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Massage Using Frangipani Aromatherapy Oil to Speed up The Duration of Childbirth

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Abstract

Excessive anxiety during childbirth can cause changes in bodily functions. The impact is that the labor process takes longer, causing complications to both mother and baby. One of the non-pharmacological ways that can be done so that the labor process is gone naturally is by providing complementary massage therapy and frangipani aromatherapy. This research aims to determine the effect of back massage using frangipani aromatherapy oil in the first stage of labor on the duration of childbirth. The type of this research is Quasi-Experimental Design, posttest control group design. The sample is 80 people consisting of the control group of 40 people and the treatment group of 40 people. The sampling technique used is Consecutive Nonprobability Sampling. The data were recorded in the observation sheet. Also. The data analysis was done through univariate and bivariate "unpaired t-test". The results showed that the average duration of childbirth in the control group was 31.25 minutes, while the treatment group was 23.75 minutes. There is an effect of massage using frangipani aromatherapy oil in the first stage of labor on the duration of childbirth at a significance level of 0.01 ($p < 0.05$). In conclusion, there is the effect of massage using frangipani aromatherapy oil in the first stage of labor on the duration of childbirth. It is hoped that midwives will use complementary frangipani aromatherapy massage in providing midwifery care during the first stage of normal labor.

Keywords: Massage, Aromatherapy, Frangipani, Duration, Childbirth

1. Introduction

Childbirth or labor and delivery is a series of events that ends with the expulsion of the baby at term or nearly term, followed by removal of the placenta and fetal membranes from the mother's body. Physiological labor is accompanied by pain, which is caused by the opening of the cervix, hypoxia, and ischemia of the uterine muscles during contraction, and the stretching of the lower uterine segment and the nerve compression in the cervix (Byron & Brueggemann, 2009; Nilvér, Begley, & Berg, 2017).

Mothers who give birth normally, if they have begun the second stage of labor, will feel more frequent and stronger pain. This is often feared by mothers, so they choose to avoid spontaneous labor by performing a caesarean section or caesarean section on request as an effort to minimize the sensation of labor pain (Alipour, Services, & Lamyian, 2011; Weckesser et al., 2019; Belizán et al., 2018). During the process of childbirth, midwives have an important role in dealing with maternal pain or stress, as one of the efforts of the Mother Care Movement or Gerakan Sayang Ibu (GSI) (Hamnah, 2008). One of those that can be done independently by midwives is doing massage and aromatherapy (Barreto et al., 2013; Czech, Fuchs, Fuchs, Lorek, & Tobolska-lorek, 2018) (Smith, Collins, & Crowther, 2011; Dewi, Sukini, Thaariq, & Hidayati, 2017; Buckley, 2015).

The presence of pain that occurs during physiological labor can cause anxiety and fear for any pregnant woman. Fear and anxiety towards pain can cause acute stress, increasing the release of the adrenocorticotropin hormone (ACTH), cortisol, anti-diuretic hormone (ADH), steroids, and various activities that are mediated by autonomic nerves (Simkin & Hara, 2007). These hormones cause tension on smooth muscle and vascular vasoconstriction. This leads to a decrease in uterine contractions, disruption of uteroplacental circulation, decrement of the flow of blood and oxygen to the uterus, and uterine ischemia which makes the pain impulses multiply (Simkin & Hara, 2007).

The escalation of autonomic nerve activity in laboring mothers increases the release of catecholamines which results in the disruption of uterine contractions, the increase of peripheral resistance, as well as cardiac output and blood pressure (Bolbol-Haghighi, Masoumi, & Kazemi, 2016). The occurrence of hyperventilation can result in hypocalcemia, increase oxygen consumption, and even respiratory alkalosis. Hypocalcemia causes tetany, paraesthesia, and impaired orientation. Respiratory alkalosis that continues without a good body compensation mechanism can lead to a metabolic acidosis resulting in acidosis in the fetus. This situation stimulates an increase in catecholamines which can cause interference to the strength of uterine contractions, and vascular as well as smooth muscle vasoconstriction (Dixon, Skinner, & Foureur, 2013; Manuaba, 2010; Byron & Brueggemann, 2009).

Excessive anxiety during labor can also cause changes in bodily functions. This occurs due to an increase in adrenaline secretion, which causes the smooth muscle of the birth canal to become stiff and less relaxed, the prolongation of the labor process, thereby increasing complications for the mother and the fetus (Alipour et al., 2011; Dixon et al., 2013). The complications that occur in labor are in the form of prolongation of the labor process so that lead to the incidence of bleeding and infection, as well as complications in infants in the form of fetal distress, asphyxia, and infection (Kat et al., 2015). The prolongation during the process of childbirth will increase labor by vacuum extraction, forceps extraction, and Caesarean section (Koelewijn, Sluijs, & Vrijkotte, 2017; Dixon et al., 2013).

The World Health Organization (WHO) recommends that the rate of cesarean section in a country is 5% - 15% (World Health Organization (WHO), 2015). In Southeast Asia the average incidence of cesarean section is 27%, varies between 19% - 35% among the countries (Festin et al., 2009). Caesarean section labor and delivery in Indonesia continues to increase every year in both public and private hospitals. Research on the proportion of caesarean section in one private hospital and one public hospital in Jakarta during the period of 1 January to 31 December 2011 found 59.2% cesarean section (Andayasari et al., 2014; Suryati, 2010; M & Nasution, 2012). The representation of women who had cesarean section surgery; 75% were not at the age of high risk for normal delivery, 80% had no history of fetal death, and only 15.4% had signs of complications during pregnancy (Suryati, 2010). The results of the study at Sanglah Central General Hospital (RSUP Sanglah) Denpasar found that there had been an increase in the rate of cesarean section labor and delivery from 22.27% in 2001 to 34.56% in 2006 (Gondo & Sugiharta, 2010).

One of the efforts to help mothers so that they can go through the labor process naturally, without drugs, and with the independent authority of midwives is by using massage and aromatherapy techniques (Astuti et al., 2016; Gondo & Sugiharta, 2010; Simkin & Hara, 2007). Aromatherapy is a complementary therapy in midwifery practice using essential oils from the fragrant aroma of plants to improve physical and emotional conditions (Luo, Huang, Xia, & Zeng, 2015; Sumarni, Astuti, & Karmilah, 2019). Frangipani is aromatherapy that has the character and benefits of increasing concentration, enthusiasm, joy, self-confidence, relaxation, reducing fear, depression,

panic, relaxing muscles, and skin (Smith et al., 2011; Simkin & Hara, 2007). Empirical experience of giving frangipani aromatherapy has not been popularly used in midwifery services. Aromatherapy research that has been done a lot is lavender and roses (Lamadah & Nomani, 2016; Massomeh Kheirkhah, Valipour, Neisani, & Haghani, 2013; Masoomah Kheirkhah, Setayesh, Pour, Nisani, & Haghani, 2014). The research found there was an effect of massage using frangipani aromatherapy oil on labor pain intensity at a significance level of $p < 0.001$ (Gusti et al., 2019).

Researchers are interested in conducting a study on the aromatherapy of frangipani as in Bali there are many frangipanis or bunga Kamboja (in Balinese bunga Jepun) and are often used for ceremonial purposes. This flower is easy to obtain no matter what the season is, but has not been widely used in midwifery services so that its benefits need to be further explored. Also, this can change the image of frangipani which are identical to mystical flowers into flowers that are useful in midwifery services, as well as has an economic value to the Balinese. Therefore, according to the background aforesaid, the researchers are interested in examining the effect of massage using frangipani aromatherapy oil in the first stage of labor on the duration of childbirth. In general, this research aims to determine the effect of massage using frangipani aromatherapy oil in the first stage of labor on the duration of the childbirth.

2. Materials and Method

2.1 Study area and population:

This research is a Quasy Experimental Design, posttest control group design using a prospective approach. The sampling technique used is Consecutive Nonprobability Sampling. The research has received permission from the Research Ethics Commission of Udayana University and Sanglah Hospital Denpasar, conducted from June to October 2016. The research subjects were mothers who gave birth at PP Dauh Puri Denpasar and BPM Gusti Ayu Widiasih Gianyar.

2.2 Sample size:

The sample was 80 people, divided into treatment and control groups. The treatment group of 40 people performed back massage using frangipani aromatherapy oil on thoracic, and lumbar 1 during the labor process in the first active phase, while a control group of 40 people was given a massage using virgin coconut oil (VCO) without aromatherapy.

2.3 Sample collection and processing:

The inclusive criteria are: first-time labor, the active phase of labor, cooperative, attending antenatal classes during pregnancy, the position of the fetus behind the head, estimated fetal weight 2,500 grams to 4,000 grams, willing to be the respondents. Then the primary data were collected. The treatment and control groups were determined using a simple random system. After the respondents were given the treatment, then the second stage was carried out, namely from the opening of the uterine cervix completely until the baby was born, then recorded on the observation sheet. The data analysis techniques include univariate and bivariate analysis using the "unpaired t-test", and the hypothesis testing through concluding is based on the p-value at the 95% confidence level.

3. Results

The data collection was carried out after obtaining Ethical Clearance approval from the Research Ethics Commission of Udayana University and RSUP Sanglah Denpasar from June-October 2016 with the following results:

Table 1. Characteristics of Research Respondents: The Effect of Back Massage Using Frangipani Aromatherapy Oil in the First Stage of Labor on the Childbirth Duration

No	Characteristics	Control Group		Treatment Group	
		f	%	f	%
1.	Education				
	Primary	15	37,50	14	12,5
	Secondary	24	60,00	26	65,00
	Higher	1	2,50	0	0
	Total	40	100	40	100
2.	Age				
	< 20 years old / > 35 years old	2	5,00	1	2,50
	20-35 years old	38	95	39	97,5
	Total	40	100	40	100
3.	Occupation				
	At work	35	97,50	36	90,00
	Not at work	5	12,50	4	10,00
	Total	40	100	40	100

Table 1 showed that the distribution of respondents in each type of education and age between the control and treatment group is almost the same. Most respondents in both groups are secondary education, ranging in age from 20-35 years, and almost all respondents are at work.

Table 2. Data Normality Test of Childbirth Duration on Research: The Effect of Massage Using Frangipani Aromatherapy Oil in First Stage of Labor on the Duration of Childbirth

No	Variable	Standard Deviation	Statistic	<i>p</i>
1	Childbirth duration on the control group	11.234	Kolmogorov-Smirnov =0,094	0.200
2	Childbirth duration on the treatment group	7.150	Shapiro-Wilk =0,963	0.208

Table 2 showed that the two groups have a *p* value > 0.5, which means that the data for the two groups are normally distributed. Thus, a parametric analysis can be carried out using the unpaired *t* test.

Table 3. Analysis Result on the Effect of Massage Using Frangipani Aromatherapy Oil on Stage I Labor on the Duration of Baby Birth

Variable	Average	Standard Deviation	<i>t</i>	<i>p</i>
Childbirth duration Without aromatherapy (n=40)	31,25	11,234	-3,562	0,01
Frangipani aromatherapy (n=40)	23,75	23,75		

Table 3 showed the duration of childbirth in the group of women who gave birth using Frangipani aromatherapy oil in the first stage labor massage had an average duration of 23.75 minutes, faster than the group of women who did not use aromatherapy in the first stage labor massage (31.25 minutes). The result of the *t* test was -3.562 with a value of *p* = 0.01 (*p* < 0.05), indicating that there was an effect of massage using frangipani aromatherapy oil in the first stage of labor on the childbirth duration at a significance level of *p* < 0.05.

4. Discussion

Aromatherapy is a complementary therapy in midwifery practice using essential oils from the fragrance of plants to improve physical and emotional conditions (Silva et al., 2019). According to Regulation of the Minister of Health of Indonesia number 103 of 2014, the ingredients used in aromatherapy are active substances taken from aromatic plants (extracts from flowers, leaves, roots, stems/twigs, fruit, seeds, etc.) which provide stimulating or relaxing effects. Aromatherapy is a body care technique using or utilizing nutritious essential oils. Aromatherapy can be used by rubbing on the skin or to be more effective with a massage.

Frangipani, also known as plumeria or frangipani flower, plays a very important role in daily activities in Bali. It is used in religious ceremonies, as well as for beauty, massage, and body scrubs. It contains saponins, flavonoids, and polyphenols. Frangipani's *Simplicia* extract contains bioactive compounds in the form of tannins, total phenols, and vitamin C. Frangipani also contains several elements of triterpenoid and amyrin compounds which are relaxing. The relaxing characteristics given off by frangipani aromatherapy oil can help increase comfort (Amirudin, Harnany, & Widowati, 2020). Frangipani Aromatherapy is one type of traditional healing method which have been known thousands of years ago. Frangipani aromatherapy massage oil is made in the form of oil with the addition of olive oil or virgin coconut oil (VCO), so it is thicker than essential oils. Its use is by applying the massage oil to the body.

Based on the research findings on the characteristics of respondents, most of the mothers got secondary education, which means that from the point of view, the level of education has exceeded primary education. This allows mothers to be able to receive information related to childbirth properly. The level of education can influence their psychosocial condition towards the preparation, expectations and treatment that will be undertaken. Age of the respondents in the control and treatment groups is mostly at the age of 20 to 25 years. Age is one of the factors that influence a person's experience. Also, it is indirectly related to labor and delivery process because it affects a person's emotions and affects the mother's expectations of treatment during the labor.

The results showed that the childbirth duration in the group that was given a massage without frangipani aromatherapy is 11 minutes (the fastest) and 60 minutes (the longest), and in the group that was given massage with frangipani aromatherapy is 8 minutes (the fastest) and 37 minutes (the longest). This means that respondents who got massage using frangipani aromatherapy experienced a shorter duration of childbirth. This is in line with the mechanism of labor pain following a series of nerve fiber pathways in general, where the nociceptive process is grouped into 4 stages, namely transduction, transmission, modulation, and perception. The massage mechanism in the thoracic area 10,11,12, and lumbar 1 which is carried out in labor to relieve pain through gentle and slow massage, a source of innervation to the uterus and cervix, will activate the transmission of more A-beta sensory nerve fibers fast as a neurotransmitter. It will then reduce pain transmission through small diameter C and A-delta fibers as well as close the synapses for the transmission of pain impulses (Barreto et al., 2013). If pain transmission is blocked it will also block modulation and pain will not be perceived. Several studies have also found that massage during the first stage of labor reduces severe pain, and mothers who give birth do not feel pain or even the pain decreases and will feel calmer (Kat et al., 2015; Astuti et al., 2016).

Massage that is carried out on the thoracic region 10, 11, 12, and lumbar 1 stimulates ascending nerve receptors. Then, the stimulation is sent to the hypothalamus through the spinal cord, is transmitted to the pons, and continued to the gray part of the midbrain (periaqueductal). This received stimulus is delivered to Hypothalamus, from the hypothalamus through the descending nerve pathways, endorphin hormones are released into the blood vessels (Smith et al., 2011; Barreto et al., 2013; Gondo & Sugiharta, 2010; Bolbol-Haghighi et al., 2016; Dixon et al., 2013). This causes the mother to be calmer, there is relaxation of smooth muscles including those in the pelvic area, coordination of regular uterine contractions so that the process of expulsion of the fetus becomes faster (Smith et al., 2011; Bolbol-Haghighi et al., 2016; Simkin & Hara, 2007; Festin et al., 2009). The results of this study are in accordance with the research which found that massage therapy during childbirth accelerates the process of stage I and stage II and increases the APGAR Score for newborns (Bolbol-Haghighi et al., 2016; Kat et al., 2015). The labor process is influenced by power, passage, passenger, psychic and assistant (Manuaba, 2010). The results of this research indicate that massage using frangipani aromatherapy provides a good response to maternal psychology. The principle of using aromatherapy is based on the nose's function. The smell that is inhaled will

make a vibration in the nose. The olfactory nerves pick up on smells, then send them to the brain, affecting the limbic system, where memory centers, moods, and intellect, which then affect the work of the brain and nerves (Smith et al., 2011). Apart from the smell, aromatherapy oil is applied as a massage oil. When frangipani aromatherapy oil massage is absorbed by the skin and muscles, it will give a warm sensation that soothes the muscles, and the mother feels calm, relaxed. The application of aromatherapy in this research has a psychological effect through the limbic system and healing physical complaints through the endocrine and nervous system (Smith et al., 2011; Simkin & Hara, 2007; Ministry of Health of Indonesia, 2008).

This research showed that Massage using frangipani aromatherapy speeds up the childbirth duration on an average of 23.75 minutes. This is faster than massage without aromatherapy with an average of 31.25 minutes. The decrease in the feeling of pain and tension of the mother during giving birth, the peace of mind and mental health, and relaxation, make the mother stronger in facing labor (Smith et al., 2018). These will also have a positive impact on uterine contractions. The regular contraction of the uterus, the stronger it is, will lead to progress and decrease in the lowest part of the fetus, thereby accelerating the process of fetal birth (Bolbol-Haghighi et al., 2016).

An aromatherapy massage is a combination of massage and the use of essential fragrant oils, providing the benefits of deep relaxation, releasing muscle tension, reducing pain, and reducing stress. The psychic condition of the mother in labor who is calm, not stressed or afraid, makes muscle contraction and relaxation become better and increases its elasticity. The elastic pelvic muscles will make it easier to stretch as the fetus passes through the birth canal.

According to the Regulation of the Minister of Health number 103 of 2014, the ingredients used in aromatherapy are active substances taken from aromatic plants. One of the aromatherapy used is frangipani which is another name for bunga Kamboja. This flower grows a lot in Bali containing several elements of triterpenoid and amyryn compounds which are relaxing. Frangipani aromatherapy can be used for massage, meditation and provides a quiet atmosphere (Bolbol-Haghighi et al., 2016; Dixon et al., 2013). Research has proven that frangipani aromatherapy oil is used by mothers who are in menopause to increase comfort during sexual intercourse and reduce the intensity of labor pain.

The skills of the assistant (midwives) determine the length of the labor process. Labor can be led when the opening stage is complete and the fetus' head is already at the base of the pelvis (Ministry of Health of Indonesia, 2008). In this research, the level of education and work experience of assistant varied, however, the labor and delivery aid methods used were the same, namely referring to the standard steps in normal delivery care.

The childbirth duration in the group of women getting frangipani aromatherapy oil in the first stage labor massage had an average time faster (23.75 minutes) than the group of women who did not receive aromatherapy in the first stage labor massage (31,25 minute). The result of the "t" test was obtained -3.562 with a value of $p = 0.01$ ($p < 0.05$). This shows that there is an effect of massage using frangipani aromatherapy oil in the first stage of labor on the childbirth process.

The duration of the childbirth in primiparous is 1-2 hours (Manuaba, 2010). Giving frangipani aromatherapy which is rubbed during massage contains the mechanism of action in the human body which takes place through two physiological systems, namely the blood circulation and the olfactory. Aromatherapy can affect a person's psychological, memory, and emotional conditions. The olfactory organ is a natural means of communication in humans (Dixon et al., 2013). The odor is a molecule that evaporates into the air and enters the nasal cavity through inhalation. The vibrating hairs in the nasal cavity function as receptors to deliver electrochemical messages to a person's emotional and memory centers so that they are recorded by the brain as the olfactory process, then the smell is transmitted as a message to the olfactory center. In this place, various neuronal cell systems interpret the smell and deliver it to the limbic system which is then sent to the hypothalamus to process (Bolbol-Haghighi et al., 2016; Manuaba, 2010).

Frangipani aromatherapy can affect a person's psychological condition, memory, and emotions. The response delivery carried out by the hypothalamus, all the elements in the essential oil are delivered by the circulatory system and chemical agents in the organs of the body that are in need. The message that is delivered throughout

the body is converted into action with the release of neurochemical substances in the form of feelings of calm, pleasure, relaxation, contraction, and relaxation of the uterine muscles. This will affect the leveling and opening of the cervix and make the mother feel stronger against fear, stress, and anxiety during labor (Astuti et al., 2016). The results of this research indicate that massage in the thoracic area 10,11,12 and lumbar 1 using frangipani aromatherapy oil provides a good response to the pelvic floor muscles. In general, two factors influence the delivery process, namely physical and psychological factors. Massage in the thoracic area 10,11,12, and lumbar 1 inhibits the series of pain nerve fiber pathways, especially at the transmission, modulation, and perception stages, so that pain is not interpreted and perceived in the central nervous system (Barreto et al., 2013; Gondo & Sugiharta, 2010). The use of frangipani aromatherapy will stimulate the thalamus to secrete enkephalin which acts as a natural pain reliever and produces a feeling of calm. This condition will stimulate the raphe nucleus to release serotonin which induces sleep. The continued impact of massage on the thoracic area 10,11,12, and lumbar 1 causes the pelvic floor muscles to become more elastic supported by the effects of aromatherapy which causes a feeling of calm, relaxation, pain, and reduced muscle tension, thus making it easier to stretch when the fetus passes birth canal, thus the duration of the baby's birth becomes faster (Dixon et al., 2013).

5. Conclusion

Based on the research findings and discussions, the researcher concluded that the duration of the childbirth for mothers who are given a massage during the first stage of labor without using frangipani aromatherapy oil is the fastest 11 minutes and the longest is 60 minutes, and the average is 31.25 minutes. On the other hand, the mothers who give birth using frangipani aromatherapy oil massage is the fastest 8 minutes and the longest 37 minutes, with an average of 23.75 minutes. Thus, there is an effect of massage using frangipani aromatherapy oil in the first stage of labor on the childbirth duration at a significance level of $p < 0.05$.

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