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Systematic Review in Population-Based General Understanding Surveys of Stroke Perception, Potential Risks, Treatments, and Perspectives for a Correlative Study on Public Awareness Between Different Age Groups and their Lifestyles

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Abstract
Background: Stroke is a major public health concern that may affect a patient's physical performance and ability to perform fundamental daily duties. Understanding the fundamentals of stroke is crucial for lowering mortality and disability rates among patients, as it allows for the preparation of a rapid and effective treatment and the comprehension of the therapy and treatment process following a stroke. Methods: A survey was distributed to 122 individuals, including 24.6% of high school pupils (12-17), 25.4% of young adults (18-25), 16.4% of adults (26-40), and 33.6% of middle-aged adults (41-60). After completion of data gathering, descriptive analysis was carried out. Results: the outcomes revealed that most participants scored higher on the general comprehension questionnaires than on the technical section. Notably, the level of comprehension of middle-aged adults ($x = 9.50$) appeared to be the highest. Moreover, those with direct experience with stroke or direct contact with stroke patients had a greater understanding of the disease and its treatment ($x = 9.05$, $p = 0.08$) than those without such experience/contact ($x = 8.00$, $p = 0.08$). Nevertheless, according to statistical analysis, there was a positive correlation between the age range of participants and their disease awareness. However, the self-care conducted was mostly found in adolescence. Discussion: Therefore, it is necessary for government organizations to encourage awareness and education about fundamental treatments that can assist individuals in avoiding possible risk factors by implementing the FAST guideline simultaneously with a public education effort on stroke response. The greater the number of individuals who comprehend the method for coping with the disease, the greater their protection against the disease.

Keywords: Stroke, Public Awareness, FAST Guideline, Stroke Knowledge Levels, Lifestyles, Age Groups

1. Introduction

1.1 Introduce the Problem

Stroke is currently a significant public health issue. This disease is the third-leading cause of mortality and disability in the world (Feigin et al., 2021). In addition, experiencing a stroke might result in adverse consequences and complications among the patients, for instance, paralysis on one side of the body or the hemiplegia, muscle spasms (Cauraugh et al., 2003) and aphasia, communication impairment (Pedersen et al.,1995). Symptoms of a stroke diminish a patient's physical performance and ability to conduct basic daily tasks. It can also have an impact on psychological, emotional, and behavioral variability (Brice et al., 2002; Chemerinski et al., 2000; Paul et al.,2013). As a result of its effect on the patient's brain, it can cause aggression (Kim et al., 2002) as well as limitations in comprehension abilities (Pinkston et al., 2009).

1.2 Importance of the Problem

Understanding the fundamentals of stroke becomes essential for reducing deaths and the disability rate among patients. This will allow individuals who may be struggling to cope with the initial symptoms that may manifest in emergency circumstances. In prefer to be able to prepare for a fast and effective treatment (Brice et al., 2002; Skolarus et al., 2013) and to comprehend the therapy and treatment process following a stroke in a systematic way. It might additionally have an influence on raising awareness of these diseases (Fogle et al., 2008) such that individuals can take care of themselves by avoiding various risk factors that may contribute to the disease. Along with getting diagnoses and regularly looking after themselves (Das et al., 2013).

Therefore, the research aims to investigate the public understanding of stroke disease in terms of the sign and symptom, its diagnosis, and treatments. Along with this, the study intends to examine the exhibited of statistical correlation between the participants 'demographic and their level of the disease knowledge with the comparison on the comprehension in different groups of age; adolescents (12-17), young adults (18-25), adults (26-40) and middle-aged adults (41-60). Yet, the study also examines the correlation between the age range of those taking part and their public awareness and self-care conducted regarding the disease.

1.3 Literature review

1.3.1 Stroke disease

Stroke, also known as cerebrovascular accidents (CVA), is the neurological manifestation of a severe reduction of cerebral blood flow in a circumscribed region of the brain, caused by the abrupt or progressively progressing occlusion of a large brain artery (Hossmann et al., 2006), which can be brought on by a variety of risk factors, medical conditions, and body mechanisms. In addition, ischemic strokes, which make up for approximately 85 percent of all strokes, are caused primarily by cerebral small vessel disease, cardiac embolism, and atherosclerosis-related thrombosis in large arteries, and approximately 15 percent of strokes are caused by intracerebral hemorrhage, which can occur in deep regions of the brain (Murphy et al., 2020). Furthermore, the most typical presenting signs and symptoms of ischemic stroke include hemiparesis and speech difficulty (Yew et al., 2009).

1.3.2 FAST guideline

The FAST acronym is widely used for stroke public education, which was designed in 1999 for easier mnemonics on the potential symptoms and for initial assessment for obtaining emergency healthcare. Face, Arm, Speech, and

Time are represented by each letter, respectively. To exemplify more, the letter "F" was used to determine numbness or dropping of the face, followed by the letter "A" which meant to check for arm weakness, particularly on one side of the patient's body. Then, the "S" for indication of comprehension and speech difficulty Lastly, is to emphasize the patient's need to get immediate treatment by calling 911 is represented by the letter "T." In terms of effectiveness, it is readily apparent that it is a better identification method for ischemic stroke and transient ischemic attack (TIA) than for hemorrhagic stroke. Consequently, about 88.9% of stroke/TIA patients were determined as a result of the use of this message (Kleindorfer et al., 2007)

1.3.3 Diagnoses and Treatments

The standard diagnostic evaluation for patients with a suspected stroke consists of a thorough medical history and physical checkup, as well as a neurologic examination (Alberts et al.,1999). The American Heart Association's published guidelines emphasize the significance of a precise diagnosis and appropriate management among people presenting with stroke symptoms by suggesting individuals suspected of having a stroke undergo a brain imaging study to differentiate the types of strokes (Adams et al., 1994). Head computed tomography (CT) and brain magnetic resonance imaging (MRI) are the two standard neuroimaging procedures used to diagnose a stroke (Alberts et al.,1999). Moreover, there is a study that illustrates that the identification of potentially treatable cerebrovascular abnormalities in younger people with ischemic stroke is dependent on cerebral angiography (Ganesan et al.,1999).

Acute ischemic stroke offers a serious health risk because there are few effective therapies available, with the exception of thrombolytic recombinant tissue plasminogen activator (rt-PA). However, rt-PA must be administered within three hours of the onset of stroke symptoms due to its sensitivity to time (Green et al., 2006). To emphasize, the treatments for the stroke were mainly aimed at preventing other subsequent symptoms (Alberts et al.,1999).

1.3.4 General misconception

Previous studies reveal that there are still common beliefs that lead to misconceptions about stroke. These can be shown in Hsia et al. (2011) whose findings are conducted with underserved urban residents that aim to identify urban underserved population-specific misconceptions that may act as barriers to undergoing delayed treatments. The result of this suggested that nearly half of participants attributed the delay to the belief that the symptoms were not severe and/or would resolve themselves. Moreover, other studies that took place in African American under-resourced communities detailed the perception of the adult-aged participants, who figured that the disease always results in fatality, so seeking the medical profession would be superfluous (Skolarus et al., 2013). Furthermore, there is a study that demonstrates a misunderstanding about factors that can be a leading cause of stroke such as high blood pressure, heart disease, diabetes, and smoking. However, as hypertension, or high blood pressure, is considered one of the greatest risk factors, only 28.9% of the participants correctly identified it (Kaddumukasa et al., 2015).

1.3.5 Incidence of Stroke

The incidence of stroke is statistically higher globally and differs from region to region. According to studies, that detail the accordance with the WHO World Standard Population, the incidence of stroke in the studies went from 76 per 100,000 people per year in Australia (2009–10) to 119 per 100,000 people per year in New Zealand (2011–12), with the latter figure only applying to people who were at least 15 years old. Only in Martinique (2011–12) was the incidence of stroke higher among females than males. In countries without or with outdated data on stroke incidence, eight had national clinical hospital-based data registries. Kazakhstan, Bulgaria, and Greece had the highest absolute mortality rates among the 128 countries that reported mortality data to the WHO in 2003.

Although there was no relationship between time and crude mortality or crude incidence of stroke, both variables were positively linked with the percentage of those 65 years of age or older (Feigin et al. ,2013) .

1.3.6 Previous studies

In conditions characterized by a higher incidence of stroke, from the outset, however, the majority of patients and the general population still possess a misconception of the disease. Based on several previous studies, this is a crucial issue in understanding the basic concepts and techniques of stroke treatment in modern times. This evidence was shown in the four urban residential areas in China that assessed their public knowledge by providing semi-structured interviews and questionnaires to their non-stroke dwellers. The topics of contributing factors, medical therapy, symptoms, stroke education, emergency responses, and their main sources from which they received information about the diseases were identified in this study. The conclusion of this investigation was that urban individuals were still lacking stroke understanding. (Sun et al., 2011). Furthermore, referring to the Kothari et al. study, the general understanding of stroke survivors was investigated. Interestingly, it was found that nearly forty percent of patients admitted with a suspected stroke were unaware and had misunderstandings about the signs, symptoms, or risk factors associated with a stroke. (Kothari et al., 1997). Moreover, the results appeared to be the same as those shown in Hospital Raja Perempuan Zainab II, where a cross-sectional survey was conducted among stroke patients admitted to the medical and surgical wards. Within eight months, stroke patients were conveniently selected, and data were collected. The result showed that the patients themselves still had a lack of stroke knowledge, with 45% of respondents answering correctly on 9 items, while 35% had misconceptions regarding 7 items (35%). (Sowtali, et al., 2016). In addition, there was further research on the comparison between the terms "stroke patients" and "none of those," as it reveals in the Suvilan et al. study, which contains a stroke knowledge test conducted with 38 non-stroke survivors (community sample) and compared to the 42 stroke patients' data. Consequently, the outcomes suggested that there wasn’t a significant difference between the stroke survivors and their sample of non-stroke survivors (Sullivan, et al., 2005).

2. Methodology

A survey distributed to a total of 122 participants which included 24.6% of high school students, 25.4% of young adults, 16.4% of adults and 33.6% of middle-aged adults residing in Thailand via the online questionnaire for data acquisition in this study.

The question was designed into four main sections and was distinct between the participants in the group that had experienced/contacted the patients and the group that had no such experience/contacted. The assessment instrument consisted of a questionnaire with four sections, each of which focused on a distinct aspect of the respondent's understanding and their comprehension of the stroke medical condition and its treatments. In total, the questionnaire consisted of 20 questions.

The objective of the first section (5 questions) was to gauge the participants' general knowledge of the disease, its signs and symptoms, and its associated risk factors. The second section (5 questions) center on the participants' comprehension of the disease's available treatment options. The objective of the third section (5 questions) was to identify prevalent misunderstandings and erroneous assumptions regarding the disease. In the last component (5 questions), the 5-point Likert-type scales ranging from strongly disagree (scale 1) to strongly agree (scale 5) questions were used to determine participant preferences and opinions regarding the disease.

2.1 Recruitment

The recruitment of respondents was carried out using an internet-based survey procedure. Participants were approached through several channels of communication, including a variety of social media platforms, chat rooms, and intended community groups on the internet. The recruitment procedure included providing a brief overview of the study's contents investigation, the study's goals, consent, and a link to the online survey. Participants were encouraged to participate in the survey voluntarily and anonymously.

2.2 Data analysis

Following the conclusion of data collection, responses to the questionnaire were compiled and arranged for analysis. Descriptive analysis was conducted to calculate the participants' general knowledge levels for calculating the mean scores of the participants to indicate the overall level of comprehension about the disease and its treatments among the sample population. The statistical differences were also applied with the utilization of T-test analysis to identify the understanding in stroke disease among various age categories and to compare the comprehension of participants who had direct stroke experience with those who had not. Nevertheless, the relationship between comprehension and age was investigated through a correlation analysis to reveal the intensity and direction of the relationship, indicating whether understanding increased or decreased with age.

3. Results

3.1 Overall understanding

Based on the results of our analysis in Table A1, it can be concluded that the overall understanding of the diseases and treatments among the sample was moderate. However, upon further examination, there was no apparent correlation between the gender of the participants and their understanding. However, it was observed that the numerical data of the understanding in both genders did contain significant differences at the level of 71%, with the perception of females (x = 8.50) and males (x = 7.96).

Table A1: Descriptive Analysis of Female and Male Overall Understanding

	Female	*Male*
Mean	8.50151515	7.96363636
Standard Error	0.28876792	0.41894821
Median	8.45	7.6
Mode	7.3	9.3
Standard Deviation	2.34596166	3.10700306
Sample Variance	5.50353613	9.65346801
Kurtosis	-0.5749386	-1.0109194
Skewness	-0.1036104	0.17189504
Range	9.7	11.3
Minimum	3.3	3
Maximum	13	14.3
Sum	561.1	438
Count	66	55

Specifically, according to the statistical analysis in Table A2, most participants revealed that they were accounting for more points on the general understanding questionnaires compared to the technical tasks. The sample had a fair understanding of the general symptoms associated with stroke diseases, with an average score of 2.81 out of a possible 5. Additionally, their technical understanding of the diseases, including the number of signs, FAST guidelines, and diagnosis remedies, was deemed adequate, with an average score of 1.96 out of a possible 5.

Table A2: Descriptive Analysis of Technical and General Understanding

	Technical	*General*
Mean	1.96179775	2.80898876
Standard Error	0.11642997	0.13547895
Median	2	3
Mode	1.3	3
Standard Deviation	1.09839817	1.27810588
Sample Variance	1.20647855	1.63355465
Kurtosis	-0.7065659	-0.4613023
Skewness	0.19364439	-0.2004679
Range	4.3	5
Minimum	0	0
Maximum	4.3	5
Sum	174.6	250
Count	89	89

3.2 Ages and understanding

The correlation between age and comprehension was found to be statistically significant. The results indicate that the level of comprehension tended to improve as the age of the sample population increased. However, upon conducting a t-test analysis, it was determined that there were simply not any statistically significant distinctions in the level of understanding among adolescents (x = 7.34), young adults (x = 7.40), and adults (x = 8.51). Notably, the level of understanding of middle-aged adults (x = 9.50) appeared to be overwhelmingly the highest score compared to those age ranges: adolescents (x = 7.34, p = 0.00), young adults (x = 7.40, p = 0.00), and adults (x = 8.51, p = 0.10) (Seen in Table B1, Table B2, Table B3, Table B4, Table B5, Table B6).

Table B1: t-Test: Adolescents and Young Adults Understanding

	Adolescents	*Young adults*
Mean	7.34	7.4
Variance	6.32386207	5.754
Observations	30	31
Hypothesized Mean Difference	0	
df	59	
t Stat	-0.0952971	
P(T<=t) one-tail	0.46220087	
t Critical one-tail	1.67109303	
P(T<=t) two-tail	0.92440175	
t Critical two-tail	2.00099538	

Table B2: t-Test: Adolescents and Adults Understanding

	Adolescents	*Adults*
Mean	7.34	8.51
Variance	6.32386207	8.582
Observations	30	20
Hypothesized Mean Difference	0	
df	36	
t Stat	-1.4626195	
P(T<=t) one-tail	0.07612385	
t Critical one-tail	1.68829771	
P(T<=t) two-tail	0.1522477	
t Critical two-tail	2.028094	

Table B3: t-Test: Adolescents and Middle-aged Understanding

	Adolescents	*Middle-aged*
Mean	7.34	9.50243902
Variance	6.32386207	5.1232439
Observations	30	41
Hypothesized Mean Difference	0	
df	59	
t Stat	-3.7319361	
P(T<=t) one-tail	0.00021467	
t Critical one-tail	1.67109303	
P(T<=t) two-tail	0.00042933	
t Critical two-tail	2.00099538	

Table B4: t-Test: Young Adults and Adults Understanding

	Young adults	*Adults*
Mean	7.4	8.51
Variance	5.754	8.582
Observations	31	20
Hypothesized Mean Difference	0	
df	35	
t Stat	-1.4157508	
P(T<=t) one-tail	0.08284312	
t Critical one-tail	1.68957246	
P(T<=t) two-tail	0.16568624	
t Critical two-tail	2.03010793	

Table B5: t-Test: Young Adults and Middle-aged Understanding

	Young adults	*Middle-aged*
Mean	7.4	9.50243902
Variance	5.754	5.1232439

Observations	31	41
Hypothesized Mean Difference	0	
df	63	
t Stat	-3.7726247	
P(T<=t) one-tail	0.00017966	
t Critical one-tail	1.66940222	
P(T<=t) two-tail	0.00035933	
t Critical two-tail	1.99834054	

Table B6: t-Test: Adults and Middle-aged Understanding

	Adults	*Middle-aged*
Mean	8.51	9.50243902
Variance	8.582	5.1232439
Observations	20	41
Hypothesized Mean Difference	0	
df	30	
t Stat	-1.3332959	
P(T<=t) one-tail	0.0962356	
t Critical one-tail	1.69726089	
P(T<=t) two-tail	0.1924712	
t Critical two-tail	2.04227246	

3.3 Contacted and non-contacted stroke patients

Those with direct experience with stroke or direct contact with stroke patients had a greater comprehension of the disease and its treatment (x = 9.05, p = 0.08) than those without direct experience/contact with stroke patients (x = 8.00, p = 0.08) seen in Table C1. Specifically, this trend was particularly pronounced among those participants that ranged between 26 - 40 and 41 – 60, which both groups exhibited a significant difference between those contacted in adults (x = 10.73) and middle-aged adults (x = 10.63) and non-contacted participants in 26 - 40 aged (x = 8.12) and 41 - 60 aged (x = 8.85) at the statistical significance level of 95% as shown in Table C4 and Table C5, followed by the age range from 18 to 25, which had an apparent difference at the significance level of 85% between those experienced (x = 8.34) and inexperienced (x = 7.13) as seen in Table C3 . However, this was not the case among the youngest group, as the level of understanding of those who had direct contact with stroke patients (x= 6.59, p = 0.19) was considerably less than that of participants who had not (x = 7.61, p = 0.19) as illustrated in Table C2.

Table C1: t-Test: Contacted and Non-contacted

	Contacted	*Non-contacted*
Mean	9.05454545	7.99550562
Variance	9.10568182	6.57384321
Observations	33	89
Hypothesized Mean Difference	0	
df	50	
t Stat	1.79063324	
P(T<=t) one-tail	0.03970358	

t Critical one-tail	1.67590503
P(T<=t) two-tail	0.07940717
t Critical two-tail	2.00855911

Table C2: t-Test: Contacted and Non-contacted (Adolescents)

	Contacted	*Non-contacted*
Mean	6.5875	7.61363636
Variance	8.25553571	5.68694805
Observations	8	22
Hypothesized Mean Difference	0	
df	11	
t Stat	-0.9033088	
P(T<=t) one-tail	0.19285827	
t Critical one-tail	1.79588482	
P(T<=t) two-tail	0.38571654	
t Critical two-tail	2.20098516	

Table C3: t-Test: Contacted and Non-contacted (Young adults)

	Contacted	*Non-contacted*
Mean	8.34285714	7.125
Variance	7.17285714	5.28456522
Observations	7	24
Hypothesized Mean Difference	0	
df	9	
t Stat	1.09152048	
P(T<=t) one-tail	0.15170055	
t Critical one-tail	1.83311293	
P(T<=t) two-tail	0.3034011	
t Critical two-tail	2.26215716	

Table C4: t-Test: Contacted and Non-contacted (Adults)

	Contacted	*Non-contacted*
Mean	10.7333333	8.11764706
Variance	0.96333333	8.98029412
Observations	3	17
Hypothesized Mean Difference	0	
df	10	
t Stat	2.8381726	
P(T<=t) one-tail	0.00880173	
t Critical one-tail	1.81246112	
P(T<=t) two-tail	0.01760347	

t Critical two-tail	2.22813885

Table C5: t-Test: Contacted and Non-contacted (Middle-aged)

	Contacted	*Non-contacted*
Mean	10.6333333	8.85
Variance	3.5652381	4.9906
Observations	15	26
Hypothesized Mean Difference	0	
df	34	
t Stat	2.72073277	
P(T<=t) one-tail	0.00509575	
t Critical one-tail	1.69092426	
P(T<=t) two-tail	0.0101915	
t Critical two-tail	2.03224451	

3.4 Ages and disease awareness

There was a correlation between the age range of those taking part and their level of awareness regarding the disease, based on statistical analysis. The results demonstrate that participants' awareness of the disease tends to increase with maturity. Young adults (x = 3.39), adults (x = 3.30), and middle-aged adults (x= 3.29) revealed comparable levels of concern. The greatest disparity can be noticed among adolescents (x= 2.7), who were found to have significantly lower levels of concern than the young adults (p=0.01), adults (p=0.06) and middle-aged (p= 0.02). (Seen in Table D1, Table D2, Table D3, Table D4, Table D5, Table D6).

Table D1: t-Test: Adolescents and Young Adults Awareness

	Adolescents	*Young adults*
Mean	2.7	3.38709677
Variance	1.04482759	1.11182796
Observations	30	31
Hypothesized Mean Difference	0	
df	59	
t Stat	-2.5842212	
P(T<=t) one-tail	0.00612736	
t Critical one-tail	1.67109303	
P(T<=t) two-tail	0.01225471	
t Critical two-tail	2.00099538	

Table D2: t-Test: Adolescents and Adults Awareness

	Adolescentss	*Adults*
Mean	2.7	3.3
Variance	1.04482759	1.16842105
Observations	30	20
Hypothesized Mean Difference	0	

df	39
t Stat	-1.9648527
P(T<=t) one-tail	0.02829195
t Critical one-tail	1.68487512
P(T<=t) two-tail	0.05658389
t Critical two-tail	2.02269092

Table D3: t-Test: Adolescents and Middle-aged Awareness

	Adolescents	*Middle-aged*
Mean	2.7	3.29268293
Variance	1.04482759	1.06219512
Observations	30	41
Hypothesized Mean Difference	0	
df	63	
t Stat	-2.4049368	
P(T<=t) one-tail	0.00956266	
t Critical one-tail	1.66940222	
P(T<=t) two-tail	0.01912532	
t Critical two-tail	1.99834054	

Table D4: t-Test: Young Adults and Adults Awareness

	Young adults	*Adults*
Mean	3.38709677	3.3
Variance	1.11182796	1.16842105
Observations	31	20
Hypothesized Mean Difference	0	
df	40	
t Stat	0.28364647	
P(T<=t) one-tail	0.38907217	
t Critical one-tail	1.68385101	
P(T<=t) two-tail	0.77814434	
t Critical two-tail	2.02107539	

Table D5: t-Test: Young Adults and Middle-aged Awareness

	Young adult	*Middle-aged*
Mean	3.38709677	3.29268293
Variance	1.11182796	1.06219512
Observations	31	41
Hypothesized Mean Difference	0	
df	64	
t Stat	0.37987236	
P(T<=t) one-tail	0.35264893	
t Critical one-tail	1.66901303	

P(T<=t) two-tail	0.70529786
t Critical two-tail	1.99772965

Table D6: t-Test: Adults and Middle-aged Awareness

	Adults	*Middle-aged*
Mean	3.3	3.29268293
Variance	1.16842105	1.06219512
Observations	20	41
Hypothesized Mean Difference	0	
df	36	
t Stat	0.02519712	
P(T<=t) one-tail	0.49001845	
t Critical one-tail	1.68829771	
P(T<=t) two-tail	0.98003689	
t Critical two-tail	2.028094	

3.5 Age and exercises

In terms of the correlation of the self-care conducted at each age, it was found to be the highest in adolescents (x= 3.80) followed by young adults (x=3.23) and middle-aged adults (x=3.12) which is moderately lower. Interestingly, the working-age adults ranging from 26 to 40 appeared to have inadequate exercise with levels of 2.75. In addition, based on the t-test analysis, the results revealed the same case for adolescents, who were at the greatest levels compared to young adults (p=0.08), adults (p=0.01) and middle-aged adults (p=0.03). However, the results of the distinction between the adults and the others are shown to be different. It was shown that there wasn't any apparent statistical difference among the young adults (p=0.25) and middle-aged people (0.36) (Seen in Table E1, Table E2, Table E3, Table E4, Table E5, Table E6).

Table E1: t-Test: Adolescents and Young Adults Self-care

	Adolescents	*Young adults*
Mean	3.8	3.22580645
Variance	1.40689655	1.84731183
Observations	30	31
Hypothesized Mean Difference	0	
df	58	
t Stat	1.75958192	
P(T<=t) one-tail	0.04187608	
t Critical one-tail	1.67155276	
P(T<=t) two-tail	0.08375216	
t Critical two-tail	2.00171748	

Table E2: t-Test: Adolescents and Adults Self-care

	Adolescents	*Adults*
Mean	3.8	2.75
Variance	1.40689655	2.19736842

Observations	30	20
Hypothesized Mean Difference	0	
df	35	
t Stat	2.65194665	
P(T<=t) one-tail	0.00597221	
t Critical one-tail	1.68957246	
P(T<=t) two-tail	0.01194441	
t Critical two-tail	2.03010793	

Table E3: t-Test: Adolescents and Middle-aged Self-care

	Adolescents	*Middle-aged*
Mean	3.8	3.12195122
Variance	1.40689655	2.0097561
Observations	30	41
Hypothesized Mean Difference	0	
df	68	
t Stat	2.18936257	
P(T<=t) one-tail	0.01600304	
t Critical one-tail	1.66757228	
P(T<=t) two-tail	0.03200607	
t Critical two-tail	1.99546893	

Table E4: t-Test: Young Adults and Adults Self-care

	Young adults	*Adults*
Mean	3.22580645	2.75
Variance	1.84731183	2.19736842
Observations	31	20
Hypothesized Mean Difference	0	
df	38	
t Stat	1.15584034	
P(T<=t) one-tail	0.12748109	
t Critical one-tail	1.68595446	
P(T<=t) two-tail	0.25496218	
t Critical two-tail	2.02439416	

Table E5: t-Test: Young Adults and Middle-aged Self-care

	Young adults	*Middle-aged*
Mean	3.22580645	3.12195122
Variance	1.84731183	2.0097561
Observations	31	41
Hypothesized Mean Difference	0	
df	66	
t Stat	0.31513394	

P(T<=t) one-tail	0.37682709
t Critical one-tail	1.66827051
P(T<=t) two-tail	0.75365418
t Critical two-tail	1.99656442

Table E6: t-Test: Adults and Middle-aged Self-care

	Adults	*Middle-aged*
Mean	2.75	3.12195122
Variance	2.19736842	2.0097561
Observations	20	41
Hypothesized Mean Difference	0	
df	36	
t Stat	-0.9331297	
P(T<=t) one-tail	0.17848484	
t Critical one-tail	1.68829771	
P(T<=t) two-tail	0.35696968	
t Critical two-tail	2.028094	

4. Discussion

However, they contain a significant difference between their general knowledge and their technical part, which is the section that is found to be struggling by most of the sample. Proponents of the results on general knowledge of the disease, which is comparable to Luan et al. (2021), whose findings also suggest that the sample recognition of stroke symptoms was moderate, which correctly attempted 5.2 out of 12. There are studies that the results of their public awareness levels on the risk factors and warning signs also appeared to contain relatively good understanding, with 59.3% and 68.3%, respectively, being able to correctly answer (Naguib et al.,2020). However, with regards to technical terms, additional education is required so that many people might not fully understand which it can be well supported by the Farraq et al. (2018) studies that aim to investigate public awareness on stroke disease in 4 Egyptian cities by conducting descriptive cross-sectional study. They found that knowledge levels on stroke treatments were inadequate with only approximately 23.9% of participants knowing the appropriate treatments. Similarly, to Sadeghi-Hokmabadi et al. (2019) findings, by focusing on technical aspects, it revealed that only 1.1% of the sample were aware that thrombolytic therapy was a first line of stroke treatments. Furthermore, our study is shown that stroke knowledge is also influenced by gender, with females representing higher levels than that of the males. This phenomenon can be well supported by Sun et al. study (2011) which also found that sex played a related factor of stroke understanding levels as their results suggested that the females acquired higher knowledge levels than the men ($p = 0.001$) also in other studies revealed that female gender is associated with greater awareness of stroke symptoms (Madsen et al., 2015).

Moreover, based on the findings, the experiences and contact with stroke patients can be considered as other factors. The participants who have experienced stroke disease or contacted stroke patients are shown to contain statistical differences and perform better understanding compared to those who had not. Surprisingly, the result is shown to be different from other previous studies from Sullivan et al. (2005) which reveals that there was no significant difference between both of these groups and Ranawaka et al. (2020) whose studies found stroke awareness is not at a satisfactory level in patients with incident stroke and is comparable to patients without stroke.

Therefore, it is recommended in this paper that it be vital for government agencies to help propagate awareness and knowledge regarding fundamental treatments that can assist individuals in avoiding potential risks.

Specifically, a public educational campaign for stroke response should be introduced as the greater number of people who fully understand the method to cope with the disease, the better for them to be safe from the disease. According to Fogle et al. (2003) studies, it was shown that after implementing a 20-week public education campaign, there was a rise in proportion of the participants indicating to respond immediately after experiencing sudden associated symptoms and it suggested that it can improve community awareness on stroke disease. Moreover, FAST guidelines, which shown to be an effective strategy in Wall et al. (2008) studies to improve short term knowledge among the adults aged or elderly to be more recognized on the stroke disease symptoms, can also be introduced within the public educational campaign.

Turning to the correlation of age range, awareness and disease understanding, it was shown that a positive correlation was presented between the age range and their awareness. However, it was not the case with the knowledge levels and participants' age groups. Middle-aged adults appeared to contain relatively good understanding compared to other age-ranges. The outcome was in line with Melnikov et al. (2018) studies which suggested that the highest stroke comprehension was found in the 45 - 64. Notably, some studies revealed that age is negatively correlated with stroke awareness (Nicol et al., 2005; Sun et al., 2011). Thus, stroke knowledge should be known as fundamental knowledge in every age group and early exposure to knowledge related to stroke through the education system is also needed to be prepared. If the curriculum contains these contents, it will impact their lifestyle by avoiding the disease's risk factors and could be well prepared for the immediately unexpected situation.

Lastly, the age group ranged between 12 to 17 which is the youngest sample in the studies, appeared to be the group that contained the highest of exercise levels, but this positive lifestyle did not significantly appear in the other groups. Conducting self-care and performing exercise strategies therefore should be promoted and done by every age group. The rationale behind this is that it is considered as the initial stage in the prevention of cardiovascular and stroke disease. As the greater number of people are looking after themself, the better of health they would receive. Thus, the most effective medication is to look after yourself by preventing the disease and staying healthy.

5. Conclusion

In conclusion, this study underscores the importance of understanding stroke fundamentals to decrease mortality and disability rates. The findings reveal a need for improvement in overall stroke comprehension, particularly in technical aspects, while highlighting that middle-aged adults exhibit the highest understanding. Direct experience or contact with stroke patients correlates with greater disease awareness. To address these gaps, government organizations must prioritize public education efforts, implementing guidelines like FAST and promoting stroke response awareness. By fostering a society that comprehends stroke coping methods, we can reduce the burden of stroke and enhance public health outcomes.

6. Limitation of the study and future recommendation

The group of subjects being studied might not be representative of the entire population, which is a limitation of this study. The study relied on a limited number of participants localized in one location. This restricts the findings' applicability to a wider range of people. To address this limitation, future research should strive to increase the sample size and incorporate participants from a variety of areas in order to gather a more representative sample. Furthermore, altering the contexts and including participants with a variety of conditions related to the research question would increase the validity of the research.

This study's reliance on survey methodology, which may limit the depth of data collected from participants, is another limitation. In some cases, surveys provide limited space for respondents to elaborate on their experiences and perspectives. This may lead to a lack of deep comprehension of the investigated phenomenon. For future

research to overcome this limitation, qualitative methods such as interviews and focus groups should be considered. Interviews would enable researchers to collect detailed descriptions and obtain a deeper understanding of the viewpoints and experiences of participants in relation to the study's topic.

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