatisfied	52 (22,61)		
Self-evaluation for work		4,17	**0,00**
satisfied	149 (64,78)		
dissatisfied	81 (35,22)		
Labor Capacity		4,70	**0,00**
satisfied	134 (58,26)		
dissatisfied	96 (41,74)		
Courses / trainings conducted by management		3,21	**0,02**
satisfied	53 (23,04)		
dissatisfied	177 (76,96)		

Discussion

The impact of dental activity on quality of life referred to by dentists has been studied by various authors. Within the public service, they found good self-perception level of quality of life and satisfaction with health research that used instruments different from the current research, which is unprecedented in dentistry.

The health-related quality of life measured by the Short-Form 36 Questionnaire (SF-36) shows score near the average in all areas. The few domains that were above the average were functional capacity (51.35 ± 6.58), Physical (50.37 ± 9.02) and Vitality (51.49 ± 8.92) which was the largest domain score while general health (43.25 ± 1.71) presented the lowest score.
The Physical Component Summary (PCS) was very similar, but higher than the Mental Component (MCS) with below-average scores (48.57 48.97 ± 6.01 and ± 9.9, respectively), which signals a bad health related quality of life of dentists. This finding does not agree with study that found that the average Physical Component score (PCS) was lower than the Mental Component (MCS) at 286 workers of hospitals.

In relation to other research conducted in Brazil and in the world with health professionals, the current one showed better scores of the SF-36 better than Cacciari et al. (2013) in all areas. The results found in functional capacity and physical aspects were more than 20 points higher than the study conducted in the State of Paraná and can be justified by the fact that the latter has included 34 nurses in readjustment and retraining, while in Salvador the individuals were healthy.

In a close reality, the Freire et al. (2015) research with 59 professionals of Pernambuco and Bahia showed similar results in the areas of functional functionality(PF), pain(BP), Emotional aspects(RE) and superiority of

the health related quality of life measure. In the areas of Physical aspects(RP), Vitality(VT), Social Function(SF) and general health state(GH), area with the most discrepant scores, because while the Freire et al. (2015) research was 83,20 score, the Salvador one had a 55,67 score, signaling a bad health related quality of life.

Studies conducted in Spain, for your time, show that the economic and cultural difference is revealed in health-related quality of life of health professionals. The research of Suñer-Soler et al. (2012) and Fernandez-Prada et al. (2014) showed higher scores to those in the current study in almost all areas. The difference of the results should be weighted by the peculiarities of each profession, as dentistry has as occupational risks exposure to infectious diseases and equipment and instruments without obeying the ergonomic criteria, among others.

Among the potential variables associated to health related quality of life, it can be noted the greater participation to those related to the work process and the satisfaction. However, in the present study, as well as in the Joslin et al. (2014) study, age was not related to any component, with ethnicity and having children being the socio-demographic variables under influence on the Mental Component (MCS).

Lin et al. (2015) concluded that the worker's performance influences in his health related quality of life, which was corroborated in the found results, since the work capacity was statistically significant for the dentists' Mental Component (MCS).

Although the present study is cross-sectional , the under average result of the health related quality of life, warns that the inclusion of dentists in the public sector does not exclude the possibility of dissatisfaction with the work process that might generate alterations on the professionals' physical and emotional health, which may compromise the quality of the service provided to citizens.

Conclusion

The result shows a low health related quality of life in dentists of the public sector. The interference of occupational variables in this process draws attention to the importance of the workplace in personal life, well-being and professional's health; and to the need of promoting policies in the area of worker's health.

References

Brasil. Ministério da Saúde (MS). Portaria nº 1.823, de 23 de agosto de 2012. Institui a Política Nacional de Saúde do Trabalhador e da Trabalhadora. 2012.

Brasil. Ministério da Saúde. Diretrizes nacionais para a instituição de planos de carreiras, cargos e salários no âmbito do Sistema Único de Saúde: proposta para discussão e aprovação. Brasília: Ministério da Saúde; 2006

Chaves SCL, Silva LMV. Professional practices in public dental healthcare: case study of two municipal districts, Bahia State, Brazil. Ciência & Saúde Coletiva 2007, 12 (6):1697-1710.

Lacaz FAC. Política Nacional de Saúde do Trabalhador: desafios e dificuldades. O avesso do trabalho II: trabalho, precarização e saúde do trabalhador. São Paulo: Expressão Popular 2010: 199-230.

Vilagut G et al. El cuestionario de salud SF-36 español: una década de experiencia y nuevos desarrollos. Gaceta sanitária 2005, 19 (2): 135-150.

Ebrahim S. Clinical and public health perspectives and applications of health-related quality of life measurement. Social science & medicine, v. 41, 1995.

Ware JEJ. SF-36® Health Survey Update. Available online: http://www.webcitation.org/ 6c9AgVrNQ (accessed on 13 September 2017).

http://www.qualitymetric.com/download/InstallationGuide_ScoringSoftwareV4.5pdf

Nunes MF, Freire MCM. Qualidade de vida de cirurgiões-dentistas que atuam em um serviço público. Revista de saúde pública 2006, 40 (6): 1019-1026.

Miranzi SSC et al. Qualidade de vida e perfil dos dentistas da Estratégia de Saúde da Família do Triângulo Mineiro, Brasil. Saúde Coletiva 2011, 50 (8): 120-125.

Carmo IC et al. Fatores associados à sintomatologia dolorosa e qualidade de vida em odontólogos da cidade de Teresina-PI. Rev. bras. Epidemiol 2011 14 (1): 141-150.

Yarid SD, Alves CCNGN, Almeida TYL. Qualidade de vida de cirurgiões-dentistas da cidade de Jequié – Bahia 2013: 41–49.

Rovida TAS et al. Qualidade de vida de cirurgiões-dentistas que atuam no serviço público. Revista Brasileira de Pesquisa em Saúde/Brazilian Journal of Health Research 2013, 15(4).

Monteiro CM, Benatti MCC, Rodrigues RCM. Acidente do trabalho e qualidade de vida relacionada à saúde: um estudo em três hospitais. Rev Latino-Am Enferm. 2013;17(1):101-107.

Wu S et al. Quality of life and its influencing factors among medical professionals in China. International archives of occupational and environmental health 2010, 83 (7): 753-761.

Suner-Soler R et al. Burnout and quality of life among Spanish healthcare personnel. Journal of psychiatric and mental health nursing 2013, 20 (4):305-313.

Cacciari P et al. Estado de saúde de trabalhadores de enfermagem em readequação e readaptação funcional. Revista Brasileira de Enfermagem, 2013, 66(6).

Freire, Cícero Beto et al. Qualidade de vida e atividade física em profi ssionais de terapia intensiva do sub médio São Francisco. Revista Brasileira de Enfermagem, v. 68, n. 1, p. 26-31, 2015.

Tallo FS et al. An evaluation of the professional, social and demographic profile and quality of life of physicians working at the Prehospital Emergency Medical System (SAMU) in Brazil. Clinics 2014, 69 (9):601-607.

Fernández-Prada M et al. Calidad de vida relacionada con la salud en una muestra de médicos internos residentes que realizan guardias en un Servicio de Urgencias: una perspectiva de género. Revista médica de Chile 2014, 142(2): 193-198.

Leggat PA, Kedjarune U, Smith DR. Occupational health problems in modern dentistry: a review. Industrial health 2007, 45(5): 611-621.

Garbin AJI et al. Musculoskeletal disorders and perception of working conditions: a survey of brazilian dentists in São Paulo. International Journal of Occupational Medicine and Environmental Health 2017, 30(3): 367-377.

Joslin L et al. Quality of life and neck pain in nurses. International journal of occupational medicine and environmental health 2014, 27(2): 236-242.

Lin WQ et al. Workplace violence and job performance among community healthcare workers in china: the mediator role of quality of life. International journal of environmental research and public health 2015, 12(11): 14872-14886.

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On the Existence of Fundamental Theorems of Medical Diagnosis and Practice

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Abstract
In this article, the authors discuss their previous treatment of the fundamental theorems of medical diagnosis and practice to a wider class of situations in which Koch postulates and Fredericks & Relman extended version theorem could be used to prove the second theorem. A new approach is introduced involving the importance of Koch's famous postulates to disease transmission.

Keywords: Koch Postulates, Fredericks & Relman Extended Version Theorem, Diagnosis, Zero-Point Condition, Equilibrium Point Condition, Disease Transmission

Introduction

Despite the well-developed field of diagnostic medicine, the practice of medical diagnosis has no theorems of its own. Recently, the results of a diligent study in medicine furnished us with an idea that medical theorems could be derived from diagnostic principles to help champion the usefulness of the field of diagnosis, which has for many years already gained tremendous illumination from Bayesian theorem. The latter theorem, which is borrowed from mathematics, is commonly used to help discussions involving medical diagnosis because of its probabilistic nature.

This short inquiry could later lead to collaborations from competent professionals who will make their contemplations concerning this important phenomenon in renowned journals around the world. These theorems, if scholars agree, could then be scrutinized further to commence the gradual development which theories and its theorems go through before they are accepted in the academic domain and later elaborated upon for them to fulfill their academic functions.

Statement of the Problem

For some time, the Bayesian theorem from mathematics has been utilized to explain the dynamics of what goes on in medical diagnosis without making a concrete analysis of what the contents of medical diagnosis as a whole entail. These implicit advantages which physicians gain by employing this useful theorem worldwide have made them neglected the fact that the procedure of diagnosis itself has its fundamental theorems which could be used

to help diagnosticians to comprehend disorder-symptom relation, disorder-transmission relation, and finally, practitioner-patient relation in medicine.

Statement of Purpose

This paper is intended to analyze the fundamental theorems of medical diagnosis, which have been deduced from a well-known theory of medicine that postulates the existence of several conditions that ultimately lurk behind etiology of illnesses/diseases whether it is physical, psychological or mental disorders. In particular, the article points out that Koch (1876) postulates and its reformulation by Fredericks and Relman (1996), could be adequately employed to prove the existence of the second fundamental theorem of medical diagnosis which states that 'A disorder can be transmitted from one individual to one another.'

Methodological Issues in the Inquiry

Employing the method of deductive, the investigation provides some essential principles and definitions by which other propositions or theorems are deduced from for further analyses and considerations. The method of deductive as a scientific procedure leads to scientific knowledge that is more superior which could then be tested by empirical scientists. The design offers premises in the form of definitions and then uses observation, empirical materials, and reason to prove them. Let us, therefore, premise this investigation with definitions, for as Aristotle and some later scientists saw this clearly, the basic premises of demonstrations are definitions. With these definitions and the premises, one can then move further to deduce the theorems for the field of diagnostic medicine.

The Bayesian Theorem in Brief and its Importance to Medical Diagnosis

Bayes theorem is by far one of the most important probability theorem set forth by an English mathematician called Thomas Bayes who lived between the years 1702-1761 (Bayes & Price 1763). In medical decision making and some of the biomedical sciences, his theorem has become essential and significant. It is utilized to make accurate measurements in guiding physicians' decision making. Bayes' theorem is employed in clinical epidemiology to establish the probability of a particular disorder in a group of persons with a specific characteristic based on the overall rate of which disorders and its likelihood of that specific characteristic in healthy and disordered individuals occur. The theorem is also applied in clinical decision making where it is employed to calculate the probability of a particular conclusion given at the onset of specific indicators, signs, or outcomes of some tests that have been made.

One example which scholars employ often is in the use of Coronary Artery Disease known as CAD. Here, the accuracy of the exercise cardiac stress test in predicting significant coronary artery disease (CAD) depends in part on the "pre-test likelihood" of CAD: the "prior probability" in Bayes' theorem (Lukeprog 2011). This theorem, therefore, makes it possible in order to permit the influence of new information on the merit of competing for scientific hypotheses to be compared, by computing for each hypothesis the product of the antecedent plausibility and the likelihood of the current data given that particular hypothesis and rescaling them so that their total is unity. In the terminology of mathematics, in Bayes' theorem, the antecedent plausibility is termed "the prior probability;" the likelihood of the current data given that particular hypothesis is called the "conditional probability;" and finally, the rescaled values are the "posterior probabilities"(Lukeprog 2011). Presently, Rev. Bayes theorem remains the normative standard for medical diagnosis, but as some have noted, unfortunately, it is commonly debased in clinical practice (Lukeprog 2011). An attempt to simplify its application with diagnostic computer programs, nomograms, rulers or internet calculators have not helped to enhance its application and use in research (Lukeprog 2011).

Criticisms against Bayes Theorem

According to Norton, "while Bayesian analysis has enjoyed notable success with any particular problems of inductive inference," he does not see it conforming true to universal logic of induction. To him, the Bayesian

approach fails to provide a universal logic of induction. He makes more arguments in support of his thesis in his article (Norton n.d.).

Lukeprog, on the other hand, finds two enduring criticisms to Bayes' system which unfortunately affect its credibility. He says that in the first place, mathematicians were extremely dismayed to discover something as whimsical as a guess play role in rigorous mathematics. Second, Bayes said that if he did not know what guess to make, he would just assign all possibilities equal probability to start. For most mathematicians, Lukeprog indicates that this problem of priors was insurmountable.

To Lukeprog the fact that Bayes never published his much-acclaimed discovery, but left it to his friend Richard Price to do it later makes it all the more insecure and untrustworthy. Price found it in Bayes' notes after Bayes' death in 1761, worked with it, and found publishers for it. It is therefore assumed that his theory was not read by several people until the arrival of Laplace's disputations on this very theory concerning chance (Lukeprog 2011).

A question like "Is Bayes' theorem the most robust mathematical theorem for developing medical diagnosis algorithms?" in our opinion would be answered by many scholars who have followed the literature in research reviews as indeed "Yes." This is because it uses conditional relationships and identifies the magnitude of the joint probabilities of multiple events when using small sample sizes. It can therefore be argued that the theorem is after all significant in medicine despite the criticisms leveled against it by some philosophers of logic and mathematics.

The current notion is that it is useful and could be applied in the medical domain such as diagnosis. A scholar of applied mathematics at Columbia University called Chris Wiggins (2019) gave an illustration with a posed question like this in an article in *Scientific American* to stress its usefulness in modern-day diagnosis: Let us take for instance that a patient goes to consult a doctor in his practice. Then this doctor conducts a test with 99 percent reliability–that is, 99 percent of people who are sick test positive and 99 percent of the healthy people test negative. Still, imagine that the doctor is aware that only 1 percent of the people in the country are currently sick. The question then is put forward: "if the patient tests positive, what are the chances the patient is sick?" The spontaneous response by many people would be 99 percent, but Wiggins indicates the precise answer should be indeed 50 percent. Why should it be so?

According to Wiggins, whose work has been adopted by many scholars for similar illustrations, the solution to this posed question can easily be computed by employing the theorem of Bayes. Bayes stated that the probability a patient tests positive and is sick is the product of the likelihood that one test positive given that one is sick and the "prior" probability that he is sick– the prevalence in the population. Put simply, his rationalization is that Bayes's theorem permits one to compute a conditional probability based on the information that is provided.

The formula for Bayes's Theorem goes like this:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

P (A) is the probability of event A; P (B) is the probability of event B; P (A|B) is the probability of observing event A if B is true; P (B|A) is the probability of observing event B if A is true. Wiggins's rationalization can be recapitulated with the aid of the below-mentioned table that gives the setting in a conjectural resident of 10,000 inhabitants:

Table 1: Conditional and unconditional probability table on medical diagnosis (Adapted from Wayne 2016)

	Those having disease	Those without disease	Total
Testing positive (+)	99	99	198
Testing negative (-)	1	9,801	9,802
Total	100	9,900	10,000

In this setting P (A) is the unconditional probability of disease; that is 100/10,000 = 0.01. P (B) is the unconditional probability of a positive test; that is 198/10,000 = 0.0198.

But what we want to find out is P (A | B), that is, the probability of disease (A), provided that the patient has a positive test (B). We are given that the prevalence of disease (the unconditional probability of disease) is 1% or 0.01; this is denoted by P (A). In a population of 10,000, therefore, there will be 100 diseased people and 9,900 non-diseased people. We also know the sensitivity of the test is 99%, i.e., P (B | A) = 0.99; therefore, among the 100 diseased people, 99 will test positive. We also know that the specificity is also 99%, or that there is a 1% error rate in non-diseased people. Therefore, among the 9,900 non-diseased people, 99 will have a positive test. And from these numbers, it follows that the unconditional probability of a positive test is 198/10,000 = 0.0198; this is P (B). Thus, P (A | B) = (0.99 x 0.01) / 0.0198 = 0.50 = 50%. From the above illustration, one can also see that given a positive test (subjects in the Test + row), the probability of disease is 99/198 = 0.05 = 50%.

The theorems to be discussed below will add more knowledge to Bayes theorem to make it rich in its application to medical diagnosis in that they provide more information concerning the context in which medical diagnosis could take place, as well as postulate that certain conditions exist in the background which must be taken seriously.

Formal Presentation of Fundamental Theorems of Medical Diagnosis

General Definitions

Fundamental theorems originate from theorems of war and mental disorders that describe human unhealthiness which triggers the precipitation of distressed conditions (Ayim-Aboagye et al. 2018). The disease stricken person voluntarily seeks help from a competent practitioner (i.e., trained through several years of apprenticeship in medicine). Here, the inequality which steers the fruitful relationship is described and portrayed vividly. With (<), the patient is portrayed as being in a subservient position in the distressed condition in relation to the practitioner S who is strong and healthy, and with (>), the latter is shown to be possessing exceeding knowledge encompassing the patient providing us the inequality of conditions $Q_ə < S > Q$. This is synonymous to professional security that is guaranteed and ultimately given to $Q_ə$ in his distressed condition. Zero-point condition (Zç) signifies the state of being in absolute distressed, petrified, and non-equilibrium. This state is closer to the death state (ʒç) which is equal to the state of negation (Nç). So (ʒç = Nç) in the phenomenon of medical diagnosis. A patient's restoration to 'health–generated–wellness' by the practitioner is called equilibrium–point condition (Eç). Thus zero-point (Zç) is defined as "$Q_ə$ is in a subservient condition of S if $Q_ə < S$ for all $Q_ə$ ε N." The equilibrium-point condition (Eç) thus becomes "S is more knowledgeable over $Q_ə$ if $S > Q_ə$ for all S ε N." With this, we can also add the concept of time (t) in the rationalization accompanying the onset of any disease/illness.

Fundamental theorems, furthermore, establish the existence of common fundamental grounds upon which all medical diagnoses rest among a collection of abnormalities defined on certain arranged disorders that are subject to diagnostic procedures. The theorems are relevant both because of its interdependent theoretical significance and also because other results can be deduced from them that can be regarded as corollaries (Ayim-Aboagye 2008).

The following are the theorems of medical diagnosis:

Theorem 1:
No disorder is without a symptom; vice versa no symptom is without a disorder.
Theorem 2:
A disorder can be transmitted from one individual to one another.
Theorem 3:
An Individual patient disorder cannot be treated in isolation by the patient; it must be attended to by experts through voluntary consultation that has been made by the patient.

Alternative Statements of the Theorems can also be written as:

1. If a patient is diagnosed as possessing a specific disorder, then there is a corresponding symptom(s) on which the practitioner has based his competent decisions/predictions.
[If an individual Q is diagnosed as having a disorder D, then there is a corresponding symptom C which is known as lurking behind D; then $Q_ə = C \cong D$ and the vice versa is also true $Q_ə = D \cong C$.
Where ə represents the condition of Q.]

2. In cases where a disorder is judged to be an infectious disease or violent personality disorder, then there is the greater likelihood that a patient can transmit this disorder to other individuals irrespective of who comes into contact with him/her.
[Suppose that $Q_ə$ were to be the distressed patient in a zero-point condition (Zç) who is distressed, petrified, and disequilibrium, then the following (could result) patients can contract the illness from $\{Q_ə \rightarrow Q_ə1 \rightarrow Q_ə\ 2 \rightarrow Q_ə\ 3 \rightarrow \ldots\ Q_ə\ N\}$]. The formula then becomes $Zç = Q_ə \rightarrow Q_ə1 \rightarrow Q_ə\ 2 \rightarrow Q_ə\ 3 \rightarrow \ldots\ Q_ə\ N$.

3. A diagnostic procedure involving a disorder is not handled in isolation by a patient; it is attended to and steered by a competent practitioner who confronts a distressed patient that has voluntarily sought help.
[Let Q be in the zero-point condition (Zç) of illness $Q_ə$ that is distressed, petrified, and disequilibrium. For every zero-point condition $Q_ə < S > Q$. Then, the following inequalities hold at any zero-point condition: $Zç = Q_ə < S > Q$. This means $Q_ə$ is subservient to S, the practitioner that is more knowledgeable than Q in the encompassing powerful context of medical diagnosis.]

These theorems can help physicians to comprehend: Firstly, disorder- symptom relation; secondly, disorder-transmission relation (Here, Koch postulates and its reformulation by Fredericks and Relman (1996) could be used to prove this theorem); and thirdly, practitioner-patient relation.

Proof of First Fundamental Theorem

If an individual Q is diagnosed as having a disorder D, then there is a corresponding symptom C which is known as lurking behind D; then $Q_ə = C \cong D$ and the vice versa is also true $Q_ə = D \cong C$.
Where ə represents the condition of Q.]

Proof
Referring to theorem one, since it is acknowledged that every disorder has a symptom upon which it could lead the competent practitioner to the root cause of the patient's dire situation, and vice versa every symptom has a lurking disorder/points to a disorder at every zero-point condition (Zç), the theorem is said to be obvious. Thus it says that $Q_ə = C \cong D$ and the vice versa is also true $Q_ə = D \cong C$. Furthermore, the zero-point condition is the originating point of all true conditions of disease /illness when patients need cure/treatment.

Remarks
The nature of the theorem as an obvious one is not to be disputed. It can, therefore, be remarked that when we discuss or engage in the commencement of every diagnosis, we most often focus on the fundamental theorem.

Proof of Existence of Second Fundamental Theorem

Preamble
Let us now introduce the second fundamental theorem again:
A disorder can be transmitted from one individual to one another.
Alternative propositions:
In cases where a disorder is judged to be an infectious disease or violent personality disorder, then there is the greater likelihood that a patient can transmit this disorder to other individuals irrespective of who comes into contact with him/her.

[*Suppose that $Q_ə$ were to be the distressed patient in a zero-point condition (Zç) who is distressed, petrified, and disequilibrium, then the following (could result) patients can contract the illness from {$Q_ə$ → $Q_ə1$ → $Q_ə$ 2 → $Q_ə$ 3 → ... $Q_ə$ N}]*. The formula then becomes Zç = $Q_ə$ → $Q_ə1$ → $Q_ə$ 2 → $Q_ə$ 3 → … $Q_ə$ N.

Remarks

While the first theorem is obvious and needs no proof, because it is agreed that every disorder has a symptom and also that every symptom portrays the signal of a major or minor lurking disorder, according to our understanding, the second fundamental theorem could easily be proved with Koch postulates (Koch, 1893:319-38). Yet, additional illumination could also be gained from the use of the Fredericks and Relman (1996: 18-33) extension theorem of Koch postulates.

Robert Hermann Koch and his Famous Postulates

Proof Using Koch's Postulates

Koch postulates guarantee the existence of disorders' transmission as they satisfy the conditions in which these are experienced be it in the laboratory or research field. Koch's postulates are four criteria designed to establish a causative relationship between a microbe and a disease that can later be transmitted to humans. The postulates were originally formulated by Robert Koch and Friedrich Loeffler in 1884(Koch 1893), based on earlier concepts labeled by Jacob Henle and perfected and published by Koch in 1890 (Evans 1978). Koch used the postulates to picture the etiology of cholera and tuberculosis which he generalized to other diseases. It must be emphasized that Koch postulates were generated before the understanding of modern concepts in microbial pathogenesis that cannot be examined using Koch's postulates, including viruses– which are obligate cellular parasites– or asymptomatic carriers. Currently, they have largely been ousted by other well-known principles such as the Bradford Hill Criteria for infectious disease causality in modern literature of public health.

The following are Koch's postulates which have been disseminated widely in the literature both academic and popular science: The microorganism must be found in abundance in all organisms suffering from the disease, but should not be found in healthy organisms; The microorganism must be isolated from a diseased organism and grown in pure culture; The cultured microorganism should cause disease when introduced into a healthy organism; The microorganism must be isolated again from the inoculated, diseased experimental host and identified as being identical to the original specific causative agent (Koch, 1876: 277–310).

Alternative Proof Using Fredericks and Relman Extended Version Theorem

Fredricks and Relman have also suggested an extended version theorem of Koch's postulates for the present century and they also guarantee the existence of transmission of disease/disorders. The following conditions also satisfy the fundamental theorems:

(a) A nucleic acid sequence belonging to a putative pathogen should be present in most cases of an infectious disease. Microbial nucleic acids should be found preferentially in those organs or gross anatomic sites known to be diseased, and not in those organs that lack pathology.
(b) Fewer or no copies of pathogen-associated nucleic acid sequences should occur in hosts or tissues without the disease.
(c) With the resolution of disease, the copy number of pathogen-associated nucleic acid sequences should decrease or become undetectable. With clinical relapse, the opposite should occur.
(d) When sequence detection predates disease or sequence copy number correlates with the severity of disease or pathology, the sequence-disease association is more likely to be a causal relationship.
(e) The nature of the microorganism inferred from the available sequence should be consistent with the known biological characteristics of that group of organisms.
(f) Tissue-sequence correlates should be sought at the cellular level: efforts should be made to demonstrate specific in situ hybridization of microbial sequence to areas of tissue pathology and visible microorganisms or to areas where microorganisms are presumed to be located.
(g) These sequence-based forms of evidence for microbial causation should be reproducible.

These adaptions by Fredericks and Relman (1996:18-33), according to some scholars, are still debatable in that they are not successful in accounting well for established disease associations, such as papillomavirus and cervical cancer nor do they take into account prion diseases, which have no nucleic acid sequences of their own. All the same, these could be employed to explain how diseases could be transmitted from individuals to individuals [organism to another organism].

Since the second theorem of the fundamental theorems of medical diagnosis states that a disorder can be transmitted from an individual to another individual and this is well exemplified in hospital environments as well as general environment through research, we infer from Koch postulates and Fredericks and Relman's extended version theorem that a disorder is transmittable to individuals in all conditions as explained (whether it is in the laboratory or the field). Hence there is an illness or disease transmission that is enshrined in the fundamental concepts of medical diagnosis. Moreover, there exists a disorder transmission principle which the second theorem postulates.

Concluding Remarks

Fundamental theorems of medical diagnosis are the results in a medical theory involving disorders which establish the existence of a common genesis of zero-point condition illness or disease etiology. The theorems are ingredients in several other important results, notable among which are proofs that a disorder can be transmitted from one person to another person. Therefore, it signifies that there exists a disorder transmission that the second theorem in particular postulates on. Finally, the theorems are to be represented by the following formulas:

T1: $Q_ə = C \cong D$ and the vice versa is also true $Q_ə = D \cong C$.

T2: $Zç = Q_ə \rightarrow Q_ə 1 \rightarrow Q_ə 2 \rightarrow Q_ə 3 \rightarrow \ldots Q_ə N$.

T3: $Zç = Q_ə < S > Q$.

References

Ayim-Aboagye, D., Adzika, V., & Gyekye, K. (2018). "Fundamental Theorem of the Theory of Superiority Complex", *International Journal of Emerging Trends in Science and Technology (*IJETST), Vol. 5., Issue 7, July, 6688-6703.

Ayim-Aboagye, D. (2008). *Matter Man and Motion: Scientific Theories on Modern Man and Adaptation.* London, Hammersmith: Lulu Com UK Enterprise.

Bayes, T., & Price, M. (1763). *An Essay Towards Solving a Problem in the Doctrine of Chances*. Philosophical Transactions of the Royal Society of London*,* 370–418

Chris, W. (2019). What is Bayes's theorem, and how can it be used to assign probabilities to questions such as the existence of God? What scientific value does it have? Retrieved 16/06/2019 https://www.scientificamerican.com/article/what-is-bayess-theorem-an.

Evans, A. S. (1978). Causation and disease: a chronological journey. The Thomas Parran Lecture. *American Journal of Epidemiology.* **108** (4): 249–58. PMID 727194.

Fredericks, D. N. & Relman, D. A. (1996). Sequence-based identification of microbial pathogens: a reconsideration of Koch's postulates*. Clin Microbiol Rev. **9** (1): 18–33.* PMC 172879. PMID 8665474.

Koch, R. (1876). Untersuchungen über Bakterien: V. Die Ätiologie der Milzbrand-Krankheit, begründet auf die Entwicklungsgeschichte des Bacillus anthracis[Investigations into bacteria: V. The etiology of anthrax, based on the ontogenesis of *Bacillus anthracis*] (PDF). *Cohns Beitrage zur Biologie der Pflanzen* (in German). **2**(2): 277–310.

Koch, R. (1893). Ueber den augenblicklichen Stand der bakteriologischen Choleradiagnose [About the instantaneous state of the bacteriological diagnosis of cholera]. *Zeitschrift für Hygiene und Infektionskrankheiten (in German).* **14**: 319–38. DOI:10.1007/BF02284324

Koch, R. (1876). Untersuchungen über Bakterien: V. Die Ätiologie der Milzbrand-Krankheit, begründet auf die Entwicklungsgeschichte des Bacillus anthracis[Investigations into bacteria: V. The etiology of anthrax, based on the ontogenesis of *Bacillus anthracis*] (PDF). *Cohns Beitrage zur Biologie der Pflanzen* (in German). **2**(2): 277–310.

Lukeprog (2011). A History of Bayes' Theorem, Retrieved 16/06/2019 https://www.lesswrong.com/posts/RTt59BtFLqQbsSiqd/a-history-of-bayes-theorem. 29th August.

Norton, J. D. (n.d). Critique of Bayesiansim Induction and Confirmation. Retrieved 16/06/2019**,** https://www.pitt.edu/~jdnorton/homepage/research/ind_crit_Bayes.html.

Wayne, W. (2016). Bayes theorem. Boston University School of Public Health, 24 July, Retrieved 16/06/2019. http://sphweb.bumc.bu.edu/otlt/MPH-Modules/BS/BS704_Probability/BS704_Probability6.html.

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The Additive Effect of Hepatitis B Virus and Aflatoxin B1 to Liver Disease Burden: A Case Study in Kitui, Makueni and Machakos Counties, Kenya

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Abstract
There are various causes of liver disease, including viruses, trauma, and toxins. Hepatitis B virus (HBV) is a major etiological agent for liver disease in lower eastern Kenya. This had compounded an already existing problem of aflatoxinB1 induced hepatoxicity associated with contaminated grain which had been reported over the years in parts of the region including Kitui, Makueni and Machakos counties. A study was carried out to evaluate the additive effects of hepatitis B virus (HBV) and dietary AFB1 in liver disease among the subjects. Liver disease bio markers HBSAg and AFB1 lysine albumen adducts were used in this study. The investigation was conducted as a case-control study where blood samples from appropriately selected subjects were collected and analyzed for exposure to dietary AFB1 and HBV. A non-probability purposive sampling method was used to choose and divide the study area into strata with 19 clusters. The sample size (n) for the human case-control study was determined as per the Schelsselman formula (1982), as 283 each for both cases and controls A computer software SPSS® version 18.0 was used to analyze the data statistically. For case subjects, 52.29% (n=148) of serum samples were positive for HBsAg with level range of 500 to 9800 Iu/mL and a mean of 3.204 x 103 Iu/mL {95%; CI= (2.76 to 3.65)x 103}, p≤ 0.05. For controls, 24% (n=68) of serum sample was positive for HBsAg with a level range of 50 to 990 Iu/mL and a mean of 347.57 Iu/mL (95%; CI= (278.35 to 416.80), p≤ 0.05. For AFB1 lysine albumin adducts, case subjects had 55.83% (n=158) of positive serum sample with a level range of 15.5 to 135.0 pg/mg and a mean of 42.93 pg/mg (95%; CI= (39.36 to 46.51) p≤ 0.05, while the controls with 31.0% (n=88) of positive serum sample had a lower AFB1 serum albumin adducts level range of 3.5 to 60.5 pg/mg with a mean of 14.30 pg/mg (95%; CI= (12.23 to 16.36), p≤ 0.05. Case subjects had higher means for both HBsAg and AFB1 lysine albumin adducts than controls, suggesting an additive effect on liver disease among the subjects. In control subject samples, lower HBsAg suggested either a carrier state or a recent exposure and recovery from HBV. In control serum samples, lower mean AFB1 lysine albumin adducts suggested a lower level of dietary aflatoxin B1 exposure among those subjects. The case and control cohorts, the higher total number of serum samples testing positive for HBsAg, 30.83% (n=175) and AFB1 lysine albumin adducts 36.13% (n=205) out of the total sample (N=566), implied that the causal factors for the liver disease

were endemic in the region. There was a higher dietary AFB1 exposure to residents than HBV exposure. It is concluded that AFB1 induced hepatoxicity was more prevalent than HBV infection among the study subjects.

Keywords: Hepatitis B Virus, Aflatoxin B1, Additive Effect to Liver Disease, Kitui, Makueni, Machakos

INTRODUCTION

Liver disease is known to have various causal factors, including viruses, toxins, autoimmune diseases, and even physical injuries. Infection with hepatitis B virus (HBV), leads to liver disease, which is grouped into two broad categories, namely: Acute hepatitis B and Chronic hepatitis B.

Acute hepatitis B manifest as an illness that begins with general ill-health, loss of appetite, nausea, vomiting, body aches, mild fever, and dark urine, and then progresses to the development of jaundice. It has been noted that itchy skin has been an indication of a possible symptom of an infection with hepatitis B virus sub types (Liaw *et al.,* 2010). The illness lasts for a few weeks and then gradually improves in most affected people. A few people may have more severe liver disease (fulminant hepatic failure), which may be fatal as a result. The infection may be entirely asymptomatic and may also go unrecognized (Liaw *et al.,* 2010). An estimated 30% of those infected do not show typical signs or symptoms (Terrault *et al.,* 2005; Liaw *et al.,* 2010). Generally, however, infection with hepatitis B virus leads to liver diseases including hepatocellular carcinoma, fulminant liver failure, liver cirrhosis and membranous glomerular nephritis (MGN), with the attendant symptoms (Gan *et al.,*2005). Between 85 to 95% of infected individuals develop permanent immunity to the disease, while 5 to 10% of adults and children older than 5years develop chronic infection and become HBV carriers, with the highest rate of infection occurring between the ages of 20 to 49 years. In children, 90% of those born to infected mothers acquire the disease, and only 5% of these newborn children develop full immunity to the disease (Bell and Nguyen, 2009).

Chronic hepatitis B infection could be asymptomatic or may be associated with a chronic inflammation of the liver (chronic hepatitis), leading to cirrhosis over a period of several years. This type of infection dramatically increases the incidence of hepato cellular carcinoma (liver cancer), more so in areas where dietary aflatoxin B1 toxicity is endemic.

Transmission of hepatitis B virus results from exposure to infectious blood or body fluids containing the virus. Possible forms of transmission include sexual contact and blood transfusions or transfusion with other human blood products (Buddeberg *et al.,* 2008; Fairley & Read, 2012). Re-use of contaminated needles and syringes and vertical transmission from mother to child (MTCT) during childbirth are other important means (CDC, 2012). However, at least 30% of reported hepatitis B infections among adults cannot be associated with an identifiable risk factor (Redd *et al.,* 2007).

The virus is divided into four major serotypes (adr, adw, ayr, ayw) based on antigenic epitopes presented on its envelope proteins, and into eight genotypes (A-H) according to overall nucleotide sequence variation of the genome. The genotypes have a distinct geographical distribution and are used in tracing the evolution and transmission of the virus. Differences between genotypes affect the disease severity, course and likelihood of complications, and response to treatment and possibly vaccination (Chan *et al.,* 2009).

Hepatitis B virus primarily interferes with the functions of the liver by replicating in liver cells, specifically the hepatocytes. A functional receptor for the virus is NTCP (Yan, *et al.,* 2012). There is, however, evidence that the receptor in the hepatitis B virus is a carboxypeptidase D (Glebe and Urban, 2007). The virions bind to the host cell via the preS domain of the viral surface antigen and are subsequently internalized by endocytosis. HBV-preS-specific receptors are expressed primarily in hepatocytes, however, viral DNA and proteins have also been detected in extrahepatic sites, suggesting that cellular receptors for HBV may also exist on extrahepatic cells (Coffin *et al*., 2011).

During HBV infection, the host immune response causes both hepatocellular damage and viral clearance. Although the innate immune response does not play a significant role in these processes, the adaptive immune

response, in particular, virus-specific cytotoxic T lymphocytes (CTLs), contributes to most of the liver injury associated with HBV infection. CTLs eliminate HBV infection by killing infected cells and producing antiviral cytokines, which are then used to purge HBV from viable hepatocytes (Iannacone *et al.,* 2007). Although liver damage is initiated and mediated by the CTLs, antigen-nonspecific inflammatory cells can worsen CTL-induced immunopathology, and platelets activated at the site of infection may facilitate the accumulation of CTLs in the liver (Sitia *et al.,* 2007).

According to Karayiannis *et al.,* (2009), hepatitis B surface antigen is most frequently used to screen for the presence of hepatitis B infection. It is the first detectable viral antigen to appear during infection. However, early in an infection, this antigen may not be present, and it may be undetectable later in the infection as it is being cleared by the host. Studies have shown that infectious virion contains an inner "core particle" enclosing viral genome. The icosahedral core particle is made of 180 or 240 copies of core protein, alternatively known as hepatitis B core antigen, or *HBcAg*. During this 'window' in which the host remains infected but is successfully clearing the virus, IgM antibodies to the hepatitis B core antigen (*anti-HBc IgM*) may be the only serological evidence of disease. Therefore most hepatitis B diagnostic kits contain HBsAg and total anti-HBc, including both IgM and IgG (Karayiannis *et al*., 2009). Individuals who remain HBsAg positive for at least six months are considered to be hepatitis B carriers. It is instrumental that, many carriers of the virus may have chronic hepatitis B, which would be reflected by elevated serum alanine aminotransferase (ALT) levels and inflammation of the liver, as has been revealed in many cases of liver biopsies (Lok and McMahon, 2007).

Like is the case with HBV, various studies have linked exposure to aflatoxin B1 (AFB1) to chronic and acute hepato cellular injury leading to chronic liver diseases, including hepato cellular carcinoma. Aflatoxins could be defined as toxic secondary metabolites produced by fungal strains of the genus *Aspergillus,* mostly *A. flavus* and *A. parasiticus* that grow on a variety of substrates (Lawley, 2013). Aflatoxins are of particular concern due to their biochemical and biological effects on human and animal health (EFSA, 2013). Among the different aflatoxin compounds identified, aflatoxin B_1, B_2, G_1, and G_2 are the most important in terms of their toxic effects (Bao *et al*., 2010), with aflatoxin B_1 having shown the highest potency as a natural hepato-carcinogen and usually, is the major aflatoxin produced by the aflatoxigenic fungal strains.

Naturally, aflatoxin producing fungi occur in certain food products in the form of spores, and when conditions are favorable, the fungi produce aflatoxins in high amounts. These foods include maize, sorghum, pearl millet, rice, wheat, groundnuts, soybeans, sunflower seeds, cotton seedcake, chilies, coriander, turmeric, and ginger. Tree nuts, including almonds, pistachio, walnuts, and coconut, are also attacked. Other than aflatoxin M_1 found as a metabolite of aflatoxin B_1 in animal milk products, powdered milk can also be attacked directly by aflatoxin producing moulds (Lawley, 2013; EFSA, 2013).

The presence of these fungal toxins reduces the economic value of food products and devalues it as a commodity for human consumption (EFSA, 2013). Because of the hepatoxicity of these aflatoxins, the level of exposure is of particular public health concern. Both the Food and Agricultural Organization (FAO), and Agro-food and Veterinary Diagnostics Organization (AVD), estimates that mycotoxins contaminate 25% of agricultural crops worldwide (CAST, 1998; AVD, 2013).

Aflatoxin contamination of food stuff may occur during pre-harvest or post-harvest period, during storage, transportation, and processing (Li *et al.,* 2009; Rural21, 2013). Continued dietary exposure to aflatoxins is a major risk factor for hepatocellular carcinoma and general liver damage in populations, particularly in areas where hepatitis B virus (HBV) infection is endemic. Ingestion of higher doses of aflatoxins can result to acute aflatoxicosis, which manifests as hepatoxicity and in severe cases, fulminate liver failure (Golthardt *et al.,* 2009). Once ingested with food, aflatoxin B1 forms AFB_1 lysine albumin adducts which are carcinogenic and which are used as biomarkers for AFB1 induced hepatoxicity.

Objective of the study

The purpose of this study was, therefore, to evaluate the additive effects of the elevated levels of both HBsAg and AFB_1 lysine albumin adducts and determine whether the two etiological factors for liver disease are endemic in the region.

MATERIALS AND METHODS

Study design

The study was designed and conducted as a Case-Control study for human subjects which involved the collection of blood samples from both cases and controls after which a laboratory serum sample analysis for levels of HBsAg and AFB_1- lysine albumen adducts was performed. The presence or absence of HBsAg in human serum was to determine the actual exposure and non exposure to HBV while AFB_1 lysine albumin adducts would determine exposure to aflatoxin B1. For both case and controls, a structured questionnaire employing Likert scale was administered to help match the case and controls on the basis of age bracket, sex, alcohol consumption, and residency of the subjects.

Study Area

The study was conducted in Kitui, Makueni, and lower part of Machakos regions. The area was stratified into three (3) main strata and nineteen (19) sub-clusters based on health centers administrative units (districts and divisions) whose distribution was as below (Table 1).

Table 1: Distribution of the sub-clusters within the strata in the study area.

Kitui county	Makueni county	Machakos county
Mutomo	Makindu	Masaku
Kyuso	Wote	
Tei wa yesu	Sultan Hamud	
Mwingi	Mtito Adei	
Kitui	E mali	
Nuu	Kathozweni	
Kavisuni	Kibwezi	
Mtito ndooa		
Migwani		
Muthale		
Mathuki		

Study authorization

The study was granted approvals by Ethical research committee (ERC), of Kenya medical research institute (KEMRI), through the scientific steering committee (Protocol no.2988) and National committee on science, innovation, and technology (NACOSTI/P/15/5700/7331), after the vetting procedures for protocols of studies dealing with human subjects.

Target population

The target human populations for the case-control study comprised of all people who have been resident in Kitui, Makueni and lower Machakos all parts of lower eastern Kenya for at least a year for both males and females and who were between the age of 12 and 80 years.

Study population

The study population comprised of selected Case subjects from the Sub-district, District, and level 5 health centers that had been clinically diagnosed with liver disease. Controls consisted of those suffering from non-liver ailments within the same categories of hospitals and health centers under investigation and who were matched in terms of sex, age, residency, and non-use of alcohol

Case subjects identification

Human subject Cases were identified from health facilities within the study area on condition that they had the clinical manifestation of liver disease. Hospital admission registers at various county or district hospitals in the counties were also used to confirm admissions due to liver disease.

Control subjects identification

Controls were drawn from the samples of the population where the Cases were drawn from. Appropriate numbers of Controls equal to the number of Cases were picked from the same hospital where the cases were admitted but from the non GIT sickness sections, including surgical, orthopedic, and trauma wards to avoid confounding and or Berkson bias (Westreich *et al*., 2012; Pearce *et al.,* 2014)

Controls were matched to Cases as much as possible, including using personal characteristics, including age, sex, food preference, and residency. Matching was, however, limited to three factors, including age, sex, and locality (residency) of the participants.

This was a case-control study which employed non-probability stratified purposive sampling method on the basis of clinical diagnosis of liver disease among cases and non-disease in control subjects

Participant characteristics

a) Inclusion criteria

The human subjects were included into the study on condition that:

i) They were between ages of 12 to 80 years for all sexes.
ii) They had been residents of the study area for at least one year.
iii) They gave an informed consent to participate in the study in case of those above 18 years (a prescribed standard consent format was used for this procedure).
iv) They gave an ascent to participate in the study in case of those who were below 18 years, and an informed consent of the guardian or parent was also to be provided.
v) They had been clinically diagnosed to have liver disease.
vi) They did not belong to the vulnerable groups, including prisoners, blind persons, pregnant women, mentally impaired, or persons lacking consent capacity.

b) Exclusion criteria

The human subject was excluded from this study if:-

i) Below 12 yrs and above 80 yrs
ii) He or she had not been a resident of the study area for more than one year
iii) He or she had not given an informed consent to participate in the study in case of those above18 years.
iv) He or she had not given an ascent to participate in the study in case of those who are below 18 years and irrespective of whether an informed consent of the guardian or parent had been provided.
v) He or she was a consumer of alcohol in any form and did not meet all or some of the inclusion criteria above.
vi) They had not been clinically diagnosed to have liver disease
vii) He or she belonged to the vulnerable groups, including prisoners, blind persons, pregnant women, mentally impaired persons, or any person lacking consent capacity due to various reasons.

Subjects sampling procedure

Non-probability stratified purposive sampling method was used to pick human subjects on the basis of clinical diagnosis of liver disease for Cases and non-liver disease for Controls. Recruitment of human participants to the study was done at health facilities within the study area, and questionnaires were used to link individuals in strata to serum samples by use of code numbers for anonymity.

Sample size for the case-control design

The sample size (n) for the case-control study was determined by use of the Schlesselman (1982), formula, thus:-

$$n = \frac{\left(Z_\alpha\sqrt{2\bar{p}\bar{q}} + Z_\beta\sqrt{p_1q_1 + p_0q_0}\right)^2}{(p_1 + p_0)^2}$$

Where P_0 = exposure rate of Controls (general population)

P_1 = exposure rate of Cases

Z_α = 1.96 for 95% confidence level; Z_β = 0.84. Since it can be shown that

$$p_1 = \frac{P_0 R}{[1 + P_0(R - 1)]}$$

Then $q_1 = 1 - p_1$; $q_0 = 1 - p_0$,
While $\bar{p} = \frac{p_1 + p_0}{2}$; and $\bar{q} = 1 - \bar{p}$.

Given that the aflatoxin prevalence rate in the study area was 9.3% (Lauren *et al.,* 2004; CDC, 2004), then the general population (controls), exposure rate was estimated to be 10%. Hence

$p_0 = 0.1$; $p_1 = 0.1818$; $q_0 = 0.9$; $\bar{p} = 0.1409$; $q_1 = 0.8182$; $\bar{q} = 0.8591$; $Z\alpha = 1.96$;
$Z\beta = 0.84$; then (n) = 283.

Based on the three categories of health facilities, mainly sub-districts, district and level 5 (provincial facility), the sample size (n) of 283 cases was divided into a ratio of 1:2:3 so that there was a minimum of 47, 94 and 142 cases to be enrolled from sub-districts, district and level 5 facilities respectively. The number of case sample (n), per hospital, was worked on depending on mean totals from each hospital register. Thus if admission from all causes in a particular health facility was (t), and the total mean admission for all health facilities in that category was T, then sample (n) per hospital was determined as (t/T x 47), (t/T x 94), and (t/T x 142) respectively for sub-district, district and level 5 health facility. Since the hospital admissions differed, the case sample (n) from one facility to another also differed. Similarly, since Controls were matched for each Case, they similarly differed (Table 2).

This implied that the minimum total number of subjects, both case and controls in the study was to be 283×2 = 566. Since this sample was representative, the study enrolled those admitted to health centers since following outpatients was not practical in this case.

Table 2: Case and control serum sample per health center

Health center	Case (n)	Control (n)	Category
Mutomo	17	17	District
Tei wa yesu	4	4	Sub district
Kitui	21	21	District
Mtito ndooa	7	7	Sub district
Mwingi	10	10	District
Kyuso	2	2	District
Migwani	10	10	Sub district
Kavisuni	3	3	Sub district
Nuu	6	6	Sub district
Muthale	15	15	District
Mathuki	5	5	Sub district
Kibwezi	3	3	District
Wote	45	45	Level 5
Sultan H	12	12	Sub district
Masaku	97	97	Level 5
Kathozweni	12	12	District

Makindu	7	7	District
Emali	4	4	District
Mtito Adei	3	3	District
Total	283	283	

Procedure for collection of blood samples.

The invasive procedure for collection of blood samples was undertaken by a qualified lab technologist (phlebotomist) as per the WHO, (2010) guidelines.

Blood samples were drawn after consent was obtained, then frozen and transported for analysis.

Analysis and determination of AFB_1 albumin serum adduct levels

Preparation of samples and AFB_1-albumin standards.

The direct competitive ELISA Kit (Glory® Science Co., Ltd. USA), was used for the total determination of AFB_1-albumin adducts in the human serum samples for both case and controls in the study. The kit manufacturer (Glory Science Co. Ltd USA), had put the kit detection lower limit to 0.3ug/L (0.3ug/mL) with extracts from feed fish, shrimps urine or serum samples.

Each sample serum extract in a $10cm^3$ test tube was diluted using methanol (1:10) solution, then centrifuged for 3 minutes to get the liquid supernant (serum) for the test.

Six aflatoxin-albumin adduct standards, vials each of 1ml, and the concentration 0 ng/ml, 0.1ng/ml, 0.3ng/ml, 0.9ng/ml, 2.7ng/ml, and 8.1ng/ml was arranged in a test tube rack and labelled; S_1, S_2, S_3, S_4 and S_5(Glory Science Co,. Ltd. USA).

Preparation of AFB_1- albumin adduct-enzyme conjugates.

The ELISA kit (Glory® Science Co., Ltd USA), had an already prepared AFB_1-albumin adduct-enzyme conjugate which was used for tests, in both micro-titre and standard wells.

Preparation of TMB-enzyme substrate

The ELISA kit was supplied with an already made enzyme colour marker with TMB-substrate, but for accuracy purposes, the solution was prepared by mixing a portion of (1:1), citric acid buffered solution (pH 3.8), containing 325ul of 30% hydrogen peroxide per litre of solution and one portion of a solution of 50.4 mg tetra methyl benzidine (TMB) in an acetone-methanol (1: 9) solution.

Analysis/Method:

Fifty (50) ul, of the standard AFB_1-albumin serum adduct solution, was pipetted in duplicate to the pre-coated aflatoxin albumin adduct antibody removable micro-titer plates in the order S_0, S_1, S_2, S_3, S_4 and S_5 representing standard dilutions of 0 ng/ml, 0.3ng/ml, 0.9ng/ml, 2.7ng/ml and 8.1ng/ml. Similarly, 50 ul, of sample serum was pipetted into adjacent pre-coated wells. Aliquots of 50 ul, of AFB_1-albumin adducts enzyme conjugate (Glory® Science Co. Ltd USA), was added to all the wells of both the standards and the sample, covered with an aluminum foil and incubated at room temperature (28ºC) for two (2) hours.

The plate was then emptied and washed with saline tween solution (8.55gm sodium chloride dissolved in 1000 ul distilled water, plus 0.25ml of poly oxy ethylene sorbitan monohydrate), and dried by tapping with a blotting paper.

An enzyme-substrate (Glory® Science Co. Ltd USA), which consisted of Horse radish peroxidise and tri methyl benzidine, was added and the plates incubated in the dark for 10 minutes, after which the enzyme reaction was stopped by adding 100 ul of 2M sulphuric acid simultaneously into all micro-titre wells. The colour had changed from blue to yellowish.

The intensity of colour in all wells was determined by measuring absorbance at 450nm, using an ELISA reader (Uniskan II® Lab systems, Finland). The absorbance value data for standards and serum samples were entered into computer software (R-ridasoftwin® version 1.60, R-bio pharm., Germany), which used percentage absorbance against known standard aflatoxin adducts concentrations to draw a standard curve. The software automatically generated AFB_1-albumin adducts levels in ng/mL, which was converted to pg/mg of albumin (Gathumbi *et al.,* 2001).

(b Determination of HBsAg level in case and control serum samples

The quantification of HBsAg was done by automated analyzers available commercially, namely Architect QT® (Abbot Laboratories). This investigation used Architect QT® (Abbot Laboratories), to quantify HBsAg in blood samples since it was more easily available, and it was also the oldest kit in use among many other Immuno assays analyzers. The assay was capable of processing up to 800 HB_SAg tests per hour

Architect QT is a Chemiluminescence Microparticle Immuno assay (CHIA), in which 1ml serum and anti-HB_SAg-coated paramagnetic micro particles were combined. After washing, acrinium- labeled anti-HB_S-conjugate was added; and after another washing step, pre-trigger and trigger solution were added.

The subsequent chemiluminiscent reaction was measured in relative light units (RLU), which are converted to HB_SAg units, using a previously graduated Architect HB_SAg calibration curve (Deguchi *et al.,* 2004*).* The range of the assay for this test was between 0.05 IU/mL to 250 IU/mL of HB_SAg in undiluted sera. Manual dilution could be done up to a ratio of 1: 999, but in this study, an On-board auto dilution was done up to a ratio of 1: 500, to offer a wider range of quantification (O' Neil *et al*., 2012). Auto dilutions demonstrated better precision values within and between runs. The performance of this automated analyzer is comparable to the new generation chemiluminiscent assay for hepatitis B surface antigens (Chen *et al.,* 2006)

A sample of blood each for case and control was run through and analyzed for HBsAg in IU/mL units, and data entered in the data collection tool for data analysis.

Data analysis

Laboratory data on HB_S Ag and AFB_1 lysine albumin adducts level, was analyzed for means, medians, ranges, standard deviation (Sd) and confidence intervals of the means (CI) by use of a computer software SPSS version 18.0. The confidence interval (CI) statistical manipulations was cross worked with Casio® fx-82EX (Casio®, Japan), statistical tool at 95% confidence level ($0 < p \leq 0.05$).

Analysis of means was done to determine any synergistic (ʒ) or additive effect on liver disease due to a combined sero presence of HBsAg and AFB_1 lysine albumin adducts in subjects compared with those determined to be HBsAg sero positive only, in the study.

RESULTS

In case cohort sample, (N=283), 32% (n=91) of subject serum samples were positive for HBsAg, while 36% (n=101) was positive for aflatoxin B1 lysine albumin adducts (AFB_1 lysine albumin adducts). In the same cohort, 20% (n=57) of the serum sample had evidence of mixed infection with serum samples positive for both HBsAg and AFB_1 lysine albumin adducts. Case subjects had 12% (n=34) of the serum samples testing negative for both HBsAg and AFB_1 lysine albumin adducts and therefore was of unknown status. Table 3 shows the case subject serum samples which tested positive and negative for HBsAg and AFB_1 lysine albumin adducts as biomarkers of liver disease in the study.

Table 3: Case subject serum samples positive or negative for biomarkers of liver disease

Disease factor	sample(n)	ratio	percentage %
HBsAg	91 positive	0.32	32.00
AFB_1 lysine albumin adducts	101 positive	0.36	36.00
AFB_1 lysine adducts + HBsAg	57 positive	0.20	20.00
All above	34 negative	0.12	12.00
Totals	283	1.00	

The chart shows percentage of serum samples positive for the biomarkers of liver disease with 12% (n=34), of total sample negative for both etiologic factors for liver disease.

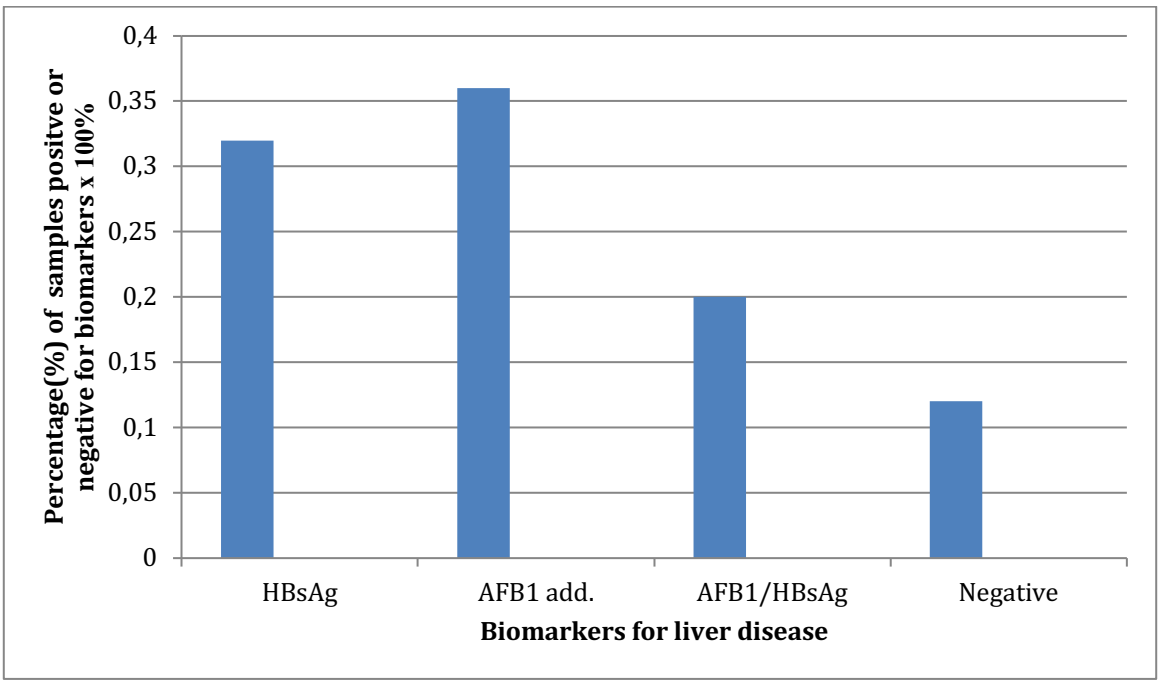

Figure 1: A comparative bar chart on case samples analyzed for liver disease biomarkers

In case cohort, the ratio of serum samples testing positive for AFB_1 lysine albumin adducts was higher at 36%, than that of serum samples testing positive for HBsAg at 32%. The serum samples testing negative for both etiologic factors for liver disease had a lower ratio at12%.

The control subjects (N=283), were clinically disease-free, however, 15% (n=42) of serum samples were positive for HBsAg, while 22% (n=62) of the sample was positive for AFB_1 lysine albumin adducts. In the same cohort, 9% (n=26) of the serum sample was positive for both HBsAg, and AFB_1 lysine albumin adducts an indication of recent exposure to disease factors or recovery from liver disease by the same factors. Control cohort had 54% (n=153) of the subject serum sample testing negative for the etiologic factors for liver disease (Table 4 and figure 2).

Table 4: Control subject serum samples positive or negative for biomarkers of liver disease

Disease factor	sample (n)	ratio	percentage (%)
HBsAg	42 positive	0.1484	14.84
AFB_1 lysine albumin adducts	62 positive	0.22	22.00
AFB_1 lysine albumin adducts + HBsAg	26 positive	0.09	9.00
All above	153 negative	0.54	54.00
Total	283	1.00	

Figure 2 is a control comparative bar chart showing percentage (%) of subject serum sample which tested positive and negative for liver disease biomarkers (HBsAg and AFB_1 lysine albumin adducts), but at much lower levels comparatively than case subject serum samples.

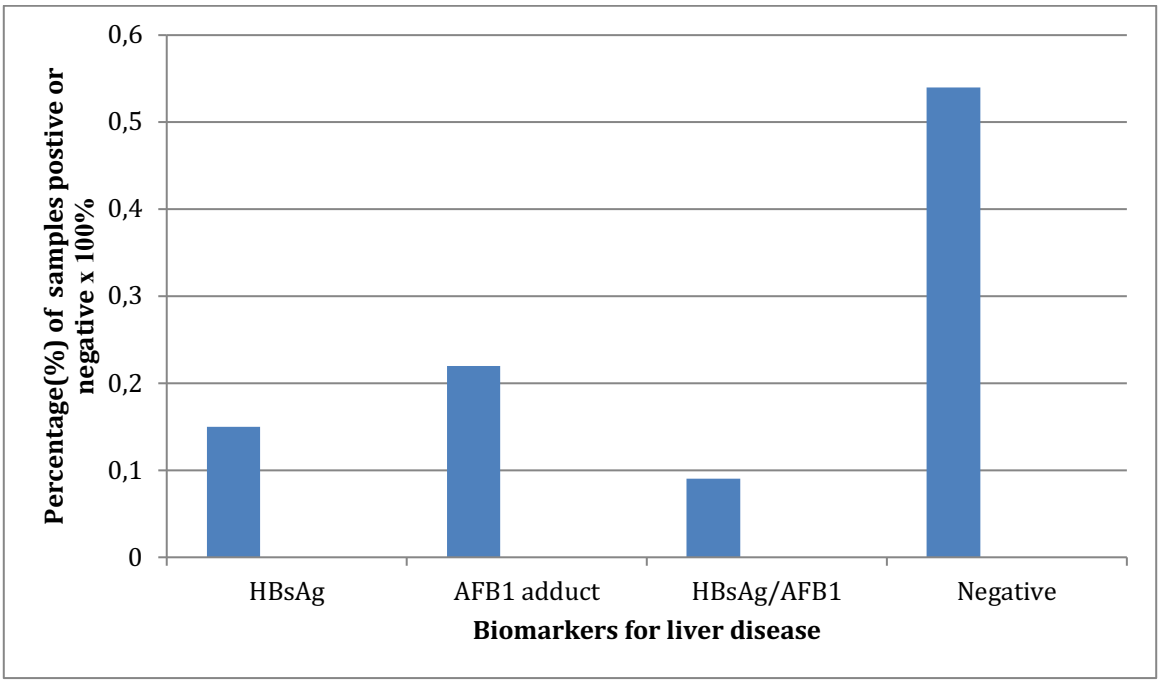

Figure 2: A control comparative bar chart for samples on disease biomarkers

Case cohort hepatitis B surface antigen (HBsAg) level in serum samples

Within the total case sample (N = 283), two categories of serum sample immerged on analysis; those positive for both HBsAg and AFB_1 lysine albumin adducts and those positive for HBsAg only. Among the subcohort identified with only HBsAg, 32.15% (n = 91), of the subject serum samples had positive evidence of hepatitis B surface antigens (HBsAg) at various levels, with a range of 0.50 x 10^3 Iu/mL to 9.80 x 10^3 Iu/mL and a mean of 4.289 x 10^3 Iu/mL, {95%; CI= (3.683 to 4.895) x 10^3}, $p \leq 0.05$. Within the same case-cohort, 20% (n = 57) of the sample was positive for both HBsAg and AFB_1 lysine albumin adducts. Among the case subject samples in this second subcohort, the HBsAg levels ranged from 0.7 x 10^3 Iu/mL to 8.5 x 10^3 Iu/mL, with a mean of 1.471x 10^3 Iu/mL {95%; CI= (1.206 to 1.736) x 10^3} $p \leq 0.05$. In this category of mixed infection, 20% (n=57) of sample had AFB_1 lysine albumen adducts range of 18.60 pg/mg to 102.80 pg/mg with a mean of 41.41 pg/mg {95%; CI= (36.20 to 46.63)} $p \leq 0.05$. Overall however, 52.29% (n = 148), of the case subject blood samples had evidence of active HBV infection as indicated by the quantified levels of hepatitis B surface antigens (HBsAg) with an HBsAg range of 0.50 x 10^3 Iu/mL to 9.80 x10^3 Iu/mL and a mean of 3.204 x 10^3 Iu/mL {95%; CI= (2.76 to 3.65) x 10^3} $p \leq 0.05$.

For the case subject HBsAg positive serum samples, the median mean was 2.20 x 10^3 Iu/mL. Any center HBsAg means above this median was considered high while any mean below was considered low for the purpose of comparisons.

Among the centers with higher sample means for HBsAg levels, Mathuki health center with 0.70% (n=2) of positive subject serum sample had an HBsAg range of 1.8 x 10^3 to 9.8 x 10^3 Iu/mL and a mean of 5.80 x 10^3 Iu/mL, while Mwingi health center with also 0.7% (n=2) of the positive subject sample had an HBsAg range of 1.4 x10^3 to 7.50 x10^3 Iu/mL and a mean of 4.45 x 10^3 Iu/mL. E mali health center in same category but with 1.06% (n=3) of the subject positive sample had an HBsAg range of 0.70 x 10^3 to 8.50 x 10^3 Iu/mL and a sample mean of 4.13 x 10^3 Iu/mL. Table 5 shows those health centers which registered highest mean HBsAg levels irrespective of sample size (n) for serum samples. Makindu health center was among such category with 1.06% (n=3) of positive serum sample which had an HBsAg range of 1.30 x 10^3 to7.80 x 10^3 Iu/mL and a mean of 3.90 x 10^3 Iu/mL. Sultan health center had 2.12% (n=6) of serum samples positive for HBsAg and followed with a range of 0.95 x 10^3 to 7.80 x 10^3 Iu/mL and a mean of 3.86 x 10^3 Iu/mL, while Masaku health facility with 16.6% (n=47) of serum sample positive for HBsAg had a range of 0.50 x 10^3 to 9.80x 10^3 Iu/mL and a mean of 3.57 x 10^3 Iu/mL {95%; CI= (2.73 to 4.41)x10^3}, $p \leq 0.05$. Wote health center with 8.48% (n= 24) of serum sample positive for HBsAg had a range of 0.80 x 10^3 to 9.00 x 10^3 Iu/mL and was among centers which had

comparatively higher mean HBsAg values at 2.69 x 10^3 Iu/mL. Kathozweni health center with 3.18% (n=9) of positive serum sample had an HBsAg sample mean above the median mean at 2.44 x 10^3 Iu/mL and a level range of 0.85 x 10^3 Iu/mL to 6.50 x 10^3 Iu/mL.

Among the centers with HBsAg means below the median mean and therefore categorized as having lower mean HBsAg levels, Kibwezi and Kavisuni health centers had no case HBsAg positive serum samples, while Nuu health center with 0.7% (n=2) of positive subject sample had an HBsAg level range of 0.90 x 10^3 Iu/mL to 1.80 x 10^3 Iu/mL and a center lower mean of 1.35 x 10^3 Iu/mL. Mtito adei health center with only one positive HBsAg sample at 0.35% (n=1) had a mean of 1.60 x 10^3 Iu/mL while Kitui health center with 5.30% (n=15) of the HBsAg positive sample had a range of 0.60 Iu/mL to 9.20 Iu/mL and a mean of 1.70 x 10^3 Iu/mL. Tei wa Yesu health center with 1.41% (n=4) also had an HBsAg range of 0.70x 10^3 Iu/mL to 3.20 x 10^3 Iu/mL and a mean of 1.75 x 10^3 Iu/mL. Kyuso health center had a positive sample midline mean of 2.25 x 10^3 Iu/mL, and an HBsAg levels range of 1.30 x 10^3 Iu/mL to 3.20 x 10^3 Iu/mL. All the other health centers had serum sample HBsAg means above this midline. Table 5 is a summary of the case serum samples size (n), range, median, and mean HBsAg levels per health centre. It also shows the HBsAg positive samples (n) out of the original sample for each center in the study.

Table 5: Case subject sample mean HBsAg levels per health center

Heath center	sample n	range Iu/mL (10^3)	mean Iu/mL (10^3)	median Iu/mL(10^3)	sd
Mutomo	12	0.50—9.80	2.85	1.40	2.994
Tei wa yesu	4	0.70—3.20	1.75	1.55	0.906
Kitui	15	0.60—9.20	1.70	3.10	2.880
Mtito ndooa	4	1.50—8.50	3.26	1.53	3.023
Mwingi	2	1.40—7.50	4.45	4.45	3.050
Kyuso	2	1.30—3.20	2.25	2.25	0.950
Migwani	5	1.10—6.80	3.44	2.30	2.283
Kavisuni	0	0.00	0.00	0.00	0.000
Nuu	2	0.90—1.80	1.35	1.35	0.450
Muthale	7	0.15—9.50	3.14	2.20	2.720
Mathuki	2	1.80—9.80	5.80	5.80	4.00
Kibwezi	0	0.00	0.00	0.00	0.000
Wote	24	0.80—9.00	2.69	1.55	2.392
Sultan H.	6	0.95—7.80	3.86	3.15	2.560
Masaku	47	0.50—9.80	3.57	1.95	2.928
Kathozweni	9	0.85—6.50	2.44	1.80	1.641
Makindu	3	1.30—7.80	3.90	2.60	2.808
Emali	3	0.70—8.50	4.133	3.20	3.252
Mtito adei	1	0	1.60	1.60	0.000

Comparatively though, Nuu health center with 0.7% (n=2) of positive serum sample had the lowest mean HBsAg value at 1.35 x 10^3 Iu/mL followed by Mtito adei health center which was in category of those centers with lower sample HBsAg means, but with only 0.35% (n=1) of positive serum sample, at 1.60 x10^3 Iu/mL lower than that of Kitui health center which had 5.3% (n=15) of positive serum samples having an HBsAg range of 0.60 x 10^3 Iu/mL to 9.20 x 10^3 Iu/mL and a mean of 1.70 x 10^3 Iu/mL. Figure 3 is a bar chart comparison of the case subjects HBsAg mean levels per center with Mathuki, Mwingi and E mali health centers having higher HBsAg center means, while Nuu, Mtito adei , Kitui and Tei wa Yesu centers had lower HBsAg means in serum samples analysed.

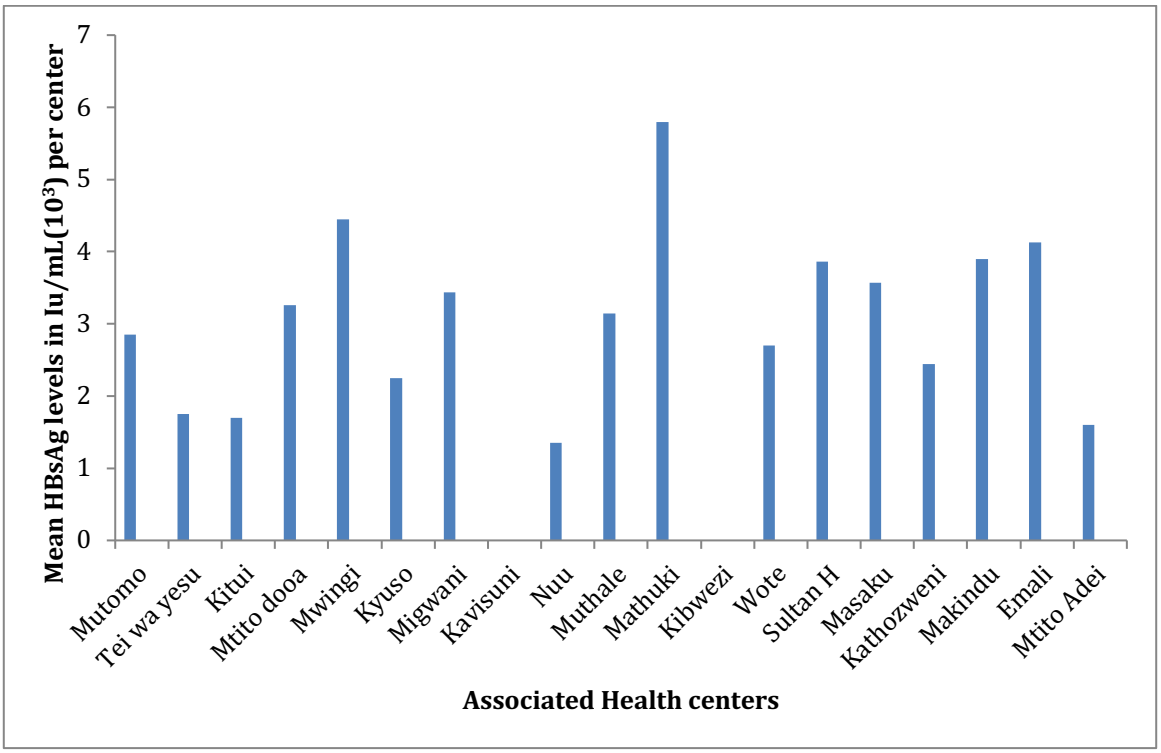

Figure 3: Case subjects serum mean HBsAg levels per health center

Control cohort hepatitis B surface antigen (HBsAg) levels in blood sample

The control cohort had serum samples positive for both HBsAg and AFB_1 lysine albumin adducts but some serum samples were positive for HBsAg only. Within the sample, (N = 283), 15% (n = 42), of serum samples had positive evidence of HBsAg only, with levels ranging from 150 Iu/mL to 990 Iu/mL, and with a mean of 506.3 Iu/mL, (CI = 427.8 to 584.8), at 95% confidence level ($p \leq 0.05$). The control cohort also had 9% (n = 26), of the serum sample positive for both hepatitis B surface antigens and AFB_1 lysine albumin adducts at various levels(Table 6). Among this sub group, 9% (n=26), of sample was positive for AFB_1 lysine albumin adducts with a range of 3.5 pg/mg to 22.4 pg/mg and a mean of 10.35 pg/mg (CI= 8.56 to 12.15) at 95% confidence level ($p \leq 0.05$), while hepatitis B surface antigens (HBsAg) had a range of 50 to 150 Iu/mL, with a mean of 86.35 Iu/mL (CI = 76.99 to 95.70), at 95% confidence level ($p \leq 0.05$). Overall however, 24% (n = 68), of the control subject serum sample was positive for low levels of HBsAg in serum samples with a level range of 50 Iu/mL to 990 Iu/mL and a mean of 347.57 Iu/mL (CI= 278.35 to 416.80) at 95% confidence level, $p \leq 0.05$. Table 6 shows the HBsAg range and the medians per health center. In controls the median mean for HBsAg was 0.15 Iu/mL and therefore ten (10) health centers had mean HBsAg greater than the median while eight (8) centers had means below the median and hence considered to have low mean levels for HBsAg. However, among the control health centers with the low serum sample mean HBsAg in this cohort, Kavisuni and Kyuso centers each with 0.35% (n=1) of the positive subject sample had a mean of 0.70 $x10^3$ and 0.90 x 10^3 Iu/mL respectively, considered low even without a clinical disease among the subjects from whom the serum sample was drawn.

Table 6: Control subjects mean HBsAg levels in serum samples per health center

Health center	sample n	range Iu/mL(10^3)	mean Iu/mL(10^3)	median Iu/mL(10^3)	sd
Mutomo	10	0.085—0.990	0.411	0.40	0.310
Tei wa yesu	1	0.00	0.060	0.06	0.00
Kitui	3	0.095—0.150	0.132	0.15	0.026
Mtito ndooa	0	0.00	0.00	0.00	0.00
Mwingi	4	0.07—0.80	0.500	0.57	0.297
Kyuso	1	0.00	0.900	0.90	0.00
Migwani	4	0.55—0.85	0.683	0.67	0.108

Kavisuni	1	0.00	0.780	0.78	0.00
Nuu	3	0.20—0.55	0.333	0.25	0.155
Muthale	3	0.15—0.95	0.483	0.35	0.339
Mathuki	1	0.00	0.150	0.15	0.00
Kibwezi	0	0.00	0.00	0.00	0.00
Wote	13	0.05—0.50	0.228	0.25	0.144
Sultan H	5	0.20—0.49	0.348	0.35	0.097
Masaku	17	0.06—0.98	0.304	0.10	0.333
Kathozweni	3	0.085—0.150	0.108	0.09	0.030
Makindu	0	0.00	0.00	0.00	0.00
Emali	0	0.00	0.00	0.00	0.00
Mtito Adei	0	0.00	0.00	0.00	0.00

Migwani health center with 1.41% (n=4) of positive serum sample and HBsAg level range of 0.55 x 10^3 to 0.85 x 10^3 Iu/mL had a mean of 0.683 x 10^3 Iu/mL{95%; CI= (0.577 to 0.788) x 10^3} $p \leq 0.05$, while Mwingi health center in same category, had 1.41% (n=4) of positive subject samples with HBsAg range of 0.07 x 10^3 Iu/mL to 0.80 x 10^3 Iu/mL but a lower center mean of 0.50 x 10^3 Iu/mL{CI= (0.208 to 0.791)x 10^3} at 95% confidence level ($p \leq 0.05$). Muthale health center with 1.06% (n=3) of positive serum samples had an HBsAg level range of 0.15 x 10^3 to 0.95 x 10^3 Iu/mL and a mean of 0.483 x 10^3 Iu/mL{95%; CI= (0.099 to 0.866) x 10^3} $p \leq 0.05$. This was followed by Sultan H center with 1.77% (n= 5) of positive serum sample and an HBsAg level range of 0.20 x 10^3 to 0.49 x 10^3 Iu/mL but a mean of 0.348 x 10^3 Iu/mL {95%; CI=(0.263 to 0.433) x10^3} $p \leq 0.05$. This was considered high for a clinically HBV disease free group.

Table 6 shows the control subject mean HBsAg levels in blood samples per health center. It was noted that the health centers with highest numbers (n) of positive samples in control cohort had much lower mean HBsAg values. This included Masaku health center with 6.0% (n=17) of positive serum samples which had an HBsAg level range of 0.06 x 10^3 to 0.98 x 10^3 Iu/mL and a mean of 0.304 x 10^3 Iu/mL{95%; CI= (0.146 to 4.623) x10^3} $p \leq 0.05$, while Wote center with 4.59% (n=13) of positive serum sample had an HBsAg level range of 0.05 x 10^3 to 0.50 x 10^3 Iu/mL and a mean of 0.228 x 10^3 Iu/mL{95%; CI= (0.150 to 0.306) x 10^3} $p \leq 0.05$, among the others.

Among the centers with lowest mean HBsAg levels, Makindu, Emali, Mtito Adei, Kibwezi and Mtito ndooa, each had 0%(n=0) of positive serum sample while Kathozweni with 1.06% (n=3) of positive sample had an HBsAg levels range of 0.085 x 10^3 Iu/mL to 0.150 x 10^3 Iu/mL and a mean of 0.0108 x 10^3 Iu/mL.

Figure 4 bar chart compares the control subjects' sample HBsAg means per center with Kyuso and Kavisuni health centers having the highest control HBsAg means, while Tei wa yesu and Kathozweni had the lowest HBsAg means among the health centers with subjects positive serum samples.

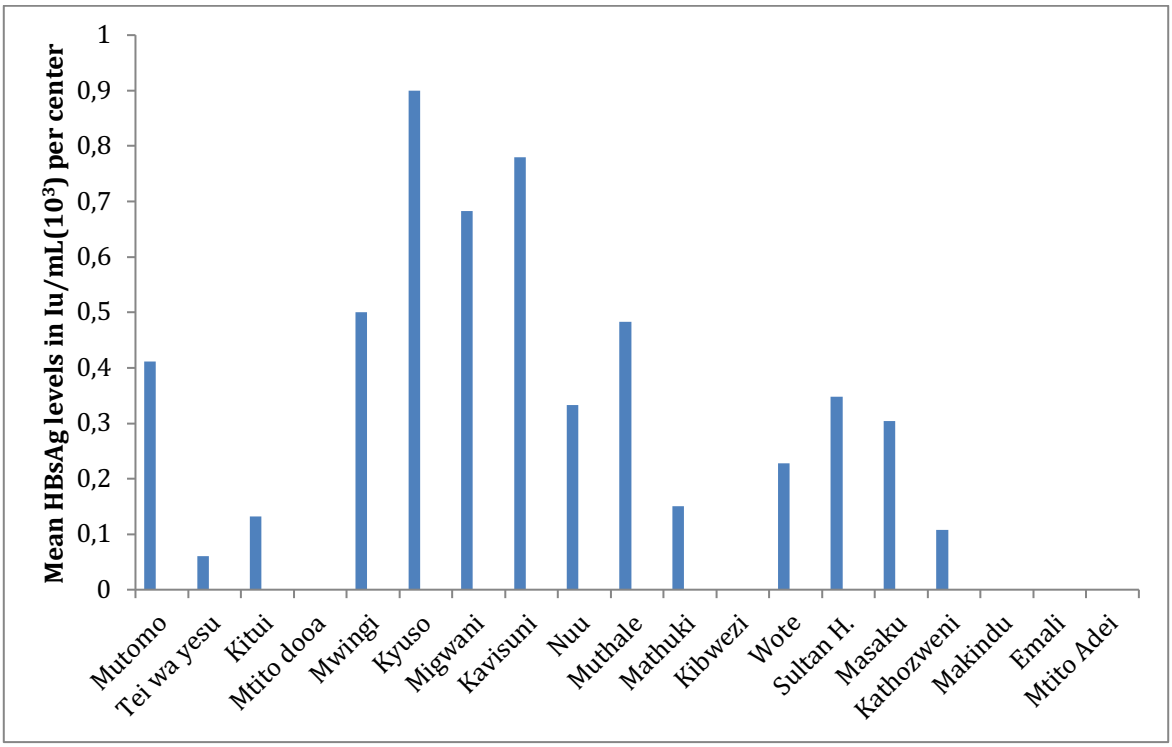

Figure 4: Control subjects mean HBsAg levels in blood samples per health center

Case cohort AFB_1 lysine albumin adducts level in blood samples.

Among the total number of case samples (N = 283), 36% (n = 101), positive subject samples had an AFB_1 lysine albumen adducts level with a range of 15.5 pg/mg to 135 pg/mg, and a mean of 43.64pg/mg (CI= 38.91 to 48.37), at 95% confidence level ($p \leq 0.05$). Additionally, within the same case cohort, 20% (n = 57), of serum samples analyzed tested positive for both hepatitis B surface antigens (HBsAg) and AFB_1 lysine albumin adducts. For this sub cohort, 20% (n=57), of the subject serum sample had AFB_1 lysine albumin adducts with a range of 18.60 pg/mg to 102.80 pg/mg, and a mean of 41.41 pg/mg (95%; CI= 36.195 to 46.624) $p \leq 0.05$, while HBsAg levels ranged from 700 Iu/mL to 8500 Iu/mL, with a mean of 1471 Iu/mL (CI=1205.7 to 1736.3) at 95% confidence level ($p \leq 0.05$) . Overall however, 55.83% (n=158) of the case subject sample had AFB_1 lysine albumin adducts range of 15.5 pg/mg to 135.0 pg/mg with a mean of 42.93 pg/mg (CI=39.36 to 46.51) at 95% confidence level ($p \leq 0.05$).

Among the centers with higher mean for AFB_1 lysine albumin adducts, Mathuki health center with 0.706% (n=2) of the serum samples, had a subject AFB_1 lysine albumin adducts level range of 68.0 pg/mg to 82.50 pg/mg with a mean of 75.75 pg/mg (95%; CI= 65.70 to 85.80) $p \leq 0.05$, while Kathozweni health center with 3.15% (n=9) of subject serum samples had a range of 23.8 pg/mg to 102.80 pg/mg with a mean of 63.80 pg/mg(95%; CI= 46.20 to 81.43), $p \leq 0.05$. E mali health center with 1.06% (n=3) of the serum sample was in same category, with a subject serum AFB_1 lysine albumin adducts range of 18.50 pg/mg to 64.80 pg/mg, but with a center adducts mean of 42.80 pg/mg (CI= 21.40 to 64.20) at 95% confidence level($p \leq 0.05$). Table 6 shows the case subject AFB_1 lysine albumin adducts level per center.

For health centers with lower mean subject AFB_1 lysine albumin adducts in this cohort, Mtito ndooa with 1.06% (n=1) of the sample had a range of 18.80 pg/mg to 25.00 pg/mg and an AFB_1 lysine albumin adducts mean of 21.53 pg/mg (95%; CI= 18.61 to 24.45) $p \leq 0.05$, while Kyuso health center with 0.35% (n=1) of the sample had a mean of 23.80 pg/mg. Tei wa Yesu in this category with 0.71%(n=2) of the sample had an AFB_1 adducts range of 19.80 pg/mg to 31.50 pg/mg and a mean of 25.65 pg/mg(CI= 17.56 to 33.74) at 95% confidence level, $p \leq 0.05$. Table 7 shows the case subjects AFB_1 lysine albumin adducts levels, range, means and median per health center

Table 7: Case subjects AFB_1 lysine albumin adduct level in blood samples per health center

Health center	sample (n)	range pg/mg	mean pg/mg	median pg/mg	sd
Mutomo	11	15.80—93.80	34.06	25.80	24.84
Tei wa yesu	2	19.80—31.50	25.65	25.65	5.840
Kitui	9	16.80—47.80	33.28	33.80	9.344
Mtito ndooa	3	18.80—25.00	21.53	20.80	2.583
Mwingi	8	18.50—96.50	44.83	28.65	30.23
Kyuso	1	0.000	23.80	23.80	0.000
Migwani	7	19.80—63.00	38.08	32.00	17.090
Kavisuni	2	19.80—56.50	38.15	38.15	18.350
Nuu	5	15.80—71.80	38.84	32.00	21.030
Muthale	10	19.50—66.50	34.24	27.90	15.930
Mathuki	2	68.00—82.50	75.25	75.75	7.250
Kibwezi	1	0.000	33.80	33.80	0.000
Wote	24	17.50—64.50	34.15	31.25	11.797
Sultan H	7	19.80—74.50	43.66	43.00	21.040
Masaku	52	15.50—97.80	47.38	43.00	22.500
Kathozweni	9	23.80—102.8	62.13	63.80	26.980
Makindu	5	24.00—55.00	40.62	38.80	11.410
Emali	3	18.50—64.80	42.03	42.80	18.910
Mtito Adei	3	53.30—135.0	68.50	68.50	35.417

Figure 5 shows a comparison on case subject mean AFB_1 lysine albumin adducts between health centers with Mathuki health center having higher subject mean of 75.75 pg/mg, while Mtito ndooa health center had the lowest AFB_1 lysine albumin mean at 20.80 pg/mg of albumin.

Within the same case cohort, a total of 55.83% (n = 158), of case subject serum samples had tested positive for AFB_1 lysine albumin adducts, suggesting a mixed etiology for liver disease.

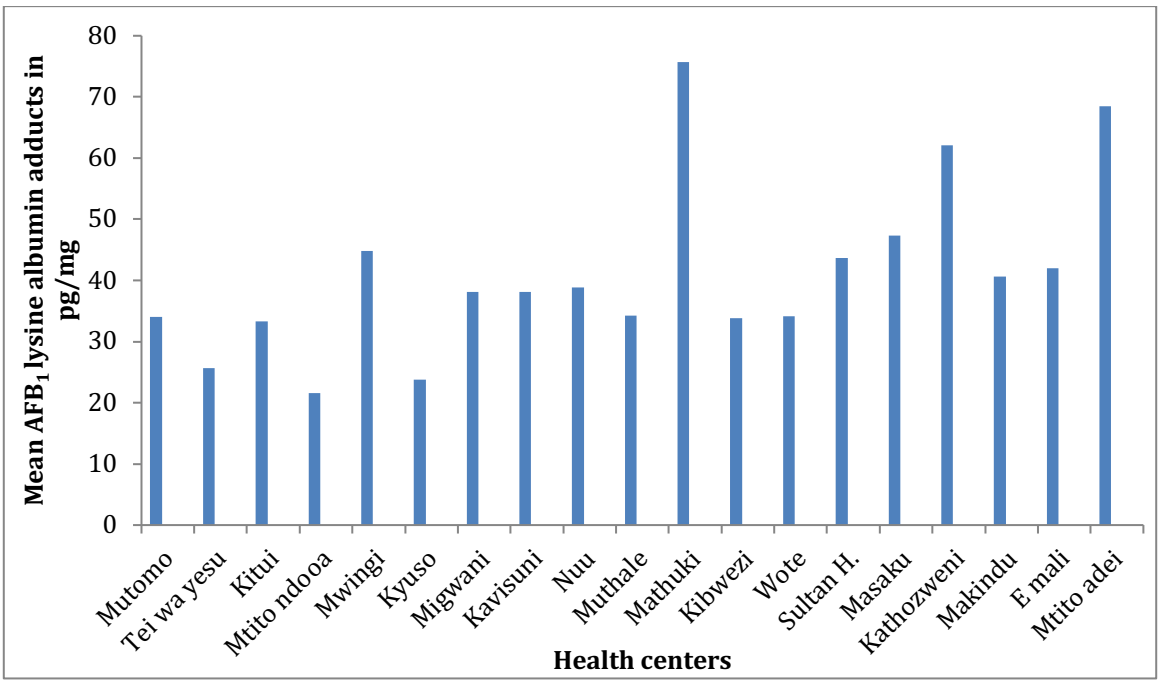

Figure 5: Case mean AFB_1 lysine albumin adducts level in blood samples per center

Control cohort AFB_1 lysine albumin adducts level in blood samples

Among the control cohort sample (N=283), 22% (n = 62), of the sample had tested positive for AFB_1 lysine albumin adducts with a range of 4.30 pg/mg to 60.50 pg/mg and a mean of 15.95 pg/mg (CI = 13.22 to 18.67) at 95% confidence levels ($p \leq 0.05$). Within the same cohort, 9% (n = 26), of the control serum samples had evidence of both HBsAg and AFB_1 lysine albumin adducts at various levels (Table 8).

Table 8: Control subjects mean AFB_1 lysine albumin adduct level in serum samples per center

Health center	positive sample (n)	range pg/mg	mean pg/mg	median pg/mg	sd
Mutomo	8	6.50—12.00	9.03	7.90	2.130
Tei wa yesu	2	5.50—16.50	11	11	5.500
Kitui	7	9.50—29.50	19.73	19.50	6.387
Mtito ndooa	1	0.00	4.50	4.50	0.000
Mwingi	3	5.80—15.60	12.30	15.50	4.596
Kyuso	0	0.00	0.00	0.00	0.000
Migwani	1	0.00	8.40	8.40	0.000
Kavisuni	0	0.00	0.00	0.00	0.000
Nuu	1	0.00	8.00	8.00	0.000
Muthale	5	5.50—32.50	18.12	18.80	10.452
Mathuki	2	17.00—28.50	22.75	22.75	5.750
Kibwezi	0	0.00	0.00	0.00	0.000
Wote	11	4.50—23.40	12.25	13.00	5.269
Sultan H.	1	0.00	9.50	9.50	0.000
Masaku	33	3.50—40.50	13.90	10.80	9.262
Kathozweni	8	6.40—60.50	23.125	15.70	18.281
Makindu	3	5.80—10.40	8.33	8.80	1.906
E mali	1	0.00	7.50	7.50	0.00
Mtito adei	1	0.00	11.40	11.40	0.00

Within this sub cohort, sample serum hepatitis B surface antigens (HBsAg) levels had a range of 50 Iu/mL to 150 Iu/mL with a mean of 86.35 Iu/mL (95%; CI= 76.99 to 95.69) $p \leq 0.05$, while AFB_1 lysine albumin adducts had a level range of 3.5 pg/mg to 22.4 pg/mg with a mean of 10.35 pg/mg (CI= 8.56 to 12.15) at 95% confidence level ($p \leq 0.05$). Overall however, 31% (n=88) of the control subject serum samples were positive for AFB_1 lysine albumin adducts with a level range of 3.5 pg/mg to 60.50 pg/mg and a mean of 14.30 pg/mg (CI= 12.23 to 16.36) at 95% confidence level ($p \leq 0.05$). Table 8 shows the control subjects mean AFB_1 lysine albumin adduct levels per health center.

Among the control centers with higher mean AFB_1 lysine albumin adducts level, Kathonzweni health center with 2.83%(n=8) of positive serum samples had an AFB_1 albumin adducts range of 6.4 pg/mg to 60.5 pg/mg and a mean of 23.125 pg/mg (95%; CI=10.46 to 35.80) $p \leq 0.05$, while Mathuki center with 0.71% (n=2) of positive serum sample had an AFB_1 adducts range of 17.00 pg/mg to 28.50 pg/mg with a mean of 22.75pg/mg (95%; CI=14.78 to 30.72) $p \leq 0.05$. In this category, Kitui health center with 2.47% (n=7) of positive serum samples had a range of 9.50 pg/mg to 29.50 pg/mg with an AFB_1 lysine albumin adducts mean of 19.73 pg/mg (CI=14.99 to 24.46) at 95% confidence level ($p \leq 0.05$). Among centers with lower mean AFB_1 lysine albumin adducts, Mtito ndooa and E mali health centers with 0.35% (n=1) each, of positive serum sample, had an AFB_1 lysine albumin adduct mean of 4.50 pg/mg and 7.50 pg/mg respectively. Makindu center in this lower mean category, had a sample range of 5.8 pg/mg to 10.4 pg/mg with a mean of 8.33 pg/mg (CI= 6.17 to 10.49) at 95% confidence level ($p \leq 0.05$). Figure 6 shows a bar chart comparison of AFB_1 lysine albumin adduct means per center, with Kathozweni and Mathuki health centers having highest mean AFB_1 albumin adducts at 22.75 pg/mg and 23.13 pg/mg respectively, while Mtito ndooa had the lowest mean AFB_1 serum adducts at 4.5 pg/mg.

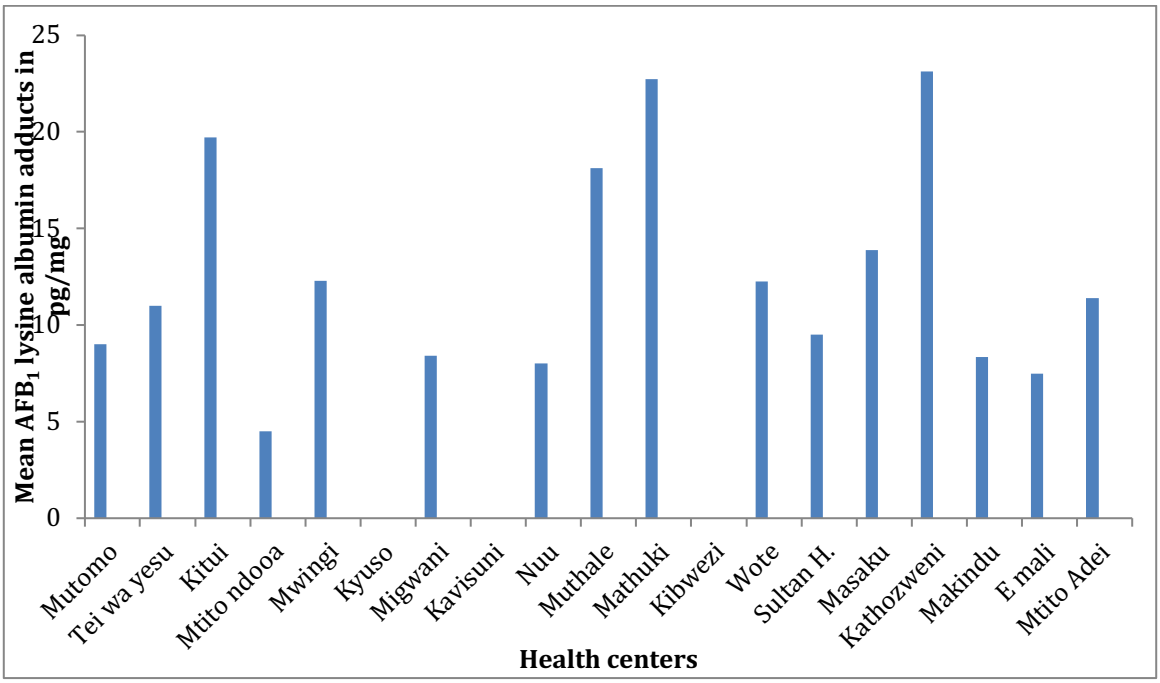

Figure 6: Control subjects mean AFB_1 lysine albumin levels per health center

DISCUSSION

The current work is the first study to evaluate the link between the elevated levels of serum HBsAg and AFB_1 lysine albumin adducts as biomarkers to liver disease in lower eastern Kenya.

Lower eastern Kenya has had an aflatoxicosis outbreak severally in the near past, with the outbreak of April 2004 generating 317 cases and causing 125 deaths (Lewis *et al.,* 2005). A cross sectional study by the team revealed a high level of AFB1 contamination of maize grain which was and still his the stable food in this region (Lewis *et al*., 2005). Aflatoxin B1 is also metabolized primarily in the liver by cytochrome p-450 system, forming the highly reactive AFB_1-8, 9-epoxide which binds to hepatic cell's DNA. This bio chemical reaction forms AFB_1-formalmidopyrimidine DNA adducts which alters normal cell function, making the macro molecule highly carcinogenic (Turner *et al.,* 1998). Studies have shown that, the half life (1/2) of serum albumin adducts stored under normal temperature is 20 days, hence any chronic exposure to dietary AFB_1 leads to high circulatory concentration of AFB_1 lysine albumin adducts leading to chronic liver damage, liver disease or sudden aflatoxicosis, depending on a patient's immune system in dealing with the toxin (Scholl & Groopman, 2008). In this study the case subjects had more positive serum samples 55.83% (n=158) testing for AFB_1 lysine albumin adducts than control subjects at 31.0% (n=88), who had no liver disease. Similarly, the case subject mean AFB_1 lysine albumin adducts was higher at 42.93 pg/mg (95%; CI=39.36 to 46.51) $p \leq 0.05$, than the controls at 14.30 pg/mg (95%; CI=12.23 to 16.36) $p \leq 0.05$. According to Turner, *et al.,*(2013), formation of AFB_1 serum albumin adducts is dose dependent, with accumulation of the lysine albumin adducts correlating well with exposure to dietary AFB_1 in many cases. This observation agrees with this study, which is suggestive of high exposure to dietary AFB_1 among the case subjects in the region. The lower mean level for AFB_1 lysine albumin adducts in controls who had no evidence of liver disease suggested a certain cumulative threshold for ingested AFB1 as one causal agent for the liver disease had not been met. This suggested that AFB1 induced hepatoxicity in case subjects in this study were dose and level dependent. This agrees with studies by Turner *et al. (*2013).

This observation again agrees with other studies by Muthomi *et al.,* (2009) and Muhia *et al.,* (2008) which found that subjects in this region were exposed to higher levels of aflatoxin B1 from dietary maize grain. Other studies have shown that products of exposure to dietary AFB_1 and other mycotoxins, end up in the liver and the circulatory system, including AFB_1 lysine albumin adducts and are highly toxic to the human body, at times

causing acute jaundice and liver failure (WHO, 2018; Redd *et al.,*2009). This agrees with the current study, which found varying levels of AFB_1 lysine albumin adducts in both case and control serum samples.

Exposure to HBV may lead to acute or chronic hepatitis B infection depending on age and the immune status of an individual whose diagnosis relies heavily on the presence of HBsAg as a biomarker of liver disease in subject serum samples (Terrault *et al.,* 2016). The lower mean of HBsAg in control subject samples, which were disease-free of 3.476×10^2 Iu/mL suggested that subjects were under incubation for HBV or had recovered after an exposure to an HBV infection. This was supported by studies by Dufour (2006), who observed that HBsAg was detectable in chronic, passive, or acute hepatitis B infections, even soon after recovery. In the same study, 20% (n=57) of case subjects serum samples were positive for both HBsAg and AFB_1 lysine albumin adducts, while the control subjects had 9.0% (n=26) of the sample positive for the combined AFB_1 serum adducts and HBV infection. In this study, the case subjects had a higher number of samples with mixed infection than the controls. This suggested that a combined infection of HBsAg and AFB_1 toxicity had a synergistic or an additive effect on liver damage and hence, liver disease among the subjects. This view is supported by studies, including that which exposed the synergistic effect of dietary AFB_1 and HBV in transgenic mice on hepatocellular carcinoma (Kew, 2003). Further, since the control subjects were not among those admitted to health centers for liver disease and did not have physical symptoms of the disease, this was suggestive of a recent exposure or recovery from an HBV infection.

CONCLUSION

This is the first case-control study in lower eastern Kenya to link the serum levels of HBsAg and AFB_1 lysine albumin adducts to liver disease among the subjects. This evaluation study exposed dietary AFB_1 and HBV as endemic multifactor etiology for liver disease in lower eastern Kenya. The residents of the study area were found to be highly exposed to dietary AFB_1 and hepatitis B virus as determined by the quantified AFB_1 lysine albumin adducts and HBsAg values in serum samples presented in the study. While the control subjects were disease-free, some had evidence of a recent exposure to the two liver disease factors with HBsAg means of 347.57 Iu/mL (95%; CI= 278 to 416.80) $p \leq 0.05$ and AFB_1 lysine albumin adducts mean of 14.30 pg/mg (95%; CI=12.23 to 16.36) $p \leq 0.05$. Within the case and control cohorts, the percentage (%) of subject serum samples testing positive for AFB_1 serum albumin adducts were more (36.13%), than those testing positive for HBsAg (30.83%). It is therefore concluded that, even though both dietary AFB_1 toxicity and HBV infection were endemic in the area, comparatively dietary AFB_1 toxicity was much more prevalent in the region than hepatitis B infections and that the two factors had an additive effect to liver disease

Acknowledgments

This study was carried out in lower eastern Kenya in nineteen (19) health centers, which also included major county referral health facilities where serum samples were collected. Part of the work also took part in the Kenya medical research institute (KEMRI), and Bora Biotech laboratories limited, Kabete. Laboratory analysis of samples was supervised by J. Gathumbi. The principal investigator, Pius m. Kimani collected the serum samples, did laboratory testing under the supervision, and statistically analyzed the data. This work is part of some certification for Pius m. Kimani. We thank the study subjects/participants for granting this study the human samples used. This work is sent for publication with permission from the Director, KEMRI and the approval of the JKUAT appointed corroborators, Yeri Kombe, Fred w. Wamunyokoli, Charles F. L.Mbakaya, and Joseph Gathumbi. I thank all for guidance and mentorship during the study.

References

Agro food & veterinary diagnostics organization (AVD), (2013). Mycotoxins Handbook: Euroclone kits for mycotoxins detection: www.euroclonegroup.it/allegati/prodotti/flyermycoen/3288/pdf

Bao, L., Trucksess M. W., White K. D. (2010). "Determination of Aflatoxins B_1, B_2, G_1 and G_2 in olive oil, peanut oil and sesame oil". *Journal of AOAC international,* 93 (3) : 936 –942.

Bell,S.J., Nguyen,T.(2009). "The management of hepatitis B infection." *Australian preser.* 23(4):99-104.

Buddeberg, F., Schimmer B., Spahn, D. (2008). Transfusion-transmissible infections and transfusion-related immunomodulation. *Best Practice & Research. Clinical Anaesthesiology* 22 (3): 503–17.

Coucil for agriculture, science & technology(CAST). (1989). Mycotoxins: Economics and health risks. *Task force report No.116 Ames,* IOWA, 1: 5-8.

Chan, H,L., Wonq, G, L., Chin, A, M., Yu, K, K., Chan, H,Y., Sunq, J,J., Wonq, V,W.(2009). Hepatitis B virus genotype C is associated with more severe liver fibrosis than genotype B. *Clinical gastroenterelogy hepatology,* 7(12):1361-1366

CDC, (2012). Epidemiology and prevention of preventable diseases. The Pink Book: Courses textbook- 12th edition, 9:216--240

CDC, (2004). Outbreak of aflatoxins poisoning in Eastern and Central provinces, Kenya,–July 2004. *Morbidity Mortality Weekly Report*. 53: 790 –792.

Chan, H. L., Wong, V.W., Wong, G. L., Tse, C. H., Chan, H. Y., Sung, J. J. (2010): A Longitudinal study on the natural history of serum hepatitis B surface antigen changes in chronic Hepatitis B. *Journal of hepatology* 52:1232-1241.

Chen, D., Kaplan, L.(2006).The performance of a new generation chemiluminescent assay for hepatitis B surface antigen. *Clinical chemistry* 52:1592--1598

Coffin, C. S., Mulrooney-Cousins, P.M., Vanmarle, G., Roberts, J.P., Michalak, T.I., Terrault, N. (2011). "Hepatitis B virus (HBV) quasispecies in hepatic and-extrahepatic viral reservoirs in liver transplant recipients on prophylactic therapy". *Liver Transpl*ants, 17 (8): 955–62

Dufour, D.R. (2006).Hepatitis B surface antigen(HBsAg) Assays -- are they Good enough for their current uses?. *Clinical chemistry*. 52(8): 1447--1458

EFSA, (2013). Aflatoxins in food. www.efsa.europa.eu/en/topics/topic/aflatoxins.htm

Fairley, C., Read, T. (2012). Vaccination against sexually transmitted infections. *Current Opinion in Infectious Diseases,* 25 (1): 66–72.

Gan, S.I., Devlin, S.M., Scott-Douglss, N.W., Burak, K.W.(2005). "Lamivudine for the treatment of membranous glomerulopathy secondary to chronic hepatitis B infection". Canadian journal of gastroenterology, 19(10):625-629.

Gathumbi, J.K., Usleber, E., Martlbauver, E.(2001). Production of ultra sensitive antibodies against aflatoxin B1. *Letters in applied microbiology*, 32:347- 351.

Golthardt, D., Riediger,C., Weis, K.H., Encke,J., Schemmer,P., Schmidt,J., Sauer, P. (2009). Fulminant hepatic failure, etiology and indications for liver transplantation. *Nephrology dialysis & transplantation*, 22(8):85-88.

Iannacone, M., Sitia G, Isogawa, M., Marchese, P., Castro, M., Lowenstein, P., Chisari, F., Ruggeri, Z.,, Guidotti, L. (2005). Platelets mediate cytotoxic T lymphocyte-induced liver damage. *National Medical journal,* 11 (11): 1167–9.

Karayiannis, P., Thomas, H., Mahy, B., Regenmortel, M. (2009). *Desk Encyclopedia of Human and Medical Virology*. Boston: Academic Press. 5: 110-115

Kew, M.C.(2003). Synergistic interaction between aflatoxin B1 and hepatitis B virus in hepato Carcinogenesis. *Liver international.* 23(6):405—409

Lawley, R. (2013). Aflatoxins: The science of safe food: *Food safety watch*. www.foodsafetywatch.org/factsheet/aflatoxins.

Lewis, L., Onsongo, M., Njapau, H., Schurz – Rogers H., Luber, G., Kierzak, S. (2005). Aflatoxin contamination of commercial maize products during an outbreak of acute aflatoxicosis in eastern and central Kenya. *Environmental health perspective,* 113:1763–1767.

Li, F.Q., Li, Y.W., Luo, X.Y., Wang, Y.R., Luo, X.Y. (2009)."Natural occurrence of aflatoxin in Chinese peanut butter and sesame paste" Journal of agricultural and food chemistry, 57(9): 3519-3524.

Liaw, Y. F., Brunetto, M. R., Hadziyannis, S. (2010). "The natural history of chronic HBV infection and geographical difference." *Antiviral therapy,* 15: 25 – 33.

Lok, A., McMahon, B., (2007). Chronic hepatitis B infections. *Journal of Hepatology,* 45 (2): 507–39

Liaw Y. F. (2011): Clinical utility of hepatitis B surface antigen, quantification in patients with hepatitis B: A review. *Journal of hepatology.* 53:2121-2159.

Muthomi J. W., Njenga L. N., Gathumbi, J. K., Chemining'wa G. W. (2009): The Occurrence of aflatoxins in maize and distribution of mycotoxin – producing fungi in Eastern Kenya. *Journal of plant pathology.* 8: 113-119.

Muhia J. T., Straetmans M., Ibrahi A., Njau J., Muhanje O., Gurach A., Gikundi S., Mutonnga D., Tetteh C., Likimani S., Breiman R. F., Njenga K.,Lewis L. (2008). Aflatoxin levels in locally grown maize from Makueni District in Kenya. *East african medical journal*. Vol. 85 (7): 312 -316.

Pearce, N., Richardi, L.(2014). Commentary: Three worlds collide. Berkson bias, Selection bias, and Collider bias. *International journal of epidemiology* 43(2): 521--524

Redd, J.T., Baumbach, J., Kohn,W., Williams, I. (2009). "Patient to patient transmission of hepatitis B virus associated with Oral surgery*" Journal of infectious diseases,* 195(9):1311-1314.

Rural 21, (2013). No chance for aflatoxins. *International Journal for rural development*; http:www.rural21.com/English/news/details/article/no-chance-for-aflatoxin-0000656

Schecsellman, J.J. (1982). Sample size determination in epidemiological studies. *American Journal of Epidemiology.* 115: 752-758.

Scholl, F., Groopman , J.D.(2016). "Long term stability of human aflatoxin B1 albumin adducts assessed by Isotope-- dilution mass spectroscopy and HPLC-Fluoresence. *Cancer epidemiological Biomarkers Preview*. 17(6):1436--1439

Sitia, G., Iannacone, M., Ruggeri, Z., Guidotti, L. (2007). HBV pathogenesis in animal models: recent advances on the role of platelets. *Journal of Hepatology,* 46 (4):719–26.

Terrault, N., Roche, B., Samuel, D. (2005). "Management of the hepatitis B virus in the liver transplantation setting: a European and an American perspective". *Liver Transpl.* 11 (7): 716–32.

Terrault, N.A., Bzowej, N.H., Chang K-M.(2016). AASLD guidelines for treatment of chronic hepatitis B infections. *Journal of hepatology* 63(1):261—283

Turner, P.C., Dingley,K.H., Coxhead, J., Rusell, S., Garner, S. (1998). Detectable levels of serum aflatoxin B1 albumin adduct in the United Kingdom population: Implications for AFB_1 exposure in the United Kingdom. *Cancer epidemiology, Biomarkers and Prevention*. 7(5):441—7

Westriech, D. (2012). Berkson Bias, Selection bias, and missing data. *Epidemiology,* 23(1):159--164

WHO, (2010). WHO guidelines on drawing blood: best practices in Phlebotomy. *NLB: WB 381*, 4:25-29

WHO. (2018): Aflatoxins: Risk assessments on aflatoxins undertaken by the joint FAO/WHO, expert committee on food additives. *JECFA*

Yan, H., Zhong, G., Xu, G., He, W., Jing, Z., Gao, Z., Huang, Y. (2012). Sodium taurocholate co transporting polypeptide is a functional receptor for human hepatitis B and D virus. *E Life* 1: e00049.

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The Prevalence and the Common Types of Cyanotic Congenital Heart Diseases in Albaha, Saudi Arabia

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Abstract
Background: Cyanotic congenital heart disease accounts about one-third of all congenital heart disease, and the prevalence of it vary from center to another due to related factors. Objectives: The study aimed to provide the prevalence and the most common types and distribution of CCHD in children less than 14 years of age in Albaha area Saudi Arabia. Methods: Hospital-based retrospective observational cross-sectional study involved all cases of Cyanotic congenital heart disease (CCHD) diagnosed at the King Fahad Hospital Albaha, Saudi Arabia, between January 2006 and January 2019. All patients were screened by echocardiography to confirm the diagnosis. Results: Total of 314 patients were diagnosed as cyanotic congenital heart disease (CCHD) in our center. There were 158 males (50.32%) and 156 females (49.68%). The age of patients was from 1 day to 14 years with a mean of 35.42±4.1 months. The neonatal period was the modal age at diagnosis. Approximately 80% of the children had been diagnosed at the age of < 1 yr and 20% of cases diagnosed after that. Tetralogy of Fallot (TOF) was the most common CCHD; it was diagnosed in 125 pts 39.81%. Double Outlet Right Ventricle (DORV) diagnosed in 48 pts 15.29%. Transposition of the Great Arteries (TGA) diagnosed in 34 pts 10.82. Pulmonary atresia 20 pts, 6.37%., Truncus arteriosus 20 pts, 6.37%., and Hypoplastic Left Ventricle Syndrome 20 pts, 6.37%. The other cyanotic congenital heart disease (CCHD) was 13.16%. Cyanosis was the common clinical presentation in all patients. Conclusions: The prevalence of cyanotic congenital heart disease in Albaha area was 14.62% of all congenital cardiac abnormalities, and no significant difference between male and female patients was seen. The most common types were TOF. Cyanosis was the most common clinical presentation. The outcome can be improved by early diagnosis. CCHD screening program associated with physical examination can help in early diagnosis.

Keywords: Cyanotic Congenital Heart Disease, Prevalence, and Presentation

Introduction

The cyanotic congenital heart diseases (CCHD) include many types of structures abnormalities with impaired cardiac function. It can be a result of decreased pulmonary flow as in Tetralogy of Fallot (TOF), pulmonary atresia, and right side hypoplastic heart, or with decreased aortic flow as in left-sided hypoplastic heart, interrupted arch, and severe coarctation, or due to blood mixing inside or outside the heart as in TGA, DORV, and TA, etc. **(**Allen HD, Driscoll DJ, Shaddy RE, et al., 2013. Jeffrey R. Boris, Marie J. Béland Lisa J. Bergensen, et al. 2017**).** CCHD accounts about one-third of the congenital heart disease**,** and the prevalence of it varies worldwide (Hoffman JI, Kaplan S 2002**,** Kennedy N, Miller P 2013**)**. The common CCHD include tetralogy of fallot (TOF), double outlet right ventricle (DORV), transposition of the great arteries (TGA), total anomalous pulmonary venous return (TAPVR), truncus arteriosus and tricuspid atresia (TA), **(**Van der Linde D, Konings EE, Slager MA, et al 2011**).** Ebstein's anomaly, Hypoplastic left heart syndrome (HAHS), pulmonary atresia (PA), tricuspid atresia (TA), pulmonary atresia (PA), and single ventricle, are the less types of CCHD, (Van der Linde D, Konings EE, Slager MA, et al. 2011). The most common type is TOF **(**O'Brien P, Marshall AC, et al. 2014**).** The presentation depends on the type of abnormalities, the severity of obstruction, and the cardiac output. Some CCHD may present early like TGA, HLHS**,** PA, and TA, while the signs may be presented late in the 1st year in the patients with TOF **(**Animasahun BA, Madise-Wobo AD, Gbelee HO, et al. 2017; Okoromah CA et al. 2011**).** The cyanosis, feeding difficulties, failure to thrive, and respiratory problems are the common clinical findings in patients have CCHD**.** Some chemical risk factors, genetic disorders, consanguinity, intrauterine infections like rubella, medication used in pregnancy, and chromosomal abnormalities as Down, Noonan, and Turners syndromes, can be considered as risk factors of CCHD, but the exact etiology is unknown **(**Gorini F, Chiappa E, Gargani L, et al 2014; Campbell M et al 1961**;** Shawky RM, Elsayed SM, Zaki ME, et al 2013**).** The management of children with CCHD is multidisciplinary**.** Surgical correction is the main stone of the management combined with medical treatment, is important to give the proper care for the patients **(**Radu S, Floria M, Baroi GL, et al. 2016**).** Limited reports were available about the cyanotic congenital heart disease in Saudi Arabia, and the data about CCHD is included in reports about all congenital heart diseases **(**Alabdulgader AA et al. 2006**).** Critical congenital heart disease screening (CCHD) program has a good rule in early detection of cyanotic cardiac defects **(***Abdulmajid M. Almawazini et al. 2017;* Movahedian AH, Mosayebi Z, Sagheb S, et al. 2016**).** Antenatal diagnosis can be done in utero by fetal echocardiography (Chew C, Halliday JL, Riley MM, et al. 2007; Hoffman JIe et al. 2013).

Objectives

The study aimed to provide the prevalence and the most common types, clinical presentation, and distribution of CCHD in children less than 14 years of age in Albaha area Saudi Arabia.

Methods

Hospital-based retrospective observational cross-sectional study included the cases of CCHD. The study was conducted in the Pediatric and Neonatology Department, King Fahad Hospital, Albaha, Saudi Arabia from January 2006 to January 2019. The study was approved by the Scientific Research and Ethical Committee in the hospital. Statistical Package for Social Sciences (SPSS) was used to analyze the data and the outcome. Statistical significance were $P<0.05$, 95%CI, OR, and RR. All the patients were aged 0–14 years. Mean age ± standard deviation was considered. The inclusion criteria were all patients diagnosed to have cyanotic congenital heart. Patients had acyanotic heart disease, neonates with patent ductus arteriosus (PDA) or patent foramen ovale (PFO), and other types of heart diseases were excluded. Echocardiography was performed using Philips IE33 Ultrasound (Philips, Bothel, WA, USA). 2-D echocardiography, colored Doppler, and M-mode were used for the diagnosis of structures abnormality and the evaluation of cardiac function and hemodynamic status for all patients, (Alabdulgader AA et al. 2006). A detailed history and physical examinations were performed for all. Cyanotic congenital heart disease screening program was applied in our center in the last 4 years, and was done for all neonates (*Abdulmajid M. Almawazini et al. 2017*). Chest radiograph, electrocardiography, and laboratory investigations were done as required. For surgical intervention, patients were referred for higher cardiac centers in Saudi Arabia. The outcomes were prevalence of CCHD, most common types, and the clinical presentation. The files of the patients were reviewed retrospectively and findings recorded. Level of significance was P value

< 0.05. Odd ratio (OR), Relative Risk (RR), and 95% confidence interval were considered. The protocol used in this study was convinced with AHA/ACC circulation for the diagnosis, classification, evaluation of heart structures and function, and guidelines for the care of children with congenital heart disease, **(**Jeffrey R. Boris, Marie J. Béland Lisa J. Bergensen, et al. 2017**).**

Results

Table 1: Distribution of all children screened during the time of the study.

Patients		Number	Notes
Total children		8035	Screened
Normal		1640	Excluded
PFO closed in 1st year		2557	Excluded
PDA closed in 1st month		1623	Excluded.
Heart Disease (no CHD)		67	Excluded.
CCHD 2148 Pts	Acyanotic CHD	1834 (85.38%)	Excluded
	Cyanotic CHD	314 (14.62%)	Included
CCHD: cyanotic congenital heart disease; CHD: congenital heart disease; PFO: patent foramen ovale; PDA: patent ductus arteriosus; Pts: patients.			

Table 2: The Types and Prevalence of CCHD diagnosed in this study.

Type CCHD	Pts number	% CHD	% CHD	Male	Female	P value
All Pts	314	100%	15.13	158 (50.32%)	156 (49.68%)	0.68
TOF	125	(39.81)	5.82	65 (52%)	60 (48%)	0.65
DORV	48	(15.29)	2.23	20 (41.67%)	28 (58.33%)	0.54
TGA	34	(10.82)	1.58	21 (61.76%)	13 (38.24%)	0.48
PA	20	(6.37)	0.93	9 (45%)	11 (55%)	0.64
TRUNCUS	20	(6.37)	0.93	6 (30%)	14 (70%)	0.08
HLHS	20	(6.37)	0.93	15 (75%)	5 (25%)	0.06
CCCHD	10	(3.18)	0.47	6 (60%)	4 (40%)	0.63
TAPVR	8	(2.48)	0.37	2 (25%)	6 (75%)	0.06
Ebstein's anomaly	6	(1.9)	0.28	3 (50%)	3 (50%)	0.72
Interrupted Arch	5	(1.6)	0.23	3 (60%)	2 (40%)	0.59
Single ventricle	5	(1.6)	0.23	3 (60%)	2 (40%)	0.59
Inoperable CCHD	5	(1.6)	0.3	3 (60%)	2 (40%)	0.59
DILV	3	(0.9)	0.14	2 (66.67%)	1 (33.33%)	0.08
TA	3	(0.9)	0.14	1 (33.33%)	2 (66.67%)	0.08
HRHS	2	(0.6)	0.1	1 (50%)	1 (50%)	0.71

CCHD: cyanotic congenital heart disease; CHD: congenital heart disease; DORV: Double outlet right ventricle; DILV: Double inlet left ventricle; HLHS; Hypoplastic left ventricle syndrome; HRVS: Hypoplastic right ventricle syndrome; PA: pulmonary atresia; AVSD: atrio-ventricular septal defect; TOF: Tetralogy of Fallot; TGA: transposition of great arteries.

Between January 2006 and January 2019, a total of 2148 patients diagnosed as congenital heart disease. Cyanotic congenital disease (CCHD) was diagnosed in 314 patients (14.62%) in our center **(table 1).** There were 158 males (50.32%) and 156 females (49.68%) with no significant difference, (OR 1.1. P= 0.68). The age of patients was from 1 day to 14 years with a mean of 35.42±4.1 month, and the neonatal period was the modal age at diagnosis. Approximately 80% of the children had been diagnosed at age of less than 1 year and 20% of cases diagnosed after that. As mentioned in (**table 2)**, our results revealed that the most common type of CCHD was Tetralogy of Fallot (TOF), which was diagnosed in 125 pts 39.81%; there were 65 males 52% and 60 females 48% with a male to female ratio of 1.1:1. Double Outlet Right Ventricle (DORV) diagnosed in 48 pts 15.29%, with 20 males 41.67% and 28 females 58.33%, a female to male ratio of 1.4:1. Transposition of the Great Arteries (TGA) diagnosed in 34 pts 10.82%, with 21 males 61.76% and 13 females 38.24% with a male to female ratio of 1.6:1. Pulmonary atresia diagnosed in 20 pts, 6.37%, there were 9 males 45% and 11 females

55% with a female to male ratio of 1.2:1. Truncus arteriosus diagnosed in 20 pts, 6.37%, there were 6 males 30% and 14 females 70% with a female to male ratio of 2.3:1. Hypoplastic Left Ventricle Syndrome diagnosed in 20 pts, 6.37%, there were 15 males 75% and 5 females 25% with a female to male ratio of 3:1. Total Anomalous pulmonary veins connection (TAPVR) diagnosed in 8 patients 2.48%, and there were 2 males 25% and 6 females 75% with a female to male ratio of 3:1. Ebstein anomaly diagnosed in 6 patients 1.9%, there were 3 males 50% and 3 females 50% with no difference between male and female. The other types of cyanotic congenital heart disease were diagnosed in 33 pts 10.51%. Inoperable complex cyanotic congenital heart disease was diagnosed in 5 pts (1.6%), two patients had Dextrocardia with pulmonary atresia and large ventricular septal defect (VSD) and atrial septal defect (ASD), two pts had truncus arteriosus with severe hypoplasia in the all branches of pulmonary arteries, and one patient has complex CCHD. Cyanosis was the common presentation, documented in 300 cases 95.54% of all patients, cardiac murmur in 275 pts 78.57%. Features of Down syndrome presented in 25 pts 7.97% and the majority of them diagnosed to have TOF. Signs of heart failure were confirmed in 20 pts 6.37%. Feeding difficulties and weight affected seen in 10 pts 3.18%, and associated congenital anomalies in 5 pts 1.6%.

Discussion

Data were reviewed for all cases of CCHD over 13 years (2006-2019). It was documented the distribution, prevalence, and clinical presentation, of cyanotic congenital heart disease in King Fahad Hospital Albaha, Saudi Arabia. There are previous reports from Albaha Area about congenital heart disease, but no previous reports about CCHD. The critical cyanotic congenital heart disease screening program (CCHD) was applied in our hospital, and other centers in Albaha area for all newborns at the age of 24 hours for early diagnosis of CCHD, **(***Abdulmajid M. Almawazini et al. 2017;* Movahedian AH, Mosayebi Z, Sagheb S, et al. 2016**).** About 80% of the patients were diagnosed in early infancy while only 20% of cases diagnosed in older ages (P= 0.036), same as mentioned in international reports **(**Hoffman JI, Kaplan S 2002**,** Kennedy N, Miller P 2013**,** Van der Linde D, Konings EE, Slager MA, et al. 2011**).** Some cases diagnosed in utero by fetal echocardiography **(**Chew C, Halliday JL, Riley MM, et al. 2007**;** Hoffman JIe et al. 2013**).** Less than 1% of the cases discharged before screening and less than 1% missed and did not diagnose till the age of 2 years and more when patient had clear central cyanosis **(**Shawky RM, Elsayed SM, Zaki ME, et al. 2013; Radu S, Floria M, Baroi GL, et al. 2016**).** There was no significant male to female ratio difference in total CCHD, but we found male more affected in TOF, TGA, HLHS, while female more affected in TAPVR, Truncus arteriosus, and DORV, and no significant difference in residual types of CCHD, as documented in international studies **(**Kennedy N, Miller P 2013**,** Van der Linde D, Konings EE, Slager MA, et al 2011**;** Sadoh WE, Uzodimma CC, Daniels Q et al 2013**).** Tetralogy of Fallot (TOF) was the most common, it was diagnosed in 125 patients (39.81), and associated in 25 patients by down syndrome features, same as mentioned in other published studies **(**O'Brien P, Marshall AC et al 2014**;** Alabdulgader AA et al 2006; Sadoh WE, Uzodimma CC, Daniels Q et al 2013**).** DORV and TGA were established as the other most common CCHD (Hoffman JI, Kaplan S 2002**,** Kennedy N, Miller P 2013**;** Okoromah CA et al. 2011**)**.

Truncus Arteriosus, TA 3 pts, and TAPVR 8 pts were diagnosed in our study, maybe of the long period covered by this study, as reported in national and international reports **(**Hoffman JI, Kaplan S 2002**,).** The less common defects were Single Ventricle, and Ebstein's anomaly, which is similar to what was published in some previous national and international studies. The cyanosis and cardiac murmur were the most common clinical presentation and the reasons to transfer the patients for cardiac evaluation. Easy fatigability, tachypnea, tachycardia, feeding difficulties, failure to thrive, and signs of heart failure were also seen and common signs in the patients with cyanotic congenital heart disease (Allen HD, Driscoll DJ, Shaddy RE, et al 2013**;** Van der Linde D, Konings EE, Slager MA, et al 2011**;** Okoromah CA et al 2011**)**. The patients managed as multidisciplinary team **(**Jeffrey R. Boris, Marie J. Béland Lisa J. Bergensen, et al. 2017**;** Radu S, Floria M, Baroi GL, et al. 2016**),** medical treatment started, and all patients were transferred to a higher cardiac center for surgical correction. Complete correction is done for the majority of the patients while univentricular repair done for 10 patients. Five patients had complex inoperable CCHD were kept on medical treatment because no surgical intervention could be done for them.

Conclusions

Cyanotic congenital heart disease is common in Albaha area, and males to female ratio vary in different types of CCHD. Echocardiography was the safe and easy investigation can confirm the diagnosis. Cyanosis and cardiac murmur were the common presentation in the majority of the cases. Early diagnosis can improve the outcome. Multidisciplinary team is an ideal for management of patients with cyanotic congenital heart diseases.

References

Allen HD, Driscoll DJ, Shaddy RE, et al. Moss and Adams' heart disease in infants, children, and Adolescents. Including the fetusand young adults. 8th ed. Philadelphia: Lippincott Williams and Wilkins; 2013.

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards 2017. Jeffrey R. Boris, Marie J. Béland Lisa J. Bergensen, Steven D. Colan, Joanna Dangel, Curtis J. Daniels, Christopher Davis, Allen D. Everett, Rodney Franklin, J. William Gaynor, Darryl T. Gray. Originally published14 Jul,2017https://doi.org/10.1161/HCQ.0000000000000027, AHA/ACC Circulation: Cardiovascular Quality and Outcomes. 2017, vol. 10, No.8.

Hoffman JI, Kaplan S. The incidence of congenital heart disease. J Am Coll Cardiol 2002;39:1890-900. 10.1016/S0735-1097(02)01886-7.

Kennedy N, Miller P. Spectrum of paediatric cardiac disease presenting to an outpatient clinic in Malawi. BMC Res Notes 2013;6:53. 10.1186/1756-0500-6-53 [PMC free article].

Van der Linde D, Konings EE, Slager MA, et al. Birth prevalence of congenital heart disease worldwide: a systemic review and meta-analysis. J Am Coll Cardiol 2011;58:2241-7. 10.1016/j.jacc.2011.08.025.

O'Brien P, Marshall AC. Cardiology patient page. Tetralogy of Fallot. Circulation 2014;130:e26-9. 10.1161/CIRCULATIONAHA.113.005547.

Animasahun BA, Madise-Wobo AD, Gbelee HO, et al. Children with transposition of the great arteries: Should they actually be born in Nigeria? World J Cardiol 2017;9:277-82. 10.4330/wjc.v9.i3.277 [PMC free article].

Okoromah CA, Ekure EN, Lesi FE, Okunowo WO, Tijani BO, Okeiyi JC. Prevalence, profile, and predictors of malnutrition in children with congenital heart defects: a case-control observational study. Arch Dis Child. 2011 Apr;96(4):354-60. doi: 10.1136/adc.2009.176644. Epub 2011 Jan 24.

Gorini F, Chiappa E, Gargani L, et al. Potential effects of environmental chemical contamination in congenital heart disease. Pediatr Cardiol 2014;35:559-68. 10.1007/s00246-014-0870-1 [PubMed].

Campbell M. Place of maternal rubella in the aetiology of congenital heart disease. Br Med J 1961;1:691-6. 10.1136/bmj.1.5227.691.

Shawky RM, Elsayed SM, Zaki ME, et al. Consanguinity and its relevant to clinical genetics. Egyptian Journal of Medical Human Genetics 2013;14:157-64. 10.1016/j.ejmhg.2013.01.002.

Radu S, Floria M, Baroi GL, et al. Heart Team in cardiovascular disease – between utility and limits.Rom J Cardiol 2016;26:440-9.

Alabdulgader AA. Congenital heart disease in Saudi Arabia: current epidemiology and future projections. East Mediterr helth J 2006;12 Suppl 2:S157-67.

Abdulmajid M. Almawazini, MD, PhD, Hamdi K. Hanafi, SSCP, CABP, Hasan A. Madkhali, MBBS, Noura B. Majrashi, MBBS. Effectiveness of the critical congenital heart disease screening program for early diagnosis of cardiac abnormalities in newborn infants. Saudi Med J 2017; Vol. 38 (10).

Movahedian AH, Mosayebi Z, Sagheb S. Evaluation of Pulse Oximetry in the Early Detection of Cyanotic Congenital Heart Disease in Newborns. J Tehran Heart Cent. 2016 Apr 13;11(2):73-78.

Chew C, Halliday JL, Riley MM. Population based study of antenatal detection of congenital heart disease by ultrasound examination. Ultrasound Obstet Gynecol 2007;29:619-24. 10.1002/uog.4023.

Hoffman JIe. The global burden of congenital heart disease. Cardiovasc J Afr 2013;24:141-5. 10.5830/CVJA-2013-028.

Sadoh WE, Uzodimma CC, Daniels Q. Congenital Heart Disease in Nigerian Children. World J Pediatr Congenit Heart Surg 2013;4:172-6. 10.1177/2150135112474026.

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Smoking, Alcohol, Wellbeing and Academic Attainment

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Abstract
Three studies examined associations between smoking, alcohol consumption, wellbeing and academic attainment of university students. Wellbeing was measured using the Student Wellbeing Process Questionnaire (WPQ) and academic attainment measured by the Grade Point Average (GPA) and perceived work efficiency. In the first study frequency of consuming alcohol, alcohol units, consumers versus non-consumers and drinking more than the recommended safe level were examined. 895 university students (95 males, 797 females; 6 % smokers) participated in the study. When established predictors of wellbeing were co-varied, smoking still had significant effect on academic attainment but not wellbeing. There were no significant effects of frequency of alcohol consumption or high/low alcohol units, and no significant interaction between smoking and alcohol group. Non-consumers of alcohol reported higher negative outcomes but greater work efficiency. Those who consumed more alcohol than the recommended safe limit had lower scores for positive well-being, work efficiency and course stress. A second smaller study examined effects of binge drinking. There was only one significant effect. Regular binge drinkers reported lower work efficiency than the less frequent binge drinkers, who in turn reported lower work efficiency than those who never engaged in binge drinking. A final study examined associations between frequency of hangovers, well-being and attainment. The only significant effect was again on work efficiency, with those who regularly had a hangover being less efficient than those who sometimes had a hangover who were less efficient than those who never had a hangover.

Keywords: Smoking, Alcohol, Binge Drinking, Hangover, Wellbeing, Academic Attainment

1. Introduction

Smith (2019) examined the effects of smoking on well-being and academic attainment. Univariate analyses showed that smoking was associated with greater negative well-being and lower attainment. When established predictors of well-being were co-varied, smoking still had a significant effect on attainment but not well-being. The studies reported here continued this line of research and also considered various parameters of alcohol consumption. The next section provides a brief overview of the approach to well-being adopted here.

The model of wellbeing used in our research has been based on the Demands-Resources-Individual Effects (DRIVE) model (Mark & Smith 2008, 2011, 2012, 2018a, 2018b). This model includes negative characteristics such as exposure to stressors, resources such as control and support, and individual differences reflecting coping style and personality. Negative outcomes such as anxiety and depression are also measured. A more recent development has been to add positive outcomes, such as life satisfaction, positive affect and happiness (Smith 2011a, 2011b; Smith & Wadsworth 2011; Smith et al., 2011; Wadsworth et al., 2010). These positive outcomes

are generally referred to as wellbeing but our approach has considered a wellbeing process that include both positive (e.g. control, support) and negative (e.g. stressors) characteristics, appraisals (life satisfaction and perceived stress), individual differences (e.g. negative coping and positive personality) and outcomes (happiness and anxiety/depression). Other variables can also be included in the model (e.g. resilience, and training attitudes - Nor & Smith 2018; psychological contract fulfilment - Ahmad et al., 2018a, 2018b; ethnicity - Capasso et al., 2016a, 2016b, 2018; Zurlo et al., 2018; work-life balance and burnout - Omosehin & Smith 2019). Health-related behaviours such as sleep also have significant effects, with day-time sleepiness predicting academic attainment and wellbeing (Howells & Smith, 2019).

The Wellbeing Process Questionnaire (WPQ - Williams & Smith 2012, 2016, 2018a, 2018b; Williams, Pendlebury & Smith 2017; Williams, Thomas & Smith 2017) and the Smith Wellbeing Questionnaire (SWELL – Smith & Smith 2017a, 2017b, 2017c; Fan & Smith 2017a, 2017b, 2018) were developed to investigate the well-being process. These questionnaires consist of short scales that have been shown to be correlated with established longer measures. Most of the research has been cross-sectional but longitudinal studies, which provide a better indication of causality, have confirmed the early results (Galvin 2016; Nelson 2017). This approach has also been used with students (Williams, Pendlebury, Thomas & Smith, 2017; Alharbi & Smith, 2019; Nor & Smith, 2019).

Smith (2019) reviewed the literature on smoking, attainment and wellbeing. Results from his study showed that, after established predictors of the outcomes were co-varied, smoking was associated with lower attainment but had no significant effect on wellbeing. Alcohol related harm is a major public health problem (Bell & Britton, 2014; WHO, 2012). Studies in Europe, the USA and Australia have shown a high prevalence of alcohol use disorders, alcohol dependence, stress, anxiety, eating disorders and depression among university students (Kirsch, Doerfler & Truong, 2014; Said, Kypri & Bowman, 2013; Slutske, 2005; Stallman, 2010) compared to their non-university peers (Cvetkovski, Reavley & Jorm, 2012). Studies of the association between alcohol and mental health suggest that individuals with harmful alcohol consumption are more likely to report stress, depression, and anxiety (Pereira et al., 2013). Poor mental health has been associated with academic pressure and irregular sleep patterns (Said, Kypri & Bowman, 2013) and leads to lower academic performance (Cleary et al., 2011). Tembo, Burns and Kalembo (2017) found that a considerable proportion university student consume alcohol at hazardous levels, which was associated with poor academic performance and mental health outcomes.

The aim of the present study was to examine whether smoking and different aspects of alcohol consumption were associated with wellbeing and attainment outcomes when the established predictor variables were statistically controlled.

2. Study 1: Method

This study involved a survey of the well-being of university students using the Student WPQ. It was carried out with the informed consent of the volunteers and approval from the ethics committee, School of Psychology, Cardiff University. Students were asked to complete an online survey presented using Qualtrics software. They were given course credits for completing the survey.

2.1 Participants

The participants were 895 university students (95 males, 797 females; mean age: 19.5 years s.d. 2.2 years; approximately 50% in year 1 and year 2) of whom 6% were smokers. The smokers smoked an average of 3.8 cigarettes a day (range = 1-30). They consumed an average of 10.2 units of alcohol a week (1 unit = 0.5 pint beer; one glass of wine = 2 units; 25ml spirits = 1 unit) with a range of 0-80 units. 7.6% never consumed alcohol, 37.8% drank one day a week, 49.2% 2-3 days a week, 3.8% 4-5 days a week and 1.6% consumed alcohol on 6-7 days a week.

2.2 Measures

A major problem with most of the previous research is that correlated attributes of wellbeing, smoking and alcohol consumption have not been controlled for. Established predictors of wellbeing include exposure to

stressors, negative coping (wishful thinking, avoidance and self-blame), positive personality (self-efficacy, self-esteem and optimism) and social support. Conscientiousness is a well-established predictor of attainment. The present study initially examined univariate association between smoking, alcohol consumption and wellbeing and attainment. Following this the established predictors were co-varied to determine whether any associations with smoking and alcohol consumption were still significant. The following psychosocial measures were derived from the survey:

- Positive Personality (self-efficacy, self-esteem and optimism)
- Social Support
- Exposure to student stressors
- Negative coping
- Positive outcomes
- Negative outcomes
- Self-reported performance efficiency
- Self-reported course stress

Marks for coursework and exams were obtained and combined to give a grade point average (GPA).

2.3 Statistical analysis

Initial univariate analyses examined associations between smoking, alcohol consumption and the predictors of wellbeing as well as the wellbeing outcomes. Subsequent analyses examined smoking, alcohol consumption and the wellbeing and attainment outcomes while controlling for the established predictors (positive personality, exposure to stressors, social support and negative coping).

2.4. Results

The initial analyses used a t-test to compare smokers on the wellbeing predictors and outcomes. There were significant effects with smokers being less conscientious, having lower attainment and work efficiency scores but higher exposure to stressors, negative coping and negative outcome scores. These confirm the results of Smith (2019). Similar analyses were carried out for the alcohol variables (median split of alcohol units and alcohol frequency). Those in the high alcohol units category were less conscientious and report lower work efficiency and course stress, and lower negative outcomes than those in the low alcohol group. Those in the more frequent alcohol consumption group showed similar effects to the analysis based on units. Further analyses compare those who consumed no alcohol at all with consumers. Alcohol consumers reported greater social support. Non-consumers reported less course stress, greater work efficiency but more negative outcomes. A final analysis compared those who consumed more than the recommended safe level (14 units per week) with those with safe levels of consumption. Those who consumed more than the recommended maximum reported lower work efficiency and had a lower GPA. In contrast, they also reported lower course stress.

The next set of analyses involved a MANOVA with smoking and alcohol consumption as the independent variables; conscientiousness, social support, positive personality, exposure to stressors and negative coping were the covariates; and GPA, work efficiency, course stress and positive and negative wellbeing outcomes being the dependent variables. Separate analyses considered alcohol consumption as: low v high alcohol units; low v high frequency of consumption; non-consumers versus consumers; and below or above recommended threshold for safe consumption. The effect of smoking was significant in all analyses and reflected the lower GPA scores obtained by smokers (smoker mean: 60.20 s.e. 1.34; non-smoker mean: 64.23 s.e. 0.22; $p < 0.001$). There were no significant effects of alcohol in the low/high units or frequency analyses. There were also no significant interactions between smoking and alcohol consumption.

The analysis of the non-consumers versus consumers showed that the non-consumers reported significantly higher negative outcome scores but had greater work efficiency (Negative outcomes: Non-consumer mean: 21.63 s.e. 0.60 ; consumer mean: 20.48 s.e 0.33 $p < 0.05$; Work efficiency: Non-consumer mean: 6.41 s.e. 0.22; consumer mean: 5.87 s.e. 0.12 $p < 0.01$). The analysis comparing those who consumed more alcohol than the recommended safe limit also revealed significant effects. Those who consumed more than the

recommended safe limit reported lower positive wellbeing (Positive wellbeing: below limit: mean: 19.41 s.e. 0.14 ; above limit: mean: 19.27 s.e. 0.35 $p < 0.05$), lower work efficiency (Work efficiency: : below limit: mean: 5.73 s.e. 0.10 ; above limit: mean: 5.66 s.e. 0.24 $p < 0.001$) and lower course stress (Course stress: : below limit: mean: 6.93 s.e. 0.09 ; above limit: mean: 6.58 s.e. 0.21 $p < 0.05$).

Overall, the present findings confirm that smoking is associated with lower academic attainment but not reduced wellbeing. This effect was not modified by alcohol consumption. The effect of alcohol consumption depended on how it was categorised. Comparison of low versus high consumption, or frequent versus less frequent, based on median splits showed little effect. It was only when the tail of the distributions were examined that significant effects became apparent. Non-consumers reported more negative wellbeing but greater work efficiency. Those who consumed more alcohol than the recommended limit reported lower positive wellbeing and lower work efficiency but less course stress.

The next study examined a specific type of alcohol consumption, binge drinking, to determine whether this is related to academic attainment and wellbeing. Binge drinking (also called heavy episodic drinking, risky single-occasion drinking etc.) is a major public health problem. Mostly occurring among young people at weekends, binge drinking increases the risk of stress, anxiety, traumatic events and depression (Kuntsche et al., 2017).

3. Study 2: Binge drinking methodology

This study involved a survey of the well-being and attainment of university students using the Student WPQ. It was carried out with the informed consent of the volunteers and approval from the ethics committee, School of Psychology, Cardiff University. Students were asked to complete an online survey presented using Qualtrics software. They were given course credits for completing the survey.

3.1 Participants

The participants were 352 university students (43 males, 309 females; mean age: 19.1 years, range 17-46 years; approximately 50% in year 1 and year 2) of whom 12.2% were smokers. The smokers smoked an average of 4.0 cigarettes a day (range = 1-30). They consumed an average of 9.1 units of alcohol a week with a range of 0-80 units. 12.5% never consumed alcohol, 36.4% drank one day a week, 46.0% 2-3 days a week, 4.5% 4-5 days a week and 0.3% consumed alcohol on 6-7 days a week. 22.7% never engaged in binge drinking (drinking rapidly over a short period of time), 16.2% rarely carried out binge drinking, 27.3% were binge drinkers every few weeks and 33.8% carried out binge drinking every week.

3.2 Measures

The psychosocial measures were identical to the previous study.

3.2 Results

The multi-variate analyses comparing those who never engaged in binge drinking with those who were frequent and less frequent binge drinkers only revealed one significant effect. Regular binge drinkers reported lower work efficiency than the less frequent binge drinkers, who in turn reported lower work efficiency than those who never engaged in binge drinking (Work efficiency: Never binge: mean: 6.26 s.e. 0.24; Rarely binge: mean: 5.67 s.e. 0.27; Every few weeks binge drinkers: mean: 5.55 s.e. 0.22; Frequent binge drinkers: mean: 5.52 s.e. 0.19 $p < 0.05$).

The next study examined the effects of hangovers on wellbeing and attainment. Alcohol-induced hangover, defined by a series of symptoms, is the most commonly reported consequence of excessive alcohol consumption. Alcohol hangovers contribute to reduced wellbeing and poor academic achievement. They may also compromise potentially dangerous daily activities such as driving a car (Verster et al., 2010).

4. Study 3: Hangovers after drinking alcohol

This study involved a survey of the well-being of university students using the Student WPQ. It was carried out with the informed consent of the volunteers and approval from the ethics committee, School of Psychology,

Cardiff University. Students were asked to complete an online survey presented using Qualtrics software. They were given course credits for completing the survey.

4.1 Participants

The participants were 277 university students (32 males, 245 females; mean age: 19.4 years, range 18-45 years; approximately 50% in year 1 and year 2) of whom 10.5% were smokers. The smokers smoked an average of 3.5 cigarettes a day (range = 1-20). They consumed an average of 9.1 units of alcohol a week with a range of 0-50 units. 13% never consumed alcohol, 37.5% drank one day a week, 43.3% 2-3 days a week, 1.1% 4-5 days a week and 0.4% consumed alcohol on 6-7 days a week. 21.7% never suffered from hangovers, 52.3% sometimes had a hangover and 20.6% always had a hangover

4.2 Measures

The psychosocial measures were identical to the previous studies.

4.3 Results

The multi-variate analyses showed that the only effect of frequency of having a hangover was on work efficiency. Those who regularly had a hangover were less efficient than those who sometimes had a hangover who were less efficient than those who never had a hangover (Never: mean 6.44 s.e. 0.30; sometimes: mean: 6.01 s.e. 0.21; always: mean: 5.41 s.e. 0.27 $p < 0.05$).

5. Discussion

The present results confirmed that when established predictors of attainment and wellbeing were included in multivariate analyses, smoking was associated with poorer academic performance but not reduced wellbeing. These findings confirm the importance of conducting multi-variate analyses and controlling for confounders. The effects of alcohol consumption were less obvious. Analyses splitting the sample into high/low groups relating to frequency and amount of consumption revealed no significant effects. It was only when the tail of the distribution was examined that effects of the different alcohol groups emerged. When those who consumed no alcohol were compared with consumers, the non-consumers were found to have greater negative wellbeing but worked more efficiently. Similarly, binge drinking and having hangovers were related to work efficiency but no other variables. Only 10% of the sample consumed more alcohol than the recommended safe limit and this may explain the differences from studies with much higher levels of harmful consumption (e.g. Tembo, Burns & Kalembo, 2017)

One limitation of the studies was that they were cross-sectional and further longitudinal studies, preferably with appropriate interventions, are required. The samples used in the present study were young adults (university students) and future research should investigate older working adults who may have been smoking and drinking for longer periods of time. Another limitation is that the present study does not inform on the underlying mechanisms linking smoking and poorer academic attainment and alcohol consumption and poorer work efficiency. Future research should address the underlying mechanisms and use a multi-variate longitudinal approach to assess the benefits of smoking cessation and education about alcohol consumption. There is also a need to examine other health-related behaviours, such as drug use, as negative habits rarely occur in isolation and there is a need to examine combined effects of the different behaviours.

References

Ahmad, M. I., Firman, K., Smith, H., & Smith, A. P. (2018a). Short measures of organisational commitment, citizenship behaviour and other employee attitudes and behaviours: associations with well-being. *BMIJ, 6*(3), 516-550. https://doi.org/10.15295/bmij.v6i3.391

Ahmad, M. I., Firman, K., Smith, H., & Smith, A. P. (2018b). Psychological contract fulfilment and well-being. *Advances in Social Sciences Research Journal, 5*(12), 90-101. https://doi.org/10.14738/assrj.512.5758

Alharbi, E., & Smith, A. P. (2019). Studying-away strategies: A three-wave longitudinal study of the wellbeing of international students in the United Kingdom. *The European Educational Researcher, 2*(1), 59-77. https://doi.org/10.10.31757/euer.215

Bell, S. & Britton A. (2014). An exploration of the dynamic longitudinal relationship between mental health and alcohol consumption: a prospective cohort study. *BMC Medicine*, 12(1):9 402.

Capasso, R., Zurlo, M. C., & Smith, A. P. (2016a). Ethnicity, work-related stress and subjective reports of health by migrant workers: a multi-dimensional model. *Ethnicity and Health, 23*(2), 174-193. https://doi.org/10.1080/13557858.2016.1258041

Capasso, R., Zurlo, M. C., & Smith, A. P. (2016b). Ethnicity and work-related stress in Eastern European care workers for the elderly: an application of a proposed multi-dimensional model. *Diversity and Equality in Health and Care, 13*(2), 197-205. https://doi.org/10.21767/2049-5471.100052

Capasso, R., Zurlo, M. C., & Smith, A. P. (2018). Stress in factory workers in Italy: an application of the Ethnicity and work-related stress model in Moroccan factory workers. *Psychology and Developing Societies, 30*(2), 1-34. https://doi.org/10.1177/0971333618783397

Cleary, M., Horsfall, J., Baines, J., & Happell B. (2011). Mental health behaviours among undergraduate nursing students: Issues for consideration. *Nurse Education Today*.

Cvetkovski, S., Reavley, N.J. & Jorm, A.F. (2012). The prevalence and correlates of psychological distress in Australian tertiary students compared to their community peers. Australian and New Zealand Journal of Psychiatry, 46(5), 457–67. https://doi.org/10.1177/0004867411435290 PMID: 22535294

Fan, J., & Smith, A. P. (2017a). Positive well-being and work-life balance among UK railway staff. *Open Journal of Social Sciences, 5*, 1-6. https://doi.org/10.4236/jss.2017.56001

Fan, J., & Smith, A. P. (2017b). The impact of workload and fatigue on performance. In L. Longo & M.C. Leva (Eds.), *Human Mental Workload: Models and Applications*. H-WORKLOAD 2017. Communications in Computer and Information Science (Vol. 726, pp. 90-105), Cham: Springer. https://doi.org/10.1007/978-3-319-61061-0_6

Fan, J., & Smith, A .P. (2018). The mediating effect of fatigue on work-life balance and positive well-being in railway staff. *Open Journal of Social Sciences, 6*, 1-10. https://doi.org/10.4236/jss.2018.66001

Galvin, J. (2016). *A multi-method approach to researching stress and mental health in two groups of healthcare students: nursing students and trainee clinical psychologists*. (PhD Thesis, Cardiff University, Cardiff). Retrieved from: http://orca.cf.ac.uk/98616

Kirsch, D.J., Doerfler, L.A. & Truong D. (2014). Mental Health Issues Among College Students: Who Gets Referred for Psychopharmacology Evaluation? Journal of American College Health, 63(1), 50–6. https:// doi.org/ 10.1080/ 07448481.2014.960423 PMID: 25222760 15.

Kuntsche, E., Kuntsche, S., Thrul, J., & Gmel, G. (2017). Binge drinking: Health impact, prevalence, correlates and interventions, *Psychology & Health,* 32 (8), 976-1017, DOI: 10.1080/08870446.2017.1325889

Mark, G. M., & Smith, A .P. (2008), Stress models: A review and suggested new direction. In J. Houdmont & S. Leka (Eds.), *Occupational health ssychology: European perspectives on research, education and practice* (pp. 111-144), Nottingham: Nottingham University Press.

Mark, G., & Smith, A. P. (2011). Effects of occupational stress, job characteristics, coping and attributional style on the mental health and job satisfaction of university employees. *Anxiety, Stress and Coping, 25*, 63-78. https://doi.org/10.1080/10615806.2010.548088

Mark, G., & Smith, A. P. (2012). Occupational stress, job characteristics, coping and mental health of nurses. *British Journal of Health Psychology, 17*, 505-521. https://doi.org/10.1111/j.2044-8287.2011.02051.x

Mark, G., & Smith, A. P. (2018a). A qualitative study of stress in university staff. *Advances in Social Sciences Research Journal, 5*(2), 238-247. https://doi.org/10.14738/assrj.52.4195

Mark, G., & Smith, A. P. (2018b). Coping and its relation to gender, anxiety, depression, fatigue, cognitive difficulties and somatic symptoms. *Journal of Education, Society and Behavioral Science, 25*(4), 1-22. https://doi.org/10.9734/jesbs/2018/41894

Nelson, K. (2017), Behind the frontlines: occupational stress and well-being in Jamaican police officers. (PhD Thesis, Cardiff University, Cardiff). Retrieved from: http://orca.cf.ac.uk/99877/

Nor, N. I. Z., & Smith, A. P. (2018). Attitudes to training and its relation to the well-being of workers. *Journal of Education, Society and Behavioural Science, 27*(2), 1-19. https://doi.org/10.9734/jesbs/2018/44445

Nor, N. I. Z., & Smith, A. P. (2019). Psychosocial characteristics, training attitudes and well-being of students: A longitudinal study. *Journal of Education, Society and Behavioral Science, 29*(1), 1-26. https://doi.org/10.9734/JESBS/2019/v29i130100

Omosehin, O., & Smith, A. P. (2019). Adding new variables to the Well-being Process Questionnaire (WPQ) – Further studies of workers and students. *Journal of Education, Society and Behavioral Science, 28*(3), 1-19. https://doi.org/10.9734/jesbs/2018/45535

Pereira, G., Wood, L., Foster, S., & Haggar, F. (2013). Access to Alcohol Outlets, Alcohol Consumption and Mental Health. PLoS ONE, 8(1).

Said, D., Kypri, K. & Bowman J. (2013). Risk factors for mental disorder among university students in Australia: findings from a web-based cross-sectional survey. Soc Psychiatry Psychiatr Epidemiol, 48(6), 935– 44. https://doi.org/10.1007/s00127-012-0574-x PMID: 22945366

Slutske, W. (2005). Alcohol use disorders among US college students and their non-college-attending peers. Arch Gen Psychiatry, 62(3), 321–7. https://doi.org/10.1001/archpsyc.62.3.321 PMID: 15753245

Smith, A. P. (2011a). A holistic approach to stress and well-being. *Occupational Health (At Work), 7*(4), 34-35.
Smith, A. P. (2011b). A holistic approach to stress and well-being. Part 2: Stress at work: models, practice and policy. *Occupational Health (At Work), 8*(1), 33-35.
Smith, A.P. (2019). Smoking, Wellbeing and Academic Attainment. Journal of Health and Medical Sciences, Vol.2, No.3, 279-284. ISSN 2622-7258 DOI: 10.31014/aior.1994.02.03.48 https://www.asianinstituteofresearch.org/
Smith, A. P., & Smith, H. N. (2017a). An international survey of the wellbeing of employees in the business process outsourcing industry. *Psychology, 8*(1), 160-167. https://doi.org/10.4236/psych.2017.81010
Smith, A. P., & Smith, H. N. (2017b). Workload, fatigue and performance in the rail industry. In L. Longo & M. C. Leva (Eds.), *Human Mental Workload: Models and Applications*. H-WORKLOAD 2017. Communications in Computer and Information Science (Vol. 726, pp. 251-263), Cham: Springer. https://doi.org/10.1007/978-3-319-61061-0_17
Smith, A. P., & Smith, H. N. (2017c). A short questionnaire to measure wellbeing at work (Short-SWELL) and to examine the interaction between the employee and organisation. In R. Charles & J. Wilkinson (Eds.), *Contemporary Ergonomics and Human Factors 2017* (pp. 200-205). Chartered Institute of Ergonomics and Human Factors.
Smith, A. P., & Wadsworth, E. (2011). A holistic approach to stress and well-being. Part 5: what is a good job?, *Occupational Health (At Work), 8*(4): 25-27.
Smith, A. P., Wadsworth, E. J. K., Chaplin, K., Allen, P. H. and Mark, G. (2011). *The relationship between work/well-being and improved health and well-being*. Leicester: IOSH.
Stallman HM. (2010). Psychological distress in university students: A comparison with general population data. Australian Psychologist, 45(4), 249–57.
Tembo, C., Burns, S., & Kalembo, F. (2017). The association between levels of alcohol consumption and mental healthproblems and academic performance among young university students. PLoS ONE, 12(6):e0178142. https://doi.org/ 10.1371/journal.pone.0178142
Verster JC, Stephens R, Penning R, et al. (2010). The alcohol hangover research group consensus statement on best practice in alcohol hangover research. Curr Drug Abuse Rev, 3(2), 116–126.
Wadsworth, E. J. K., Chaplin, K., Allen, P. H., & Smith, A. P. (2010). What is a Good Job? Current Perspectives on Work and Improved Health and Well-being. *The Open Health & Safety Journal, 2*, 9-15. https://doi.org/10.2174/1876216601002010009
WHO (2012). Alcohol in the European Union. Consumption, Harm and Policy Approaches Copenhagen,: World Health Organisation Regional Office for Europe.
Williams, G. M., & Smith, A. P. (2012). A holistic approach to stress and well-being. Part 6: The Wellbeing Process Questionnaire (WPQ Short Form). *Occupational Health (At Work), 9*(1), 29-31.
Williams, G. M., & Smith, A. P. (2016). Using single-item measures to examine the relationships between work, personality, and well-being in the workplace. *Psychology: Special Edition on Positive Psychology, 7*, 753-767. https://doi.org/10.4236/psych.2016.76078
Williams, G. M., & Smith, A. P. (2018a). A longitudinal study of the well-being of students using the student well-being questionnaire (WPQ). *Journal of Education, Society and Behavioral Science, 24*(4), 1-6. https://doi.org/10.9734/jesbs/2018/40105
Williams, G. M., & Smith, A. P. (2018b), Diagnostic validity of the anxiety and depression questions from the Well-Being Process Questionnaire. *Journal of Clinical and Translational Research, 10*. https://doi.org/10.18053/jctres.04.201802.001
Williams, G. M., & Smith, A .P. (2018c). A practical method of predicting wellbeing at work: the Wellbeing Process Tool. *Advances in Social Sciences Research Journal, 5*(2), 86-93. https://doi.org/10.14738/assrj.52.4158
Williams, G., Pendlebury, H., Thomas, K., & Smith, A. P. (2017). The student wellbeing process questionnaire (Student WPQ). *Psychology, 8*, 1748-1761 https://doi.org/10.4236/psych.2017.811115
Williams, G., Pendlebury, H., & Smith, A. P. (2017). Stress and well-being of nurses: An Investigation using the Demands-Resources- Individual Effects (DRIVE) model and Well-being Process Questionnaire (WPQ). *Jacobs Journal of Depression and Anxiety, 1*, 1-8.
Williams, G., Thomas, K., & Smith, A. P. (2017). Stress and well-being of university staff: An investigation using the Demands-Resources- Individual Effects (DRIVE) model and Well-being Process Questionnaire (WPQ). *Psychology, 8*, 1919-1940. https://doi.org/10.4236/psych.2017.812124
Zurlo, M. C., Vallone, F., & Smith, A. P. (2018). Effects of individual differences and job characteristics on the psychological health of Italian nurses. *Europe's Journal of Psychology, 14*(1), 159-175. https://doi.org/10.5964/ejop.v14i1.1478

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The Knowledge and Perceptions Regarding Probiotics Among the People of Al-Qassim Region, Saudi Arabia

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Abstract
Probiotics are defined as live strains of strictly selected microorganisms which, when administered in adequate amounts, confer a health benefit to the host. There are naturally available probiotics that are present in fermented food types, and other commercial newly manufactured ones that differ in strains and usage. The aim of this research is to find out the knowledge, attitude, and perception about probiotics among Saudi population in Al Qassim region. This observational type of cross-sectional study included 669 participants. Data was collected using the self-administered online questionnaire. The data were entered in Excel and analyzed using EpiInfo7 statistical software. The majority of participants were between 18 and 25 years (44%) age group. 83% of them were females, and 17% were males. The knowledge about probiotics was very limited. Only 26% of the participants had heard about probiotics, whereby social media was their main source of knowledge (35%). The participants with college degrees education, showed more knowledge about probiotics (70%) with significant P value= 0.015. 30% indicated that yoghurt was a source of probiotics. 20% of the subjects consumed probiotics, and 44% of them mentioned that they consumed probiotics to maintain good gastrointestinal health and immune system followed by 13% of the participants consumed probiotics to treat antibiotic-associated diarrheas and other abdominal discomforts. And only 24% of them took probiotics with a meal. Probiotics are still a debatable topic for many people, and the knowledge about the topic is not well understood. Also, there is a huge gap in the probiotics knowledge among the Saudi population. This gap need to be addressed on different levels to be able to reach the widest range of people to facilitate the growth of a healthy generation.

Keywords: Probiotics, Immunity, Gastrointestinal health, Yogurt, Lactobacillus

Introduction

"Probiotic" means "for life" is derived from Greek language and was coined by Kollath in 1953. the United Nations Food and Agriculture Organization (FAO) and the World Health Organization (WHO) in 2001 defined Probiotics as "live microorganisms which upon ingestion in sufficient concentrations can exert health benefits to the host." (Hill C, et al.2014). Beneficial probiotic bacterial strains reported are species belonging to the genera Lactobacillus and Bifidobacterium. The representative species include Lactobacillus acidophilus, Lactobacillus casei, Lactobacillus plantarum, Bifidobacterium lactis, Bifidobacterium longum, and Bifidobacterium bifidum (Kailasapathy K, Chin J.2000).

The major health benefits attributed to probiotics use is associated with the improvement of gastrointestinal microflora, and treating infections associated with gastrointestinal tract: infections, antibiotic-associated diarrhea, constipation and as therapeutic agent against irritable bowel syndrome and inflammatory bowel diseases. It is also used for the enhancement of immune system, reduction of serum cholesterol, prevention of atopic allergies, cancer prevention, antihypertensive effects, and also to improve lactose metabolism. (Nagpal R et al. 2012) Moreover, according to the American Family Physician Association, there are typically few or no adverse effects associated with probiotic use. Occasionally, flatulence or mild abdominal discomfort, usually self-limited, are reported. (AAFP, 2008) The protective role of the probiotic bacteria is by competing with the intestinal pathogens by way of releasing antibacterial substances such as bacteriocins and metabolites like acetic acid and lactic acid. (Behnsen J et al.2013).

The natural sources of probiotics are fermented foods such as yogurts, dairy, and dairy-related products and vegetables are main sources of normal flora to the gut. (Agrawal, 2005) Probiotics supplements using specific strains of Lactobacillus and Bifidobacterium species are available in the form of tablets, capsules, granules, and liquids. (Bosch M et al.2012). Probiotics are also available in various other varieties in the market such as: functional food & beverages - non-dairy beverages, breakfast cereal, baked foods, fermented meat products, dry-food probiotics; dietary supplements - food supplements and nutritional supplements; Specialty nutrients in the form of infant formulations and as animal feed (Ranadheera, C et al.2017).

There is a need to create a positive attitude of the people towards probiotic use as not many are aware of probiotics and the health benefits associated with the use of probiotics. The present study was aimed at finding out the knowledge, attitude, and practices of people of Al Qassim region towards the use of the probiotics.

Method

This cross-sectional study was conducted from March to April 2019 in Al Qassim region, KSA, and the data was collected through an online self- administered questionnaire, which was translated to Arabic language. The inclusion criteria being that the participants had to be above 18 years of age and belonged to Qassim region. The questionnaire consisted of two parts. The first section included questions on demographic characteristics, and the second section included questions on the knowledge, attitude, and practices associated with probiotic use. Informed consent was obtained from all participants before participating in the survey. The ethical approval for this study was obtained from the Departmental Research Review Committee, College of Applied Medical Sciences, Qassim University. The data were entered in Microsoft Excel and analyzed using EPI INFO7 software. Associations between outcome and predictor variables were analyzed using Chi-square, and the level of statistical significance was set at 0.05.

Results

A total of 669 participants took part in the study. The details of the demographic characteristics are provided in table 1. Majority of the participants were females 83%, and males were 17%. Majority of the study population 44.39% were from the age group18-25 years. 70% of the participants had a college level of education. Only 26% of the participants were aware of probiotics, and their main source of information was social media 35%, followed by family and friend 15%. Table 1 also shows a significant association between the level of education and awareness of probiotics with P = 0.01. Figure 1, shows the knowledge of the people regarding the probiotic term. 30% of them associated probiotics with yogurt, 23% with lactobacillus, followed by bifidobacterium 15%, milk 13%, and the rest 53% don't know. 85% of the participants were not aware of the required bacterial dose needed for optimum effect.

Out of 669 participants, 19.6% of participants consumed probiotics. The questions on practices associated with probiotic use were assessed among these 131 participants. Table 2 projects the questions and the frequency of the options chosen. When asked how did they choose which probiotic to use, 19.9% answered depending on number of bacteria, followed by the manufacturing company. But 35.9% did not care about any of the above-mentioned factors. 24.4% of them consumed probiotics with the meal. 33.6% did not follow any pattern of consumption. Figure 2 shows, 44.27% consumed probiotics to maintain good gastrointestinal health and immune

system, 13.7% consumed probiotics to treat antibiotic-associated side-effects and other abdominal side effects and 5% is to reduce Inflammatory Bowel Disease. 31.3% agreed that probiotics were beneficial to them, whereas 44.3% were not sure of the same. Figure 3 shows, 53.44% of the participants never experienced any side effects following the consumption of probiotics, 4.6% experienced gas and bloating 2.3% headache, 1.5% thirst and allergy symptoms and 0.8% experienced constipation. 57.3% expressed the opinion that they would continue using probiotics in the future, whereas the rest do not know. When asked would they recommend probiotics to others: 66.9% said yes, rest 30% don't know.

Table 1: Association between demographic characteristics of the study participants and their awareness about probiotics

DEMOGRAPHIC CHARACTERISTICS	**FREQUENCY (%) N = 669**	**P value**
AGE		0.34
18 - 25	297(44.39%)	
26 - 32	133(19.88%)	
33 – 40	114(17.04%)	
>40	125(18.68%)	
GENDER		0.06
Male	116(17.34%)	
Female	553(82.66%)	
SOCIAL STATUS		0.2
Married	354(52.91%)	
Unmarried	315(47.09%)	
EDUCATION LEVEL		0.01*
Primary	21(3.14%)	
Secondary	139(20.78%)	
Collage	474(70.85%)	
University and above	32(4.78%)	
None	3(0.45%)	

*significant association

From table 1 we see the age, 18-25 years was the highest proportion to answered to the Questionnaire (44.39%) (When we see the Social Status married, was the highest proportion (52.91%), When we see the education level, the Collage Was the highest proportion (70.85%) and it was significantly associated with awareness of probiotics, with P = 0.01.

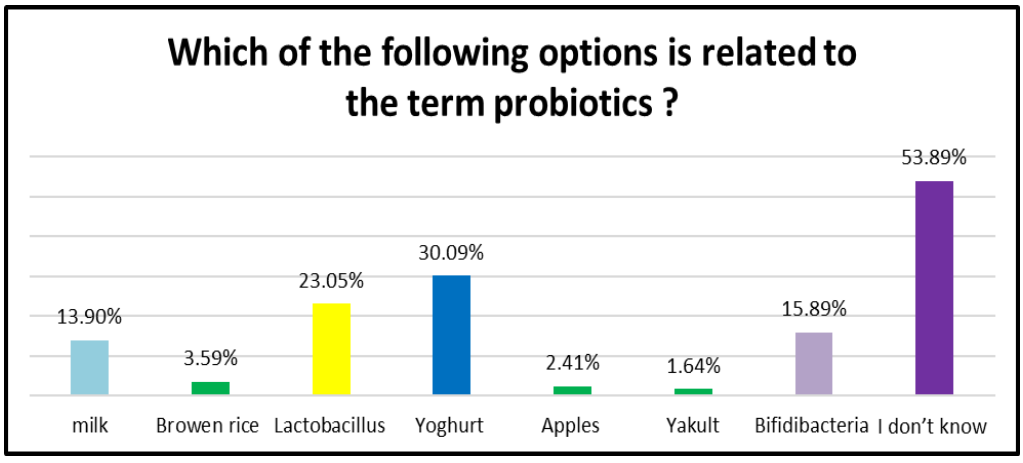

Figure 1: The bar chart above, indicates how people can identify the connection of some food items and bacterial species with probiotics. The majority (53%) stated that they don't know, and the rest mainly pointed out Lactobacillus (23%) and Yoghurt (30%).

Table 2: Practices and attitude related to Probiotics use

Practices	FREQUENCY (%) N = 669
Do you consume probiotics?	
Yes	131 (19.58%)
No	538 (80.42%)
	FREQUENCY (%) N = 131
How do you select which probiotics to consume?	
Depending on the number of bacteria	26 (19.85%)
Depending on the On price	4 (3.05%)
Depending on the On company	24 (18.32%)
I don't care	47 (35.88%)
I don't know	30 (22.90%)
When do you consume them?	
Before meal	17 (12.98%)
With meal	32 (24.43%)
Within 30 minutes following a meal	10 (7.63%)
after a meal	20 (15.27%)
I don't know	52(39.69%)
How often do you consume them?	
Once a day	30 (22.90%)
Once in 2 day	6 (4.58%)
Once a weak	10 (7.63%)
Do not follow any pattern	44 (33.59%)
As and when required	10 (7.63%)
I don't know	31(23.66%)
Were probiotics beneficial to you?	
Yes	41 (31.30%)
NO	1 (0.76%)
Not sure	58 (44.27%)
I don't know	31 (23.66%)
Attitude	**FREQUENCY (%) N = 131**
Will you continue using them in the future?	
Yes	75 (57.25%)
No	7 (5.34%)
I don't know	49 (37.4%)
Do you Recommend others to take probiotics?	
yes	87 (66.92%)
No	4 (3.08%)
I don't know	39 (30%)

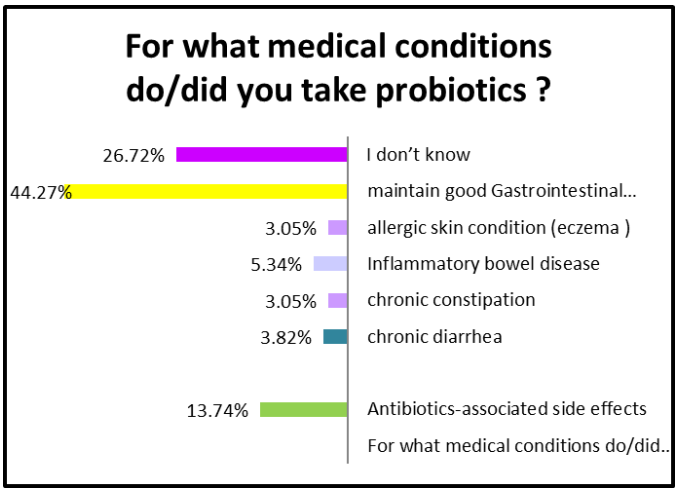

Figure 2: The bar chart, is showing the reasons that caused the participants to take probiotics, 5% is to reduce Inflammatory Bowel Disease, 13% to reduce abdominal side effects, and the majority 44% indicated that it's to maintain good gastro-intestinal health

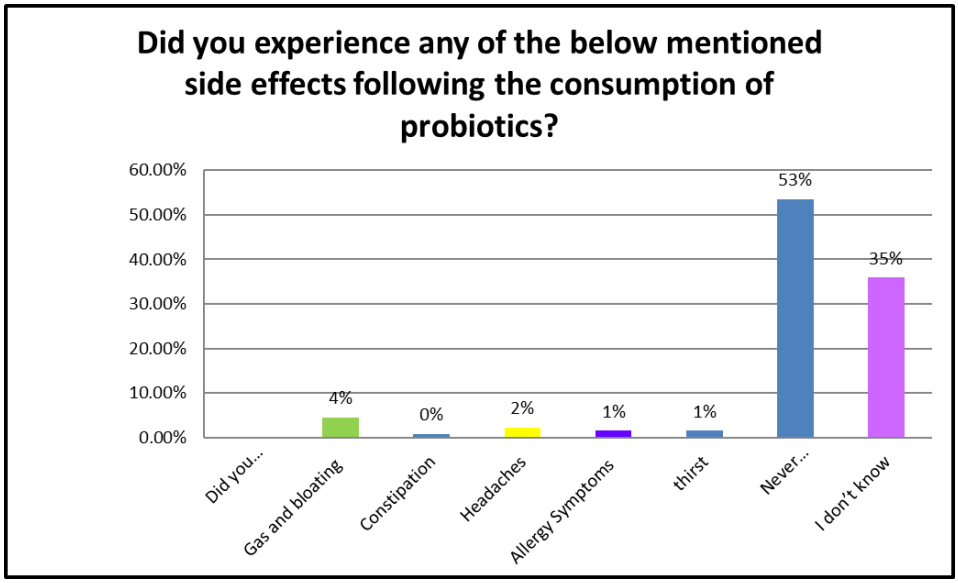

Figure 3: The bar chart above indicates that more than half of the participants did not experience any side effects after consuming probiotics (53%), Minorities experienced bloating and allergies, 4% had gas and bloating, while 2% had a headache while the rest do not know

Discussion

In order to assess the knowledge and the perceptions of the Saudi population about probiotics, this study was conducted. The literature suggests that people do not know much about probiotics, (Annunziata, 2013) and that was reflected in this study. For instance, Annunziata (2013) indicated that "customer groups significantly differ in their evaluation of perceived healthiness of functional foods and in the importance attached to price and brand" (Annunziata, 2013).

The results in the previous section showed clearly that the participants in which the study was subjected to, have minor knowledge about probiotics and how it can be used. Out of the total subjects, 73% did not have any idea about probiotics. This is considered relatively a high percentage, since it reflects that a big portion of people is not aware of the availability of probiotics. This shows that they were not told before about probiotics from healthcare institutions, and also they did not read before anything related to this topic. The percentage of people

that don't know about probiotics is relatively higher than other studies, where Betz (2015) indicated that 43% of participants were aware of probiotics (Betz, 2015). On the contrary, another study in Nigeria targeting clinicians, where the study showed that out of 62 clinicians, only 3 (4.8%) indicated that they are familiar with the use of probiotics". (Anukam, 2005) This shows that the geographical location, and the public health awareness in a society plays a role in the probiotics knowledge in a country.

The main source of information for participants was social media, where it seemed to be playing an important role in educating people (35% knew about probiotics from social media). This is studied in literature back in 2013, and our findings agreed with the studies done. Moorhead (2013) suggested that social media platforms will soon take important actions towards spreading awareness across communities with respect to health education. Results also show that only 7% of participants knew their information about probiotics from their doctor, which is not a good news because doctors should play an important role in clarifying such issues to patients (NCCIH, 2015).

A good portion of the subject knew that probiotics are linked to yoghurt. And that it helps in preventing and treating constipation. NCCIH showed that people since ages consumed probiotics as cure for many problems, without knowing what strains it contained. (NCCIH, 2015) This is clear in Betz (2015) study where 72% of the participants took their probiotics from yoghurt, 20% dairy drinks, 7% from pills, and 1% from cereals.

Upon questioning the required dose of probiotics, around 85% did not have any answer about it. Such results clearly note that even people taking probiotics are not consuming it out of a good knowledge about it, but just because they heard some rumors about it. In order to measure this issue specifically, results from table 2 show that 15% consume probiotics after a meal, while 13% before food, 24% said that they take their dose with the meal, and 7% after 30 minutes after a meal. The rest do not take commercial probiotics. This indicates that participants do not have any idea about how the stomach HCL kills the probiotics if ingested in the morning or before a meal, and even the subjects that indicate consuming after a meal did not appear to be knowing the real reason behind it. This piece of information is not easily found in literature, where the majority of studies address the knowledge and not the way of which probiotics are taken. Betz (2015) study indicated that 40% consume probiotics daily, and 34% do not stick to a pattern.

Examining further issues addressed in the questionnaire, such as side effects, the data collected matched the literature reviewed, where participants that previously consumed probiotics did not have any highlighted side effects, effects, such as dangerous infections, in individuals with severe underlying medical complications. Studies about the side effects of probiotics are done with respect to strains, which is not statistically comparable to this study.

Understanding the different factors that may lead to some people knowing about probiotics and others no, was also studied, in which the table 1 in the previous section showed that the best age to be able to know about probiotics is between eighteen and twenty-five years old. According to the Suchman (1965) people in this age tend to be more curious about the medical information, and today with the era of technology this information is readily available over the internet and can be ready by all age groups. (Suchman, 1965) In Betz (2015) study the most age group with the highest knowledge of probiotics was below 45 years old (Betz, 2015).

Furthermore, assessing the knowledge with respect to education showed that College level participants are more prone to such information, likewise married couples. Betz (2015) indicated this in his study by stating "Patients with more years of education were more likely to be familiar with the term probiotic" This can be explained since a couple that are preparing to have a family may read more and do research about growing a family in a healthy manner. For this reason, the knowledge about probiotics may be higher and especially among females.

As part of follow-up for the future, participants were asked if they would take probiotics, or they would recommend someone to take probiotics; the answers where 57% and 66% respectively; and that is because 23% do not know about any benefits of probiotics, and 44% are not sure about it.

Oliver (2014) study suggests that in order for people to recommend probiotics for one another, a healthcare provider should recommend it first, and her study indicated that 45% of healthcare providers recommend probiotics, and 78% of dieticians do that also, where it was stated as well that "Recommendation practices may be influenced by knowledge" (Oliver, 2014).

Conclusion

Probiotics are still a debatable topic for many people, and the knowledge about the topic is not well understood. Also, there is a huge gap in the probiotics knowledge among the Saudi population. This gap needs to be addressed on different levels to be able to reach the widest range of people. This can be on the level of the doctors, hospital campaigns, social media awareness posters, or even public speeches. With the current era of technology, healthcare providers and institutions should take an advantage of the available tools to spread to the world the knowledge of probiotics and aid in the growth of a healthy generation.

References

Agrawal, R. (2005). Probiotics: an emerging food supplement with health benefits. Food Biotechnology, 19(3), 227-246.

Anukam, K. C., Osazuwa, E. O., & Reid, G. (2006). Knowledge of probiotics by Nigerian clinicians. International Journal of Probiotics and Prebiotics, 1(1), 57.

Annunziata, A., & Vecchio, R. (2013). Consumer perception of functional foods: A conjoint analysis with probiotics. Food Quality and Preference, 28(1), 348-355.

Behnsen, J., Deriu, E., Sassone-Corsi, M., & Raffatellu, M. (2013). Probiotics: properties, examples, and specific applications. Cold Spring Harbor perspectives in medicine, 3(3), a010074.

Betz, M., Uzueta, A., Rasmussen, H., Gregoire, M., Vanderwall, C., & Witowich, G. (2015). Knowledge, use and perceptions of probiotics and prebiotics in hospitalised patients. Nutrition & dietetics, 72(3), 261-266.

Hill, C., Guarner, F., Reid, G., Gibson, G. R., Merenstein, D. J., Pot, B., ... & Calder, P. C. (2014). Expert consensus document: The International Scientific Association for Probiotics and Prebiotics consensus statement on the scope and appropriate use of the term probiotic. *Nature reviews Gastroenterology & hepatology*, *11*(8), 506.

Kailasapathy, K., & Chin, J. (2000). Survival and therapeutic potential of probiotic organisms with reference to Lactobacillus acidophilus and Bifidobacterium spp. Immunology and cell biology, 78(1), 80-88.

Moorhead, S. A., Hazlett, D. E., Harrison, L., Carroll, J. K., Irwin, A., & Hoving, C. (2013). A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication. Journal of medical Internet research, 15(4).

Nagpal, R., Kumar, A., Kumar, M., Behare, P. V., Jain, S., & Yadav, H. (2012). Probiotics, their health benefits and applications for developing healthier foods: a review. FEMS microbiology letters, 334(1), 1-15.

National Center for Complementary and Integrative Health (NCCIH). (2015). Probiotics: In Depth. Retrieved from https://nccih.nih.gov/health/probiotics/introduction.htm

Oliver, L., Rasmussen, H., Gregoire, M. B., & Chen, Y. (2014). Health care provider's knowledge, perceptions, and use of probiotics and prebiotics. Topics in Clinical Nutrition, 29(2), 139-149.

Ranadheera, C., Vidanarachchi, J., Rocha, R., Cruz, A., & Ajlouni, S. (2017). Probiotic delivery through fermentation: dairy vs. non-dairy beverages. Fermentation, 3(4), 67.

Suchman, E. A. (1965). Social factors in medical deprivation. American Journal of Public Health and the Nations Health, 55(11), 1725-1733.

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Delusional Disorder Structured on Antisocial Vein/ Absence of Empathy and Remorse

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Abstract
Motivation behind choosing the subject: Forensic psychiatry is always a challenge by raising the issue of discernment when committing an antisocial act. The fact becomes all the more interesting as it is not a schizophrenia case, but other diagnoses in the psychotic spectrum, but which maintain a better contact with reality and a greater social functioning. Study Questions: Paranoid schizophrenia can overlap high emotionality, lability, the richness of the affective life being supported by the nature of the delusional idea. Objective: We want to present the life history of a patient with AHC filled with heritability for the paranoid spectrum, whose diagnosis ranged from Polymorphic Personality Disorder with Psychotic Decompensation to Delirious Disorder for ten years, during which he had two prolonged admissions between a hospital of maximum security and special measures. Results: The patient presents disorders predominantly in the register of thought, delirious ideation of persecution, prejudice, with the disorganization of thought and language (predominantly in writing, with jargonophasia and the intrication of the delusional idea totally discordant of context, without neglecting the total absence of empathy, both the patient, as well as that of his brother, related to the disappearance of their mother for several months who suffers from Alzheimer's disease. This, together with the lack of insight, enhances the danger, together with the pathology that dictated the last hospitalization (repeated threats with stabbing to the address to some unknown people). Conclusions: The high doses of antipsychotic and timostabilizing medications acted on the thinking component, but less on the axis II disorder, failing to modulate the affectivity, the aspect of psychopatoidization remaining evident.

Keywords: Delusional Disorder, Antisocial Personality, Danger, Compulsory Treatment, Hospitalization of Measures and Increased Safety, Absence of Empathy and Criticism, Forensic Psychiatry

1. Introduction

1.1. General description of the case:

Personal data:
• born in 1968, being the youngest of the three children (the older sister is a step-sister)
• Mother - professional driver profession, affirmatively diagnosed with Alzheimer's disease; missing from home for several months.
• the father - deceased in 1982 (at the age of 67) - affirmative stroke; teacher of mathematics, physics, and astronomy (the patient was 14 years old at the time of his father's death)
• brother - married
• sister - deceased - brain tumor; the patient is confused about the year of her death
• states that he lives with his mother, in an urban environment, although she has been missing for several months; the brother has the same address as the patient's
• both deny AHC for Schizophrenia

Studies:
• starts schooling at the Industrial High School (construction profile) and continues at another Industrial High School (architecture profile) - average Bachelor's degree 7.52 - ends in 1986 with the qualification "gas and sanitary installer."
• 1988 –1991 - employed as an installer
• 1986 - 1988 - satisfies the military internship in transmissions - affirmatively he was "front man" and "detachment chief."
• 1988 - waiter courses - bartender - cook
• 1990 - 1993 - piloting courses - sports aviation, affirmative 220 hours of flight - obligatory to obtain the patent for recreational aircraft - "the best period of his life," in which he also has a cohabitation relationship
• 1991 - 1994 - works as a taxi driver - with short periods in which he did not work
• 1995 - employed for one year as a waiter
• 2009 - 2011 - Faculty of Legal Sciences and Administrative Sciences - unfinished
• 2015 - sales agent diploma - graduate course - three weeks period
• 2018 - diploma course project manager

Forensic history:
• 2002 - 2003 - Penitentiary - Psychiatric department - punishment for the act of outrage
• 2004 (May - November) continued the sentence of punishment in a Psychiatric Hospital for Safety and Special Measures
• 2007 - leaves the respective hospital
• 2008 - 2010 multiple admissions to psychiatry
• 2010 - receives invalidity pension, as well as disability pension (i.e.: Delirious disorder; denial of having had a history of schizophrenia diagnosis)
• 2011 - 2012: second conviction - for theft (affirmatively steals two video cameras from a neighbor) - hospitalization in another hospital for Special Safety and Measures
• 2013 - released from the Psychiatric Hospital for Safety and Special Measures
• 2013 - 2016 - lived in the parents' home - the patient claims to have complied with the treatment
• May 2016 - October 2017 - hospitalization for Safety and Special Measures ("Because I did not take my treatment")
• 2017 - present - claims to have permanently taken the treatment

About his family:
• Divorced parents - when the patient was 9 years old
• "Dad said it was not good that my mother was a taxi driver, she was a professional driver, she had been an educator, qualified at work, but gave up."
• "Dad was 20 years older than my mother."
• "My mother was my father's high school student."

• "They did not understand jealousy."
• "My mother was late at night, she was smelling of gasoline and diesel."
• "The father won the divorce in the court, he proved that mother cheated on him."
• "In our family, there was an ordeal, they were arguing all the time, and they didn't have time to take us to kindergarten and school."
• "Mother was very beautiful."
• "My grandmother loved me, she made me sweets, she took me for walks."
• "The mother was previously married, had a daughter from that marriage" - the patient's deceased sister
• Affirmative, the brother destroyed the house of some neighbors with the ax "because they took a land that we inherited"
• 1991 - 1994 had a cohabitation relationship with L., the mother forbidding that marriage ("We lived at my place for a while, we quarreled over my jealousy"); later he stated sporadic relationships ("I was handsome, and women liked me, but I didn't care about having a relationship")
• 2017 - states he has a relationship with E. (37 years old), having the profession of a salesman; the patient stating that he is ashamed to reveal to her that he is admitted to the psychiatric service

About the mother - in recent years:
• "Mother goes on pilgrimages to churches."
• "She had Alzheimer's, and she forgot, she got lost, she called me, and she asked people on the street to tell me in what area she is, to come and pick her up."
• "She was admitted to psychiatry and neurology."
• "She didn't have stability, she didn't stand well on her feet."
• "She disappeared in June 2018, I am abandoned and alone."
• "I told the police after three weeks - a month to make her disappear, because she sometimes slept in front of Real, where she was selling flowers."
• "I and my brother were very worried, it's just my mother, I hope she is okay."
• "I think someone stole her pension or she went around to churches."
• "I had to be very careful with her, otherwise she would get lost."
• "I thought she was still at my brother's place. She went to him sometimes. My mother would be missing from home sometimes, she was sleeping on the street, so that she would not pay taxes in her building."

1.2. Hospitalization in a Psychiatric Hospital

(SZ = Day Hospitalization; SC = Continuous Hospitalization)
SZ: 8.01.2008
SC: 05.11 - 12.11 2008
SC: 15.06 - 05.08 2009
SZ: 25.01.2010
SZ: 24.02.2010
SZ: 22.03.2010
SC: 20.04 - 22.04.2010
SZ: 02.06.2010
SZ: 01.07.2010
SZ: 14.07.2010
SC: 28.07 - 30.07.2010
SC: 30.07 - 19.08.2010
SZ: 25.08.2010
SZ: 15.09.2010
SC: 12.10 - 20.10.2010
SZ: 27.10.2010
SZ: 10.11.2010
SZ: 22.12.2010
SZ: 02.02.2011 - Mental Health Center - Dg: Paranoid personality disorder
SC: 22.08. - 29.08.2011 - Sun: Delirious disorder

SC: 8.06.2014 - 22.05.2015 - Sun: Delusional disorder
SC: 7.06 - 22.08.2016 - Sun: Delusional disorder
SZ: 2.02.2018 Mental Health Center
SZ: 11.05.2018 Mental Health Center
SZ: 7.12.2018 Mental Health Center
SZ: 24.05.2018 Mental Health Center

By the end of 2009, the patient is presented with the diagnosis of Paranoid Personality Disorder with psychotic decompensations, starting with 2010, the diagnosis being that of Delirious Disorder. (McDougall, 1989)

1.3. Current episode

• He is currently talking about a relationship with a partner E. This is integrated in the delirious representations of the patient: "I was passing by Dr. D.'s psychiatric ward, on the way to E., it was her birthday, and she wanted an Airball toy from Noriel, I wanted to give it to her but Dr. D.'s bodyguards, at his instructions, they came after me to beat me, to give them the toy and the money I had with me. When I came out of the store where I had bought the toy, I saw a woman throwing some pots at the garbage. I found the two knives in the trash and took them to protect myself from the guard company, although the police said I had them at my disposal, but I had found them in the trash with the plates and pots. What was I to do? They wanted to take my three mobile phones and the 500 RON I had. The patron of the guard company asked the P.M. bodyguard to beat me with a rake and the two-meter dig. The doctor wanted me to bribe him, because every month he asked for my pension." (Bion, 1904)

Delirious ideas last affirmed and sustained on July 25, 2019
• "I got tested by Marius Nasta to make hormones for Băsescu because he needed the pearl of Ardeal, which is the substance they take from my blood sample, it is a very good antidote, I cannot tell you why."
• "Melania Trump is my daughter, as well as Mădălina Pușcălău, who is a model."
• "The psychologist is Putin's niece, but she does not want to tell us."
• “When I was eight, my aunt touched my penis because she wanted my sperm, and she put it in a tube. Carmen and Klaus Iohanis are my children, they are from another religion, and this is why the marriage was allowed."
• "I know Melania Trump is my daughter, because when I was in Săpoca, Melania and Donald Trump came to get married in front of me."
• "I have more children in the tube, none in the natural way."
• "The dolls in the office are made by Mrs. Monica Nicoleta, the daughter of Vladimir Putin, who did not keep her name so that she would have no problems. I met her in high society at the Hotel Royal Constanta, and we are good friends now. Monica Nicoleta was there with Miss Irina, her daughter, and Putin's niece."

2. Materials and methods

Prolonged hospitalization with compulsory treatment until recovery or elimination of any degree of danger, assessment of the degree of danger, of the mental capacity at various moments of hospitalization, assessment of the discernment in the commission of forensic psychiatric medical expertise, psychological examination, life map tracking the evolution under treatment.

3. Results

3.1. Examination of the present mental state

Observations: the patient, in a hospital gown, relatively uncared for, tense inside, with adhesive and psychic viscosity, insistent, with verbal stereotypes, not always understanding the unavailability of the interlocutor, irritable, potentially explosive, excitable and self-aggressive when it comes to minor frustrations (such as lack of cigarettes).

Perception: he denies the auditory and visual hallucinations, or at the level of another analyzer, both at present and in the past, the pathology being present at each hospitalization in the register of thought, which was an argument for supporting the diagnosis of Delirious Disorder. (Trifu, 2017)
Attention: voluntary hypoprosexia, with spontaneous hyperprosexia for certain insignificant details, but integrated deliriously or with some significance for the patient.
Memory: fixation hypomnesia, with non-selective hypermnesia for certain data, facts, or delusional integrated events. Pseudoreminescences on which the patient builds confabulations and supports his delusional idea.
Thinking: accelerated flow and rhythm of ideo-verbal, fast-talking having as its correspondent the graphomania and, sometimes, fast writing (in writing the patient's thinking is disorganized by curbing the jargon-phasia), ideoverbal disorganization in long sentences, but not in short ones. (Cassidy, 2016) Delusional interpretation, coincidence detection, attribution of meanings and allusive meanings, delusional polymorphic ideas not systematized, mainly of magnitude and filiation, as well as persecution and prejudice related to hospitalization, given the absence of criticism. Deficiency of mentalization. Constructions of illogisms, inability to anticipate the consequences of his actions ("I feel like it / I do it!"). (Adler, 2010)
Affectivity: potentially dysphoric, excitable, explosive, acting-out manifestations with the breaking of thinking and transposing in a self-aggressive way, primary affections from the register of hatred, anger, revenge, absence of empathy, remorse, inability to feel his depression or guilt, affective switch towards his brother, the affective flattening regarding the disappearance of his mother.
Instinctive life: antisocial tendencies, hetero-aggressive acts, compulsive smoking in large quantities, the potential for social danger, minimal risk of self-aggression. Delayed response of pulsation control during high-dose psychotropic treatment. (Durkheim, 1997)
Activity: the minimum capacity to carry out useful social activities, due to the disorganization of thinking and behavior.
Sleeping pattern: sleep is difficult to induce with medications.
Disease consciousness: absent
Current diagnosis: Persistent delusional disorder (Winnicott, 2005)

3.2. The evolution during the last hospitalization

Patient T. has been admitted to psychiatry for about two months. We mention that he came to the hospital with a crew of the Police Station, for a marked psychomotor agitation behavior (threatening with the knife several people on the street), for his acquisition and hospitalization, it was necessary to immobilize and handcuff him. From the Police report, the patient was incoherent ideo-verbally, with marked hetero-aggressiveness.

It is under the incident of art. 109 Penal Code, in the psychiatric dispensary at the Mental Health Center, after the last discharge from the Safety and Special Measures Hospital. The attending physician in his dispensary found that he was not compliant with the prescribed pharmacological treatment, notifying the Court in this regard, which is why after decommissioning the non-voluntary hospitalization procedure in the emergency room. The court cites the patient in the court in order to replace/cease the measure of compulsory medical treatment (art. 568 / NCPP) and to replace it with the measure of the provisional medical hospitalization until the recovery or improvement of any danger state (Kernberg, 1995).

It is worth mentioning that during the entire hospitalization in our clinic, the patient was in the surveillance room, he was presented every time in front of the Court, as well as at the National Institute of Legal Medicine, where he refused psychiatric expertise.
At the beginning of the hospitalization, high doses of medication were required, both classical neuroleptics and atypical antipsychotics (Clopixol Acuphace superimposed over 8 mg Risperidone), due to the manifestations of hetero-aggressiveness that persisted for more than three weeks.

Throughout the hospitalization the patient was adhesive, insistent, with verbal and physical aggression towards the staff and the other patients, with graphomania (multiple petitions filed both in the attention of the Hospital Management and in the attention of the Court, the current doctor sending to the Court the majority of the patient's documents). In most of the documents, he requested to be released from the incidence of non-voluntary medical hospitalization and to transform the hospitalization into a voluntary one. He also states that he is aware

of his rights and that he does not want to be evaluated by the expert committee of the National Institute of Legal Medicine, but by a party expert, whom he will designate himself (Bowlby, 1976).
He was visited on several occasions by his brother, who had a manipulative behavior (asking for the keys of the apartment in which they both live, against the patient's will, as well as numerous papers related to his brother's health, not presenting any legal document from which it would result that he is the patient's guardian). In this regard, the opinion of the legal lady of the Safety and Special Measures Hospital was requested, who stated that there is no document referring to the patient having a designated legal guardian in the medical file of the hospital.

We mention that throughout the hospitalization, the pathology of the patient was manifested mainly at the behavioral level, with marked violence and heterogeneity, as well as in the thinking area. As a result of the treatment, after about a month, the ideo-verbal incoherence was partially restored, but delusional ideas persisted, mainly of filiation, as well as of persecution and prejudice. (Klein, 2011) The absence of the emotional resonance was observed, the psychological examination highlighting an antisocial personality line, the potential for marked danger, acting out type reactions with a mentalization deficit, the inability to understand the consequences of his aggressive actions, the lack of empathy, the absence of remorse, the lack of insight, the lack of criticism. Regarding phenomenology that determined the hospitalization (including in the present moment he considered that "It is not great that I had in my hand two knives, it seemed to the police that I was threatening people").

All the necessary investigations were carried out, the psychological examination insisting on the delusional ideas of persecution and grandeur, on the interpretations and delusional behavior, developed on a lower average intelligence level IQ - 95. The personality is imprinted by paranoid tendencies, impulsivity, and hetero-aggressive decompensations, with poor overall operating efficiency (GAFS = 40). The EEG describes a hypovoluble route, with an alpha rhythm of 10 cycles/second, poorly represented, symmetrical, reactive, without pathological graphs (Trifu, 2015).

To mention the patient's graphomania, all the citations issued by the Court, which were communicated and handed to him, being filled with multiple patient's writings, partially legible, partly highlighting fragments of delusional ideas ("I was decorated in April 1990 by General Lafayetet Trueman ... ") later the speech was disorganized and suggested jargonophasia, by mixing English words in the text, later writing that he refused all psychiatric and psychological expertise. He notes in the court citation: "I specify that Melania Trump is my daughter, and her children are my legal grandchildren." The writings bump multiple references to older psychiatric expertise, performed in another county court, intricate with legislative concepts from the patient's past (former student at the faculty of law), wrongly understood and used outside the context ("Decree 14 of Protocol 114 of 14.11.1994. Strasbourg. Extra-judiciary.") (Kohut, 2009)

The attending physician, the department head doctor, the resident doctors and the psychologists of the clinic performed repeated anamnesis throughout the hospitalization, one of the subjects discussed being the absence of the patient's mother's from home (it was understood that she was old, suffering from Alzheimer's and disappeared about eight months before), neither the patient nor his brother showed any emotional feelings of concern about what might have happened. We emphasize once again the lack of emotional resonance capacity, the total lack of affect, the only forms of externalization in this register being impulsivity, excitable discharges, irritability, irascibility. (Gabbard, 2014)

During the hospitalization, despite the high doses of medication (the last treatment followed was Risperidone 8 mg, Tiapridal 300 mg, Levomepromazine 25 mg and neuroleptic Fluanxol 20 mg depot a vial every two weeks) and being in a ward supervision, the patient presented multiple aggressive behaviors, both to the staff and to other inpatients. (Freud, 2014) Accordingly, we are of the opinion that at the present time the high degree of danger regarding the patient is maintained, which is why it was considered a necessity to continue the provisional medical hospitalization until the Decision of definitive medical hospitalization by the Court, within the Sapoca Special Safety and Measures Hospital, because a current psychiatric hospital does not offer sufficient protection measures regarding such a patient, his behavior endangering the integrity of the other patients admitted.

References

Adler, Alfred (2010). *Understanding Human Nature.* Eastford: Martino Fine Books; Tra edition.

Bion, Wilfred (1904). *Second Thoughts: Selected Papers on Psychoanalysis.* New York: Karnac Books.

Bowlby, John (1976). Separation: Anxiety And Anger (Basic Books Classics) Volume 2 (Attachment and Loss Vol 2). 1st Edition. New York: Basic Books.

Cassidy, Jude & Shaver, Phillip (2016). *Handbook of Attachment, Third Edition: Theory, Research, and Clinical Applications.* 3rd Edition. New York: The Guilford Press.

Durkheim, Emile & Simson, George (1997). *Suicide: a study in sociology.* Forence: Free Press; Reissue edition.

Freud, Sigmund (2014). SIGMUND FREUD 7 BOOK PREMIUM COLLECTION: General Introduction To Psychoanalysis; Totem And Taboo: Interpretation Of Dreams; Dream Psychology; and many more (Timeless Wisdom Collection 626). Kindle Edition. Business and Leadership Publishing.

Gabbard, Glen (2014). Tratat de psihiatrie psihodinamica. Bucuresti: Editura Trei.

Kernberg, Otto (1995). *Borderline Conditions and Pathological Narcissism (The Master Work Series).* Lanham: Jason Aronson, Inc.

Klein, Melanie (2011). *Love, Guilt And Reparation Kindle Edition.* New York: Vintage.

Kohut, Heintz (2009). *The Analysis of the Self: A Systematic Approach to the Psychoanalytic Treatment of Narcissistic Personality Disorders.* Chicago: The University of Chicago Press.

McDougall, Joyce (1989). *Theaters Of The Body: A Psychoanalytic Approach to Psychosomatic Illness.* New York: W.W. Norton&Company.

Trifu S, Brăileanu D., Carp E.G., Chirilescu A., Mihai I (2015). Psychodynamic Particularities in Expressing Systematized Delirium in Paranoid Schizophrenia. Procedia - Social and Behavioral Sciences, Volume 203, 412-418, doi: https://doi.org/10.1016/j.sbspro.2015.08.315.

Trifu S., Trifu, A.C. Trifu A.I. (2017). Nevroglya and superior cognitive functions. Antidepressants and neuroplasticity. Journal of the neurological sciences. Volume:381 Supplement: S. Pages: 837-837. doi: https://doi.org/10.1016/j.jns.2017.08.2355

Winnicott, D.W. (2005). *Spaima de prabusire – Explorari psihanlitice.* Bucuresti: Editura Fundatiei Generatia.

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Child's Eating Behavior: A Difficulty that Needs be Known and Overcome

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Abstract
Eating is one of the priorities of the body to stay alive, it is an instinctive act only in the first weeks of life and that, after that period, should become a learned behavior. During the first thousand days of life the child evolves through some stages related to feeding starting with nutrition through the umbilical cord in the intrauterine period, passing through a phase of exclusive liquid intake during the first six months of life, and then begin to receive other types of food that will challenge your senses and enhance your development until it is integrated into the family's food routine. In a short time, the child should learn how to eat, what to eat, and how much to eat to meet all of their physical and emotional needs. One of the problems that most often arise during childhood is the child that does not eat, leading to exaggerated concerns from family members. This article presents the main events related to feeding, from the characterization of hunger/appetite, the importance of chewing and swallowing processes during the child's neuromotor and emotional development, food selectivity and neophobia and the basic principles that must be observed to the child is fed correctly.

Keywords: Food Neophobia, Picky Eating, Eating Behavior, Child Nutrition

Introduction

Eating is one of the priorities of the body to stay alive, it is an instinctive act only in the first weeks of life and that, after this period, should become a learned behavior, since it is the only bodily task that requires the participation of all organs and senses. Besides being an act of survival, it is also fundamental in the human and environment relational process and, in order to be fulfilled, requires neurological, emotional maturity and muscular coordination (Stevenson & Allaire 1991). The omnivore needs to learn what to eat when to eat and what foods can be combined, and although it needs a varied diet for its proper growth and development, the ingestion of certain substances can be harmful.

During the first thousand days of life the child evolves through some stages related to feeding starting with nutrition through the umbilical cord in the intrauterine period, passing through a phase of exclusive liquid intake during the first six months of life, and then begin to receive other types of food that will challenge their senses and enhance their development until it is integrated into the family's dietary routine (Nicklaus 2016). Therefore,

in a short time, the child should learn how to eat, what to eat, and how much to eat to meet all of their physical and emotional needs. And this entire learning process requires the participation of parents/caregivers until the child becomes autonomous and is able to feed with adults in the context of family meals, incorporating the bases for future eating habits (Savage et al. 2007, Walton et al. 2007).

Hunger and appetite

Hunger (latin *faminem*) is the name given to the physiological sensation by which the body perceives that needs food to maintain its inherent activities in life. Appetite can be defined as a behavioral act or a pleasant sensation linked to the act of eating, which is variable according to nutritional needs, age, physical and emotional conditions, room temperature and intake in the previous meal. Because it is linked to cognitive factors, besides the metabolic ones, the appetite is able to continue stimulating the individual to eat, even without hunger (Morley & Levine 1985, Marty et al., 2018).

While in adults the appetite has a strong emotional component manifested by intention to ingest food, in children nutritional needs and their digestive capacity play an important role in the amount of food to be eaten, which leads to the full development of digestive maturation and behavior until the end of the fourth year of life (Abrahamse et al. 2012).

The ingestion of food necessary for growth and development is regulated by complex cognitive and metabolic mechanisms involving the sense organs, different structures of the gastrointestinal tract and the central nervous system, enabling the individual to eat foods in quantity and quality necessary to satisfy their needs physical and/or emotional desires (Williams & Suchdev 2017). All integration of these mechanisms occurs at the brain level that determines both metabolic and cognitive satisfaction (Stevenson & Allaire 1991).

The simple thought about food, the observation of its appearance, odor and taste, associated to stimuli coming from other structures such as oral cavity, stomach, duodenum, pancreas and adipose tissue, characterizing the cephalic, gastric and intestinal phases of the appetite control, trigger stimuli directed to the hypothalamus, brain stem and cortex (limbic system and base nuclei) that produce, through hormonal, the activation of appetite-regulating neurons that determine if the individual will eat or feel sated (Damiani & Damiani 2011, Chambers et al. 2013, Anderson et al. 2016).

The senses and the feeding

Children base their preferences on the sensory characteristics of food by creating a mental image of what should be acceptable food to be eaten, and those that do not fit into that creation are usually turned down (Maiz et al. 2018).

For the child, among the various senses, the vision is more important than the sensory process in deciding what to eat, which gives more participation of the visual aspect of the dish in their meals. To be stimulating foods should be presented on the plate in a separate manner, allowing the children to satisfy the desire to pick up the pieces and portions with their fingers, bringing them to their mouths as do the adults they are observing and imitating during the meal act (Lafraire et al. 2016).

As children show exploratory behavior for their development it should be allowed to touch, smell, play and put in the mouth the different foods, before completing the act of eating, since they are in the process of observation, imitation, exploration, and repetition during the which increases affective bonds and optimizes learning during the sensitive period, ideal for the development of preferences (Stenvenson & Allaire 1991, Marty et al. 2018, Cashdan 1994, Stoica & Alexe 2016).

The palate is the sensation produced by placing a food in the mouth while the taste describes the chemoreception of the gustatory cells located in the taste buds, mediated by nerve endings. The palate is composed of a sensitive system that captures information and sends it to the central nervous system. The taste buds are found in greater number in the epithelium of the tongue, although they are also present in the palate and the oropharynx. In

humans, the distribution of the taste buds of the palate and oropharynx occurs in a greater number in neonates and children than in adults. The tongue is the largest sensory organ and, in addition to the taste buds, also has the Krause corpuscles, structures that can capture tactile sensations (Stoica & Alexe 2016, De Cosmi et al. 2017).

The perception of taste is mainly a function of the taste buds, although the odor strongly contributes to this sense. Also, the texture of the food, detected by the tactile sense of the mouth, and the presence of substances that stimulate the nerve endings can significantly alter this perception (Demattè et al. 2014). Smell has an important role in food serving as an alert to the body about potential harmful elements in the environment and recognizing foods useful for survival (Nicklaus 2017, Demattè et al. 2014). The sense of taste plays an important role in the life and nutritional condition of the human being. The sensations of sweet and salty can be identified on the tip of the tongue, the sensation of sour, in the portions lateral, while the sensation of bitter, on the posterior region of the tongue and soft palate.

Children start to be exposed to the different flavors of food from the prenatal period, when the amniotic fluid presents the feeding experiences of the pregnant woman, and continues during breastfeeding, offering the infant the stimuli to develop a wide spectrum of flavors. This fact explains why breastfed children are less demanding and more predisposed to try new foods (Gregory et al. 2011, Lam 2015, Wadhera et al. 2015). Children are born with a preference for sweet taste while all other flavors need to be learned by exposure, which should preferably occur between 4 and 6 months of age (Harris & Mason 2017, Ross 2017).

At birth, the oral cavity exhibits the most organized sensory and motor integration of the human being, necessary for survival. While an innate preference for sweet taste from the prenatal stage is observed, rejection of the bitter flavors of vegetables can be considered as a natural protection factor, avoiding the consumption of harmful substances (poisons) and low energy content (vegetables with unpleasant taste and texture) (Lam 2015). On the other hand, more caloric foods are more accepted because of the greater palatability and sensation of satiety after ingestion and, when unknown foods are associated with sugar, they are more well accepted (Ramos & Stein 2000).

Chewing

Chewing is the initial phase of the digestive process characterized by mechanical acts of biting, organizing, grinding and milling the food, modulated by neuromuscular activities, preparing it for swallowing. It arises as a result of the maturation and coordination of neuromuscular movements that were initiated during the first semester of life when the child feeds almost exclusively through the suctioning process. It provides functional stimuli that help the development of the maxillary bones, mandible, dental arches and other structures of the oral cavity, besides playing an important role in the speech, propitiating the articulation of words through the movement of the tongue and other structures of the oral cavity (Wickewire et al 1981, Green et al 1997).

The force of the jaw muscles determines the amount of energy available to chop or grind foods and prepares them for swallowing, which is a complex process that requires the work of 26 muscle groups and six cranial nerves. The first masticatory movements are uncoordinated and inaccurate, beginning between the sixth and seventh month of life, when the eruption of the lower and upper central incisor teeth occurs (Gavião et al. 2001).

In the fifth year of life, a fully developed mastication is expected, equivalent to the maturation of the masticatory apparatus since as the first dentition is completed, the chewing cycle becomes stable (Lucas et al. 2004).

The most suitable period for the introduction of foods with more complex textures is between 6 and 10 months. The introduction of more consistent foods after 10 months of age is associated with acceptance difficulties and eating problems at more advanced ages.

Neuromotor development

During the different stages of its development, the child increasingly interacts and intervenes in the reality, and the environment that surrounds him and the food loses the exclusivity in his interest, which happens to be shared

with many other stimuli. From the seventh week of gestation, it is possible to observe important responses of the perioral region to the tactile stimuli. The innate reflex of suction appears from the 5th month of intrauterine life and is observed more clearly in the 29th week. However, its development will be complete during the 32nd week of gestation when the coordination between the sucking and swallowing reflexes appears, which aims to stimulate the child's motor-oral development and provide conditions for an efficient diet. The coordination between suction and deglutition with respiratory movements occurs between 32 and 34 weeks of gestational age, presenting interdependent structural and neurophysiological relationship, and its maturation is fundamental so that aspiration does not occur during feeding (Stevenson & Allaire 1991). The nutritive suction depends on the integration of several elements like reflex suction, lips, tongue, and mandible acting in coordination, oral cavity size and muscular strength of the cheeks (Harris & Mason 2017).

The child's neuromotor development evolves in the craniocaudal direction and provides conditions for the feeding process to occur naturally. While at birth, reflex suction, voracity and the so-called oropharyngeal reflex (all excitation of the posterior part of the mouth leads to the swallowing movement), there is also the extrusion reflex, which disappears after 3 months of age. At 4 months the extrusion reflex is no longer observed (expulsion of what is placed in the anterior part of the tongue) and the suction-swallow movements are better coordinated and are voluntary; until the 6th month of life there is improvement of the labial activity, begins the phase of bringing food and objects to the mouth and masticatory movements that, although rudimentary, play a fundamental role in this stage of life. From then on, the ability to move the liquid in the anterior part and swallow it with the tongue. Between 6 and 7 months of age, the child can sit without the support, which increases the stability and safety of eating. Up to one year of age fine motor skills are more developed and allows the child to pick and feed food with tweezers, use spoon, bring them to the mouth more accurately and chew more efficiently due to greater stability the jaw and the madibulolinguistic movements, as well as ingesting liquids in glasses and interacting more with the environment and with people, imitating the behaviors of adults observed during meals (Lam 2015, Largo et al 2003).

The child's tongue movements that do not chew solid foods during the first year of life are restricted and immature; therefore, foods tend not to be properly chewed and are more difficult to swallow.

Due to the adequate development, the introduction of complementary foods to breastfeeding can occur in the following sequence (Borowitz & Borowitz 2018):
a) 4 to 6 months: homogeneous textures such as purees and potatoes, since the movements of the tongue are present and the closing of the lips to capture the food;
b) 6 to 8 m: the texture of the food is increased, as it is already observed a greater movement of the tongue and the cheeks, with masticatory movements; the upper lips can clean the spoon;
c) after 8 m: introduction of soft pieces to be kneaded with tongue and gums; the tongue already performs lateralisation movements that allow to take the food towards the dental arches for chewing;
d) after 10 m: with the greatest movement of the tongue the child learns to organize and swallow foods that have been chewed from the lateral regions to the center of the tongue and from there to the pharynx;
e) after 18 m: coordination for mastication is developed; can transport the food from the center of the tongue to the side, chews and moves back to the center, before swallowing, being able to determine if the food still needs to be chewed or can already be swallowed;
f) 2 to 3 years: it presents total control of chewing being able to eat any food that requires different movements of the mouth at the same time.

Children that are breastfed have adequate development of oral motricity, because their respiration is predominantly nasal, physiological, whereas mouth breathing, by not exciting the nerve endings of the nasal fossa, compromises the development of the maxilla, nasal fossae and appendages, making it difficult to (Lefton-Greif et al. 2007).

Emotional development

Breast milk is undoubtedly the best food for the child and should be offered exclusively in the first six months of life and supplemented until the child reaches the age of two. From the age of six months, or exceptionally sooner

when necessary, the infant's complementary feeding should be started, however considering its many particularities that are related to the act of feeding (Victora et al. 2016).

The child has the ability to regulate the amount of food that will be ingested according to his needs and the frequency of meals during the day (Smith et al. 2005, Cooke et al. 2017). Due to its decreasing rate of growth during the first two years of life, there is a decrease in appetite at the end of the first and during the second year, a period that must be understood as having a great influence on the eating behavior over the following years.

When this stage of life is elapsed without intercurrences, that is, in a natural and harmonic way, the development of the child helps the consolidation of its diet, since at 15 months it already relates the food to the act of playing, between 17 and 20 months begins to select foods and already wants to eat alone; in about 3 years begins to appreciate the appearance of the food, the color, the form and the consistency that make the meal more pleasant and pleasurable. At 4 years of age, the child may express willingness to help prepare food, set the table and join the family group, reaching the age of five with an improvement in appetite, which will increase by 8 years (Madeira & Aquina 2003).

However, this is not always the case in everyday life. It is very common to hear references to the little appetite manifested by the children in their first years of life, mainly from the moment that it starts to have more autonomy and new alimentary practices are initiated.

Oral defense

Sensory integration is a complex mechanism responsible for recording and transmitting peripheral sensations to the central nervous system, where they will be processed and give rise to a response that, although adequate, is variable among individuals (Lafraire et al. 2016). Some children present exacerbated reactions when stimulated mainly by touch, due to an inefficient processing of these stimuli, with negative interpretation of fear, protection, fight and flight (Weiss-Salinas & Williams 2001, Spira & Kupietzky 2005, Blisset & Foggel 2013). This exacerbated response, called tactile defensiveness, has two important components: the first, protective, which acts through receptors located on the skin, head, face and genitals; and the second, discrimination, due to receptors on the hands, fingers, soles of the feet, mouth, and tongue. Mouth and hand are the structures that have the greatest amount of receptors in the body.

At birth, the child presents some well-developed sensory behaviors, which are consequent to the maturation of responses to stimuli in the perioral region, which can be observed at seven weeks' gestation (Smith et al. 2005). To recognize child's oral defensiveness, it is necessary to check for signs such as: do not put fingers or objects in the mouth, refuse various types of food (due to taste, smell, texture), not chewing, have tactile sensitivity in others areas (discrimination of clothing, difficulties with bathing, etc.), avoiding spicy foods, nausea and vomiting (Spira & Kupietzky 2005, Yan 2017). Such behaviors can manifest with repercussions on food since the increased sensitivity to heat, textures, and condiments can trigger reactions of refusal and withdrawal of these foods. Treatment involves the reduction of sensory defense by stimulation of the most sensitive areas of the mouth, in order to increase the sensorimotor-oral comfort. To this end, teethers and brushes are used which, through touching and massaging, tend to facilitate the contact of the different regions of the oral cavity with food.

Food neophobia

The term food neophobia is characterized by an overall reduction in appetite and refusal of new foods. It is defined as reluctance to eat or "avoid new foods" that usually starts between 6 and 12 months of age and can last up to 6 years, when decreases, but may remain some residual until the adult life (Wadhera et al. 2015, Yan 2017). It occurs at the stage where the child has a slowing of growth, and the interest in the food is replaced by the stimuli of the environment. No triggers are identified, no nutritional status is impaired, and there are no emotional disturbances of the child, the mother or relevant family problems (Dovey et al. 2008, Kerzner et al. 2015, Cole et al. 2017).

The rejection of new foods, especially vegetables (bitter taste, low energy content, unpleasant texture), is related to sensorial characteristics such as odor, taste, touch, and appearance and can be considered as an efficient adaptive mechanism to avoid the risk of eating unknown foods and potentially dangerous (Lafraire et al 2016, Johnson et al 2015, Bamsbo-Sveden et al 2017). 78% of cases are hereditary (Rodriguez-Tadeo et al. 2015). It is usually a much bigger problem for parents than for the child that does not suffer nutritional repercussions.

Food selectivity

A child with difficulty to eating can usually be identified when exhibits characteristics such as eating poorly, not expressing an interest in food, and frequently refusing them. This phase usually begins with the introduction of solid foods, around 8 months, and is understood as a common and characteristic fact of the normal development of the child (Field & Seiverling 2010). In the literature, such behaviors are called picky eating.

Picky eating (PE)

It characterizes children that eat little, has great food preferences, and refuses mainly new foods (Walton et al. 2017, Lam 2015, Chao 2018). Such practice may lead to increased carbohydrate consumption and distortion in the nutritional composition of the diet, with a low intake of vegetables, vegetables, and fruits (Ong et al. 2014, Taylor et al. 2015). The prevalence is higher in preschool children and seems to disappear up to seven years (Steinsbekk et al. 2017). The development of PE can be caused by factors such as pressure to eat, practices and parental styles of feeding, short time or absent breastfeeding, the introduction of complementary foods before six months or late introduction of foods that require chewing (Taylor et al. 2019). For these children, the meal is not pleasurable, which causes them to eat slowly, to stir the food a lot, and to be satiated more quickly. As a consequence, these children are subject to small variety and imbalance in diet and low intake of some important micronutrients such as iron and zinc (Taylor et al. 2019).

The literature has pointed out some risk factors associated with PE: low birth weight, birthright, maternal negativity, young mother, family styles with behavioral changes (anxiety, low self-esteem) and low socioeconomic level (Cano et al. 2018). On the other hand, prolonged breastfeeding and the introduction of food after six months of age tend to act as protective factors. The conduct is mainly aimed at reducing maternal anxiety and continuing to expose the child to food since there is a great possibility that such behavior ceases to manifest itself after the age of seven (Samuel et al. 2018).

How to proceed

The conduct of cases of children that don't eat should be considered under three fundamental points: the child, the adult, and the environment. Between the first two, a division of responsibilities must be established: parents provide and prepare food, decide what, when and where the child will eat, and the child decides whether and how much to eat (Cooke et al. 2017, Harada et al. 2019, Yan 2017, Ong et al. 2014).
Environment

The environment must take into account that social interactions that bring together food and pleasure increase affection and bonding. Therefore, family participation during meals, their relationships, and interaction with the child play a very important role in the feeding process of the child (Marty et al. 2018). The social context of food can be positive: when potentializing preference as in the case of parties, when sugar, fat, and salt are related to pleasurable events and have a comfortable feeling of satiety. On the other hand, the negative context, as in the case of vegetables, when offered with insistence and pressure, tend to trigger refusal (Lefton-Greif et al. 2007).

Role of adults in infant feeding

Food can be understood as the most important form of communication between the child and his mother. Beginning with breastfeeding and evolving to the other stages of life, mother and child develop a complex system of emotional and behavioral relationship that will facilitate or hinder the child's attitudes towards food. Faced with the difficulties that may arise during the different stages of infant feeding, mothers may experience

feelings of loss of control, incompetence, frustration or guilt that lead to stress in their relationship with the child. Sometimes the child's food manifestations may be reflecting family maladjustments and/or personality changes and social conduct of those with whom lives. The exacerbated, coercive external control exercised by the parents prevents the child from learning about the sensation of hunger and satiety, greatly interfering in their capacity for self-control, since under normal conditions the child is competent to regulate the amount and interval of meals (Marty et al. 2018, Lefton-Greif et al. 2007, Orrel-Valente et al. 2007, Owen et al. 2010). Adults should, therefore, be role models for children, teaching behaviors, and offering protection against the risks associated with unhealthy or risky foods. The coercion for a child to eat, exercised as external control, ends up working only for a short time. Subsequently, there will appear a negative reaction of preference and aversion for food, even when offered as a reward (Lefton-Greif 2007).

The child

Children are particularly reluctant to try new foods, having an innate preference for sweet, high-energy flavors (Savage et al. 2007, Marty et al. 2018, Cooke et al. 2017), and they tend to try new foods when they see adults ingesting them and not only when they are offered by them (Birch & Doub 2014). Therefore, in order to achieve the goal of having the child accept the meals, it must be verified whether the refusal to eat maybe a adults (Wadhera et al 2015), to take advantage of the window of opportunity (Cooke et al 2017) and to repeat exposure to new foods 10 to 15 times (increases the sense of security, familiarizes the child with the food, relates flavor to the nutrient and different flavors) (Cooke et al 2017, Caton et al 2014).

Basic principles to achieve success (Walton et al. 2017, Ong et al. 2014, Leung et al. 2012, DeCosta et al. 2017, Brunk & Moller 2019, DeJesus et al. 2019)
1. to stimulate the appetite increasing the palatability of the foods
2. identify the child's preferences
3. avoid distractions
4. to stimulate independence
5. gradual introduction of food and textures (liquid, homogeneous, fine granulosa, coarse granulosa, coarse particles, and fragments)
6. limiting the time of meals
7. offer the food in containers and with cutlery appropriate to the conditions of the child
8. maintain neutral attitudes during meals
9. child should spend energy with physical activities.

Baby-Led Weaning

The baby-led weaning (BLW) is a technique introduced about 15 years ago to aid in the process of feeding the child. It has as a basic principle that children from the sixth month of age have the motor capacity to guide their own intake and are able to start the consumption of food in pieces, with no substantial changes inconsistency. It allows children to choose the times when meals will be started, what will be consumed (among the options offered by caregivers), the pace of meals and the amount that will be eaten at each meal (Rapley et al. 2015). It can be considered a facilitator for self-feeding of the child (Arantes et al. 2018), which has as peculiarities the waste and dirt that accompany each meal.

The advantages of using this method may be longer duration of breastfeeding, children are more likely to consume the same family food and share mealtimes, saving tasks for mothers that do not need to prepare specific meals, higher consumption of fresh food and selected, lower requirement for food, satiety and less possibility of excessive weight gain (D'Auria et al. 2018). Also, in this way, it is observed that the textures of the foods favor the sensorial perception of the child and generate benefits to the orofacial growth, allowing more exploration, less time spent to take care of the child while eating and less anxiety (González & Fernández 2018). On the other hand, some concern has been highlighted as to the possibility of the child choking. In view of this, some authors suggest that the parents are well oriented and trained in first aid. In addition, one should always check that the child is sitting safely and monitor the amount ingested, in order to guarantee the necessary nutritional contribution to the age group.

Conclusions

Eating habits are initiated in the first years of life when determining intake patterns and preferences (Lam 2015). During childhood, the child may present great diversity in eating patterns without any abnormal development (González & Fernández 2018). Knowledge of the physical and emotional particularities of different stages of life is needed to provide guidance to parents/caregivers on how to help the child feed and consume more nutritious foods.

References

Abrahamse E, Minekus M, van Aken GA, van de Heijning B, Knol J, Bartke N et al. (2012) Development of the digestive system – experimental challenges and approaches of infant lipid digestion. Food Dig 3:63-77.

Anderson GH, Hunschede S, Akilen R, Kubant R. (2016) Physiology of fodd intake control in children. Adv Nutr 7(suppl):2325-2340.

Arantes ALA, Neves FS, Campos AAL, Netto MP. (2018) The baby-led weaning method (BLW) in the context of complementary feeding: a review. Rev Paul Pediatr 36:353-363.

Birch LL, Doub AE. (2014) Learning to eat: birth to age 2 y. Am J Clin Nutr 99(suppl):723S-728S.

Blisset J, Foggel A. (2013) Intrinsic and extrinsic influences on children's acceptance of new foods. Physiol Behav 121:89-95.

Borowitz KC, Borowitz SM. (2018) Feeding problems in infants and children. Pediatr Clin N Am 65:59-72.

Brunk L, Moller P. (2019) Do children prefer colored plates? Food Qual Pref 73:65-74.

Cano SC, Hoek HW, Bryant-Waugh R. (2018) Picky eating: the current state of research. Curr Opin Psychiatry 28:448-454.

Cashdan E. (1994) A sensitive period for learning about food. Hum Nat 5:279-291.

Caton SJ, Blundell P, Ahern SM, Nekitsing C, Olsen A, Moller P et al. (2014) Learning to eat vegetables in early life: the role of timing, age and individual eating traits. PLOSone 9:e97609.

Chao HC. (2018) Association of picky eating with growth, nutritional status, development, physical activity, and health in preschool children. Front Pediatr 12:22-28.

Chambers AP, Sandoval DA, Seely RJ. (2013) Integration of saciety signals by the central nervous system. Curr Biol 23:R379-R398.

Cole NC, An R, Lee S, Donovan SM. (2017) Correlates of picky eating and food neophobia in young children: a systematic review and meta-analysis. Nutr Rev 75:516–532.

Cooke L, Higgins C, McCrann U. (2017) Managing common feeding difficulties in toddlers and pre-schooll children. Paediatr Chil Health 27:366-373.

Damiani D, Damiani D. (2011) Appetitte brain sinalization. Rev Bras Clin Med 9:138-145.

Damsbo-Svedsen M, Frost MB, Olsen A. (2017) Development of novel tools to measure food neophobia in children. Appetite 113:255-263.

D'Auria E, Bergamini M, Staiano A, Banderali G, Pendezza E, Penagini F et al. (2018) Baby-led weaning: what a systematic review of the literature adds on. Ital J Pediatr 44:49-60.

De Cosmi V, Scagiloni S, Agostini C. (2017) Early taste experiences and later food choises. Nutrients 9:107-115.

DeCosta P, Møllera P, Frøst MB, Olsen A. (2017) Changing children's eating behaviour - A review of experimental research. Appetite 113:327-357.

DeJesus JM, Gelmanbc SA, Herold I, Lumeng JC. (2019) Children eat more food when they prepare it themselves. Appetite 133:305-312.

Demattè ML, Endrizzi I, Gasperi F. (2014) Food neophobia and its relation with olfaction. Front Psychol 5:1-5.

Dovey TM, Staples PA, Gibson L, Halford CG. (2008) Food neophobia and "picky/fussy" eating in children: a review. Appetite 50:181-193.

Field DG, Seiverling L. (2010) Food refusal in children: A review of the literature. Res Develop Disab 31:625-633.

Gavião MBD, Raymundo VG, Sobrinho LC. (2001) Masticatory efficiency in children with primary dentition. Am Acad Ped Dent 6:499-506.

González MASJ, Fernández PM. (2018) El niño mal comedor y la importancia de um buen comienzo. Bol Pediatr 58:107-116.

Green JR, Moore CA, Ruark JL, Rodda PR, Morvée WT, VanWitzenburg MJ. (1997) Development of chewing in children from 12 to 48 months: longitudinal study of EMG patterns. J Neurophysiol 77:2704-2716.

Gregory JE, Paxton SJ, Brozovic AM. (2011) Maternal feeding practices predict fruit and vegetables consumption in young children: results of a 12-month longitudinal study. Appetite 57:167-172.

Harada M, Amariglio N, Wills H, Koolwijk I. (2019) Feeding issues in young children. Adv Ped 66:123-145.

Harris G, Mason S. (2017) Are there sensitive periods for food acceptance in infancy? Curr Nutr Rep 6:190-196.
Johnson SL, Davies PL, Boles RE, Gavin WJ, Bellows LL. (2015) Young children's food neophobia characteristics and sensory behaviors are related to their food intake. J Nutr;145:2610-2616.
Kerzner B, Milano K, MacLean WC, Berall G, Stuart S, Chatoor I. (2015) A practical approach to classifying and managing feeding difficulties. Pediatrics 135:344-354.
Lafraire J, Rioux C, Giboreau A, Picard D. (2016) Food rejections in children: cognitive and social/environmental factors involved in food neophobia and picky/fussy eating behavior. Appetite 96:347-357.
Lam J. (2015) Picky eating in children. Front Ped 3:1-3.
Largo RH, Fischer JE, Rousson V. (2003) Neuromotor development from kindergarten age to adolescence: developmental course and variability. Swiss Med Wkly 133:193-199.
Lefton-Greif MA, Sharon A. McGrath-Morrow SA. (2007) Deglutition and Respiration: Development, Coordination, and Practical Implication. Sem Speech Lang 28:166-179.
Leung AKC, Marchand V, Sauve RS. (2012) The "picky eater": the toddler preschooler who does not eat. Paediatr Child Health 17:455-465.
Lucas PW, Prinz JF, Agrawal KR, Bruce IC. (2004) Food texture and its effect on ingestion, mastication and swallowing. J Tex Stud 35:159-170.
Madeira IR, Aquina LA. (2003) Difficulties in the management of sleep and eating disorders. J Pediatr (Rio J) 79(suppl 1):S43-S54.
Maiz E, Urdaneta E, Allirot X. (2018) La importancia de involucrar a niños y niñas en la preparación de las comidas. Nutr Hosp 35(suppl4):136-139.
Marty L, Chambaron S, Nicklaus S, Monnery-Patris S. (2018) Learned pleasure from eating: an opportunity to promote healthy eating children? Appetite 120:265-274.
Morley JE, Levine AS. (1985) Appetite regulation. Modern concepts offering food thought. Postgrad Med 77:42-48.
Nicklaus S. (2016) The role of food experiences during early childhood in food pleasure learning. Appetite 104:3-9.
Nicklaus S. (2017) The role of dietary experience in the development of eating behavior during the first years of life. Ann Nutr Metab 70:241-245.
Ong C, Phuah KY, Salazar E, How CH. (2014) Managing the "picky eater" dilemma. Singapore Med J 55:184-190.
Orrel-Valente JK, Hill LG, Brechwald WA, Dodge KA, Pettit GS, Bates JE. (2007) Just three more bites: an observational analysis of parents' socialization of children's eating mealtime. Appetite 48:37-45.
Owen J, Metcalfe A, Dryden C, Shipton G. (2010) If they don't eat it, it's not a proper meal: images of risk and choice in fathers' accounts of family food practices. Health Risk Soc 12:395-406.
Ramos M, Stein LM. (2000) Development of children's eating behavior. J Pediatr (Rio J) 76(suppl3):S229-S237.
Rapley G, Forste R, Cameron S, Brown A, Wright C. (2015) Baby-led weaning a new frontier. ICAN 7:77-85.
Rodriguez-Tadeo A, Villena BP, Urquidez-Romero R, Vidaña-Gaytan ME, Caston MJP, Berruezo GR et al. (2015) Neofobia alimentaria: impacto sobre los hábitos alimentarios y aceptación de alimentos saludables em usuários de comedores escolares. Nutr Hosp 31:260-268.
Ross ES. (2017) Flavor and taste development in the first years of life. Nestle Nutr Inst Workshop Ser 87:49-58.
Samuel TM, Musa-Veloso K, Ho M, Venditti C, Shahkhalili-Dulloo Y. (2018) A Narrative review of childhood picky eating and its relationship to food intakes, nutritional status, and growth. Nutrients 10:1992-2021.
Savage JS, Fisher JO, Birch LL. (2007) Parental influence on eating behavior: conception to adolescence. J Law Med Eth 53:22-34.
Smith AM, Roux S, Naido NT, Venter DJL. (2005) Food choises of tactile defensive children. Nutrition 21:14-19.
Spira G, Kupietzky A. (2005) Oral defensiveness: children with a dysfunction of sensory regulation. J Clin Ped Dent 29:119-123.
Steinsbekk S, Boneville-Roussy A, Fildes A, Llewellyn CH, Wichstrom L. (2017) Child and parent predictors of picky eating from preschool to school age. Int J Behav Nutr Phys Act 14:87-95.
Stevenson RD, Allaire JH. (1991) The development of normal feeding and swallowing. Pediatr Clin North Am 38:1439-1453.
Stoica M, Alexe P. (2016) Factors influencing food neophobia. A brief review. J Res Trade, Manag Econ Dev 3:35-41.
Taylor CM, Wernimont SM, Northstone K, Emmett PM. (2015) Picky/fussy in children: review of definitions, assessment, prevalence and dietary intakes. Appetite 95:349-359.
Taylor CM, Emmet PM. (2019) Picky eating in children: causes and consequences. Proc Nutr Soc 78:161-169.
Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J et al. (2016) Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong eff ect. Lancet 387:475-490.

Yan HR. (2017) How to approach feeding difficulties in young children. Korean J Pediatr 60:3719-384.
Wadhera D, Phillips EDC, Wilkie LM. (2015) Teaching children to like and eat vegetables. Appetite 93:75-84.
Walton K, Kuczynski L, Haycraft E, Breen A, Haines J. (2017) Time to re-think picky eating? a relational approach to understanding picky eating. Int J Behav Nutr Phys Act 14:62-69.
Weiss-Salinas D, Williams N. (2001) Sensory defensiveness: a theory of its effect on breastfeeding. J Hum Lac 17:145-152.
Wickewire NA, Gibbs CH, Jacobson P, Lundeen HC. (1981) Chewing patterns in normal children. Angle Orthodon 51:48-60.
Williams AM, Suchdev PS. (2017) Assessing and Improving Childhood Nutrition and Growth Globally. Pediatr Clin North Am 64:755-768.

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Findings of High Resolution Computed Tomography in Patients Presenting with Signs and Symptoms of Interstitial Lung Disease Having Normal Chest X-Ray

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Abstract
Background: Interstitial lung Disease is a general category that includes many different lung conditions. This study aimed to compare the chest X-rays and HRCT for clear diagnosis of ILD. Objectives: To rule out the findings of high resolution computed tomography in patients presenting with signs and symptoms of interstitial lung disease having normal chest x-ray. Methods: The study was conducted in the department of Radiology, Gulab Devi Trust Teaching Hospital and its duration was of three months from September 2019 to November to 2019. Results: Out of 148 patients, there were 65 (43.9%) males and 83 (56.1%) were females, with the mean age of 55.89 ±14.39 years. Patchy ground glass appearance 92.6%, Honey Comb Appearance 45.9%, Centri lobular CT 29.1% and Parenchymal appearance 24.3% were the high scoring variables of HRCT and were also most frequent in the patients presented with ILD. While Pleural Effusion 4.7%, Consolidation 2.7%, and nodules 12.8 % were found the less frequent variables. Conclusion: After having normal chest X-ray and confirmation of diagnosis on high resolution computed tomography (HRCT), it can be concluded that HRCT is more accurate and highly reliable technique or diagnostic tool to diagnose interstitial lung disease as compared to chest X-ray.

Keywords: Interstitial Lung Disease, Computed Tomography, High Resolution Computed Tomography

Introduction

Interstitial lung disease (ILD) relates to a miscellaneous class of disorder such as interstitial pneumonia, idiopathic pulmonary fibrosis, and hypersensitivity pneumonitis(HP), Although it is uncommon in children, lungs are commonly influence organ in the course of chronic granulomatous disease (Esenboga, 2017). ILD usually consists of boundary scale in younger group as compared to adults, although it is not very common in children (Vij,2013). ILD causes are asthma, respiratory allergy may be due to environmental changes, air borne and air pollution (D'amato, 2015). Further reasons of ILD are coal mine, dust lung disease, smoking, silica dust, rheumatoid arthritis, chronic obstructive pulmonary disease. Interstitial lung disease is group of diffuse parenchymal lung abnormalities define by pulmonary inflammation and fibrosis (Agrawal, 2019).

Other than these the drug induce injury, which also involve air ways lung parenchyma, mediastinum, pleura, pulmonary vasculature or may be neuromuscular system, it is often drug induced lung toxicity, the drugs may

involve are antimicrobial agents, anti-inflammatory,biologicalagents,cardiovascularagents, chemotherapeutic agents (Schwaiblmair, 2012). Signs and symptoms of ILD are chest pain, dyspnea, hemoptysis (blood in sputum), dry cough (can be chronic dry) or long term dry cough lasting tiredness, weight loss, bulb like development of fingertips (a condition called clubbing), the patient with these symptoms are advised for chest x-ray and HRCT, chest X-ray and HRCT used in suspicious profile of patients in ILD,HRCT is valid in detection of more ILD cases as compared to chest radiographs, chest X rays tend to be normal often in patients with (ILD), In a survey it is indicated that 6 of out 37 patients of ILD show normal chest X rays, While HRCT indicated the abnormalities in these patients. Chest radiographs are the initial imaging techniques for the lungs but in present time HRCT is mostly advised to clarify the CXR findings in ILD patients (Lynch, 2019). Chest radiograph demonstrates patchy ground-glass pattern with fine reticulation of lungs while computed tomography (CT) shows patchy, centrilobular ground-glass opacification with septal thickening, honeycombing with subpleural bullae (Esenboga, 2017). In this era, HRCT is a gold standard for diagnosis of ILD, it permits early ascertain of lung involvement even at very initial stages, HRCT has been the respectable diagnostic elevation for the previous two decades in detection of ILD, a wide range of research in diagnostic HRCT is done, although it was the beginning of advancement of the precise beam collimation, high spatial resolution, reconstruction algorithm raised up the possibility of the computed tomography (CT) for diagnostic usage in ILD, they associate HRCT scans with histopathology detections and conclusions were that HRCT was the standard non-invasive modality scan for detection of ILD, the sensitivity of HRCT is 94.59% and its specificity is 66.66% and the sensitivity for chest radiograph in the detection of ILD is 83.78% and specificity is 33.33% ,sensitivity and specificity were less with radiographys compared to HRCT in the detection of ILD[10]. The recent study is designed and guided for the comparison of the sensitivity and specificity of HRCT and chest radiographs in patients with ILD, lungs are generally recognized to be more influenced organ in the patients, being the causualnodules, scarring, emphysema, tractionchiectasis, airtrapping, mediastinal hilar lymphadenopathies and pleural effusion, these all probably caused by invading bacterial-fingal inflammation or by hyperinflammation (Esenboga, 2017). The lab test required for ILD are antinuclear antibody, aldose test, creatinin kinase test, erythrocyte sedimentation rate, pulmonary function test are also performed on patients with 6 minutes walk test that is performed for diagnosis and examination,total lung capacity and oxygen saturation is also examined, lung biopsy for upper, middle and lower lung field are also helpful.

Methods

It was a comparative cross sectional study carried out in department of Radiology, Gulab Devi Trust Teaching Hospital, Pakistan and its duration was from July 2018 to November 2018. By the use of cross sectional technique and convenient sampling, 148 patients were included in the study of all age groups and with the symptoms of chest pain, dyspnea, hemoptysis, dry cough and weight loss. Patients with lungs cancer wasn't made the part of study due to limitation of HRCT in the diagnosis of lung carcinoma. 16 slice Toshiba Aquilion were the equipment used. SPSS 20 was used for the statistical analysis, frequencies and percentages were found.

Results

It was cross-sectional study, conducted in the Radiology Department of Gulab Devi Chest Hospital, Lahore that included 148 patients. The data was collected using consecutive technique from September 2018 to November 2018. A questionnaire was used for each patient, which was filled out on the basis of history and image findings. There was no gender specification in this study. Out of 148 patients, there were 65 (43.9%) males and 83 (56.1%) were females. (Table 1).Patients from all age groups were included in this study, 19 years were considered the minimum and 83 years were maximum age group participated. (Table 2) So the mean age was 55.89 ±14.39 years.

Table No. 1: Table shows frequency distribution in b/w male and female patients of ILD

	Gender	Frequency	Percent
	F	83	56.1
	M	65	43.9
	Total	148	100.0

Table No. 2: Describes percentage of Chest Xrays of ILD patients showing nodules.

	Frequency	Percent
0	129	87.2
1	19	12.8
Total	148	100.0

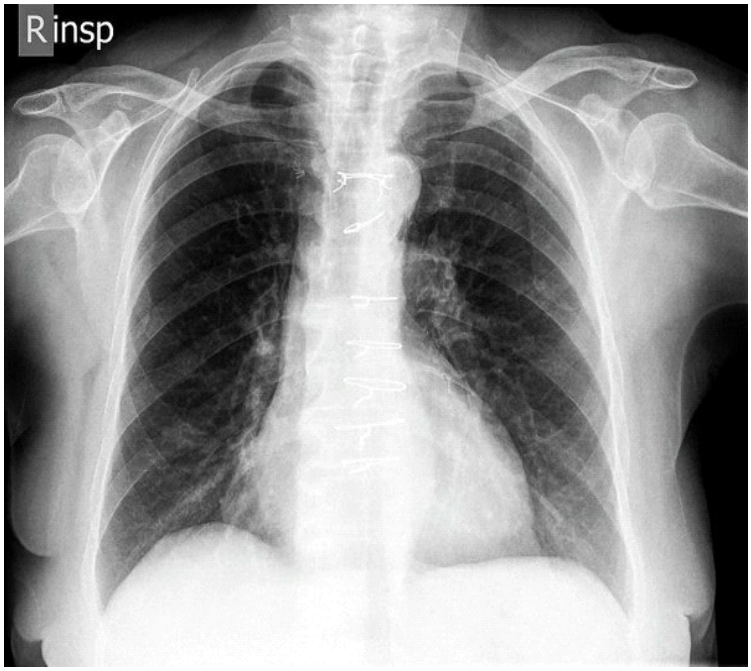
Table No. 3: Describes percentage of Chest Xrays of ILD patients having Pleura effusion.

		Frequency	Percent
	0	140	94.6
	1	8	5.4
	Total	148	100.0

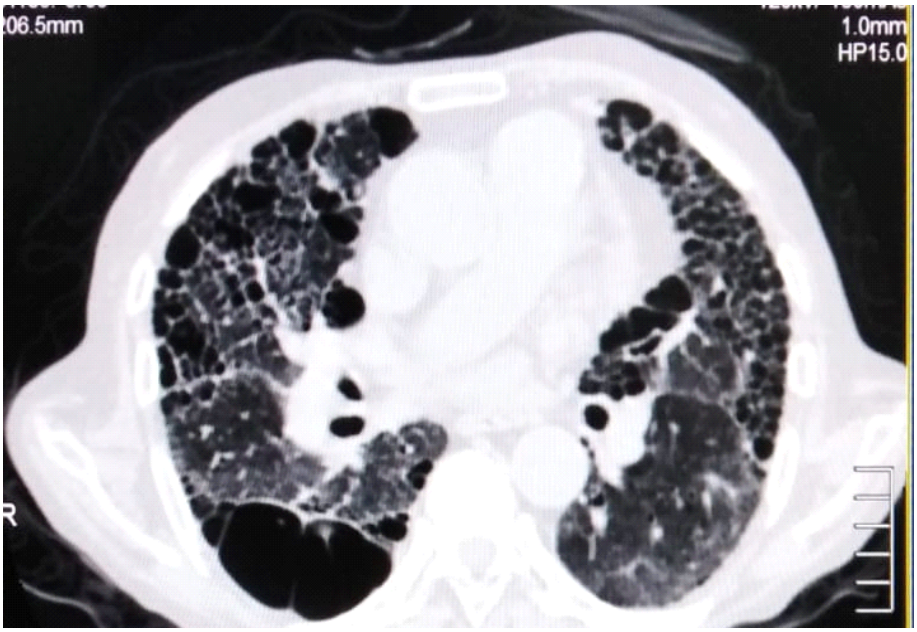
Table No.4: Describes the ratio of different variables on HRCT scans of ILD pts.

Sr No.	Variables	Frequency "1" (Present)	Percentage (Present)	Frequency "0" (Absent)	Percentage (Absent)
1	**Parenchymal Abnormality**	36	24.3%	112	75.7%
2	**Nodules**	19	12.8%	128	86.5%
3	**Centrilobular CT**	43	29.1%	105	70.9%
4	**Pleural Effusion**	7	4.7%	140	94.6%
5	**Consolidation**	4	2.7%	144	97.3%
6	**Honeycomb Appearance**	68	45.9%	80	54.1%
7	**Patchy Ground Glass Pattern**	137	92.6%	11	7.4%

Out of 148 patients, 24.3% patients were found having parenchymal abnormality.12.8% patients were found to have nodules on their CT chest. Consolidation of lungs is more focused on chest X-ray but was also come under our consideration in CT chest. Honey comb appearance on CT makes the percentage of 45.9%). Patchy Ground Glass was among the highest frequent variables that makes 92.6%



Picture 1: Patient showing normal CXR



Picture 2: Patient with normal CXR showing bronchiectasis and ground glass appearance on HRCT presenting with ILD.

Discussion

It was cross-sectional study, conducted in the Radiology Department of Gulab Devi Chest Hospital, Lahore that included 148 patients. The data was collected using consecutive technique from September 2018 to November 2018. Interstitial lung disease (ILD) relates to a miscellaneous class of disorder such as interstitial pneumonia, idiopathic pulmonary fibrosis and hypersensitivity pneumonitis (HP). Although it is uncommon in children's lungs are commonly influence organ in the course of chronic granulomatous disease (CGD). ILD usually consists of boundary scale in younger group as compared to adults, although it is not very common in children. ILD causes are asthma, respiratory allergy may be due to environmental changes air borne and air pollution. Further reasons of ILD are coal mine, dust lung disease, smoking, silica dust, rheumatoid arthritis, chronic obstructive pulmonary disease (COPD).

Study presented by Arun A, et al(Arun A, Yeganagi M, Mittal S) in 2017on interstitial lung disease (ILD) which can be detected by several techniques, out of 40 patients 36 patients were found symptomatic and 4 were asymptomatic and study concluded HRCT as more accurate technique to diagnose ILD as compared to CXR. Christopher J. Ryerson et al conducted study on prevalence and prognosis of unclassifiable interstitial lung disease (ILD). The study concluded Uncategorized interstitial lung disease(ILD) depicted just about 10% of Interstitial lung disease reports and has a miscellaneous clinical methodology which can be projected by medical and radiological inconstant (Ryerson, 2012).

.Thomas Frauenfelder et al conducted study on screening for interstitial lung disease in systemic sclerosis. Primitive detection of interstitial lung disease (ILD), recently the major reason of mortality in systemic sclerosis (SSc), is necessary. The overhead explained chest HRCT protocol steadily calculates precise mild SSc- ILD in clinical exercise, with the benefit of a much less radiation dose assimilate with standard whole chest HRCT (Oikonomou, 2013).

Arun A et al conducted HRCT as more reliable and specified modality for the diagnosis of ILD, because they found 7 patients normal while reading their chest radiographs but they were diagnosed with ILD after HRCT, alike our study HRCT is concluded as more spaecified imaging protocol for diagnosis of ILD, because large number of patients participated in our study were found asymptomatic and had normal radiographs. The only difference from Arun A el was inclusion of asymptomativ patients. Therefore our study highly supports the above mentioned studies, and we only took those patients that were presented with the symptoms of ILD but were having normal CXR, so HRCT were performed to confirm that either patient is infected with ILD or not.

Frequency was found among 148 patients of symptomatic ILD and among all those patients included in the study, HRCT was found more accurate technique to diagnose the disease. As patch ground glass appearance, honey comb appearance, centrilobular appearance, nodules, parenchymal abnormality and pleural effusion were only or found more accurately on HRCT and was among those variables that scored high in the frequency column and confirmed the accuracy of HRCT in the diagnosis of ILD.

Conclusion

After the inclusion of 148 patients with the presentation of symptomatic interstitial lung disease but having normal chest X-ray and confirmation of diagnosis on high resolution computed tomography (HRCT), it can be concluded that HRCT is more accurate and highly reliable technique or diagnostic tool to diagnose interstitial lung disease as compared to chest X-ray.

References

Esenboga S, Emiralioglu N, Cagdas D, Erman B, De Boer M, Oguz B, Kiper N, Tezcan İ. Diagnosis of interstitial lung disease caused by possible hypersensitivity pneumonitis in a child: think CGD. Journal of clinical immunology.2017.1;37(3):269-72.

Vij R, Strek ME. Diagnosis and treatment of connective tissue disease-associated interstitial lung disease. Chest.2013. 1;143(3):814-24.

D'amato G, Vitale C, De Martino A, Viegi G, Lanza M, Molino A, Sanduzzi A, Vatrella A, Annesi-Maesano I, D'amato M. Effects on asthma and respiratory allergy of climate change and air pollution. Multidisciplinary respiratory medicine.2015;10(1):39.

Petsonk EL, Rose C, Cohen dust lung disease. New lessons from an old exposure. American journal of respiratory and critical care medicine.1;187(11):1178-85.

Agrawal MK, Kumar A, Agrawal R, Rana R. To study the significance of HRCT over Chest X-RAY in the diagnosis of INTERSTITIAL LUNG DISEASES. Journal of Evolution of Medical and Dental Sciences. 2019 Jan 14;8(2):94-9.

Schwaiblmair M, Behr W, Haeckel T, Märkl B, Foerg W, Berghaus T. Drug induced interstitial lung disease. The open respiratory medicine journal.2012;6:63.

Arun A, Yeganagi M, Mittal S. Comparative Accuracy of HRCT and Chest Radiography in the Diagnosis of Interstitial Lung Diseases: A Hospital Based Study. INDIAN JOURNAL OF APPLIED RESEARCH.14;7(4)

Lynch JP, Weigt SS, Suh RD. Thoracic imaging for diffuse ILD and bronchiolar disorders. InInterstitial Pulmonary and Bronchiolar Disorders.Apr 19 (pp. 47-76).

Esenboga S, Emiralioglu N, Cagdas D, Erman B, De Boer M, Oguz B, Kiper N, Tezcan İ. Diagnosis of interstitial lung disease caused by possible hypersensitivity pneumonitis in a child: think CGD. Journal of clinical immunology.2017.1;37(3):269-72.

Arun A, Yeganagi M, Mittal S. Comparative Accuracy of HRCT and Chest Radiography in the Diagnosis of Interstitial Lung Diseases: A Hospital Based Study. INDIAN JOURNAL OF APPLIED RESEARCH.14;7(4)

Esenboga S, Emiralioglu N, Cagdas D, Erman B, De Boer M, Oguz B, Kiper N, Tezcan İ. Diagnosis of interstitial lung disease caused by possible hypersensitivity pneumonitis in a child: think CGD. Journal of clinical immunology. 1;37(3):269-72.

Vij R, Strek ME. Diagnosis and treatment of connective tissue disease-associated interstitial lung disease. Chest. 1;143(3):814-24.

Arun A, Yeganagi M, Mittal S. Comparative Accuracy of HRCT and Chest Radiography in the Diagnosis of Interstitial Lung Diseases: A Hospital Based Study. INDIAN JOURNAL OF APPLIED RESEARCH.14;7(4)

Ryerson CJ, Urbania TH, Richeldi L, Mooney JJ, Lee JS, Jones KD, Elicker BM, Koth LL, King TE, Wolters PJ, Collard HR. Prevalence and prognosis of unclassifiable interstitial lung disease. European Respiratory Journal. 1:erj01319-2012

Oikonomou A, Prassopoulos P. Mimics in chest disease: interstitial opacities. Insights into imaging.2013. 1;4(1):9-27.

Arun A, Yeganagi M, Mittal S. Comparative Accuracy of HRCT and Chest Radiography in the Diagnosis of Interstitial Lung Diseases: A Hospital Based Study. INDIAN JOURNAL OF APPLIED RESEARCH.14;7(4)

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Indigenous Health Practices of the Naga People: Continuity and Change

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Abstract
For many indigenous people, health is not merely absence of disease but a state of spiritual, communal, and ecosystem equilibrium and well-being. The indigenous concept of health hence articulates physical, mental, spiritual, and emotional elements, from both individual and communal points of view, and involves political, economic, social, and cultural aspects. The health care activities of the indigenous people are often embedded in the traditional beliefs, customs, folklore, taboos, and prescriptions. Like in most indigenous communities, the living traditions of health care exist in Naga society too, which are passed down orally from generation to generation. They have age-old knowledge of preparation and administration of medicines for different diseases using ingredients sourced from roots, barks, leaves, fruits as well as animal derivatives and other natural minerals. Healing rituals employed for invoking the intervention of supernatural forces are an integral component of the treatment procedure. On the whole traditional medicine helped the Naga people to effectively maintain an efficient health care system long before the arrival of the modern medical system. The current existence of a plurality of health care system in the Naga society brings to the fore the question of relevance and continuity of the indigenous health care system which have served the people well for millennia.

Keywords: Christianization, Indigenous Medicines, Medical Plurality, Nagas, Supernatural

1. Indigenous health practices

The term ‘indigenous medicine’ or ‘indigenous system of health care’ refers to the long-standing indigenous system of health care found in the developing countries particularly among indigenous populations As recognised by the World Health Organisation (WHO), for many indigenous people, health is not merely absence of disease (Guite, 2011). Health is a state of spiritual, communal, and ecosystem equilibrium and well-being, which probably explains why traditional pharmacology includes remedy to cure physical ailments. Thus, the indigenous concept of health articulates physical, mental, spiritual, and emotional elements, from both individual and communal points of view, and involves political, economic, social, and cultural aspects. It is shaped by indigenous peoples’ historical experiences and worldviews and is expressed in the rules and norms that are applied in the community and practiced by its members. An indigenous community to promote health and prevent illness seeks to recuperate and maintain its interior and exterior equilibrium, including the harmony between community members who are sick and the world around them (UN, 2004).

Indigenous concepts of health and illness are based on and reflect the values, traditions, and beliefs of the people's way of life, or culture. Through time indigenous medicine has sustained itself through processes deeply

rooted in a society's socio-cultural complexes. Indigenous medicinal substances, their nature, axioms, and practices vary from one culture to another (Guite, 2011). The names, practices, and products would be context-specific depending upon the socio-cultural heritage, religion, and political identity of the people practicing it. Generally, the indigenous systems of health care are low cost, locally available treatments which according to World Health Organisation (WHO) are utilized as a source of primary health care by 80 percent of the world's population. The health care activities of the indigenous people are often embedded in traditional beliefs, customs, folklore, taboos, prescription, etc. These are enacted through family networks, health roles, healers, shamans, priests, medicine-man, etc. They have certain age-old techniques and methods of preparation and administration of medicines for different diseases. The ingredients of their medicine include herbs in roots, barks, leaves, fruits, and other plant parts, animal derivatives, and also a few minerals. Healing rituals employed for invoking the intervention of supernatural forces are an integral component of the treatment procedure. For the indigenous peoples, the choice of medical treatment is often explained by the complex understanding of health and the perceived causes of illness. The choice of medical treatment is hence, often related to the perceived cause of illness. Common illness caused by the natural world can be cured by medicinal plants or drugs, whereas illness, caused by spiritual beings can only be cured by the intervention of a traditional healer. When a person gets sick, he/she is often first treated as if the person suffered from a common illness. Plants remedies are administered sequentially or simultaneously often without consultation from any expert. If condition persists, they start being suspicious that the illness is caused by witchcraft, in which case, they seek the help of a treatment and the perceived causes of the illness might be more relevant in the selection of the treatment.

Unlike non-tribal societies, in tribal communities, the concept of etiology of the disease can be broadly divided into natural causation and supernatural causation. Therefore, cultural factors like religion, social status, relationship with the fellow members of the society, nature of the relationship with the supernatural world, etc. plays a decisive role in the evolution of the concept of etiology in a tribal society (Boban K, 1998). Murdock (1980) divided the cause of illness and disease beliefs into two, viz. natural and supernatural. According to Murdock’s ill health theoretical model, natural causes include beliefs that the impairment of health is a physiological consequence of some experience of the victim that is consistent with western biomedicine. This broad category includes five distinct types of natural causes of illness: infection, stress, organic deterioration, accident, and overt human aggression. Whereas, supernatural causes rest on supernatural assumptions which modern medical science does not recognize as valid. However, they do fall into three groups: theories of mystical causation (i.e., fate ominous sensation, contagion, and mystical retribution), theories of animistic causation (i.e., soul loss, and spirit aggression), and theories of magical causation (i.e., sorcery and witchcraft).

A common trend in the health, culture, and structure triad is the study of health-seeking behaviour, and the most likely question is how health seekers in different societies make choices about treatment (Sujatha, 2014). In many societies, people follow more than one type of medical system to deal with the illness situation. Even though the modern allopathic system is widely accepted, many countries adopt their own traditional medical systems in addition to modern medicine. Despite being labeled as ‘unscientific, many therapies continue to have popularity among health seekers (ibid). According to Gabe, Bury, and Elson, medical pluralism refers to the co-existence in a society of differing medical traditions, grounded in different principles or based on different world-views (in Akram, 2014). Several studies conducted by researchers (Leslie 1976, 1977 and 1980, Nichter 1978, Press 1978, Kleinman 1980, and Young 1983) have shown that the medical system in many places, especially in the developing world, is pluralistic, that is, people use both Western biomedicine and non-Western form of health care in meeting their health needs. For most inhabitants in the developing world, access to biomedicine remains a challenge; hence, people use traditional medicine more frequently because it is more easily accessible. Aside from its easy accessibility, traditional medicine is also embedded in the cultural and the belief system of the indigenous people, thus making it acceptable to them. The Nagas of Northeast India are one such community who for long had a well established but informal indigenous healing system based on their traditional knowledge.

2. Situating the Study

The Naga people or the Nagas as they are colloquially known are an Indo-Mongoloid group of indigenous people speaking the Tibeto-Burmese language. Their homeland stretches along with the northeastern states of Assam, Manipur, Arunachal Pradesh, and north western Myanmar (Nagaland State Human Development Report, 2016). Nagaland, the sixteenth State of the Union of India came into being on 1st December, 1963. With a geographical area of about 16, 579 Sq. Km., the state of Nagaland lies between 25˚10 N and 27˚40 North latitude and 93˚20 E and 95˚15 East longitude in the northern extension of the Arakan Yoma ranges. Nagaland is a largely mountainous state with altitude rising from the Brahmaputra valley in Assam to an elevation of 3840 metres at Mount Saramati (ibid). Currently, the state of Nagaland consists of eleven districts namely Kohima, Dimapur, Mokokchung, Wokha, Zunheboto, Longleng, Kiphire, Tuensang, Mon, Peren and Phek with a total population of 19,78,502 (2011 Census). Each district has generally predominance/concentration of one of the major tribe of the state, thereby making districts distinct in their linguistic, cultural, traditional and socio-political characteristics. The Nagas do not have a common language or dialect, yet they have similar cultures and traditions. Being primarily agriculturists, every aspect of the Naga life, be it rituals, ceremonies, and festivals, are entwined with agriculture. In the past, the people were largely self-reliant, building their own houses and other functional household articles with locally available resources. They were expert weavers, potters, artisans, and craftsmen weaving their own attires and crafting the weapons and ornaments they needed for sustenance and protection. It is said that until the advent of the British in the 1830s, the Nagas had little contact with the outside world apart from the cultural contact with the Ahoms of Assam.

As such even in terms of healthcare, the people developed a self-reliant system of traditional healing system utilizing resources in their natural environment coupled with spiritual ‘interventions' to treat ailments which could not be adequately explained or understood physiologically. The present article thus is an effort to delve into the indigenous health care practices of the Naga People guided by the question of its continuum in the present era of the advanced medical health care system. The findings presented in this article are based on an extensive multisided ethnographic study covering the districts of Tuensang, Mokokchung, Mon, and Phek representing the east, west, north and south zones respectively of the state. From the selected districts, in order to represent both urban and rural populace, respective headquarters along with three villages each were selected from the sample districts. Thus, Tuensang, Mokokchung, Mon, and Phek towns were selected to represent urban areas. From Tuensang district, Tuensang village, Yimrup village and Kejok village were selected as sample representatives for rural areas; Ungma village, Longkhum village and Chuchuyimlang village were selected from Mokokchung district; likewise, Longwa village, Chenwetnyu village and Shangsha village from Mon district and Phek village, Khezhakeno village and Lasumi village from the district of Phek were selected as sample villages respectively. A sample size of 50 respondents each were drawn from the four selected towns, i.e., a total of 200 sample size, whilst from the twelve selected villages a total of 252 sample size were drawn, i.e., of 21 respondents from each village. The method of purposive sampling has been employed to select the respondents representing categories such as traditional health practitioners, village chairmen, knowledgeable elders, as well as the general public.

3. Of Spirits, Healing and the Nagas

The Nagas have a rich knowledge based on their natural resources of indigenous folk medicine which have been handed down through the generations besides the use of natural resources gleaned from their local environment, many of the believed antidotes for various illnesses is connected with magico-religious beliefs and propitiation of supernatural beings and spirits (Thong & Kath 2011). Traditionally the there was no binary division between religion and the secular for the Naga people because everyday lives were permeated with spirituality and rituals. They had a belief in gods and spirits, which did not affect the society directly but influenced them in the form of malevolent and benevolent characteristics.` Within this cultural milieu, the traditional healers in Naga society occupied a very prominent space. Traditional healers were generally people who were believed to possess special wisdom and strength, possessing a broad knowledge base of the indigenous healing system. Each community of Nagaland had their own terminology for the traditional healers, such as *Saibu* among the Chang Nagas, *Eni* by the Khiamungan Nagas, *Arasener* in Ao Naga, *Wompa* by the Konyak Nagas, etc. Not only did the traditional healers treat the sick with locally sourced medicines, but they were also widely regarded as the

mediators between men and the spirits/gods by the people. It is quite conceivable that for the Nagas any kind of sickness was believed to have been influenced by spirits and deities. Benevolent spirits were thought to be responsible for men's well-being, and blessings, whilst malevolent spirits were responsible for causing suffering to men. They also believed that natural calamities such as earthquake, thunderstorm, fire incident, famine, epidemic disease, sickness, etc. were the wrath and cause of the supernatural powers, deities, and evil spirits. Therefore, pacification was made with animal sacrifices, and food offerings were made to the spirits to placate them. Besides, ceremonies were observed with honour and reverence to gods for positive effect on individual and community life. As a result, at every step of life, they put religion into action in such ways as sacrifices, the performance of rite and abstention from work or *genna* days. Thus, the main concept of traditional Naga belief was concentrated on three things, that is, to escape the wrath of malevolent spirits from disease and death, to ward off the evil spirits through pacification, and appeasement to maximize good harvest and win their goodwill.

In the days of yore, Naga people's ways of life and food habits were very simple. Though extremely hard working, they rarely took ill, and when they did, the treatment they undertook was also very simple. They relied primarily on herbal remedies sourced from plants, roots, and herbs for the treatment of illness, wounds, injuries, and the like. Common ailments were treated using different medicinal plants and substances available in their kitchen garden, fields, or forest. Additionally, the Naga healing system also incorporated a substantial use of rituals and sacrifices as ‘interventions' for unexplained ailments. Hence, the indigenous healing process of the Naga people can be broadly categorized into two forms, i.e., the supernatural form and the material form of healing. Detailed discussion of such is presented in the following sections:

3.1. The supernatural form of healing

The supernatural form of healing process is based upon mysticism or claimed revelations, rather than the empirical evidence which is the bases of scientific medicine. It is based upon the hypothesis that physical symptoms of illness are a manifestation of disturbances in some nonphysical component of the person. This form of healing process involves mediating between spirits and human, and worshipping in the form of sacrifices and rituals. The Authors found that the antidotes for various illnesses among the Nagas were connected to magico-religious beliefs and propitiations of the supernatural beings and spirits. In the olden days, the only ‘doctors' were these traditional healers who diagnosed the causes as well as treated the sickness too. As the go-between of the spirits and sick persons, upon examining the patient, the traditional healer instructs the patient that the spirit seeks a sacrificial animal which may be either a pig or hen. The same is procured by the patient and accordingly sacrificed by the healer, completely in the belief that the sick person would be cured. Alternatively, when a person was thought to have been stricken by spirits resulting in illness, they will consult their clan chief who then proceeds to perform a rite by killing a hen and extracting its innards. The chief will then seek for signs as to how and why he became sick. The duration to get healed was also interpreted by reading the intestines of the sacrificial hen. The patient then offers sacrifice, either a dog or a cock, as per the ‘demand' of the spirits and return home. These ritualistic sacrifices were accompanied by chants entreating the spirits ‘*to take the animal as a substitute for the sick person*.'

Being agriculturists, the Naga social life revolves around agriculture and its seasons. While going to the field, a woman always walked ahead, and the man walked behind her, carrying a *Dao*[1] in the waist belt and a spear on the right shoulder. They believed that such an act would ward off the evil spirit for it was believed that the evil spirit would see the spear as piercing the man’s throat and be amazed at the bravery of the humans. Thus, it is said that in the olden days every girl wanted to marry only those men who were brave and knew the art of spearing and use of *Daos*, which supposedly made them feel protected from enemies and evil spirits (for sicknesses).

An important element associated with the supernatural form of traditional healing system was the observance of *genna*. *Genna*, which has its roots in the Angami-Naga word *kenna*, meaning ‘prohibition’ possesses socially and religiously dangerous attributions and is believed to produce misfortune if it is not observed strictly. Thus, the Nagas strictly observed *genna* to avoid consequences upon them. During a *genna* period, much of what is

[1] A Naga Machete

part of everyday routine life comes to a standstill- it is forbidden to travel, to engage in sexual relations or to eat certain types of food. A *genna* period can last several days, and, depending on the occasion, has to be observed either by the whole family or only by certain individuals. At times of sicknesses or illness when certain rituals were necessitated, the Naga people observed *genna* or purity. In the olden days if a person was sick, then the person would abstained from taking meat as well. The healer or diviner instead took a sacrificial animal which may be either a hen, pig or a dog to the forest and offered sacrifices whilst the sick person together with his/her family members observed *genna* at that time.

The above-mentioned rituals and practices were clearly devoid of any scientific rationalization but the blind faith and belief reposed by the people upon the traditional healers and medicine men can only be attributed to the indigenous belief system of the Naga people which is characterized by belief in spirits. In light of the above-mentioned practices, some indigenous supernatural forms of healing process practiced by the Nagas are briefly discussed as under:

i. Casting away of evil wind

The following forms of treatment were indigenously practiced among the different Naga tribes in order to cast away evil or of evil wind:

(a) The leaves of Holy basil is crushed and applied on the stomach of the victim, or it is crushed, steeped, filtered in the water and the water consumed.
(b) To be protected from the 'eyes of evil spirit' or to prevent the spirit from following them, the leaves of *Artimisia* sp., locally known as *Thopi nü* in Chakhesang-khezha dialect are plucked and worn on the ears.
(c) If one put the leaves of a plant known as *Likokmeyu* in Ao Naga dialect on the ears, it is believed to keep a person safe from the evil's eye. It can be taken raw for stomach ache and evil possession.
(d) Fresh Broom stick plant, known as *Leptsu* in Ao Naga dialect was used to shoo off evil spirit by whipping with it on the possessed person.
(e) A small amount of nutgall powder wrapped in a piece of cloth and tied on the necklace of small baby, especially when the parents take them to the field, was believed to ward off the evil eye or any form of sickness.
(f) Bamboo tubes filled with water was also placed near the door in order to stop evil spirit entering the house.
(g) A plant known as *Changjangwa* among the Ao Naga was regarded as a Holy plant. This plant was often used for massaging and also to cast away evil spirit. The Naga people placed it in the house in order to cast away evil spirit or whenever a family member was sick. At such times, the sick person was cared for at home with all the doors and windows closed. All the normal chores were hauled up, and only in case of unavoidable situation, the mother goes to the field to do the task until the sick person recover. However, it may be noted that this particular plant was used only when the husband and wife in the family were observing *genna.* The traditional healers also used the plant in casting away the evil spirit from the patient. Legend has it that even the spirit or God told *Etiben*[2] When she was wearing *Changjangwa* on her ears like so, "*How can I touch you when you are wearing my flower…you never fall sick*".

ii. As *genna* plant

The plant *Zanthoxylum nitidum* known locally as *Changpet* in Ao Naga dialect is considered as a *genna* plant. When people were observing *genna*, they hung up that particular plant in the house so that visitors would know even from outside that the inmates are observing *genna*. Consequently, people refrained from visiting that particular house.

3.2. The material form of healing

[2] *The protagonist in the famous Ao Naga's love folklore, ' Etiben and Jinaba', akin to the legendary Shakespearean love story of Romeo and Juliet. A tale of love affair between two lovers under extreme pressure and opposition from family has a tragic ending.*

The material form of healing process, on the other hand, involved the use of certain minerals and natural products like plants, animal derivatives, etc. It was found that sicknesses among the Nagas were also treated with herbal remedies like holy basil, nutgall, ginger, garlic, etc. These herbs and medicinal plants were collected during summer, preserved and taken for various ailments. In addition to plant remedies, animal-based derivatives were also used by the traditional healers. For instance, snake soup for body ache, usage of the blood of the pig and deer for various diseases, etc., are known facts. Some indigenous material form of healing practiced by the Naga people are briefly discussed as under:

i. Treatment for headache

For treating headache, the following traditional methods were applied:

(a) Holy basil or *Ocimum basilicum*, which is known as *Nangpera* in Ao Naga dialect or *Ao* in Chang Naga dialect is boiled, and the water drank to relieve headache. Alternatively, the patient is advised to wash the head with cold water.
(b) Mustard leaves are warmed in the fire and pasted or placed on the forehead and on the back of the neck.
(c) Applying the paste of garlic, holy basil and mustard leaves known as *Yukushik* in Chang Naga dialect on the forehead is said to offer quick relief.
(d) Pulling little tufts of hair one after another is supposed to be another remedy for headache.

ii. Treatment for stomach ache

The following indigenous methods were practiced by the Nagas for treating stomach ache:

(a) Among the Chang Nagas, for stomach ache, warm ash along with some charcoal is dropped into a pot of water, and after filtering, the water is consumed. Otherwise, the boiled leaves of *Clerodendrum colebrookianum,* a wild vegetable known locally as *Orüma* in Ao Naga dialect or *Waram* in Chang Naga dialect is also used for the above ailment.
(b) Black tea as well as boiled guava leaves is prescribed as a tonic for stomach traditionally. Also, the leaves of *Curanga aroma*, locally known as *Longriiwa* in Ao Naga dialect is eaten raw for the same purpose.
(c) For flatulence, the fruit of red sorrel or Rosselle (*Hibiscus sabdariffa* Linn.) known locally as *Entsürep* in Ao Naga dialect is either eaten raw, or its water drank after boiling or steeping for some time.
(d) Holy basil and nutgall (*Rhus semialata*), which is commonly known as *Tangma*/ *Tangmo* among the Ao Nagas or *Ao* among the Chang Nagas or *Tangba* among Yimchuger Nagas are also prescribed to relieve stomach pain.

iii. Treatment for toothache

The following traditional treatment for toothache among the different Naga tribes was commonly practiced:

(a) For toothache, a round ball worm called Roly Poly, which is known as *Ngeket* in Chang Naga dialect was crushed, and its sticky juice applied immediately to the tooth.
(b) The roots of peach tree, known as *Shonpi* in Chang dialect, are also taken out and crushed. Then, its paste was applied to the cavities to stop the pain.
(c) The flower of *Pellitory* (*Spilanthes acmella* Linn) which is commonly referred to as Akarkara in India or *Hokisüngcha* in Ao Naga dialect is applied on the cavity afflicted tooth to reduce the pain.
(d) To relieve toothache, the fruits of *Solanum khasianum*, known as *Akho Longkok* in Ao Naga dialect or *Thechehushe* in Chakhesang Naga dialect was smoked and crushed into powder form, which was thereafter, smoked in the form of a cigarette.

iv. Treatment for burns

The following indigenous methods for treating burns were commonly practiced among the Naga tribes:

(a) The lard of chicken and snake were preserved and applied as ointment on the burns.
(b) The scale of pangolin, which is known as *Külep* in Ao-Mongsen dialect or *Tüpho* in Chakhesang-Chokri dialect, is also burned and applied on the burned area.

(c) The shell of a snail, known as *Lepo* in Chakhesang-Kheza dialect is burned, and the ashes are applied on the affected part.

v. Treatment for clotting of blood

The leaves of *Datura suaveolens* or Datura, which is locally known as *Naagben* in Ao Naga dialect, or *Thurhüba* or *Mukrenhe* in Chakhesang Naga dialect are warmed in the fire and pasted on the affected area. As a result, the leaves make the impure blood to gather in a particular place. After that, the skin is pricked with a bamboo splinter whereby the impure blood can be removed.

vi. Treatment to stop bleeding from cuts and wounds

The following traditional treatment was commonly practiced among the different Naga tribes:

(a) Ash is applied on the wound.
(b) The yolk of an egg is used for cut wound in order to prevent it from becoming septic or for healing the cut skin.
(c) The leaves of a plant called *Tsümar Za* in Ao-Mongsen dialect are also crushed and applied on the wound.
(d) Honey is also applied for cuts or wounds.
(e) The leaves of a plant called *Nok Mozü* in Ao Naga dialect are crushed and applied on the wound.
(f) To stop bleeding from cuts and wounds, the leaves of the following plants are also used by crushing and pasting it on the wound:

- *Eupatorium adenophorum*, commonly known as Crofton Weed or Sticky Snakeroot.
- The plant *Mikania micrantha* H. B. K, known as *Japanza* in Ao Naga dialect or *Japan Nya* in Chakhesang-Chokri or *Japan Prü* in Chakhesang-khezha dialect.
- A plant known as *Pentongza* in Ao-Mongsen dialect or *Vülanha* in Chakhesang-khezha dialect.
- Beggers ticks (*Bidens pilosa* L.), which is commonly known as *Kome Netsü* in Chakhesang-Khezha dialect or as *Khomanabiza* in Ao-Mongsen dialect; and
- Alder (*Alnus nepalensis*), known as *Ongpangtentong* among the Ao Naga or *Lepulü* among the Chakhesang Naga.
- The root of Curculigo (*Curculigo crassifolia* (Bak.)), which is known as *Kor* in Ao Naga dialect is crushed and applied its paste on the wound to stop bleeding.

vii. Traditional Bandage

The bark of Wild Rhea (*Debregeasia longifolia*), which is known as *Nachitong* among the Ao Naga or *Mülisuh* among the Chakhesang Naga were traditionally used as bandage to dress wounds.

viii. Treatment for quick healing of wounds

For quick healing of wounds, frog meat and snails are consumed as it is believed to hasten the healing of wounds. Even today, patients are commonly served these dishes after medical surgeries for rapid recuperation.

ix. Treatment for broken skull

Broken skull is treated by applying the yolk of the egg.

x. Treatment for dysentery and typhoid

The following methods are generally prescribed for the treatment of dysentery and typhoid:

(a) Chew guava leaves, or the outer cover of pomegranate fruit or the bark of the tree called *Pachet* tree in Ao Naga dialect.

(b) For the treatment of dysentery, the intestines of porcupine are dried, boiled, and a soup made out of it and consumed.
(c) Holy basil and nutgall are boiled together, and the water is consumed.
(d) The slippery substance which is found inside the trunk of Agarwood (*Aquilaria malaccensis* D. Don), which is locally called as *Süngya* in Ao Naga dialect is boiled, and the juice is taken to cure dysentery.
(e) Guava shoots and leaves are boiled, and the juice is taken to cure dysentery.
(f) The leaves of *Euphorbia hirta* or Pill-bearing Spurge are also boiled, and the juice is taken to cure diarrhea.
(g) Passion fruit leaves are crushed and the juice taken as tonic.
(h) Unripe banana, eaten after roasting in fire, is said to be good for dysentery.
(i) For dysentery and typhoid, a mixture of a small quantity of opium with warm water is also prescribed.
(j) A small amount of mud from anthills or some flies, known locally as *Jongko Li* in Ao Naga dialect is also taken for dysentery and stomach pain.

xi. Treatment for sore throat

Water of boiled holy basil, which is known as *Nangpera* in Ao Naga dialect or *Yanhing* in kongyak Naga dialect is drank as a tonic for sore throat.

xii. Treatment for intestinal problem

For the treatment of intestinal issues, the gallbladders of bear and porcupine, known as *Throgtu* in Sangtam Naga dialect or *Saan* in Chang Naga dialect or *Khaotsuo* in Khiamungan Naga dialect are prescribed.

xiii. Treatment for general weaknesses and recuperation from various sicknesses

The following methods of treatment were commonly prescribed:

(a) Soups derived from meat of local pig, which is known as *Okmei* in Chang Naga dialect, cock known as *Aupang* in Chang Naga dialect, hen known as *Auny* in Chang Naga dialect were served at times of accidents.
(b) Ash gourd is boiled, and its soup served to woman after delivery based on the belief that helps to produce more milk and recuperate from childbirth.
(c) Soup made from the seeds of Perilla (*Perilla frutesens* Linn.), locally known as *Avüng* in Ao Naga dialect or *Nam* in Chang Naga dialect is often given to women right after delivery. The same is also given to injured people, or people suffering from general weakness.

xiv. Treatment for backache and body pain

The following methods were indigenously practiced for the treatment of backache and body pain:

(a) The meat and soup of snake, which is known as *Lenü* or *Tinyhe* in Chakhesang Naga dialect, are taken to relieve the pain.
(b) Among the Chang Nagas, if a person suffers from backache for a long period of time, he/she is advised to go near to a tree, which should be big and huge. Then, he/she should pretend to carry the tree on his/her back by putting a traditional head strap on the tree, which is locally named as *Nyampük* in Chang dialect. Later, with all his/her might, the victim should try, twice, to walk away carrying the tree on his/her back. Lastly in vain, at the third try, he/she should run back home, leaving the tree behind saying, "*I cannot carry the load, so you just take it*." As a result, they believed that the pain would subside.

xiv. Treatment for joint pain

The following methods of treatment were usually practiced to get relief from joint pain:

(a) The leaves of castor oil plant (*Ricinus communis* Linn.), which is locally known as *Penpangtong/ Iritong* in Ao Naga dialect are warmed a bit on the fire or wrap some warm ash by it and apply it gently on the pain portion to get relief.
(b) The fats of snake and the bone marrow of an animal called *Thülü* in Chakhesang-Chokri dialect are also used for massaging joint dislocation.

xv. Treatment for menstrual cramps

For treatment of menstrual pain, a piece of cloth is soaked in warm water, squeezed and placed in the lower abdomen for smooth flow of menstruation and get relief from the menstrual cramps.

xvi. Treatment for any poisonous insect bite like snake, spider, etc.

The following treatment was commonly practiced indigenously among the Nagas:

(a) For any poisonous insect bite like snake, spider, etc., ginger leaves were crushed and applied on the wound. Or, thatch grass, which is known as *Aidong* in Ao Naga dialect or *Lang* in Chang Naga dialect is tied on the bitten part in order to stop the poison from spreading throughout the body.
(b) The bitten part is soaked in water, or the juice of banana stem was applied in order to stop the poison from spreading.
(c) Snakebite is also treated by sucking the poison out of the punctures after binding the bitten part tightly, both above and below the wound. This is followed by feeding the patient with dog meat or the juice of a crushed earthworm called *Thophü* (Chakhesang-Khezha Naga dialect) which is found in banana tree.

xvii. For birth control

In the olden days, the Chang Nagas believed that if a woman goes quickly to the bottle brush tree (*Callistemon*), which is known as *Buhoung Sovomai* in Chang Naga dialect and hug it tightly, then she would turn infertile. Chapped heels are also believed to heal by rubbing on the bark of the same tree.

xviii. Treatment for eye injury and inflammation

(a) Mother's milk is put inside the eyes, and this is considered the best treatment for any eye injury or disease.
(b) The seed of holy basil is also put inside the eyes. The tiny seed is thought to gather the particles that cause inflammation, which will eventually be dislodged from the eyes. The seeds will just melt away inside the eyes.

xix. Treatment for skin diseases like ringworm infection

For the treatment of skin diseases, holy basil leaves are crushed and pasted on the affected portion.

xx. Treatment for ear pain

The dew from the stem of spiral ginger (*Costus speciosus*), which is known as *Alar naro* in Ao Naga dialect or *Pfünotshe* in Chakhesang-Chokri dialect is put inside the ear.

xxi. Treatment for stucked fish bone

To flush down fish bone stuck inside the throat, rhododendron leaves and flowers are eaten.

xxii. Food poisoning, allergy, and vomiting

Nutgall is taken for food poisoning, allergy, and to stop vomiting.

xxiii. Dog bite

The whiskers of the dog that has bitten a man are pulled out and burned. The burned ash is then applied to the wound.

xxiv. Ant bite

For ant bite, crushed garlic is pasted on the affected area.

xxv. Treatment for cough and cold

The following traditional treatment for cough and cold was commonly practiced among the different tribes of Nagaland:

(a) For cough, massage the foot with the juice of ginger, which is known as *Si* in Chang Naga dialect.
(b) Nutgall with water is taken as tonic for cough and cold.
(c) Hatched egg shells are burnt, covered with a shawl or blanket and the smoke inhaled.
(d) Dog's gallbladder is also consumed as a remedy for cough.
(e) The legs of jungle fowl, which is known as *Opela* in Ao or as *Choli* in Chakhesang-Chokri dialect are preserved and used in case of cough by preparing soup.
(f) For monkey cough, the meat of squirrel, locally known as *Küle* in Chakhesang-Chokri and wild rat, called *Thüzü* in Chakhesang-Chokri are taken. Even its intestine and internal organs can be consumed after drying.
(g) For cough, crushed garlic in mustard oil is warmed and massaged on the chest of the patient.

xxvi. Treatment for fever

The following indigenous methods of treating fever were commonly practiced:

(a) Soup made of poison berry (*Solanum torvum*), known as *Chekhushe* in Chakhesang-Chokri dialect is taken by crushing the berry and boiling it.
(b) The root of *Rubus ellipticus*, commonly known as *Ranushe* or *Ramuhushe* in Chakhesang Naga dialect is clean and boiled. Then, the soup is served to the patient for fever.
(c) For fever, squirrel, and wild rat's meat and soup is also taken.
(d) For irregular fever, the gall bladder and pancreas of bear, locally known as *Thuga* in Chakhesang-Chokri dialect are also prescribed.
(e) To get relief from fever, cucumber leaves are washed, crushed with the palm and the juice squeezed out and consumed.
(f) The leaves of Nepal prickly ash (*Zanthoxylum oxyphyllum*), locally called as *Müyitishe* or *Metishe* in Chakhesang Naga dialect or as *Manguwa* or *Mongmong* in Ao Naga dialect is also taken after boiling.

xxvii. To regain consciousness

Orange or lemons leaves are crushed and inhaled for problems like shivering or blackout cases. In such a condition, the victim is made to inhale it, and after that, the facial muscles are pulled to make the person to regain consciousness.

xxviii. Treatment for measles

The following methods are generally prescribed for measles:

(a) Crabs and anything that are found in the water, are taken to let the measles erupt, which is believed to aid faster recovery from the disease.
(b) For measles in kids, frog meat and soup are considered the best treatment.

xxix. Treatment for Malaria

The following indigenous methods of treating malaria were practiced:

(a) The dung of the cock is eaten when it is still fresh as it is sour.
(b) Another treatment for malaria was to splash the patient with cold water wrapped in yam leafs, as he/she returns from the toilet. The shock from this treatment is believed to cure the person of malaria.
(c) The leaves of a plant called *Ngounam* in Chang Naga dialect and a tree calle*d Simbo* in Chang Naga dialect is crushed, and a tonic from its leave is taken.

Over and above the above narrated traditional remedies for various ailments, the Naga people believed that black cats could cure any kind of disease.

4. Indigenous Method of Child Birth and Care

In the olden days, pre- natal medical care was not available to pregnant women, unlike the present. It was common for pregnant Naga women to munch on Shale, a kind of soft stone called *Longpen Long* in Ao to satisfy their craving. An uncanny similarity in this habit exists in regions near Hyderabad and various parts of Kenya where pregnant women are known to consume copious portions of soft limestone in order to satisfy and subdue midnight cravings and bouts of morning sickness. The soft stones are locally known as *Odowa* in Kenya and *Khadi* in Hyderabad (Henry, 2015). No concession in daily chores was expected by Naga women during pregnancy, and they continued to engage in the daily routine of livelihood sustenance including a collection of firewood, fetching water, as well as working in the field. Perhaps due to all the physical activities undertaken by the pregnant women, childbirth was said to be relatively easy and simple. In fact, a pregnant woman was encouraged to keep up with daily chores based on the belief that physical activity would warm her blood, leading to an easier delivery. As far as delivery is a concern, women gave birth wherever they happen to be working. It is said that in the olden days babies were delivered on the way to the field, or sometimes, even in the field itself, obviously without any medical assistance. In case delivery takes place in the jungle or field, they placed some leaves on the ground for the mother to lie down. Banana leaves and Major Jenkins palms (*Livistonia jenkinsiana*) were generally used for this purpose.

Traditionally, during child birth, people removed all the ornaments from the expectant mother due to the belief that those ornaments would block the passage of the child. Thereafter, the midwife anoints the mother and would encourage her to be strong until the delivery. It is said that there were some midwives who were not compatible with the pregnant woman, which made the delivery even difficult. So in subsequent delivery of the same mother, such midwives, even if they wanted to come and help, were not called on for assistance. During child birth, diluted ash in cold water was given to the mother ostensibly in order to let the placenta be removed faster. Also, warm water, soft cooked rice, and chicken were popularly served to the mother during child birth. After delivery, a sharp bamboo sliver was used to cut the umbilical cord, which was then tied by a cotton thread. Traditionally, the father was assigned to cut the umbilical cord and wash the placenta. Thereafter, it was wrapped in banana leaves and either placed or buried in a bamboo platform to protect from animals. It was considered a bad omen if animals ate the placenta. Thus, extra care was taken in its disposal. The newborn child was then given bath with warm water and thereafter red thread was tied on the baby's belly saying "*you are mine from now*." As in the olden days, even now, it was found that the villagers of Shangsha under Mon district use bamboo to cut umbilical cord which was said to prevent it from becoming septic.

Certain rituals and observances followed the delivery of the baby. If the baby is a girl, then for five days, and for six days if it is a boy, the members of the household should not engage in any work as a form of respect; nobody within the house should speak loudly; the family members should not even cut anything with *Dao* near the place where the mother and the new born baby were lying. Above all, they should observe strict *genna* for these five or six days by not letting any guest enter the house. During these five or six days as the case maybe, they should not even go to the field or for hunting or do any house hold chores like pounding rice which produce loud sounds. Later, when the mother go the field leaving behind her new baby at home while returning back, she put a particular leave, known as *Changjangwa* in Ao Naga dialect on her ear in order to ward off evil spirit from her. This act was ostensibly to prevent any evil spirit from following her home.

Thus, delivery and childcare in olden days were very simple, yet, full of rituals. Women never undertook any pre-natal tests or examination, nor any specific medications during pregnancy. In spite of lack of access to any modern medical facilities, still complications of child birth were very rare. The only ‘doctors' for them were the traditional midwives, who assisted them in times of child birth. But even then, should they give birth in the field or on the way, they could manage by themselves.

5. Change and continuity

As the preceding sections indicate, prior to the advent of the Christianity the Nagas accorded the cause of most ailments to be the handiwork of malevolent spirits. In the absence of modern medical facilities, for any illness, wounds or injuries they had no alternative to the traditional healing system which was more often than not associated with magico-religious beliefs and propitiations of the supernatural beings and spirits. However, Christianity and modern education changed their worldview. With the advent and widespread acceptance of Christianity in the Naga society, worship of the Supreme Being, stone, lakes, big trees and spirits were changed to the worship of one God Almighty- Jehovah (Ao, 2004). The fear of the spirits and the burden of sacrificial rite were replaced by simple prayer (Henshet, 2000). The observance of *genna* and sacrifices faded away to be replaced by a new rational outlook.

Today, the indigenous health care practices, as well as the health-seeking behaviour of Naga people, have undergone a far change. People presently preferred to seek allopathic treatment for their ailments as long as they could afford it with the rationalization that the medical doctors are professionally trained, unlike the traditional healers. Moreover, it is popularly held that modern allopathic medication provided faster relief and since it is based on extensive research and clinical trials, it appears to be a more reliable and safer option than the traditional healing system for the people. However, in spite of the changes in the health-seeking behaviour of the people, there is strong evidence of the prevalence of medical plurality and amalgamation of modern and traditional health care system in Naga society. Traditional use of herbs and plants still remains the first line of treatment for minor ailments. Following which most people tend to seek allopathic doctors when it comes to common illness caused by known pathogens. However, for unexplained illnesses, diagnosis of which remains problematic even through the intervention of medical doctors, supernatural elements are believed to be at play. The response to such ailments sees people still seeking traditional healers. However, unlike the pre-Christian era which saw the extensive use of sacrificial rituals, today's traditional healers for supernatural cases comes in the form of faith healers or prayer warriors who claim to heal patients with the power of prayer and people widely throng to them for unexplained sicknesses. Hence, it is clear that the choice of treatment is often related to the perceived cause of illness. Most Nagas tend to seek allopathic doctors when it comes to common illness caused by the natural world. However, for illnesses attributed to supernatural elements, they sought the intervention of traditional healers. Thus, this practice of health-seeking behaviour among the Nagas conforms to Allan Young's (1976) concepts of 'assimilation' and 'particularization' in explaining how they look upon the modern medicine, which is an alien system for them.

With the advancement of medical science and increase in knowledge, the health care practices of the traditional healers in Naga society too have undergone changes consequent to the change in the belief system. It is seen that many healers have altered their technique of treatment as well as their medicinal products. The present study found that the medicines and therapy used by the indigenous healers today are not purely traditional in nature, but it is blended with modern scientific methods. Consequently, some traditional healers were found using a combination of allopathic medicines with their own herbal medicine in their line of treatment, while others have started using plasters, bandage, various allopathic ointment, etc., along with their traditional technique of treatment. Besides, a substantial number of healers at 13.70 percent in the study were also found prescribing allopathic medicines to the patients. This practice may be viewed with concern for two reasons: firstly, the traditional healers do not have the scientific knowledge of the chemical compositions of the medicines they are prescribing; secondly, it reflects a sense of lack of efficacy or confidence of those traditional healers in their own products. This does not augur well for the future continuity of the age-old indigenous healing system of the Naga people which is faced with the onslaught of the modern medical system and appears to be teetering.

Such development hence calls for pressing rational, proactive measures which would stem the disintegration of valuable indigenous knowledge of a people. There is a need to look at the science and technology of indigenous healing practices and try to develop it instead of replacing it in the name of scientific development and modernization. The importance of research in the field of traditionally used medicinal plants and minerals are felt more than ever. Scientific study and identification of active plant compounds and their efficacy of use in traditional healing system can lead to the discovery of new therapeutic benefits and the production of nature-based products in the future. To achieve this, extensive research is fundamentally important to control the quality

of raw drugs and formulation to justify their use in the modern medical system, subsequently, animal studies and clinical trials are required to use the benefits of these plants. Ultimately urgent proper documentation of indigenous knowledge relating to health care practices and medicines used by the traditional health practitioners in Nagaland is urgently necessary as most of the knowledge is in an oral form which can be forgotten or lost if not recorded or documented. It should be realized that the loss of these rich and diverse eco-system based knowledge and skills will be corrosion to the traditional value system and its cultural history.

References

Akram, Mohammad, 2014. *Sociology of Health*. New Delhi: Rawat Publications.

Ao, A. Bendangyabang, 2004. *History of Christianity in Nagaland: Social Change (1872-1972)*. Bangalore: Shalom Ministry Publication.

Boban K, Jose, 1998. *Tribal Ethnomedicine: Continuity and Change*. New Delhi: A.P.H. Publishing Corporation.

Guite, Nemthianngai, 2011. *Indigenous Medicine and Health Care Among Paite Tribe of Manipur*. New Delhi: Concept Publishing Company Pvt. Ltd.

Guite, Nemthianngai, 2014. *Indigenous medicinal substance use in Manipur: an exploratory study with special reference to 1990's*. Retrieved on 16/04/14 from http://hdl.handle.net/10603/31592.

Henshet, B., 2000. *The Phom-Naga Indigenous Religion (A Socio-Philosophical Perspective)*. Nagaland: Yingli College Longleng.

Henry, Nikhila, 2015, September 12. 'The secret addiction in old Hyderabad'. *The Hindu,* retrieved on 10/12/17 from https://www.thehindu.com/features/magazine/nikhila-henry-on-the-stoneeaters-of-hyderabad/article7641379.ece.

Kath, Phanenno & Joseph H. Thong, 2011. Glimpses of Naga legacy and culture, ETC, Jorhat, Assam.

Maps of India. (n.d.). About Nagaland. Retrieved on 28/02/17 from https://www.mapsofindia.com/nagaland/.

Murdock, George Peter. (1980). *Theories of Illness: A world Survey*. London: University of Pittsburgh Press.

Nagaland State Human Development Report, 2016. Government of Nagaland and UNDP

Government of Nagaland. (n.d.). *About Nagaland.* Retrieved on 28/02/17 from https://www.nagaland.gov.in/portal/StatePortal/UsefulLinks/Census.

Sujatha, V., 2014. *Sociology of Health and Medicine (New Perspectives)*. New Delhi: Oxford University Press.

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The Effect of Antenatal and Intrapartum Factors on Episiotomy Wound Dehiscence

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Abstract
Episiotomy is the most common labour ward procedure in obstetrics. Improper healing of the episiotomy wound can lead to prolonged and sometimes serious post-partum morbidity. Also, if infected, they may manifest as a surgical site infection and may lead to generalised sepsis. In this study, we aim to critically evaluate cases of episiotomy wound gapes and study antenatal, intrapartum, and infective causes for the same. This study aimed to study the prevalence and causes of episiotomy wound dehiscence and the maternal co-morbidities associated with them in a tertiary care centre. Methods: This observational, hospital-based prospective cross-sectional study conducted at the Department of Obstetrics and Gynaecology, Seth GS Medical College and KEM Hospital from 2017-2018. A total of 30 cases of episiotomy wound dehiscence were studied. The rate of episiotomy wound dehiscence was 2.14% for the year 2017-2018. More than half (60%) of the patients have a wound dehiscence were overweight or obese. Anaemia, obesity, diabetes mellitus, and hypothyroidism were the main antenatal high-risk factors identified. In the intrapartum factors, wound dehiscence was more common in patients in whom labour was induced and those undergoing instrumental delivery. 70% of the cases were diagnosed between post-partum day 7-14, and the main presenting complaint was pain at the episiotomy site. The main organisms noted in infected wounds were Escherichia Coli and Klebsiella Pneumoniae. In conclusion, episiotomy wound dehiscence is an important cause of post-partum morbidity and prolonged hospital stay. This study revisits the need to correct antenatal factors like obesity, anaemia, and hypothyroidism and highlights the need to refine intrapartum practices and post-natal follow up in patients at high risk for this condition.

Keywords: Episiotomy, Escherichia Coli, Instrumental Deliveries, Obesity, Anaemia, Peripartum Infection, Surgical Site Infections, Wound Dehiscence

1. Introduction

Episiotomy comes from the Greek work *epision*-pubic region-plus-*tomy*-to cut. 85% of the patients who have a vaginal delivery will have some sort of perineal trauma, 60-70% of whom will need suturing (Fitzpatrick M, O'Herlihy C, 2007).

Episiotomy is a surgical incision taken on the perineum in the second stage of labour in order to facilitate delivery (Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, et al, 2010, p.698-690) The three types of episiotomy described are medial episiotomy, lateral episiotomy, and mediolateral episiotomy. The most common type practised is the mediolateral episiotomy.

National episiotomy rates have decreased steadily since 2006, when ACOG recommended against routine use of episiotomy (Cunningham FG et al., 2010). Data shows that in 2012, 12 percent of vaginal births involved episiotomy, down from 33 percent in 2000 (ACOG Practice Bulletin, 2016).

Episiotomy being an iatrogenic perineal wound, like in any wound healing, factors affecting healing are: infections, diabetes, nutritional status, glucocorticoids, mechanical factors like pressure, poor perfusion, the type and location of injury (Kumar V, Abbas AK, Aster JC, 2015, p.106). Data from 1990 to 2004 shows that the leading cause of episiotomy dehiscence is undoubtedly infection (Cunningham FG et al., 2010). Anaemia and hypo-proteinemia are one of the common co-morbidities associate with delayed wound healing (Winkler KP n.d.). Hypothyroidism, one of the common endocrine disorders seen in pregnancy is also one of the main contributors to this problem (Natori J, Shimizu K, Nagahama M, Tanaka S, 1999).

Each of the three types of episiotomy mentioned above have their own merits and demerits. The traditional debate related to episiotomy involves (a) selective vs routine episiotomy (a)the best type in terms of wound healing, blood loss and pain and (b) the most appropriate suture material used for suturing the wound. However, nullifying these variables and taking into account the standard practice of doing a selective mediolateral episiotomy with a polyglactin suture material, i.e. inspite of standard protocols being followed, complications related to episiotomies still persist such as wound infection and wound dehiscence.

Inspite of episiotomy being one of the commonest procedures done in obstetrics worldwide, data and awareness regarding episiotomy wound dehiscence remains sparse due to the rare nature of the condition. The available research in this topic focuses on the traditional debate of type of episiotomy and the suture material used. There have been no studies exploring the fact that common maternal conditions like anaemia, obesity, hypothyroidism, diabetes, and intrapartum factors also have an effect on the wound healing.

Hence, this study intends to audit cases of episiotomy wound dehiscence over a period of one year in a tertiary care institute and study it giving emphasis to the maternal co-morbidities and intrapartum factors. We hope that by doing this study, we will be able to identify the women who are pre-disposed to having an episiotomy wound healing problem and provide them with a more rigorous follow-up schedule and better antibiotics.

This study, we hope will help us make better policies for the women at risk of wound dehiscence and reduce the incidence of perineal wound dehiscence to nil.

2. Aims and Objectives

a) To study the causes and of episiotomy wound dehiscence and their prevalence.
b) To study the maternal co-morbidities in cases of episiotomy wound gapes.
c) To study the common organisms involved in episiotomy wound gapes.

3. Methods

This prospective observational study was done at Seth GS Medical College and KEM Hospital, Mumbai, for a period of one year after the clearance of the Institutional Ethics Committee. All women in the puerperal period from day 1 of post-delivery to 6 weeks post vaginal delivery in our institute with clinical evidence of episiotomy wound dehiscence were included in the study. Those women who had delivered outside the hospital, those referred post-delivery with no records and women who had sustained 3rd and 4th-degree perineal tears were excluded from the study. A total of 30 cases were included in the study. Patients were recruited in the study when clinically diagnosed with episiotomy wound gape either in post-natal ward or in the routine post-natal

check-up (usually between days 10 and 15) in the outpatient department. Consent from the cases was taken for inclusion in the study. A wound swab was sent for culture and antibiotic sensitivity at the time when the wound gape was diagnosed. Detailed examination of the patient was done to record information which included demographic details, details of the present pregnancy: antenatal and intrapartum details, medical/surgical high risks if any and details of the wound dehiscence examination along with the treatment being given. Patient was followed up for whether conservative management or re-suturing was done and for the duration of stay in hospital. Analysis of the data was done using the software SPSS 16.0. The prevalence of every criteria included was calculated as a percentage of the total. The quantitative data of the study population was analysed using means, medians, and percentages

4. Results

4.1 Demographic Details:

4.1.1 Age: The mean age of the study participants was 26.8 years (20- 35 years).
4.1.2 Parity: Of the cases studied, 46.7% were primigravids, and 53.3% were multigravida patients.
4.1.3 Body Mass Index (BMI):

Table 1. Division of cases according to BMI

Class	Frequency
Underweight (BMI<18.5)	00
Normal Range (BMI: 18.5-24.9)	12
Pre-obese (BMI: 25.0-29.9)	13
Obese (BMI: >/= 30.0)	05

More than half of the cases of episiotomy wound dehiscence were either overweight or obese. 43.3% of patients were overweight, and 16.6% of patients were obese according to WHO [World Health Organisation] standards.

4.2 Details of present pregnancy and intrapartum details:

4.2.1 Gestational age at delivery:

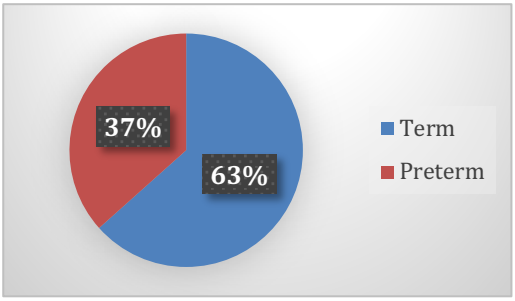

Figure 1. Gestational age at delivery

4.2.2 Maternal co-morbidities seen:

Table 2. Main maternal co-morbidities seen in the study.

Condition	Frequency
1. Overweight and Obesity	18
2. Anaemia	12
3. Hypothyroidism	09
4. Diabetes	07

5. Others (pregnancy induced hypertension, jaundice)	06
6. Nil	03

Anaemia and obesity remain the main co-morbidities seen in the cases in our study, followed by the endocrinological conditions commonly seen in pregnancy: diabetes and hypothyroidism.

4.2.3 Type of labour and mode of delivery:

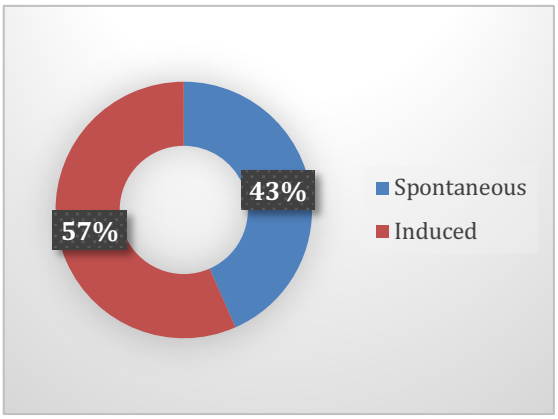

Figure 2. Type of labour

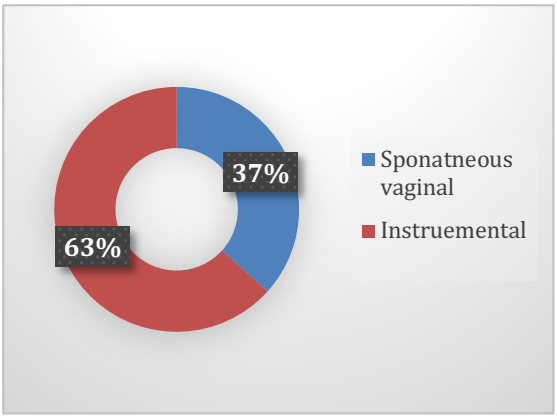

Figure 3. Mode of delivery

4.2.4 Intrapartum details:

a) The average duration of the first stage of labour in patients with episiotomy wound dehiscence was 8.3 hours.
b) Effect of second stage: Majority of the patients with wound dehiscence had a second stage of >1-hour duration.

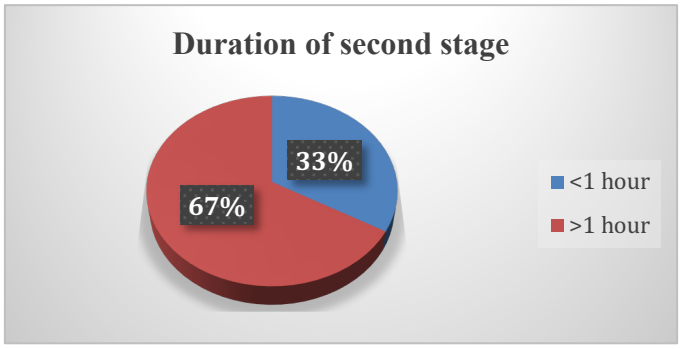

Figure 4. Division of cases according to duration of 2nd stage of labour

4.2.5 Instrumental Delivery Details:

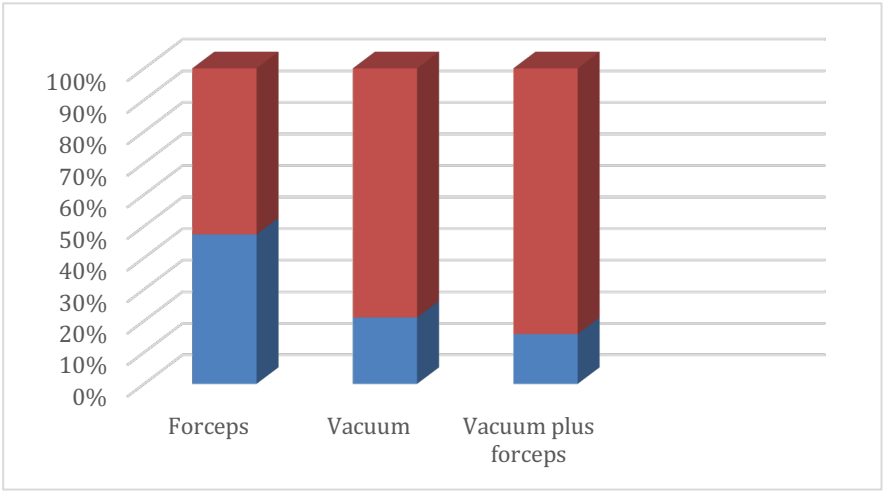

Figure 5. Details of the instrumentation done during delivery.

Out of the total 19 instrumental deliveries, the maximum were forceps application followed by vacuum.

4.3 Details of wound dehiscence:

4.3.1 Day of diagnosis:

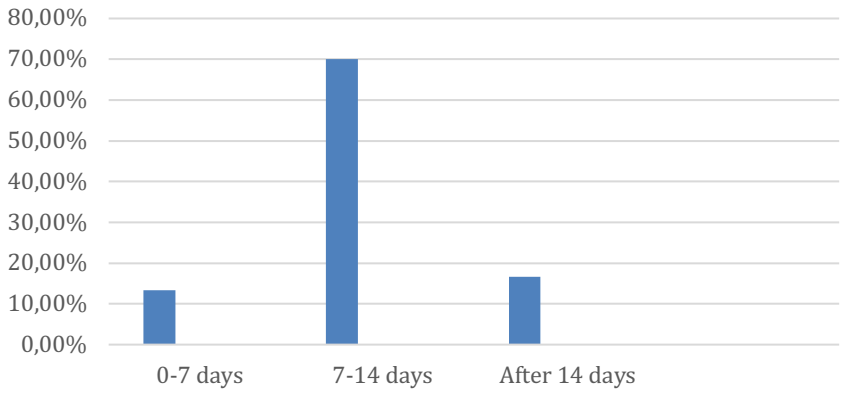

Figure 6. Distribution of cases according to the day of diagnosis

Maximum number of cases (70%) were detected between days 7 and 14 of the delivery.

4.3.2 Presenting complaints:

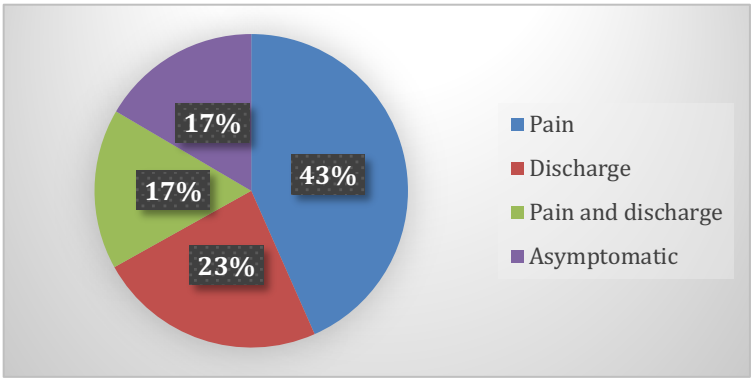

Figure 7. Chief presenting complaints

The main presenting complaint was pain at the episiotomy site followed by discharge. 17% of the patients were asymptomatic for the wound dehiscence.

4.3.3. Wound culture report:

Table 3. Main organisms seen in the wounds of patients with dehiscence

Organisms seen	Frequency
1. E. Coli	08
2. Klebsiella	04
3. Proteus	03
4. Enterococcus	02
5. Acinetobacter	01
6. Methicillin Resistant Staphylococcus Aureus (MRSA)	01
7. Pseudomonas	03
8. Multiple organisms	02
9. No growth	08

Discussion

Episiotomy is one of the most common surgical procedures done in obstetrics to facilitate vaginal childbirth. Restrictive use of episiotomy practised in Oxford from 1980-1984 paved the way for restrictive/selective over liberal/routine use of episiotomy (Reynolds JL, Yudkin PL, 1987) Many studies done worldwide later also supported the practice of restrictive vs routine episiotomy. WHO also in 2018 audited 11 randomised controlled trails and concluded that restrictive episiotomy is better than routine episiotomy (WHO recommendation, 2018).

However, even after this paradigm shift in our concept regarding the use of episiotomy, women in low- and middle-income countries remain at a higher risk of episiotomy than those in high-income ones. According to a recent study by Singh et al. in 18 tertiary care hospitals across India, studying 1,20,243 vaginal deliveries, the rate of episiotomy was found to be as high as 63.4% (Singh S, Thakur T, Chandhiok N, Dhillon BS, 2016). Hence, it is very important for us to know the risks and the morbidities arising from this procedure.

Episiotomy has been associated with various short- and long-term complications (Gün İ, Doğan B, Özdamar Ö, 2016).

Table 4. Complications of episiotomy

Short term complications	Long term complications
Perineal lacerations	Chronic infection
Haemorrhage, hematoma formation	Anorectal dysfunction
Wound infection and dehiscence	Urinary incontinence
Anal and rectal mucosal damage	Pelvic organ prolapse
Urethral and bladder injury	Sexual dysfunction
Pain	Pain

Extensive research has been done on effect of episiotomy on perineal lacerations, urethral and bladder injuries, episiotomy leading to anorectal dysfunction, dyspareunia and urinary incontinence. However, data on episiotomy wound infection and dehiscence remains sparse.

The precise incidence rate for childbirth-related perineal wound dehiscence remains unknown. However, there has been little change in the incidence of episiotomy wound dehiscence over the last 3 decades inspite of the introduction of restrictive episiotomy, more institutional deliveries, and better antibiotics. Ramin, Ramus, Little and Gilstrap (1992) reported figures of 0.1 – 0.2%, while a rate of 4.6% in relation to 4th-degree tears was suggested by Goldaber, Wendel KG, McIntire and Wendel GD(1993) whereas Dimitrov, Tsenov and Ganeva (2000) reported a rate of 1.07%. In our study, the incidence of episiotomy wound dehiscence was 2.14%.
The possible contributing factors which may lead to episiotomy wound dehiscence can be antenatal, intrapartum, or post-natal.

Antenatal factors that affect wound healing include poor nutrition, obesity, medical conditions such as diabetes, immunocompromised status, anaemia, hypothyroidism, and smoking. Substantial evidence exists demonstrating that obesity is associated with a number of postoperative complications, including deficient wound healing. In our study, 60% of the women with episiotomy gapes were either pre-obese or obese. Studies have shown that compared to non-obese women, moderately obese women and severely obese women were at 1.6- and 4.45-times risk of caesarean section and episiotomy wound infections respectively (Robinson HE, O ' Connell CM, Joseph KS, McLeod NL, 2005). In the study by Kingsbury B, Rathore S, Chelliah H, Londhe V, et al. (2018) of 14,759 peripartum patients, obesity was found to be a significant risk factor for wound dehiscence. Thus, obesity remains an important factor for episiotomy wound dehiscence. Various medical conditions like anaemia, jaundice, diabetes, hypoalbuminemia, malnutrition is also known to impair wound healing (Spiliotis J, Tsiveriotis K, Datsis AD, Vaxevanidou A, et al., 2009). In our series anaemia (40%), diabetes (23.3%) and hypothyroidism (30%) are seen to be the major maternal co-morbidities seen in cases of wound dehiscence. Kingsbury et al. and Kamel A & Khalid M (2014) in their studies, also cite anaemia as a significant factor contributing to wound dehiscence. A lot of evidence has been gathering about the effect of thyroid hormone on wound healing. Experimental studies done by Natori et al. and clinical studies done by Ekmektzoglu KA, Zografos GC (2006) both show that thyroid hormone is an essential part of wound healing due to its role in the synthesis of hydroxyproline and collagen type- IV. In our study, it is the second most common medical co-morbidity seen in cases of wound dehiscence. No other studies in our knowledge are found showing the co-relation of hypothyroidism as a cause of wound dehiscence. Diabetes is known to cause delayed wound healing by causing slow response of the polymorphonuclear leucocytes and fibroblasts. Although diabetes has been found to be the third most common co-morbidity associated with wound dehiscence in our study, both Kingsbury et al. and Williams MK and Chames MC (2006) did not find a significant correlation between the two. Other maternal co-morbidities seen in our series were pregnancy-induced hypertension, jaundice, and febrile morbidity due to dengue. In 3 cases no co-morbidities were seen in the cases. A few more antenatal factors mentioned by Kamel and Khalid that are not seen and studied in our series are bacterial vaginosis, immunocompromised status, and human papilloma virus infection. Snyder RR, Hammond TL, Hankins GD(1990) in their study of episiotomy dehiscence in the immediate postpartum period, found that human papilloma virus (HPV) infection was associated in up to 30% of patients who had episiotomy breakdown.

Intrapartum factors like pre-term or post-term labour, prolonged rupture of membranes, intrapartum fever, multiple internal examination, operative vaginal delivery, manual removal of placenta and retained products of conception are risk factors for wound dehiscence. In our series, 57% of the patients with wound dehiscence had

their labour induced while only 43% had spontaneous labour as compared to Ganapathy et al., in whose series 30% of the patients were in induced labour (Ganapathy R, Bardis NS, Lamont RF, 2008). The high incidence of dehiscence in our series can be explained due to repeated vaginal examinations, the increased incidence of premature rupture of membranes and inductions done for pre-eclampsia and diabetes. Comparing the mode of delivery, in our series, 63% of the cases had an instrumental delivery showing that instrumentation is an important factor associated with wound dehiscence. Ganapathy et al. and Williams et al. also showed instrumental delivery to be significantly associated with wound dehiscence. Instrumental deliveries predispose the patient to the risk of larger and deeper episiotomies, hematoma formation, and bleeding, all of which are risk factors for dehiscence. Another factor that had a correlation to wound dehiscence was the duration of second stage of labour. Both our study (67% incidence) and study by Williams et al. showed that duration of 2nd stage more than 1 hour is significantly related to increased chances of wound dehiscence. This is probably due to increase in per vaginal examinations (4 vs 1 in the cases where 2nd stage was <1 hour) and the increased risk of instrumentation (69% vs 31%) with increasing duration of 2nd stage.

Although maternal mortality is extremely rare, an infected perineal wound is a potential route for systemic infection, whereby sepsis and septic shock may ensue (Lewis G, 2007). Infection of episiotomy wounds fits into the criteria for Superficial Incisional Surgical Site Infection (Horan TC, Gaynes RP, Martone WJ, Jarvis WR, et al. 1992). Majority of obstetrical skin and soft tissue infections episiotomy infections are polymicrobial and results mainly from contamination with both aerobes, including Gram-negative bacilli, enterococci, group B streptococci, and anaerobes (Hussein J, Walker L, 2010). In our series, 73% of the wound gapes were infected with one or more organisms. The most common organism was Escherichia Coli. Rates of infection-causing perineal wound dehiscence has been quoted to be 40.7% by Williams et al and 61% by Goldaber et al. Postpartum factors that precipitate infections include poor aseptic technique, delayed or omitted prophylactic antibiotics, suboptimal haemostasis, haematoma, practitioner skill, contamination of wound or surgical site and residual dead space following wound closure. There have also been cases reported by Rotas M, McCalla S, Liu C, Minkoff H (2007) where an infected episiotomy wound has led to methicillin-resistant staphylococcus aureus necrotizing pneumonia and maternal death due to postpartum necrotizing fasciitis (Lynch CM, Pinelli DM, Cruse CW, Spellacy WN, 1997).

Most studies done previously highlight the fact that perineal wound dehiscence is related to 3rd and 4th-degree perineal tears. However, excluding the same, we found that even simple episiotomies can get infected or have dehiscence in the presence of antenatal risk factors like anaemia, hypothyroidism, and obesity.

Majority of the perineal wound infections present within one to two weeks of hospital discharge as shown by both Yokoe DS, Christiansen CL, Johnson R, Sands KE, et al. (2001) and Kamel and Khalid. In our series also, 70% of the patients presented within 7-14 days with complaints of either pain (43%), discharge from the wound site (23%) or both (17%) in majority of the cases. Resuturing of the wound was needed in only 40% of the cases. This was mainly seen where the wounds were deep, and all the three layers of the episiotomy had given way. Patients had to stay on an average 11 days either for dressing or for the resuturing to be done.

Conclusion

Episiotomy wound dehiscence though rare and under-reportedd, is a cause of significant postpartum morbidity. Antenatal risk factors like anaemia and obesity, intrapartum factors including type of labour and duration of 2nd stage and need for instrumentation also have significant prognostic value in predicting episiotomy wound dehiscence. It should be remembered that episiotomy wound dehiscence remains one of the main causes of readmission and prolonged hospital stay. Hence, better follow up strategies for these high-risk patients needs to be planned along with revision of the antibiotic policy for those predisposed to having wound gapes. Enhanced vigilance and correction of antenatal risk factors remain key strategies to in the reduction of this post-partum morbidity.

References

Dimitrov A, Tsenov D, Ganeva G . 2000. Causes for healing complications in episiotomy. Akusherstvo i Ginekologiia Journal (Sofi ia) 40: 17 – 20.

Ekmektzoglou KA, Zografos GC. A concomitant review of the effects of diabetes mellitus and hypothyroidism in wound healing. *World J Gastroenterol* 2006; 12(17): 2721-2729.

Fitzpatrick M, O'Herlihy C.Postpartum care of the perineum. The Obstetrician and Gynaecologist.2007; 9:164-170.

Ganapathy R, Bardis NS, Lamont RF. Secondary repair of the perineum following childbirth. J Obstet Gynaecol (Lahore).2008 Jan 2;28(6):608–13. Available from: http://www.tandfonline.com/doi/full/10.1080/01443610802403401

Goldaber KG, Wendel PJ, McIntire DD, Wendel GD. Postpartum perineal morbidity after fourth-degree perineal repair. American Journal of Obstetrics and Gynaecology 168: 489 – 493

Gün İ, Doğan B, Özdamar Ö. Long- and short-term complications of episiotomy. *Turk J Obstet Gynecol*. 2016;13(3):144–148. doi:10.4274/tjod.00087

Horan TC, Gaynes RP, Martone WJ, Jarvis WR, et al. CDC definitions of nosocomial surgical site infections, 1992; A modification of CDC definitions of surgical wound infections. *Infection Control Hosp Epidemiol.* 1992; **13** 606-608.

Hussein J, Walker L. Chapter 8 Puerperal sepsis in low- and middle-income settings: past, present and future. Maternal and Infant Deaths: Chasing Millennium Development Goals 4 & 5. London: RCOG Press, 2010:131–47.

Kamel A, Khalid M. Episiotomy and obstetric perineal wound dehiscence: Beyond soreness. *Journal of Obstetrics and Gynaecology*, 2014; 34: 215–217. DOI: 10.3109/01443615.2013.866080.

Kingsbury B, Rathore S, Chelliah H, Londhe V, Benjamin SJ, Mathews J. Risk Factors for Peripartum Wound Dehiscence. Journal of Diagnostic and Clinical Research 2018, Nov, Vol. No-12(11): QC 08-QC11.

Kumar V, Abbas AK, Aster JC editors. Infammation and repair. Robbins and Cotran Pathologic basis of disease.9th ed. Canada: Elsevier Saunders 2015. pp.106.

Lewis G, ed. 2007. The Confidential Enquiry into Maternal and Child Health (CEMACH). Saving mothers ' lives: reviewing maternal deaths to make motherhood safer: 2003 – 2005. The Seventh Report of Confidential Enquiries into Maternal Deaths in the United Kingdom. London: CEMACH. Tsenov D, Ganeva

Lynch CM, Pinelli DM, Cruse CW, Spellacy WN, et al. Maternal death from postpartum necrotizing fasciitis arising in an episiotomy: a case report. Infect Dis Obstet Gynecol [Internet]. 1997;5(5):341–4. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18476182

Natori J, Shimizu K, Nagahama M, Tanaka S. The influence of hypothyroidism on wound healing. An experimental study. Nihon Ika Daigaku Zasshi. 1999 June;66(3):176–80.

Ob-Gyns Can Prevent and Manage Obstetric Lacerations During Vaginal Delivery. ACOG Practice Bulletin. June 22, 2016. Available from: http://www.acog.org/About-ACOG/News-Room/News-Releases/2016/Ob-Gyns-Can-Prevent-and-Manage-Obstetric-Lacerations.

Puerperal Complications. In Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, et al. editors. Williams Obstetrics.24th ed. United States of America: MC Graw Hill Education 2010. pp.689-690**.**

Ramin SM, Ramus RM, Little BB, Gilstrap LC 3rd. 1992. Early repair of episiotomy dehiscence associated with infection. American Journal of Obstetrics and Gynecology 167: 1104 – 1107.

Reynolds JL, Yudkin PL. Changes in the management of labour: 2. Perineal management. Can Med Assoc J. 1987;136:1045–9.

Robinson HE, O ' Connell CM, Joseph KS, McLeod NL. 2005. Maternal outcomes in pregnancies complicated by obesity. Obstetrics and Gynecology Journal 106: 1357 – 1364

Rotas M, McCalla S, Liu C, Minkoff H. Methicillin-Resistant Staphylococcus aureus Necrotizing Pneumonia Arising From an Infected Episiotomy Site. Obstet Gynecol [Internet]. 2007 Feb;109(Supplement):533–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17267886

Singh S, Thakur T, Chandhiok N, Dhillon BS. Pattern of episiotomy use & its immediate complications among vaginal deliveries in 18 tertiary care hospitals in India. *Indian J Med Res*. 2016;143(4):474–480. doi:10.4103/0971-5916.184304

Snyder RR, Hammond TL, Hankins GD. Human papillomavirus associated with poor healing of episiotomy repairs. Obstetrics and Gynecology Journal 76: 664– 667.

Spiliotis J, Tsiveriotis K, Datsis AD, Vaxevanidou A, et al. Wound dehiscence: is still a problem in the 21th century: a retrospective study. *World J Emerg Surg*. 2009;4:12. Published 2009 Apr 3. doi:10.1186/1749-7922-4-12

WHO recommendation on episiotomy policy, 17 February 2018. Available from: https://extranet.who.int/rhl/topics/preconception-pregnancy-childbirth-and-postpartum-care/care-during-childbirth/care-during-labour-2nd-stage/who-recommendation-episiotomy-policy-0

Williams MK, Chames MC. Risk factors for the breakdown of perineal laceration repair after vaginal delivery.Risk factors for the breakdown of perineal laceration repair after vaginal delivery. Am J Obstet Gynecol. 2006 September;195(3):755–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16949409

Winkler KP, n.d. Factors that interfere with wound healing in animals. Factors that interfere with wound healing in animals. Merck Manual, Veterinary Manual. Available from: https://www.merckvetmanual.com/emergency-medicine-and-critical-care/wound-management/factors-that-interfere-with-wound-healing-in-animals

Yokoe DS, Christiansen CL, Johnson R, et al. Epidemiology of and surveillance for postpartum infections. *Emerg Infect Dis*. 2001;7(5):837–841. doi:10.3201/eid0705.010511

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Doppler Comparison of Resistive Index of Renal Artery in Obstructive and Non Obstructive Kidneys

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Abstract
Background: Renal obstruction evaluation by X-Rays and CT scan is harmful and causes ionization in the body. That's why we find out the Diagnostic Accuracy of Doppler Ultrasound by doing it in our population for the Accurate and Early Detection of RI, especially in Renal obstruction. Objectives: To compare the resistive index of the renal artery in obstructive and non- obstructive kidneys by Doppler ultrasound. Methods: Comparative study design was used for this study. 162 patients are taken as sample size from different hospitals (DHQ Joharabad and Gillani Center, Lahore). The duration of the study was 3 Months after the approval of synopsis. Sampling technique used was Convenient Sampling technique. Date collected with the help of questioner and analyzed by using SPSS 22 mean, standard deviation, frequency distribution, and t-test. Results: The mean score value of the resistive index in non-obstructive kidney group was 0.63 ± 0.02. The minimum score value was 0.60, and the maximum score value was 0.66. In obstructive kidney group, the mean value of the resistive index was 0.77 ± 0.03. The minimum score value was 0.73, and the maximum score value was 0.81. There is a significant difference between these two groups as the p value of the t test statistics is less than the level of significance. Conclusion: It was concluded that calculi obstructive kidney caused prominent changes in the value of the resistivity index as compared to the resistivity index of normal kidney. The effect of obstruction has caused elevation of resistivity index pattern.

Keywords: Intra-Obstructive Kidney, Non-Obstructive Kidney, Resistive Index

Introduction

Doppler ultrasonography has proved to be a useful tool in differentiation of obstructive and non-obstructive kidneys. Severe renal obstruction causes a decrease in blood flow and an increase in resistance (Platt et al. 1989; Kojima et al. 2000). Doppler and conventional ultrasounds are helpful in the diagnosis of kidney obstruction in patients with flank pain (Rodgers, Bates & Irving 1992). With the use of resistive index, the changes in the intra-renal arteries of obstructive kidney patients can be quantified. Resistive Index can be measured as PSV-EDV/PSV ([Peak Systolic Velocity-End Diastolic Velocity]/Peak Systolic Velocity). Doppler ultrasound also provides information about the arterial blood flow and urinary flow in obstructive kidney patients (Azam, Arfan & Beg 2013; Aziz et al. 2005). The mean value of renal artery in hilar region is more (0.6±0.17) when compared with arteries of small distal and in arteries of inter-lobar, the minimum value is (0.54±0.20).

The evaluation of the resistive index in intra-renal arteries is necessary in nephrological problems like renal hypertension and advance renal damage leading to renal failure. The normal value of RI is 0.70, and is used to differentiate the resistive index in the renal artery of obstructive and non-obstructive kidneys (Bloch & Basile 2003). The increase in RI above 0.70 shows obstruction (ed. Strandness 2000).

The pathophysiological changes in the flow of blood in renal obstruction may easily be checked by the Doppler parameters that is called resistive index. The value of RI after obstruction 6 hours increases and its peak retain for 6-48 hours with minimum changes (Ellenbogen et al. 1978). Significant or complete obstruction of urinary tract increase the resistive index that is not formed in non-obstructive dilation hence imaging by Doppler useful in obstructed kidney evaluation of dilated. In addition, intra-renal Doppler Sonography may prove to be a useful non-invasive test to suggest the significance of partial obstruction. Non-obstructive renal disease can also cause elevation of the resistive index (Basturk et al. 2012a). Non-obstructive kidneys have low RI values than obstructive kidneys (Tublin, Bude & Platt 2003).

Urolithiasis is one of the most common disorders of the urinary tract. Kidney stone prevalence is estimated to be 3% in all individuals, and it affects up to 12% of the population during their lifetime. Currently, mortality from stone disease is rare, although there is still a significant rate (28%) of renal deterioration with certain stone types. Renal obstruction due to urolithiasis is the most frequent cause. This disease is prevalent in our country, and 12% of the Pakistani population has urolithiasis (Azam, Arfan & Beg 2013). The choice of therapeutic alternative depends on the factors including calculi dimension and localization, uretheral dynamics, presence of obstruction, and associated urinary infection. When the obstruction is present in the upper urinary tract, it induces modifications in intra-renal blood flow compared to systolic one. The modification is revealed by resistive index determination on duplex Doppler ultrasonography (Shokeir et al. 1996a; Shokeir et al. 1996b).

Doppler ultrasonography is advantageous because it is a non-invasive procedure, and there is no exposure of radiation or iodinated contrast agents. This method is highly specific and sensitive. The sensitivity of Doppler ultrasound is round about 90% (Basturk et al. 2012b; Bellos, Perrea & Kontzoglou 2019; Beloncle et al. 2019). The rationale of the study is to study the accuracy of renal Doppler ultrasonography in our population. If we find high accuracy of ultrasound in the future, then we can measure the resistive index of obstructive renal diseases, especially in those areas where CT scan and x-rays are not available.

Methods

The design of our study was comparative and conducted at DHQ Joharabad and Gillani Center, Lahore. By convenient sampling technique, the required information was collected. The total sample size of our study was 162. The inclusion criteria for patients of our study were patients with renal stones, ureteric stricture, ureteric stone, UVJ obstruction, and hydronephrosis. Similarly, the exclusion criteria for patients of our study were as patients having renal cysts, renal cell carcinoma, and pregnant female.

The ultrasound machines of Toshiba Xario 100 with Convex transducer with a 3-5 MHz frequency was used. All ethical considerations for this study were fulfilled according to needs. Data collected on a sheet of data collection after informed by a written consent form. According to gender, age variables data was collected. History/complaints/clinical diagnosis was taken from the participants. All variables were asked directly from individuals. Data were analyzed by using SPSS, and data also tabulated. Descriptive statistics were calculated for data. For quantitative data, the mean and standard deviation was used for qualitative variables frequency distribution was used to describe data.

Results

The main objective of our study was to compare the RI (resistive index) value of renal artery in non-obstructive and obstructive kidney with Doppler ultrasound. This study was conducted to evaluate the significance of Doppler ultrasound for patients which have not the facility of CT scan and which avoid the rays. In obstructive kidneys group, the mean age of the patients was 41.42 ± 11.85 years. The minimum age value was in obstructive

kidney group was 20, and the maximum age value was 60 years. Similarly, in non-obstructive kidney group, the mean values of age were 39.10 ± 12.06 years. The minimum age value was in non-obstructive kidney group was 20, and the maximum age value was 60 years. Age is an important variable for any study, especially related to medical studies.

In obstructive kidneys group, the mean value of the patients for history was 4.86 ± 1.85 years. The minimum value for history in obstructive kidney group was 2, and the maximum value was 8 years. Similarly, in non-obstructive kidney group, the mean value of history was 4.85 ± 4.85. The minimum history value was in non-obstructive kidney group was 2, and the maximum history value was 8 years. History is an important variable for any study specially related to medical studies.

Group-wise distribution of gender results was as in obstructive kidneys group the 43 (53.1 %) were male, and 38 (46.9 %) were female. In non-obstructive kidney group, the 33 (40.7 %) were male, and 48 (59.3 %) were female. There is a random distribution of gender in both the group. In response to complaints, there are different results in both the group. In obstructive kidney group 19 (13.5 %) have flank pain, 16 (19.8 %) have lower abdominal pain, 20 (24.7 %) have hematuria, 12 (17.3 %) have vomiting when pain and 14 (17.3 %) have renal colic.

In non-obstructive kidney group 17 (21.0 %) have flank pain, 14 (17.3 %) have lower abdominal pain, 11 (13.6 %) have hematuria, 20 (24.7 %) have vomiting when pain and 19 (23.5 %) have renal colic. Every patient has its own complaint. The mean score value of the resistive index in non-obstructive kidney group was 0.63 ± 0.02. The minimum score value was 0.60, and the maximum score value was 0.66. In obstructive kidney group, the mean value of the resistive index was 0.77 ± 0.03. The minimum score value was 0.73, and the maximum score value was 0.81. There is a significant difference between these two groups as the p value of the t test statistics is less than the level of significance.

Table 1: Group-wise descriptive statistics of age, history, and RI

	Group	**N**	**Mean**	**SD**	**Min**	**Max**
Age	Obstructive Kidneys	81	41.42	11.85	20	60
	Non-obstructive Kidneys	81	39.1	12.06	20	60
History	Obstructive Kidneys	81	4.86	1.85	2	8
	Non-obstructive Kidneys	81	4.85	1.98	2	8
RI (Resistive Index)	Obstructive Kidneys	81	0.63	0.02	0.6	0.66
	Non-obstructive Kidneys	81	0.77	0.03	0.73	0.81

Table 2: Group-wise distribution of Gender and complaints

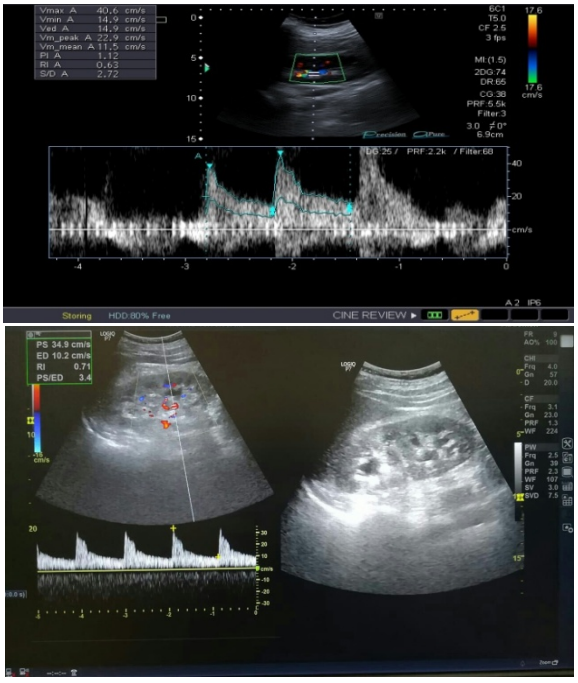
		Obstructive Kidneys	**Non-obstructive kidneys**
Gender	**Male**	43 (53.10 %)	33 (40.70 %)
	Female	38 (46.90 %)	48 (59.30 %)
Complaints	**Flank Pain**	19 (23.50 %)	17 (21.00 %)
	Lower abdominal pain	16 (19.80 %)	14 (17.30 %)
	Hematuria	20 (24.70 %)	11 (13.60 %)
	Vomiting when pain	12 (14.80 %)	20 (24.70 %)
	Renal colic	14 (17.30 %)	19 (23.50 %)

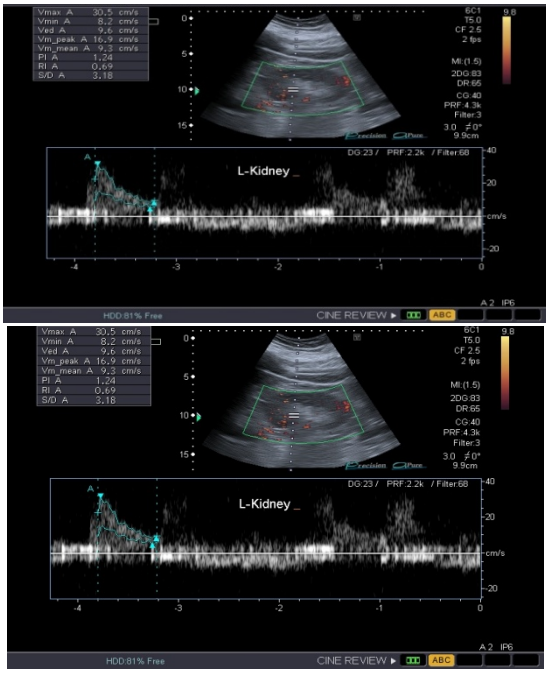
Table 3: Descriptive group-wise statistics of RI (resistive index) and t-test results

	Groups	n	Mean	SD	Min	Max	t -test	p-value
RI (Resistive Index)	**Non Obstructive Kidneys**	81	0.63	0.02	0.6	0.66	-36.66	0.000
	Obstructive kidneys	81	0.77	0.03	0.73	0.81		

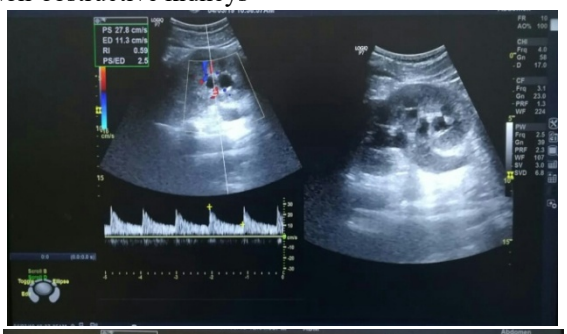
Figures: Obstructive and non-obstructive kidneys

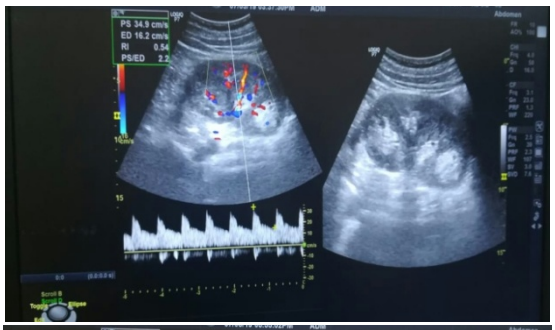
Obstructive kidneys





Non-obstructive kidneys





Discussion

In obstructive kidneys group, the mean age of the patients was 41.42 ± 11.85 years. Similarly, in non-obstructive kidney group, the mean values of age were 39.10 ± 12.06 years. These findings were matched with the studies (Conti et al. 2015; Dewitte et al. 2012). Group wise distribution of gender results was as in obstructive kidneys group the 43 (53.1 %) were male, and 38 (46.9 %) were female. In non-obstructive kidney group, the 33 (40.7 %) were male, and 48 (59.3 %) were female. In response to complaints, there are different results in both the group. Every patient has its own complaint.

The mean score value of the resistive index in non-obstructive kidney group was 0.63 ± 0.02. In obstructive kidney group, the mean value of the resistive index was 0.77 ± 0.03. These findings were like other studies (Basturk et al. 2012b; Kim et al. 2004; Nekouei et al. 2012; Bisi et al. 2017).

The role of renal arterial Doppler USG in the evaluation of acute renal obstruction is vigorously debated. A study showed an elevated RI in acutely obstructive kidneys, when compared with the RI in normal contralateral kidneys of the same patients. They also found similar results when acutely obstructive kidneys were compared with healthy subjects as control groups (Gurel et al. 2006).

Doppler ultrasonography considered as a gold standard modality for measurement of the resistive index in patients of obstructive and non-obstructive renal diseases. Few Studies have assessed the benefits of ultrasonography to measure R.I in obstructive kidneys. A study was conducted on the role of Diagnostic value of renal resistive index for the assessment of renal colic (Krumme & Hollenbeck 2007). Renal Doppler Ultrasonography performed on 70 patients. Group I comprised of 43 patients with unilateral ureteric obstruction due to stone, group II was comprised of 7 patients having flank pain, but no obstruction and group III was comprised of 20 healthy individuals with two normal kidneys.

Resistive Index was calculated using color Doppler ultrasound. RI was found to be 0.71±0.7 for group I, 0.69±0.06 for group II, and 0.62±0.03 for group III. So the RI of group I was higher than group II and III. No significant differences were noted with respect to age and gender.

This study shows that the measure of resistive index is useful for early identification of renal patients particularly for those who must avoid radiation and contrast (Kavakli, Koktener & Yilmaz 2011). A study was conducted on the role of Renal Arterial Resistive Index (RI) in obstructive uropathy. This study elaborates that Doppler is a non-invasive procedure and provides accurate results for the diagnosis of obstructive uropathy, the pressure on the renal calyces increases with the change in renal blood flow resulting in RI>0.7 (Kirkpantur et al. 2008).

160 patients were studied, among them, 103 were males, and 57 were females, 64 males and 37 females were identified as calculus obstructive RI>0.7 was observed in 84 patients. Out of them, 77 showed obstruction on CT KUB, but 7 didn't show obstruction on CT KUB RI<0.7 was observed in 76 patients, out of them 24 patient showed obstruction on CT KUB and 52 patients gave normal findings on CT KUB (Azam, Arfan & Beg 2013).

A study was conducted on Mean resistive index as a prognostic tool for hydronephrosis in patients with acute renal colic: a study in a tertiary care (Lerolle et al. 2006). They studied 84 patients who were admitted in the Emergency department of hospital due to unilateral renal colic. Some patients were presented with nausea and vomiting. Bladder ultrasound was performed along with color Doppler to measure the resistive index. There were 41 cases of hydronephrosis in total, and all of them were positive for mean resistive index value. Thus the specificity of the mean resistive index with color Doppler was 90%.

Around 95% of prediction was accurate with increased resistive index. They concluded that mean a resistive index is a good tool for the diagnosis of hydronephrosis (Ravindernath & Reddy 2017). There is a significant difference in RI (resistive index) of the renal artery in obstructive and non-obstructive kidneys. The results showed a difference in RI of both groups of kidneys. There are less researchers in literature on RI of renal artery and RAS, and these have positive effects on patient's treatment. These findings related with the findings of

(Guinot et al. 2013) that find RI is the main source of differentiate in normal and pathological resistance in flow. The results also proved that obstruction caused an increase in RI of renal artery and provided a reliable value to differentiate normal and pathological resistance to flow. There is significant difference between these two groups as the p value of the t test statistics is less than level of significance.

Conclusion

Doppler ultrasonography is advantageous because it is a non-invasive procedure and there is no exposure of radiation or iodinated contrast agents. This method is highly specific and sensitive. The sensitivity of Doppler ultrasound is round about 90 %.It was concluded that calculi obstructive kidney caused prominent changes in the value of resistivity index as compared to the resistivity index of normal kidney. The effect of obstruction has caused elevation of resistivity index pattern.

References

Azam, A, Arfan, H & Beg, MA 2013. 'Role of renal arterial resistive index (RI) in obstructive uropathy', J Pak Med Assoc, vol. 63, no. 12, pp. 1511-5.

Aziz, ZA, Satchithananda, K, Khan, M & Sidhu, PS 2005. 'High-frequency color Doppler ultrasonography of the spermatic cord arteries: resistive index variation in a cohort of 51 healthy men', J Ultrasound Med, vol. 24, no. 7, pp. 905-9.

Basturk, T, Akcay, M, Albayrak, R, Unsal, A, Ulas, T & Koc, Y 2012a. 'Correlation between the resistive index values of renal and orbital arteries', Kidney Blood Press Res, vol. 35, no. 5, pp. 332-9.

Basturk T, Albayrak R, Ulas T, Akcay M, Unsal A, Toksoy M, et al. 2012b. 'Evaluation of resistive index by color Doppler imaging of orbital arteries in type II diabetes mellitus patients with microalbuminuria', Ren Fail, vol. 34, no. 6 pp. 708-12.

Bellos I, Perrea DN, Kontzoglou K. 2019. 'Renal resistive index as a predictive factor of delayed graft function: a meta-analysis', Transplant Rev (Orlando), vol. 33, no. 3, pp. 145-53.

Beloncle F, Rousseau N, Hamel JF, Donzeau A, Foucher AL, Custaud MA, et al. 2019. 'Determinants of Doppler-based renal resistive index in patients with septic shock: impact of hemodynamic parameters, acute kidney injury and predisposing factors', Ann Intensive Care, vol. 9, no. 1, pp. 51.

Bisi MC, do Prado AD, Piovesan DM, Bredemeier M, da Silveira IG, de Mendonca JA, et al. 2017. 'Ultrasound resistive index, power Doppler, and clinical parameters in established rheumatoid arthritis', Clin Rheumatol, vol. 36, no. 4, pp. 947-51.

Bloch MJ, Basile J. 2003. 'The diagnosis and management of renovascular disease: a primary care perspective: part I. making the diagnosis', J Clin Hypertens, vol. 5, no. 3, pp. 210-8.

Conti F, Ceccarelli F, Gigante A, Perricone C, Barbano B, Massaro L, et al. 2015. 'Ultrasonographic evaluation of resistive index and renal artery stenosis in patients with anti-phospholipid syndrome: two distinct mechanisms?', Ultrasound Med Biol, vol. 41, no. 7, pp. 1814-20.

Dewitte A, Coquin J, Meyssignac B, Joannes-Boyau O, Fleureau C, Roze H, et al. 2012. 'Doppler resistive index to reflect regulation of renal vascular tone during sepsis and acute kidney injury', Crit Care, vol. 16, no. 5, pp. 165.

Ellenbogen H, Scheible FW, Talner L, Leopold GR. 1978. 'Sensitivity of gray scale ultrasound in detecting urinary tract obstruction', Am J Roentgenol, vol. 130, no. 4, pp. 731-3.

Guinot PG, Bernard E, Abou Arab O, Badoux L, Diouf M, Zogheib E, et al. 2013. 'Doppler-based renal resistive index can assess progression of acute kidney injury in patients undergoing cardiac surgery', J Cardiothorac Vasc Anesth, vol. 27, no. 5, pp. 890-6.

Gurel S, Akata D, Gurel K, Ozmen MN, Akhan O. 2006. 'Correlation between the renal resistive index (RI) and nonenhanced computed tomography in acute renal colic: how reliable is the RI in distinguishing obstruction?', J Ultrasound Med, vol. 25. No. 9, pp. 1113-20.

Kavakli H, Koktener A, Yilmaz A. 2011. 'Diagnostic value of renal resistive index for the assessment of renal colic', Singapore Med J, vol. 52, no. 4, pp. 271-3.

Kim WS, Han TI, Kim SH, Park M, Kim IO, Yeon KM. 2004. 'Renal Doppler ultrasound examination of ureteral obstruction in rabbits: effects of different sites and degrees of obstruction on renal resistive index', Invest Radiol, vol. 39, no. 9, pp. 531-6.

Kirkpantur A, Yilmaz R, Baydar DE, Aki T, Cil B, Arici M, et al. 2008. 'Utility of the Doppler ultrasound parameter, resistive index, in renal transplant histopathology', Transplant Proc, vol. 40, no. 1, pp. 104-6.

Kojima M, Ochiai A, Naya Y, Okihara K, Ukimura O, Miki T. 2000. 'Doppler resistive index in benign prostatic hyperplasia: correlation with ultrasonic appearance of the prostate and infravesical obstruction', Eur Urol, vol. 37, no. 4, pp. 436-42.

Krumme B, Hollenbeck M. 2007. 'Doppler sonography in renal artery stenosis--does the Resistive Index predict the success of intervention?' Nephrol Dial Transplant, vol. 22, no. 3, pp. 692-6.

Lerolle N, Guerot E, Faisy C, Bornstain C, Diehl JL, Fagon JY. 2006. 'Renal failure in septic shock: predictive value of Doppler-based renal arterial resistive index', Intensive Care Med, vol. 32, no. 10, pp. 1553-9.

Nekouei S, Ahmadnia H, Abedi M, Alamolhodaee MH, Abedi MS. 2012. 'Resistive index of the remaining kidney in allograft kidney donors', Exp Clin Transplant, vol. 10, no. 5, pp. 454-7.

Platt J, Rubin JM, Ellis JH. 1989. 'Distinction between obstructive and non-obstructive pyelocaliectasis with duplex Doppler sonography', Am J Roentgenol, vol. 153, no. 5, pp. 997-1000.

Ravindernath M, Reddy GM. 2017. 'Mean resistive index as a prognostic tool for hydronephrosis in patients with acute renal colic: a study in a tertiary care', Int J Adv Med, vol. 4, no. 2, pp. 329-33.

Rodgers P, Bates J, Irving H. 1992. 'Intrarenal Doppler ultrasound studies in normal and acutely obstructed kidneys', Br J Radiol, vol. 65, no. 771, pp. 207-12.

Shokeir AA, Provoost AP, El-Azab M, Dawaba M, Nijman RJ. 1996a. 'Renal doppler ultrasound in children with normal upper urinary tracts: effect of fasting, hydration with normal saline, and furosemide administration', Urology, vol. 47, no. 5, pp. 740-4.

Shokeir AA, Provoost AP, El-Azab M, Dawaba M, Nijman RJ. 1996b. 'Renal Doppler ultrasound in children with obstructive uropathy: effect of intravenous normal saline fluid load and furosemide', J Urol, vol. 156, no. 4, pp. 1455-8.

Strandness D (ed.) 2000, Doppler and ultrasound methods for diagnosis. Seminars in Nephrology.

Tublin ME, Bude RO, Platt JF. 2003. 'The resistive index in renal Doppler sonography: where do we stand?', Am J Roentgenol, vol. 180, no. 4, pp.885-92.

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Sonographic Comparison of Estimated Fetal Weight (EFW) in Diabetic and Non-Diabetic Mothers During 3rd Trimester

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Abstract
Background: Diabetes during pregnancy is very common that increase the complications in pregnancy. This study aimed to compare the EFW in Daibetic and non-diabtic mothers. during 3rd trimester. Objective: To compare sonographically the Estimated fetal weight (EFW) in diabetic and non-diabetic mothers during 3rd trimester. Methods: The study will be conducted in 35 diabetic and 35 non diabetic mothers during 3rd Trimester. To assess EFW the BPD, AC, and FL will be recorded on USG. In Diabetic mothers, the diabetes will be confirmed by Gluccometer. Results: The group statistics showed that mean estimated fetal weight among offsprings of 35 diabetic and 35 non-diabetic mothers were 2.3 and 2.0, respectively. The calculated fetal weight estimation among fetuses was as low as 1042g and as high as 4090g. Mean difference of estimated fetal weight in Diabetic & Non-Diabetic pregnant women that calculated as 2085.8285 for non-diabetic and 2334.5142 for diabetic mothers. Conclusions: It is concluded that there were no such prominent differences among the Estimated fetal weight in diabetic and non-diabetic mothers.

Keywords: Estimated Fetal Weight, Biparietal Diameter, Abdominal Circumference, Femur Length, Macrosomia

Introduction

Diabetes is a disease that is associated with the increased amount of sugar in plasma, also called as hyperglycemia (Asmat, 2016). It is caused by defects in insulin discharge, insulin accomplishment, or both. The causes may be environmental, genetic, and some chemicals and drugs that destroy pancreatic cells (Herold, 2002). Type 1 DM is one of the endocrine and metabolic conditions occurring in childhood. This disorder is caused by the harm to the pancreas that leaves it, delivering either next to no insulin or none by any means (Alper, 2019). Type II diabetes otherwise called non-insulin subordinate diabetes mellitus, is commonly well-known type of diabetes (accounting for more than 90% of all cases), it is not quite the same as type I diabetes mellitus as insulin is produced by the pancreas yet the body's cells step by step lose the capacity to retain and utilize the insulin (DeFronzo, 2015). However Gestational diabetes mellitus (GDM) is low sugar level that happens during pregnancy and ordinarily vanishes after the deliveries. It can happen in any phase of pregnancy however, it is progressively regular in the second trimester (Ural, 2008). A mother with glucose intolerance is linked with an expanded danger of by birth anomalies, neonatal malformations, and even fetal death (Evers, 2004). Diabetes during pregnancy is very common that increase the complications in pregnancy. The large gestational age percentage (LGA) was 50% in women with T1DM and 23% in women with T2DM (Kristensen,

2017). The standard laboratory methods used to diagnose the Diabetes mellitus in pregnancy is the plasma glucose level test. The diagnosis includes BSR (blood sugar random), Glycated hemoglobin test (A1C) that measures the percentage of blood glucose, which is attached to the hemoglobin (Michels, 2014). When the finding of diabetes is set up in a pregnant lady, continues screening for glucose intolerance and diabetic inconveniences are shown for the rest of the pregnancy (Ballas, 2012). Different imaging systems can be utilized to identify the different appearances and the subsequent inconveniences happening over the span of disease (Rastogi, 2016). However, the modality of choice for the examination of fetal weight estimation in glucose intolerance mothers and in non-diabetic pregnancies is ultrasound. It is a non-invasive screening test that sonographers may use to identify physical abnormalities in pregnancy with good accuracy (Appleton, 2005). Biperietal diameter, abdominal circumference of a neonate, and femur length measurement is best diagnosed on ultrasonography (Langer, 005). The estimation of the infant's weight by ultrasound is routinely used in clinical practice (Zhang, 018). Fetal weight is assessed by taking a combination of estimations that are altogether identified with three anatomical locales, the fetal head, the stomach area, and femur length (Schild, 2000). Both BPD and abdominal circumference are measured in axial plane however, the measurement of femur length is taken longitudinally. EFW can be utilized before incubation to screen fetal development, fetal sexual orientation, and ethnicity. It is a basic and clear marker of worldwide development that is anything but difficult to use for specialists and straightforward for patients, too (Salomon, 2007). Although the pregnant mothers that are associated with diabetes mellitus are at considerably high danger of producing lots of adverse maternal and fetal results, their babies are at elevated danger of early birth with low birth weight (Lin, 2017). The high glucose level in the mother puts extra fat in the baby, causing the fetus to grow larger than average. The estimated fetal weight of diabetic mothers is higher as compared to non-diabetic mothers (Katrien, 2010). This can cause large gestational age (LGA) or macrosomia and impaired glucose tolerance in infants (Feldman, 2016). The role of the US in pregnancy complicated by DM in the estimation of fetal weight, diagnosis of congenital malformation, and monitoring diabetic pregnant patients (Dudenhausen, 2015). By using low-cost technology, the neonatal morbidity rates and other maternal, as well as fetal complications, can be reduced. The benefits of this study should be weighed against the potential for expanded the amount of Cesarean deliveries and higher health care costs (Killestein, 2002).

Methods

It was a comparative cross-sectional study carried out in the Department of Radiology, Lady Willingdon Hospital Lahore, and University Ultrasound clinic Lahore. The expected duration of the study is from May 2019 to July 2019.The study was conducted on 35 diabetics and 35 non-diabetic mothers during 3rd Trimester. Both USG and Blood Sugar Random (BSR) were performed. Doppler Ultrasound machine Vision equipped with 3.5-5 MHZ curve linear multi-frequency transducer was used to scan fetus using a transabdominal approach with the subject lying in the supine position. To assess the EFW, Fetal Biparietal Diameter, Abdominal Circumference, and Femur Length were recorded on USG. In Diabetic mothers, diabetes was confirmed by using Gluccometer. The collected data was stored in EXCEL, predesigned data collection sheets, and SPSS software were used to apply relevant tests for statistical analysis. As the research follows scientific method, related information was taken from the recent articles, and the references were given in the chapter of references.

Results

In our research, data of 35 diabetics and 35 non-diabetic mothers were recorded. Women entered for ultrasound examination were minimum 20 years and maximum of 41 years old with the mean of 30.

The group statistics showed that mean estimated fetal weight among offsprings of 35 diabetics and 35 non-diabetic mothers were 2.3 and 2.0, respectively. It means their mean difference was very little or maybe neglectable. Table I.

Table 1: Mean Differences among EFW of diabetic and non-diabetics.

Group Statistics

EFW	N	Mean	Std. Deviation	Std. Error Mean
Diabetic	35	2.3345E3	723.04537	122.21697
non-diabetic	35	2.0858E3	683.82069	115.58679

According to the T-test for Equality of Means, the mean differences (248.68) and standard error differences (168.21) of EFW were same in assumed and not assumed equal variance. Table II.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
EFW	Equal variances assumed	.003	.958	1.478	68	.144	248.68571	168.21800	-86.98808	584.35951
	Equal variances not assumed			1.478	67.790	.144	248.68571	168.21800	-87.00695	584.37838

Among 35 diabetic and 35 patients with absence of diabetes, 22 females had maximum parity of 2 while 13 females were nulliparous. Table III, IV.

Table 3: Frequency table of diabetes and non-diabetes

	Frequency	Percent
Absent	35	50.0
Present	35	50.0
Total	70	100.0

The percentage of hypertensive females (22) in our study was 31.4 .while percentages of majorities of mothers (48) with normal blood pressure was 68.6. Total 41 mothers (58.6%) claimed with a positive family history of diabetes mellitus. Out of 70 females, 29 mothers (41.4%) had a family history with DM.Table V, VI.

The data showed that 33 pregnancies (47.1%) had not gone for abortion or miscarriage, whereas in 37 pregnancies miscarriage percentage was 52.9%. Among the sample size, the frequency of smokers was very low, 8.6% .most of the mothers were nonsmokers 91.4%. Table 9 represents the multiple comparisons of descriptive statistics of age, so the females came for ultrasound examination were minimum 20 years and maximum 41 years old with the mean of 29.5 (round of 30). Table VII, VIII, and IX.

Mean gestational age recorded in total sample size was 33.88; the multiple comparisons of descriptive statistics had minimum 28weeks and maximum of 41 weeks of gestational age. The calculated fetal weight estimation among fetuses was as low as 1042g and as high as 4090g. Mean estimated fetal weight recorded as 2.2. Table X, XI.

Table 11:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
EFW	70	1042.00	4090.00	2.21023	709.72603

The measurements of femur length for fetal weight estimation had examined the mean value as 63.93mm. Descriptive statistics for mean FL for both minimum and maximum measured 50.60mm and 81.60mm, respectively that are shown in Table XII.

The minimum abdominal circumference in total females recorded as 223.10mm while the maximum AC value was 363.70mm. The average abdominal circumference measurement in 70 mothers was 290.63mm. Descriptive statistics for AC is shown in Table XIII.

Biparietal diameter had to mean examined as 82.70mm, whereas 66.20mm and 96.40mm were calculated as a minimum and maximum BPD measurements, respectively. Among 70 pregnant ladies, the number of parity varied from 0 to 5 and the mean recorded as 1.8(round of 2). Table XIV, XV.

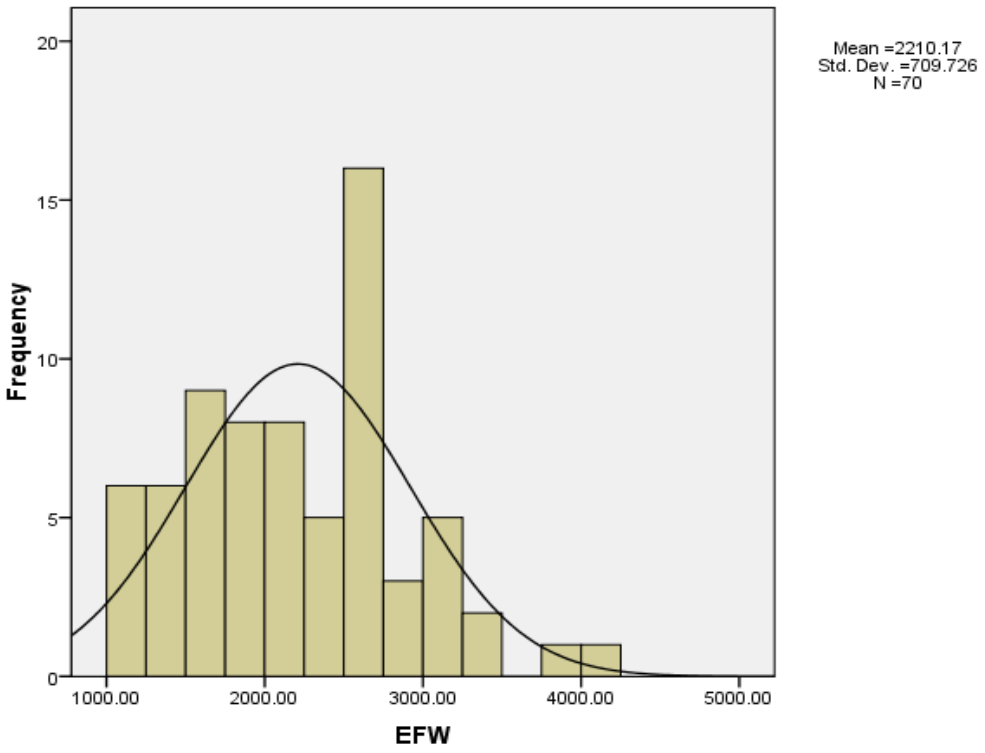
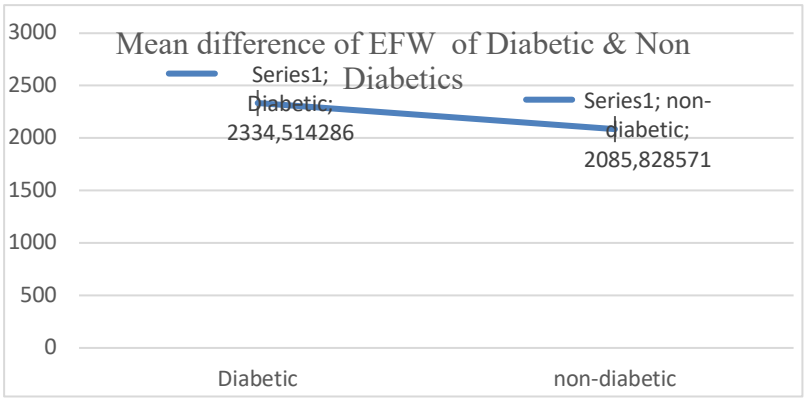


Figure 13 shows the mean difference of estimated fetal weight in Diabetic & Non-Diabetic pregnant women that calculated as 2085.8285 for non-diabetic and 2334.5142 for diabetic mothers.



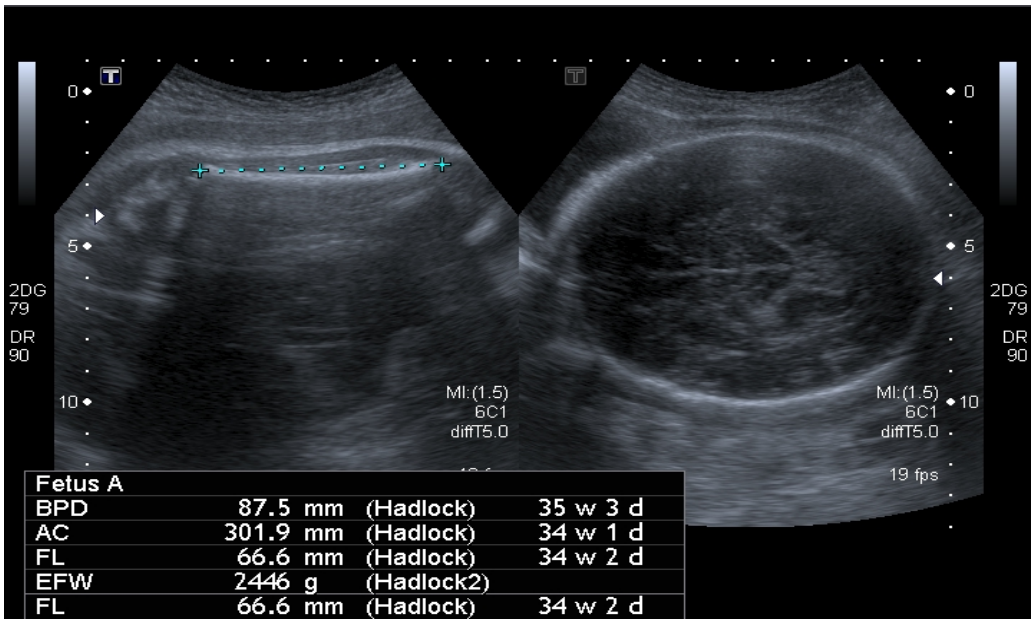


Image 1 shows normal fetal measurements in non-diabetic mother with EFW 2466g in 34w2d of GA.

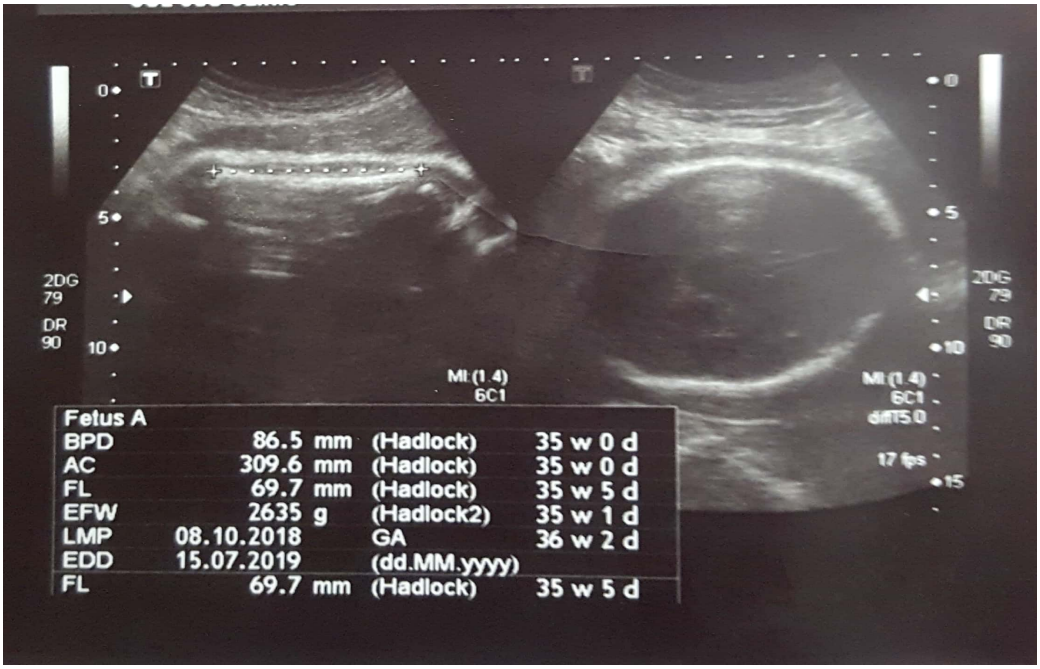


Image 2 shows fetal measurements in Diabetic mother with EFW 2635g in 35w0d of GA.

Discussion

It was a cross-sectional comparative study on the topic of the sonographic comparison of estimated fetal weight (EFW) in diabetic and non-diabetic mothers during 3rd trimester. It was performed on Lahore population in 2019. The main purpose of this research work was to compare fetal weight estimation (EFW) in diabetic and non-diabetic mothers in last trimester using ultrasound methodology. Ultrasound technique is used to detect the estimated fetal weight, which is recorded by combining the measurements of BPD, AC, and FL during 3rd trimester. We examined fetal weights estimation of 35 diabetics and 35 non-diabetic mothers in the radiology department of Lady Willingdon Hospital Lahore. Women entered for ultrasound examination were minimum 20 years and maximum of 41 years old with the mean of 30.

According to the previous researches, the estimated fetal weight is seemed to be higher in diabetic mother's neonates than in non-diabetics. A study was done in Saudi Arabia in 2012 on fetal outcome in diabetics and non-diabetics pregnancies. They examined 314 diabetic ladies; 86 gave birth to macrosomic babies who weigh more than 4000g, and these babies later in life got the glucose intolerance. Their study concluded that maternal diabetes is the main cause for macrosomic infants and other adverse fetal outcomes as well (Nadir, 2012).

The other study data was investigated in 2018 on precision of estimated fetal weight (EFW) using ultrasound examination in assumed macrosomic infants. Sum of five hundred and two ladies were analyzed, out of these three hundred and one mothers had a fetal weight estimation between 4000–4249 g, one hundred and thirty-five patients had an estimated fetal weight between 4250–4499 g, while forty-five had a fetal weight between 4500–4749 g and twenty-one mothers sonographic EFW were above 4750 g. In each estimated fetal weight gathering, the danger of increased birth weight was more prominent as compared to 50% (Zafman, 2018).

Another of study was conducted on the topic of fetal weight at birth, and Parental body mass index estimates the increased fetal weight in newborns of GDM Mothers that was investigated in (2005). The technique involves the obstetrical ultrasound. Their goal was to explore the development of youngsters from pregnancies with diabetes mellitus at gestation. Sixty-nine percent of offspring of guardians with an index of body mass was either high or equal to 30 kilograms per meter square had increased weight. Through this study, they concluded that females with gestational diabetes mellitus had newborns with increased weight than normal, and they were related with intrauterine progression and obesity of mother or father as well (Schaefer-Graf, 2005).

Another multicentre study was performed on the topic of The role of gestational diabetes, pre-pregnancy body mass index and gestational weight gain on the risk of newborn macrosomia, and this was done in 2014. The objective of the study was to investigate the independent role of pre-pregnancy BMI, Gestational weight gain, and gestational diabetes mellitus on the risk of macrosomia. It is already known that both obesity and gestational diabetes mellitus are major risk factors for unwanted maternal and fetal outcome, these factors increased the occurrence of Large Gestational Age fetuses and macrosomia (defined as baby's birth weight over 4000 g). The sample included 14109 mothers with complete records Relationship between presentation factors, and infant macrosomia were examined. Maternal excessive fat, gestational obesity, and gestational diabetes mellitus resulted to be independent indicators of macrosomia. The study concluded that the findings indicated that maternal obesity, gestational weight increase, and diabetes should be considered as independent risk factors for newborn macrosomia. To satisfactorily assess the clinical development of pregnancy, all three factors should need to be carefully monitored and observed (Alberico, 2014).

In contrast, our analyzed data showed different results, offspring of mothers having glucose intolerance and offspring of normal mothers had the calculated fetal weight estimation was as low as 1042g and as high as 4090g. Mean estimated fetal weight recorded as 2.2. There were no such prominent differences among newborn's average EFW.

Conclusion

It is concluded that there were no such prominent differences among the average estimated fetal weight in diabetic and non-diabetic mothers. Their offspring showed the same mean estimated fetal weight.

References

Asmat, U, Abad, K. and Ismail, K. Diabetes mellitus and oxidative stress—a concise review. Saudi Pharmaceutical Journal. 2016.1;24(5):547-53.

Herold, K.C., Hagopian, W., Auger, J.A., Poumian-Ruiz, E., Taylor, L., Donaldson, D., Gitelman, S.E., Harlan, D.M., Xu, D., Zivin, R.A. and Bluestone, J.A. Anti-CD3 monoclonal antibody in new-onset type 1 diabetes mellitus. New England Journal of Medicine. 2002.*346*(22):1692-1698.

Alper, C.A., Larsen, C.E., Trautwein, M.R. and Alford, D.R. A stochastic epigenetic Mendelian oligogenic disease model for type 1 diabetes. Journal of autoimmunity. 2019;*96*:123-133.

DeFronzo, R.A., Ferrannini, E., Groop, L., Henry, R.R., Herman, W.H., Holst, J.J., Hu, F.B., Kahn, C.R., Raz, I., Shulman, G.I. and Simonson, D.C. Type 2 diabetes mellitus. Nature reviews Disease primers. 2015.1;15019.

Ural, S.H. and Nagey, D.A. Diabetes Mellitus and Pregnancy. Topics in Obstetrics & Gynecology.2008;18(1):1-4.

Evers, I.M., de Valk, H.W. and Visser, G.H. Risk of complications of pregnancy in women with type 1 diabetes: nationwide prospective study in the Netherlands. Bmj. 2004. *32*8(7445):915.

Ladfors, L., Shaat, N., Wiberg, N., Katasarou, A., Berntorp, K. and Kristensen, K. Fetal overgrowth in women with type 1 and type 2 diabetes mellitus. PloS one. 2017.9;12(11):e0187917.

Atkinson, M.A., Eisenbarth, G.S. and Michels, A.W. Type 1 diabetes. The Lancet. 2014.38;3(9911):69-82.

Ballas, J., Moore, T.R. and Ramos, G.A. Management of diabetes in pregnancy. Current diabetes reports .2012.1*2*(1):33-42.

Rastogi, R. and Jain, S.K. Imaging in Diabetes Mellitus. Archives of Clinical Nephrology. 2016. I;2:028-036.

Appleton, K., Barnard, J., Jantz, A.K., Pooh, R., Comas-Gabriel, C. and Kupesic-Plavsic, S., The Role of Ultrasound in the Diagnosis of Complications Associated with Maternal Diabetes.

Langer, O. Ultrasound biometry evolves in the management of diabetes in pregnancy. Ultrasound in Obstetrics and Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynecology. 2005.*26*(6):585-595.

Zhang, X.D., Gao, J.M., Luo, J.M. and Zhao, Y. Pulmonary alveolar microlithiasis: A case report and review of the literature. Experimental and therapeutic medicine. 2018.15(1):831-837.

Schild, R.L., Fimmers, R. and Hansmann, M. Fetal weight estimation by three-dimensional ultrasound. Ultrasound in Obstetrics and Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynecology. 2000.16(5):445-452.

Salomon, L.J., Bernard, J.P. and Ville, Y. Estimation of fetal weight: reference range at 20–36 weeks' gestation and comparison with actual birth-weight reference range. Ultrasound in Obstetrics and Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynecology. 2007.29(5):550-555.

Lin, S.F., Kuo, C.F., Chiou, M.J. and Chang, S.H. Maternal and fetal outcomes of pregnant women with type 1 diabetes, a national population study. Oncotarget. 2017.8(46):80679.

Yves, J., Valerie, V., Katrien, V.H. and Guy, M. Birth weight in type 1 diabetic pregnancy. Obstetrics and gynecology international, 2010.

Feldman, A.Z. and Brown, F.M. Management of type 1 diabetes in pregnancy. Current diabetes reports. 2016.16(8):76.

Ahmed, B., Abushama, M., Khraisheh, M. and Dudenhausen, J. Role of ultrasound in the management of diabetes in pregnancy. The Journal of Maternal-Fetal & Neonatal Medicine. 2015.28(15):1856-1863.

Killestein, J. Anti-CD3 monoclonal antibody in new-onset type 1 diabetes mellitus. The New England journal of medicine. 2002. 347(14):1116.

Nadir, S., Jamil, S. and Hamid, M. The prevalence of macrosomia in newborns and its association with maternal diabetes. Journal Of Medical Sciences. 2015.23(1):3-6.

Alberico, S., Montico, M., Barresi, V., Monasta, L., Businelli, C., Soini, V., Erenbourg, A., Ronfani, L. and Maso, G. The role of gestational diabetes, pre-pregnancy body mass index and gestational weight gain on the risk of newborn macrosomia: results from a prospective multicentre study. BMC pregnancy and childbirth. 2014.14(1):23.

Zafman, K.B., Bergh, E. and Fox, N.S. Accuracy of sonographic estimated fetal weight in suspected macrosomia: the likelihood of overestimating and underestimating the true birthweight. The Journal of Maternal-Fetal & Neonatal Medicine. 2018.1-6.

Schaefer-Graf, U.M., Pawliczak, J., Passow, D., Hartmann, R., Rossi, R., Bührer, C., Harder, T., Plagemann, A., Vetter, K. and Kordonouri, O. Birth weight and parental BMI predict overweight in children from mothers with gestational diabetes.Diabetes care.2005.28(7):1745-1750.

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Work Life Balance of Female Doctors in Bangladesh: An Overview

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Abstract
The role women carry out today is somewhat different compared to earlier times due to the necessity of balancing the work of their home and job simultaneously. Despite achieving immense success in the work field, they cannot underestimate nor minimize the duties and responsibilities that need to be carried out at their home. Since, women also need to fulfill the obligation of their children's upbringing, incremental pressure comes into place due to the purpose of balancing both their career and relationships. The social context of Bangladesh makes it a strenuous task for women to ensure a healthy work-life balance. Although numerous researches have been conducted on the work-life balance, none of them has neither investigated nor did shed light on the work-life balance of female doctors in Bangladesh. Hence, it is essential to study and explore the prevailing situation of the work-life balance of female doctors. Although, numerous researches have been conducted on the work-life balance, none of them has neither investigated nor did shed light on the work-life balance of female doctors in Bangladesh. Hence, it is essential to study and explore the prevailing situation of the work-life balance of female doctors. The prime purpose of the study is to discover the existing condition of the work-life balance of female doctors in Bangladesh. Moreover, the study aims to explore the factors responsible for the work-life imbalance and also proposes the ways to achieve a healthy work-life balance. Female doctors from six different divisions employed at several renowned hospitals in Bangladesh were surveyed after securing ethical approval from the Bangladesh Medical Research Council (BMRC). The study aims to contribute by augmenting the apprehension of the present prevailing condition of the work-life balance of female doctors in Bangladesh.

Keywords: Work Life Balance, Female Doctors, Bangladesh

Introduction

Achieving a sound work life balance becomes challenging as an individual has to balance both work and personal life simultaneously. Female doctors working in the healthcare sector have to go through tremendous work pressure. They also need to interact with patients frequently and have to work in an inflexible working environment. Besides that, female doctors also need to care about the responsibilities towards their home and

family which creates an imbalance between their work and family since making balance is difficult (Addagabottu & Battu, 2015). Now these days, women are also working hand to hand with men. Therefore, the study is designed with an aim to explore and identify the factors that are responsible for the work life imbalance of female doctors in Bangladesh. There are existing literatures that primarily emphasized on male doctors who needs to work for longer shifts while their wives remain busy in taking care of their children (Anuradha & Pandey, 2016). However, as women are also entering in the medical discipline, the importance having a sound balance between work and family cannot be underestimated (Tripathi, 2017). Attempting to maintain a balance between professional as well as personal responsibilities, female doctors have to go through challenging and stressful situations (Anuradha & Pandey, 2016). Therefore, the study aims to investigate the perceived work life balance of female doctors from the context of Bangladesh. Researches related to work life balance of female doctors have been carried out in various countries. However, very few researches have been carried out to investigate the work life balance of female doctors in Bangladesh. This study aims to enhance our understanding regarding the present scenario of female doctor's work life balance in Bangladesh, and to unveil the factors on which female doctors prioritize more for having a healthy and sound work life balance.

Literature review

Work Life Balance (WLB) is balance between individual engagement and satisfaction both in work and family roles (Arima, 2016). WLB is pattern of individual combining their duties and dreams with peace and progress regardless of demographic factors like age, gender, race etc. (AlHazemi & Ali, 2016; Agarwal, et al., 2015). Many researchers have mentioned that WLB has no specific definitions (Addagabottu & Battu, 2015). WLB is all about how one gives priority between work and personal life. Here, work refers for career and ambition whereas life refers health, pleasure, family, leisure and spirituality. According to Arima (2016), WLB is the equilibrium point of professional and personal life. It also covers one's capacity to keep control over job, family and friends. WLB also explains individual's level of satisfaction both at work and at home without role conflict. Working women have to make tradeoffs and sacrifices every day (Tripathi, 2017).

Studies showed that managing their work and family responsibilities is one of the most crucial challenges faced by female doctors (AlHazemi & Ali, 2016). A female employee prefers flexible time and schedule in between work and families rather than other work benefits (Eaton 2003). Compared to men, balancing work and life is more difficult for women as the burden of responsibilities is disproportionate (Mazerolle & Barrett, 2018; Bird, 2006). As women have to look after their children and at the same time, have to fulfill their domestic responsibilities, it often creates a barrier for their career advancement (Sharma & Parmar, 2016; Cross and Linehan, 2006). Balancing both workplace and family is difficult for women since giving time to kids, spouse and office are their expected social behavior (Semlali, & Hassi, 2016). A study conducted by Goyal (2014) showed that 75% of the female doctors reported that they have less time for their children while 44% of the doctors have given preferences to household work indicating that the importance of household work cannot be underestimated. A study showed that gender disparity and coping up with obstacles like- retention of employment, workplace security especially in rural areas are major challenges faced by female doctors (as cited in Hossain, et al., 2019).

However, social stereotypical gender roles, for example, male as breadwinners and female as home makers, have also made it more difficult for females to manage work and family together (as cited in Agarwal, et al., 2015). Female doctor's experience burnout and fatigue due to having high workload (Rich, et al., 2016). Therefore, they struggle to give sufficient time to their family (Adisa, et al., 2014). Case studies from Nigeria depicted that as women have to carry out multiple roles, it often creates difficulty for female doctors to have a decent work life balance (Anuradha & Pandey, 2016). Research suggests that women who did not have children showed significant higher job commitment compared to women who had children (as cited in Mazerolle & Barrett, 2018). According to the study carried out by Pradhan (2016) depicted that while male are able to balance both of their family and work role; for women; there is a trade-off of one role for another. Female doctors face problems when they try to manage their career and life together which eventually, results in poor health, stress, absenteeism, lack of motivation (Goyal, 2014) and depression as well as exhaustion (Welford,2008). As a consequence, female doctors often end up by changing or shifting their career for their family life (as cited in AlGhamdi, 2014). It is reported that for the purpose of children's upbringing, female doctors give up their career

(Arima, 2016). In addition to that, long working hours engenders not only physical but also mental health of female doctors which, as a result; causes a decline in the doctor's performance (Arima, 2016). Apart from carrying out their regular duties and clinical practice, they are also required to engage themselves in researches and various professional conferences as well (Japanese Ministry of Health, Labor and Welfare, 2006). Due to the long working hours, female doctor's satisfaction regarding the work life balance gets reduced (Keeton et al. 2007). Therefore, the attempt of making a balance between their work and personal life at the same time creates an adverse effect on the career path of female doctors (Arima, 2016). The high workload of female doctors leads to stress and also creates conflict between their work and home. Therefore, due to having less flexibility, it adversely impacts their lives, leaving them lethargic and exhausted (McIntosh, et al., 2015). According to Yamazaki, Uka & Marui (2017), although the number hours spent by females is commensurate with men, the family interference for females is higher than men. However, women having young children faced the highest interference. Prakash (2018) demonstrated that gender difference exists when it comes to work-family conflict. Higgins, et al., (1994) in their study depicted that women experience greater amount of role overload compared to men. Talreja (2017) reported that women experience more work family conflict than men.

Conceptual frameworks

Conceptual frameworks guiding this study are based on current knowledge regarding both constructivist paradigms and feminist perspectives. Constructivist paradigms have allowed to incorporate doctors' experiences with multiple social factors and realities; moreover, their interactions and responses to those social factors and realities (Farkiya, Mogre, & Patni, 2017). Baum, 1995) along with their work-life and familial aspects have enabled to inquire about their views through subjective involvement (Hester-Moore, 2005). Through conversations with the participants, an attempt has been made to be a part of their realities and contexts that were constructed by their experiences. Conversations were recorded and further analyzed for the sound understanding regarding the building process of participant's subjective realities with balance to work life. (Baum 1995).

Secondly, feminist perspectives were used to understand how women conceptualize and construct their realities as both women and doctors, moreover, give meanings to their behaviors and attitudes through their living experiences. However, feminist perspectives provide a sensitive concentration on women's condition, criticizing conventional research, where women's experiences and voices are often overlooked and unrecognized (DeVault, 1990).

Methodology

A qualitative research method was chosen to gain knowledge about work-life balance of female doctors working in private hospitals of six different divisions (States) in Bangladesh. In-depth interviews, focus group discussion methods have been used to extract data from participants. Data was collected through subjective engagement with participants (Liamputtong, 2010). In-depth interviews allowed participants to share their feelings, experiences, realities and views; in their words, through interpretations and constructions of social lives (Silverman, 2006). For the selection criteria to be fulfilled, the participants were required to be a citizen of Bangladesh as well as to be an employee of private hospital in Bangladesh. Moreover, purposive sampling method was used for conducting the study. Invitations with consent form were sent to doctors through professional networks and have been contacted for the final selection.

In addition, the concept of reflexivity has been used for the purpose of the study. Being a woman and a member of doctor society and sharing a similar cultural background as the participants, the researcher was able to employ reflexive understandings to articulate gained knowledge which is also supported by Jorgenson (2011). In-depth interviews involve direct observations and contacts (between researchers and participants) so; reflexive engagements helped the researcher to explore their sensitive and personal stories and contexts. At the same time, these engagements enabled the researcher to examine the role and actions critically as an "insider" researcher as suggested by Dwyer & Buckle (2009). The study aims to enhance the understanding regarding the present scenario of female doctor's work life balance in Bangladesh and attempts to explore the factors on which female doctors prioritize more for having a healthy and sound work life balance. To explore the factors, In-Depth Interviews (IDIs), Focus Group Discussions (FGDs) have been used as Liamputtong (2010) mentioned IDI and

FGD as appropriate methods of data collection due to the fact that these sort of studies demand an interpretive and descriptive method with proper maintaining of confidentiality which provides adequate opportunities for the participants to share their feelings, experience, realities and the researcher gets better scope to explore their perspective.

In-depth interviews were conducted on a one-on-one basis as it provides ample opportunities for discussion (Denzing, 2003). FGDs were conducted with the participation of 6-8 participants with presence of researcher, recorder, gatekeeper and note keepers. Time length for each of the IDIs and FGDs ranged from thirty to ninety minutes. Prior to commencing each interview, a suitable time and location were managed depending on participant's convenience.

After the interviews, all recordings were transcribed manually using verbatim techniques. Attention was given to understand the participants' constructions of realities through reading and re-reading transcriptions (Silverman 2006). Next, coding was assigned to identify and organize the data by dividing themes and sub-themes (Ziebland & McPherson, 2006). Then, conceptually codes were assigned from literature review to organize the data so it gets easier to create a labeling of the collected data. The process is highlighted as follows.

Verbatim > Coding > Data Categorization > Developing Theme > Interpretation

Ethical approval was taken in the form of written consent which was sent to all of the participants and their authorized institutes. To comply with the ethical standard, prior to each interview, the research background and the purpose of the paper were explained to the participants. Participants were provided with a consent form to authorize their participation and the audio taping of the interview process. For protecting each of their participations confidentiality, a pseudonym has been applied in all unprocessed and processed data by omitting their real names.

Findings of the study

Firstly, socio-demographic characteristics of participants are demonstrated. Secondly, three major themes that emerged from data analysis are presented. All respondents are Bangladeshi female doctors working in different private hospitals in Bangladesh named 'A' Medical College Hospital, 'B' Hospital (Corporate), 'C' General Hospital. Experiences have varied according to age and qualifications.

Theme One: Participants' emotion and views about professional expectation Versus reality

Participants from every group acknowledged that their expectation regarding their dream and profession were either chosen by themselves or their family. AP2 expressed that *"It was my father who wanted me to become the first female doctor from my village just after him."* However, the views have changed when they experienced extreme study pressures and poor working environment. They expressed the reasons behind choosing this profession which are as follows-

- Societal acceptance as a noble profession.
- Cherishment by the parents to see their children as doctor when she is good at studies
- When one of the parents or both of them are physician
- Increasing social value and gaining social status, better socio-economic status
- Financial and job security
- Influence from relatives or neighbors'
- A better matrimonial acceptance for future marriage

The majority of respondents' agreed that although it is an influence from family to study in medicine but still it has a good social value. One Assistant professor stated that: *"I became doctor as I wanted to live well with respect and dignity with social security."*

They all thought at their starting period of study that they will have access to excellent job opportunities in the future and most importantly this job will be a financial and social security of them. But, reality differed when they were searching for job just after their internship. It was mainly stated by the Registrar, CA, HMO, and MO. Intern doctors have also agreed the same kind of fear and stated regarding job opportunities. IN-7 replied: 'I *was afraid to apply for the job of a medical officer after my internship because my in-laws would not allow me to do night duties'.*

Almost everyone said that the rapid increment of medical colleges is creating opportunities and fulfilling student's dream who wanted to study medicine. But they mentioned it as one of the reasons which impacts the chances for post-graduation along with its difficulties of entry processes after MBBS due to high number of participants. They desired that the process might be easier and seat number might be increased in proportion to applicants' number each year along with lowering the entrance fee too. They shared their challenges before and after marriages. Home and work-life balance gets hampered after marriages as they need to take care of others at home. Before marriage, they maintain their role by maintaining a sound work-life balance as evidence suggests that "*Women may be a top executive; still the "nurturing" or "care giving" roles are considered much a part of feminine roles" (*Malhotra & Sachdeva, 2005).

Participants IN-2 said that her family is concerned about security to move at night. So, hospital authority could be helpful with the transport service for female doctors.

Theme Two: Work-life balance and job satisfaction with quality of service

All the participants of this study have agreed that the increasing number of medical colleges should be discouraged in Bangladesh, and the quality of medical colleges' education and healthcare service should be increased. They look forward to keeping balances between quality and merits. They think that their knowledge is restricted by the bindings and limitations of family and work life balance. After analyzing the collected data, the key findings in this regards are as follows.

- Majority of the respondents were dissatisfied with the working conditions due to low payment, extended working hours and hospital policies for staff.
- Most of the respondents opined that the work stress is very high in the private sector.
- One-third of the respondents were happy with their jobs that are mainly from 'A' Medical College Hospital who had better salaries.
- Two-third of the respondents expressed that the staff communication in private sector is good due to high maintenance of cooperating policies.
- Everyone agreed on difficulties of post-graduation and studies beside their jobs due to high registration fees on post-graduation exams like FCPS, MD/MS, Diploma, MRCP/MRCS etc which acts as a barrier too.
- Training and job facilities are equally disappointing immediately after their graduation as both are not possible together. Some of the female doctors are doing these jobs so that they can do study further and also get trained up.
- Due to work stress, the respondents have been facing the problems because of work schedule and timings in the hospital, job sharing arrangements, pressure from the management, leave and holiday difficulties (parental leaves, sick leaves etc.), lack of leisure time, spending less time with families, financial problem, lack of motivation and enjoyment.
- Work-place security lets them to re-think about their priority of choosing specific specialized area. Some of them have chosen basic subjects to avoid clinical side chaos and threats raised from patient parties.

Female doctors often face pressure and other forms of violence's in the work areas. They often think to quit their jobs due to safety and security issues. One respondent added that- *"I become sad a when my patient died despite of my hardest effort but afraid at the same time for any uneven events by their attendance".*

ARg-1 said that *"Arrangements by hospital authorities are horrible sometimes in case of maintaining security and safety for doctors at work. I wish I could go back to these days when I have chosen my clinical career in surgery. After a lot of effort, I got chance in my desired subject and now I am like to quit this job with this*

present situation". She was upset as all of her peers have the same kind of feeling as ARg mainly deals with the patient related issues in hospitals in upper hand at first.

Participant HMO-2 said from her intern days' experiences that, *"People who come for seeking treatments, sometimes they often get furious with anger and lose their patience in case of emergencies. Sometimes they apply political and muscle powers on doctors".*

So, the roles of hospital should be strictly maintained and this issue needs to be solved with immediate care.

Theme Three: Physical and mental health issues

Conversations depicted that they have been facing the health problems for night duties and emergency on-call duties. They cannot stay in work places when their little children's are at home and unable to see them in long working hour's schedules due to no day-care facilities at hospital. They also felt that working mother has a difficult time in keeping balance both at home and work-place. The pattern of leave in hospital varies with level of designations. They mentioned the opportunities are different from their counterpart. As male can easily do practice and duties at the same time but women cannot. She needs to think of her family first and then her practice. P1 mentioned that: *'I stop my private practice regularly since my third child born and I avoid doing night surgeries at best possible'.*

So, gender disparity is prevalent in case of career choices, duty shifts, promotion, and their status as physician. One respondent highlighted this: '*I thought in minds thousand times in last 4 years to change this job but my adaptation and routines with familial chores will be changed. So, I ended up with that'.*

Participants MO5 from 'A' hospital mentioned that their benefits are different in comparing most of the hospitals as they are more in numbers compared to males. The respondents added that in the public sector, doctor enjoy the monetary aspects of incentives from the government whereas in the private sector, the situation is not the same. They have been facing the pressure from the management due to work and also, the salaries were not given on time which affects their physical and mental health. However, supports from seniors and peers are barely same for all. AP2 said that she got maternity leave for 6 months along with salary as she was an assistant professor that time in 'C' hospital. But, one junior group doctor replied *"I am unable to take leaves due to shifting difficulties in duties and sometimes cutting of salaries by the authorities".*

They are facing severe mental health issues like depressions, generalized anxiety disorders (GADs) etc. One respondent added that *"I dislike that parents force their children to become a physician. I wish I can have my own dream; parents support for what I wanted to be… I suffered to depression in my whole student life…now I am suffering in my work-life too!"*

Some of the participants mentioned that they are not encouraged by their families to take public jobs due to postings patterns because security and familial balance. So, they could not appear in civil service examination. But they are feeling that the public jobs are more secured than the private ones.

They have strongly declared that, some of media coverage news's about doctors in Bangladesh has a negative impact on people minds. The expectation by common people has been changed with yellow journalism. So it should be changed to overcome the emerging conditions in future. One MO said that *"It ruins and shattered my feelings when I saw my role model are covered badly in yellow journalism even after following actual protocols of treatments! I feels like I could go back and change my decision not to be the one who I am now!"*

Discussion

This study demonstrated work-life balance of female doctors in Bangladesh. Study was among in total of 30 physicians working in private hospitals only. This research has found various factors related with work life balance of female doctors in Bangladesh. It is found that female physicians outnumbered their male peers (52% vs. 48%) in the year of 2006–2015 which is consistent with the study of Hossain, et al. (2019). According to

SVRS survey, admission into medical college's male VS female ratio is 100:100.3 (SVRS, 2010). Through exploring the process of factors and causes in work –life balance, the study depicts similar findings to those reported in some other studies (Kofodimos, 1993; Rodbourne, 1996; Clark, 2000; Stevens, et al., 2004; Ungerson & Yeandle, 2005). In the process of making work life balance, there was a combination of compromises either with their duties or sacrifices in dream. They do duties in shifts and makes balance in familial lives. Research has also found that women are less satisfied with the work life balance due to overburdened night shift, less time with families (Kumari, et al., 2015). So, work life balance has significant importance in every employee's life. In a study, it is stated by the Joseph Rowntree Foundation and carried out on a nation-wide level by researchers at the university of Cambridge (Dex and Smith, 2002), concluded that

- ✓ There are positive effects on employee commitment from having family-friendly policies.
- ✓ Approximately nine out of every ten establishments with some experience of these policies found them cost effective.
- ✓ Increase in performance was associated with having one or other family-friendly policy in the case of five out of six performance indicators.

Kofodimos (1993) suggests that work imbalance arouses high levels of stress, distracts from quality of life, and ultimately reduces individuals' effectiveness at work. Jeffrey H. et.al. (2003) suggested that an equally high investment of time and involvement in work and family would reduce work–family conflict and stress thereby enhancing an individual's quality of life. *"The costs to your business of failing to improve work-life balance include: poor performance, absenteeism and sick leave; and higher staff turnover, recruitment and training costs (Department of Trade and Industry, 2001)."*

For a hospital, doctors are the main assets. So hospitals need to guide and motivate doctors, 'especially female doctors, to sustain in their jobs. In 'A' hospital ratio of female doctors was more than the male doctors. So, there were differences in 'A' facilities than 'B' and 'C'. 'A' policies towards their female doctors were a little bit changed than the others in comparing salaries structures, increments, festival bonus and training facilities except emergency leave and maternity issues. They do not allow maternity leave more than 3 months with payment. But 'C' policies for their female physician regarding leave taking issues are smoother than others as they give leave for 6 months stated by AP2. The low utilization of work-life balance programs has its probable root in the perception that adopting flexible working arrangements leads to less job security and hinders future career prospects (Rodbourne, 1996; Stevens, et al., 2004). Lack of sufficient time, gender bias, social and cultural norms as well as family responsibilities are the most significant challenges woman face to achieve balance in her professional and personal life.

Limitations of the study

Due to time limitation, it was not possible to apply several data collection methods. Thus, the findings may not be generalizable to gather representative findings of all female doctors working in Bangladesh but was concerned to find out the factors from a limited number of participants

Recommendation

The findings of the study recommend to the hospital authorities to initiate in making more work-family friendly policies for their female doctors who will help them to balance between work and family. Hence, this study could also act as a guide for HR practitioners in redesigning their policies in relation to work-life balance, thereby, ensuring the wellbeing of all female doctors. It might not be easy to achieve a work-life balance these days, as people are constantly pushed to work faster to cope with an increasing workload. So, some recommendation can be considered that can help them to make it easy to achieve work life balance properly, which are stated as below.

- Flexible work arrangements.
- Alternative work hours or weekly fixed working hours.

- Childcare options.
- Rest and refreshment.
- Leisure activities.
- Relieve from stresses.
- Support from family, spouses, peers and male colleagues.
- Improvement of work environment and policies run by authorities.
- Friendly work environment.
- Independence.
- Motivation and relaxation approaches by hospitals.
- Satisfaction.
- Work life balance programs, recreational leaves, increments, rewards etc.

Further study needs to be carried out with more sample size in all different divisional hospitals located at both urban and rural areas of Bangladesh both in public and private sectors.

Conclusion

This study demonstrated work-life balance of female doctors in Bangladesh. Study was among in total of 30 physicians working in private hospitals only. This research has found various factors related with work life balance of female doctors in Bangladesh. It has concluded that work life of female doctors in hospitals is good regardless the factors in terms of care towards their patients which is better than the male doctors (Tsugawa, 2016). There is no personal motive to blame the services of the doctors and private hospitals. There are many doctors who spent their life to serve the public and safeguard the lives of the patients without expecting any benefit. But still there are lacunae's in medical facilities and available policies in hospitals. So, the management should take utmost care to improve the work life balance for their female doctors as they are outnumbered day by day in Bangladesh.

References

Addagabottu,R.S., & Battu, N. (2015). A Study on the Variables that Influence Work Life Balance of Women Doctors and Nurses with Special Reference to Government and Private Hospitals of Guntur District, *International Journal of Research in Management & Business Studies* 2(3), pp 33-39.

Adisa, T. A., Mordi, C., & Mordi, T. (2014). The Challenges and Realities of Work-Family Balance among Nigerian Female Doctors and Nurses. *Economic Insights-Trends & Challenges*, *66*(3).

Agarwal, R., Mishra, A., & Dixit, P. (2015). Gender and work-life balance. *International Journal of Science Technology and Management, (4)*, *1*, 67-75.

Alghamdi, T. (2014). Balance between career and family life among female doctors in King Abdul- Aziz Medical City, Riyadh, Saudi Arabia. International Journal of Medical Science and Public Health,3(2), 203. doi:10.5455/ijmsph.2013.021220133

AlHazemi, A. A., & Ali, W. (2016). The notion of work life balance, determining factors, antecedents and consequences: a comprehensive literature survey. *International Journal of Academic Research and Reflection*, *4*(8), 74-85.

Anuradha, & Pandey, M. (2016). Impact of work-life balance on job satisfaction of women doctors. Problems and Perspectives in Management,14 (2), 319-324. doi:10.21511/ppm.14(2-2).2016.07

Arima, M. (2016). Career' or 'Family'? Increasing Work–Life Balance Satisfaction among Japanese Physicians with and without Children. Diversity and Equality in Health and Care (2016) 13(4): 290-291

Baum, F. (1995). Researching public health: Behind the qualitative quantitative methodological debate. Social sciences medicine. 40 (4), 459-468.

Bird, (2006). Work-life balance: Doing it right and avoiding the pitfalls,https://doi.org/10.1002/ert.20114

Campbell et al., (1994). The Effects of Family Responsibilities on the Work Commitment and Job Performance of Nonprofessional Women. Journal of Occupational and Organizational Psychology, 67,283-296

Clark, (2000), Work/Family Border Theory: A New Theory of Work/Family Balance.

Cross and Linehan, (2006). Barriers to advancing female careers in the high-tech sector: empirical evidence from Ireland. Women in Management Review, 21 (1), 28-39,

David Rodbourne, (1996). Learning as We Go, Work-Life Policies & Practices for Business.

Denzig and Lincoln , (2003). Collecting and Interpreting Qualitative Materials, Second edition.

DeVault, Marjorie L. (1990). Talking and listening from women standpoint: Feminist strategies for interviewing and analysis. Journal of social problems. 37(1)

Dex and Smith, (2002). The nature and pattern of family friendly employment policy in Britain, Bristol/York: The Policy Press/Joseph Rowntree Foundation.

Dwyer and Buckle, (2009).The Space Between: On Being an Insider-Outsider in Qualitative Research, International Journal of Qualitative methods, https://journals.sagepub.com/home/ijq.

Farkiya, R., Mogre, S., & Patni, P. (2017). A study of Work-Life Balance in Health Care Industry with special reference to Allopathic Doctors in Indore City.

Goyal (2014). Work-Life Balance of Nurses and Lady Doctors, International Journal of Engineering and Management Research,4(4). pp. 244-249

Hester-Moore, Sarah, Jennifer (2005). Handling uncertainty: Standard and local practices in the case of libido and contraception in evidence-based decision making. Health Sociology Review, 14(2): 174-186.

Hossain, P., Gupta, R. D., YarZar, P., Jalloh, M. S., Tasnim, N., Afrin, A., & Ahmed, S. M. (2019). 'Feminization'of physician workforce in Bangladesh, underlying factors and implications for health system: Insights from a mixed-methods study. *PloS one*, *14*(1), e0210820.

Japanese Ministry of Health, Labor and Welfare (2006)

Jeffrey H. et.al.(2003). The relation between work–family balance and quality of life, Journal of Vocational Behavior 63 (2003) 510–531.

Jorgenson, (2011). ANTENARRATIVE WRITING – TRACING AND REPRESENTING LIVING STORIES, Storytelling and the Future of Organizations: An Ante Narrative Handbook (pp. 284-297). New York: Routledge.

Kofodimos (1993). Balancing act: How managers can integrate successful careers and fulfilling personal lives, Balancing act. San Francisco: Jossey-Bass

Kumari et.al., (2015). A Study on work life balance Employees in Selected Service Sectors. Pacific business Review International, 7(10),17-23.

Liamputtong, P. (2010). The science of words and the science of numbers: Research methods of as foundations for evidence based practice in health. Oxford University press: Oxford.

Liamputtong, Pranee and Ezzy, Douglas (2005). Qualitative Research Methods. 2nd edition, Melbourne, Oxford Uniuversity Press

Mazerolle, S. M., & Barrett, J. L. (2018). Work-life balance in higher education for women: perspectives of athletic training faculty. *Athletic Training Education Journal*, *13*(3), 248-258.

McIntosh, B., McQuaid, R., & Munro, A. (2015). The impact of gender perceptions and professional values on women's careers in nursing. *Gender in Management: An International Journal*, *30*(1), 26-43.

Pradhan, G. (2016). *Work-life Balance Among Working Women: A Cross-cultural Review*. Institute for Social and Economic Change.

Prakash, V. (2018). Work-life Balance: Perceptions of the Non-Work Domain. *IIM Kozhikode Society & Management Review*, *7*(2), 97-108.

Rich, Viney, Needleman, Griffin and Woolf, (2016). 'You can't be a person and a doctor': the work-life balance of doctors in training-a qualitative study,BMJ Open. 2016 Dec 2;6 (12):e013897. doi: 10.1136/bmjopen-2016-013897.

Semlali, S., & Hassi, A. (2016). Work–life balance: how can we help women IT professionals in Morocco? *Journal of Global Responsibility*, *7*(2), 210-225.

Sharma, S., & Parmar, J. S. (2016). Work Life Balance of Medical Professionals in Government Hospitals of Himachal Pradesh. *Political Economy Journal of India*, *25*(1-2), 68.

Silverman (2003). Interpreting Qualitative Data:Methods for analyzing Talk, Text and Interaction, SAGE, Aug 22, 2006 - 448 pages.

Stevens, J., Brown, J., & Lee, C. (2004). The second work-life balance study: results from the employees' survey.

Sumaira Rehman, Muhammad Azam Roomi, (2012). Gender and work-life balance: A phenomenological study of women entrepreneurs in Pakistan,Journal of Small Business and Enterprise Development 19(2):209-228.

Malhotra, S. and Sachdeva, S. (2005). Social Roles and Role Conflict: An Interprofessional Study among Women, Journal of the Indian Academy of Applied Psychology, January - July 2005, 31 (1-2), 37-42.

Talreja, M. (2017). Women entrepreneurship and work life balance. *Global Journal of Human-Social Science Research*.

Tripathi, D. J. (2017). A Literature Review: Work, Family and Life - ERA of being a Superwoman Where Women Manage it All. IOSR Journal of Business and Management,19(03), 30-35. doi:10.9790/487x-1903013035.

Tsugawa, Y., Jena, A. B., Figueroa, J. F., Orav, E. J., Blumenthal, D. M., & Jha, A. K. (2017). Comparison of hospital mortality and readmission rates for Medicare patients treated by male vs female physicians. *JAMA internal medicine*, *177*(2), 206-213.

Ungerson and Yeandle (2005). Care Workers and Work—Life Balance: The Example of Domiciliary Caseworkers,In book: Work-Life Balance in the 21st Century,DOI: 10.1057/9780230373594_13.

Welford, R. (2008). Work-life balance in Hong Kong: Survey Result. Hong Kong: The University of Hong Kong.

Yamazaki, Y., Uka, T., & Marui, E. (2017). Professional fulfillment and parenting work-life balance in female physicians in Basic Sciences and medical research: a nationwide cross-sectional survey of all 80 medical schools in Japan. *Human resources for health*, *15*(1), 65.

Ziebland and McPherson (2006). Making sense of qualitative data analysis: an introduction with illustrations from DIPEx (personal experiences of health and illness), Medical Education, 40 (5), 405 to 414, ISSN-0308-0110, EISSN-1365-2923.

Appendix

Tools and characteristics of participants

Tools Applied	Characteristics of Respondents	Number in Each Group	Age Range(Years)
Focus Group Discussions(FGDs) Total 4 FGDs	Senior Group (Professor/Assoc. or Asst. Professor)	6	35 and Above
	Middle Group (Consultant/Registrar/Asst.Registar/SMO)	6	26 and Above
	Junior Group (Medical Officer/HMO/Intern)	8	24 and Above
In Depth Interviews(IDIs) Total 10 IDIs	Senior Group (Professor/Assoc. or Asst. Professor)	3	35 and Above
	Middle Group (Consultant/Registrar/Asst.Registar/SMO)	3	26 and Above
	Junior Group (Medical Officer/HMO/Intern)	4	24 And Above

Prompts for FGDs & IDIs

Area of discussion	**Prompts Used**
1. Knowledge and Experiences	- Expectations Vs reality -Social taboos - Marriage, familial pressure, support from spouse & in-laws -Barriers for Post-Graduation -Work-loads, Work-life balance, Duties & Emergency Shifting (Night Duty) -Job satisfaction, Casual leaves, Sick leaves, Recreational leaves -Support from Seniors & Peers, Opportunity as males, Private practice -Personal and family level of education, Doctor-patient relationships -Social Security Vs work place security -Quality of service, Public-Private health service, expectation by common people - Physical & Mental (Fatigue & Stress) Health of Doctors
2. Initiatives and facilities	-Government Level -Private level -Community level -Referral System
3. Prevention and recommendation	-Referral System -Insurance and policies

Tools and characteristics of participants

SL	Participants	Age range	Marital Status	Qualifications	Designations	Experiences by years	Pre-existing illness/co-morbidities/Not Answered(N/A)
1	P1	56	Married	MBBS,FCPS	Professor	32	DM,HTN
2	P2	52	Married	MBBS, FCPS,MD	Professor	29	HTN
3	AP1	48	Married	MBBS ,MD	Associate Professor	23	BA
4	AP2	44	Married	MBBS, FCPS,MD	Associate Professor	22	OA
5	AsP1	38	Married	MBBS ,MRCS,MD	Assisstant Professor	15	N/A

6	AsP2	35	Married	MBBS ,MRCP	Assisstant Professor	12	BA
7	C1	37	Married	MBBS ,MD	Consultant	15	N/A
8	C2	40	Un-married	MBBS, MD,FCPS	Consultant	18	Ovarian Cancer
9	Rg1	38	Married	MBBS ,FCPS	Registrar	15	Migraine
10	Rg2	37	Married	MBBS ,FCPS	Registrar	14	N/A
11	ARg1	26	Married	MBBS ,MRCS	Assistant Registrar	3	IBD
12	ARg2	28	Un-Married	MBBS ,PGT	Assistant Registrar	5	N/A
13	MO1	25	Un-Married	MBBS, PGT,MPH	Medical Officer	1	GAD
14	MO2	28	Married	MBBS, PGT,DCH	Medical Officer	3	N/A
15	MO3	33	Un-Married	MBBS ,PGT	Medical Officer	7	N/A
16	MO4	30	Married	MBBS,MD	Medical Officer	5	N/A
17	MO5	26	Un-Married	MBBS ,FCPS	Medical Officer	2	HTN
18	MO6	28	Married	MBBS,DO	Medical Officer	4	N/A
19	MO7	27	Divorcee	MBBS ,PGT	Medical Officer	3	N/A
20	HMO1	26	Un-Married	MBBS ,PGT	Honorary Medical Officer	2	N/A
21	HMO2	27	Un-Married	MBBS ,PGT	Honorary Medical Officer	3	N/A
22	HMO3	29	Married	MBBS ,FCPS	Honorary Medical Officer	5	N/A
23	In-3	24	Un-Married	MBBS	Intern Doctor	0.5	N/A
24	In-4	25	Un-Married	MBBS	Intern Doctor	0.4	N/A
25	In-6	25	Married	MBBS	Intern Doctor	0.8	N/A
26	In-5	26	Un-Married	MBBS	Intern Doctor	0.7	N/A
27	In-6	24	Un-Married	MBBS	Intern Doctor	0.6	N/A
28	In-7	25	Married	MBBS	Intern Doctor	0.2	Migraine
29	In-8	24	Un-Married	MBBS	Intern Doctor	0.5	N/A
30	In-9	25	Married	MBBS	Intern Doctor	0.5	N/A