

## Research Article

# Effleurage Massage With Lavender (Lavandula Lamiaceae) Essential Oil Aromatherapy Reduces Pregnant Women's Lower Back Pain

Kurniati Puji Lestari<sup>1\*</sup>, Anindya Wuri Oktaviana<sup>1</sup>, Dina Indrati Dyah Sulistyowati<sup>1</sup>, and Muhamad Jauhar<sup>2</sup>

<sup>1</sup>Department of Nursing, Health Polytechnic of Ministry of Health Semarang, Indonesia

<sup>2</sup>Department of Nursing, Faculty of Health Sciences, Universitas Muhammadiyah Kudus, Indonesia

**ORCID**

Kurniati Puji Lestari: <https://orcid.org/0000-0002-6304-2211>

**Abstract.** Pregnant women are a high-risk group because they experience physical and psychological changes, one of which is often complaints of lower back pain (LBP) in the third trimester. This can be due to changes in positioning, walking too often, using high heels, or lifting heavy weights. Effleurage massage is a complementary therapy to reduce LBP. The combination with lavender essential oil aromatherapy may reduce LBP more optimally. The purpose of this study was to identify the impact of a combination of effleurage massage with lavender essential oil aromatherapy on LBP in pregnant women. The research used a quasi-experimental pretest-posttest design with a control group. The sample consisted of 16 third-trimester pregnant women for each group (intervention and control), recruited through the purposive sampling. This research was conducted in the area of the Padangsari Health Center, Semarang City in February-March 2021. The Numerical Rating Scale (NRS) of pain was used. The intervention provided was a combination of effleurage massage with lavender essential oil aromatherapy four times a month for 15-20 minutes per session. Data were analyzed using the Wilcoxon test and independent t test. The results showed that the combination of effleurage massage with lavender essential oil aromatherapy led to a significant decrease in LBP in pregnant women ( $p < 0.001$ ). This therapy can be carried out by the family as needed because it is easy, does not cause side effects, and basic ingredients are available in the market. Nurses can accompany pregnant women and their families in the non-pharmacological management of LBP integrated with maternal health programs in primary health care facilities.

**Keywords:** aromatherapy lavender essential oil, effleurage massage, lower back pain, pregnant women

## 1. Introduction

During pregnancy, a pregnant woman experiences physical and psychological changes, especially during the third trimester of pregnancy such as insomnia, lower back pain (LBP), urinary disorders, pressure and discomfort in the perineum, low back pain (LBP),

Corresponding Author: Kurniati Puji Lestari; email: [kurniati\\_pujilestari@yahoo.com](mailto:kurniati_pujilestari@yahoo.com)

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varicose veins, constipation, leg cramps, easy fatigue and swelling of the legs. However, the changes that are most often complained of by pregnant women are low back pain (LBP) [1]. [2] explain the causes of back pain, namely bending too much and too long, walking too often, wearing high heels, lifting too heavy. So that the back muscles experience stretching, improper body mechanics, and incorrect sitting, standing, and walking positions [2]. Pain symptoms during the third trimester of pregnancy arise due to an increase in the production of the hormone relaxin. This hormone causes the joints of the pelvic bones (pubic symphysis, sacroiliac, and sacrococcygeal) to stretch which serves to facilitate the delivery process. Back and thigh muscle tension causes pain [3].

Back pain during pregnancy varies widely, around 35-60%. As many as 47-60% of pregnant women experience low back pain at 5-7 months of pregnancy [4]. The prevalence rate of low back pain in pregnant women is high as 50% occurs in Europe, Australia, China, America, Taiwan, Africa, and Nigeria [5]. [6] reported the incidence of low back pain in pregnant women in Indonesia reached 60-80%. The prevalence of low back pain in pregnant women reaches 40% in Central Java. [6] also explained that during January – September 2014 there were 202 of 325 pregnant women experiencing low back pain. [7] reported that there were 5,283,165 pregnant women in Indonesia, 585,566 pregnant women in Central Java Province, and 52,262 pregnant women in Semarang City. Nearly 70% of pregnant women experience low back pain. Based on a preliminary study at the Padangsari Health Center in November - December 2019, it was found that almost 90% of pregnant women experienced low back pain.

Back pain during the third trimester of pregnancy if not treated immediately can cause long-term back pain. Increased post-partum back pain can cause chronic pain that is difficult to cure [8]. So that it has an impact on physical activity disorders, discomfort, and difficulty sleeping so that the quality of life of pregnant women decreases [9]. Several interventions can be done by pregnant women to reduce pain, namely reducing too heavy activity, getting enough rest, sitting in a chair that can support the back, putting a small pillow on the back, avoiding too much-bending position, avoiding wearing high heels, sports, giving aromatherapy and massage [10].

The aroma of lavender can be used as an aromatherapy option. [11] reported that there were differences in pain scales before and after giving lavender oil blend essential aromatherapy to post-cesarean mothers. [12] also explains that lavender steam aromatherapy is effective in lowering blood pressure in hypertensive clients. Lavender aromatherapy can reduce anxiety [13]. There are other non-pharmacological pain management, namely massage. Massage effleurage is a method of massage using both

palms by applying gentle pressure over the surface of the body with repeated circular movements [14].

This technique improves blood circulation, reduces pain, provides a relaxing effect, and warms the abdominal muscles. This technique is easy to do, safe, inexpensive, has no side effects, and can be done alone or with the help of others [15]. [16] stated that massage effleurage and breath relaxation in reducing back pain in third-trimester pregnant women. When the massage process and pain take place simultaneously, the pressure generated from the message will reach the brain faster than the pain, so that the massage stimulation can affect the pain response. The study aims to analyze the effectiveness of the combination of massage effleurage with lavender essential oil aromatherapy on the level of low back pain scale in third-trimester pregnant women.

## 2. Methods

This study used a quasi-experimental pre-test and post-test design with a control group. The research was conducted in February-March 2020 in the Padang Sari Health Center working area. The independent variable is the combination of massage effleurage with lavender essential oil aromatherapy. The dependent variable is the scale of low back pain in pregnant women. The study population was the third-trimester pregnant women with low back pain in the Padang Sari Health Center working area, as many as 50 pregnant women. The number of research samples was 16 pregnant women for each intervention and control group through the purposive sampling technique. The inclusion criteria were the third-trimester pregnant women with low back pain on a pain scale of 4-7 (moderate pain) and were in the working area of the Padang Sari Health Center. The exclusion criteria were having complications during pregnancy.

Researchers provided a combination intervention of massage effleurage with lavender essential oil aromatherapy as much as 3-10 ml for 15-20 minutes when pain complaints appeared four times in one month. The research instrument used was the Numerical Rating Scale (NRS) measured before and after the intervention. Data analysis used the Wilcoxon test to identify differences in the pre-test and post-test in each group and an independent t-test to identify the effect of the intervention on reducing the low back pain scale. This research has passed the ethical test from the Research Ethics Committee of Faculty of Medicine Sultan Agung Islamic University (No. 047/I/2020/Komisi Bioetik).

## 3. Results

TABLE 1: Characteristics of pregnant women by age, education, parity, and employment status (n = 32)

Variable	Intervention		Control	
	f	%	f	%
<b>Age</b> 20-35 years old >35 years old	16 0	100 0	14 2	87.7 12.4
<b>Educational background</b> Elementary school Junior high school Senior high school University	0 0 11 5	0 0 68.8 31.3	1 0 12 3	6.3 0 75.0 18.8
<b>Parity</b> Primigravida Multigravida	10 6	62.5 37.5	10 6	62.5 37.5
<b>Working status</b> No Yes	16 0	100 0	16 0	100 0
<b>Total</b>	<b>16</b>	<b>100</b>	<b>16</b>	<b>100</b>

TABLE 2: Description of the low back pain scale before and after the intervention in the intervention and control groups

Group	Mean	Median	SD	Min	Max
<b>Intervention</b> Pre-test Post-test	6.13 2.00	6.00 2.00	0.719 0.894	5 1	7 3
<b>Control</b> Pre-test Post-test	5.75 5.19	6.00 5.00	0.856 0.655	4 4	7 6

### 3.1. Characteristics of pregnant women

Based on table 1, it can be seen that the researchers grouped the age of the respondents into 2 groups. From the table, it can be seen that most of the respondents are aged 20-35 years, namely 16 respondents or 100%. Most of the pregnant women’s educational background was senior high school as many as 11 pregnant women (68.8%) in the intervention group and 12 pregnant women (75%) in the control group. Most pregnant women have parity status were primigravida both in intervention and control group as many as 10 pregnant women (62.5%). All of the pregnant women both in intervention and control group were not working or as a housewife.

#### Description of the low back pain scale before and after the intervention in the intervention and control groups

Based on table 2, the mean pain scale in the intervention group before the intervention was 6.13 (SD = 0.719 ), and after the intervention was 2.00 (SD = 0.894). The mean pain scale in the control group before the intervention was 5.75 (SD = 0.856) and after the intervention was 5.19 (SD = 0.655).

#### Differences in low back pain scale before and after intervention in the intervention and control groups

TABLE 3: Differences in low back pain scale before and after intervention in the intervention and control groups

Group	Mean	SD	MD	p-value
<b>Intervention</b> Pre-test Post-test	6.13 2.00	0.719 0.894	4.13	0.000
<b>Kontrol</b> Pre-test Post-test	5.75 5.19	0.856 0.655	0.56	0.007

TABLE 4: The effect of the combination of massage effleurage with lavender essential oil aromatherapy on the low back pain scale in third-trimester pregnant women

Group	Mean	SD	MD	p-value
<b>Intervention</b> Pre-test Post-test	6.13 2.00	0.719 0.894	4.13	0.000
<b>Kontrol</b> Pre-test Post-test	5.75 5.19	0.856 0.655	0.56	

Based on table 3, there is a significant difference in pain scale before and after the intervention in the intervention group with  $p = 0.000$  ( $p < 0.05$ ) and in the control group with  $p = 0.007$  ( $p < 0.05$ ).

**The effect of the combination of massage effleurage with lavender essential oil aromatherapy on the low back pain scale in third-trimester pregnant women**

Based on table 4, there is a significant effect of the combination of effleurage massage with lavender essential oil aromatherapy on reducing low back pain scale in third-trimester pregnant women with  $p\text{-value} = 0.000$  ( $p < 0.05$ ).

## 4. Discussion

### 4.1. Characteristics of pregnant women based on age, education, parity, and occupation

The average age of pregnant women is 29 years, the youngest age is 23 years and the oldest age is 42 years. [17] states that the average age of pregnant women is included in the safe pregnancy and delivery age group, which is 20-35 years. This age is the productive age for women to produce offspring, namely 14-45 years. At this age, the female uterus can produce ovaries and reproduce [18]. [19] stated that the age of pregnancy and childbirth is 20-30 years. Pregnant women aged less than 20 years are at high risk because biologically and psychologically they are not ready to accept the results of conception so that it is possible to have complaints that often occur. The age

of pregnant women is more than 30 years poses a high risk because the reproductive organs begin to experience a decline in function.

Based on the results of the study, all pregnant women became housewives. There are so many household chores that must be done by pregnant women, which can trigger lower back pain. The daily activities of housewives that are a quite dense trigger fatigue in pregnant women, thereby increasing the perception of pain. Fatigue stimulates sensory pain more intensively and decreases coping mechanisms [20]. [21] explained that pregnant women when doing activities in the wrong sitting position for a long time can cause the back muscles to become tense and can damage soft tissues. If this situation continues, it can cause a herniated nucleus pulposus.

Parity is a condition of a mother who gives birth to a baby more than once [22]. Based on the results of the study, most of the pregnant women had primigravida parity status. According to [23], the experience of pain that has been felt does not rule out the possibility for these individuals to more easily accept pain in the future. However, a person who experiences repeated pain experiences will make it easier to interpret the sensation of pain. The more often the mother is pregnant and the older the gestational age, the more often she feels pain due to the compression of the stretched nerve muscles. Whereas in primigravida pregnant women have never experienced back pain before, so they do not have experience stretching muscle tone during pregnancy [24]

#### **4.2. Description of pain scale before and after intervention in the intervention and control groups**

In the intervention group, which was given a combination of massage effleurage with lavender essential oil aromatherapy, the average pain scale before the intervention was 6.13, and after the intervention was 2.00. Along with increasing gestational age, pregnant women more often complain of lower back pain. Some of the causative factors are changes in posture and the hormone relaxin that affects the ligaments [25]. This is following [3], the greater maternal gestational age affects body posture to compensate for the weight of the uterus. Pregnant women balance the body by pulling the shoulders back. This occurs because the abdomen is enlarged so that the spine is curved inwards excessively. In addition, changes in posture are usually accompanied by relaxation of the sacroiliac joints which causes lower back pain.

Another factor is experience and activity [26]. Fatigue causes the perception of pain to increase. Pain may subside after a period of sleep. [27] stated that strenuous physical activity is associated with a high risk of low back pain during pregnancy. This statement

is in line with the research of [28], pregnant women as housewives are more susceptible to back pain due to heavy household work, especially primigravida pregnant women. [29] also stated that there was a relationship between low back pain and the activity level of pregnant women in the second and third trimesters.

Pain is also caused by previous pain experiences such as multigravida mothers. Changes during pregnancy are not completely reversed after pregnancy and delivery such as the appearance of striae gravidarum. Similarly, abdominal muscle tone that experiences stretching cannot return to its original state [16]. [30] stated that there was a parity relationship with the incidence of back pain in third-trimester pregnant women. The abdominal muscles of pregnant women can cause failure to support the enlarged uterus so that the back arch gets deeper. In addition, pain is influenced by psychological needs factors such as internal-external stressors and family support [3]. Pregnant women with excessive stress will release catecholamine hormones so they are unable to eliminate fear. Arteries narrow because the pain is unbearable and blood flow and oxygen are reduced [31]. [32] states that there is a relationship between work and stress levels in pregnant women.

The role of the family, especially the husband, affects the psychological condition of pregnant women who experience physical and psychological changes. Support can provide comfort, calmness, increase self-confidence, and reduce medical procedures for pregnant women. Psychologically, the presence and support of the closest people will minimize pain [33]. Low back pain if not treated immediately harms the quality of life of pregnant women [34]. Low back pain also has an impact on decreasing sleep quality [35]. [36] explained that pregnant women who experience low back pain have poorer sleep quality.

### **4.3. Differences in low back pain scale before and after intervention in the intervention and control groups**

The combination of massage effleurage with lavender essential oil aromatherapy in the intervention group had a stronger difference than the control group. [16] stated that there was an effect of effleurage massage on reducing back pain in third-trimester pregnant women. [37] stated that there was a significant difference in the intensity of menstrual pain before and after being given effleurage massage in the intervention group. [38] said effleurage massage has a positive impact such as providing relaxation for the body, calming nerves, stress, headaches, and preventing insomnia. Massage effleurage stimulates the central nervous system, provides warmth to the body, improves

blood circulation and lymph flow, removes toxins, and improves skin. [39] explained that pregnant women who receive regular massage will experience a decrease in anxiety, back pain, and sleep better, minimize complications during childbirth, and reduce levels of stress-causing hormones.

[40] explained that pain fibers that carry painful stimuli to the brain are slower than the broad tactile fibers and the sensation runs faster. If touch and pain are stimulated simultaneously, the touch sensation travels to the brain so that the cerebral cortex cannot receive pain signals and the intensity of pain can be reduced. [41] stated that there was an effect of giving effleurage massage and warm compresses to reduce back pain in third-trimester pregnant women. This study uses lavender essential oil aromatherapy for massage. Massage techniques using aromatherapy are useful for reducing pain, reducing tension, and improving blood circulation. Oil molecules are believed to be able to absorb into the bloodstream during the massage and spread evenly through the nervous system [42].

[38] said that aromatherapy can stabilize emotions and relieve symptoms of illness. Essential oils in aromatherapy are efficacious for reducing stress, reducing nausea, vomiting, improving blood circulation, relieving pain, reducing swelling, removing toxic substances, treating viral or bacterial infections, burns, high blood pressure, respiratory disorders, insomnia, digestive disorders, and diseases other. Aromatherapy will stimulate the thalamus to release enkephalin which functions as a natural pain reliever. [11] stated that there was an effect of lavender oil blend essential aromatherapy on reducing pain in post-cesarean section mothers. [43] explained that there was an effect of the combination of P6 point acupressure and ginger aromatherapy on nausea and vomiting in post-chemotherapy cancer patients.

[13] explained that aromatherapy is a volatile oil molecule when carried by air to the roof of the nose where soft cilia emerge from the receptor cells. When the molecule attaches to the cilia, electrochemical messages are sent via smell to the limbic system. This stimulates memory and emotional responses. The hypothalamus acts as a relay and regulation, generating messages to the brain and other parts of the body. The received message is then converted into action in the form of the release of electrochemical compounds that cause euphoria, relaxation, or sedation. The limbic cortex is used for the emotional expression of the system. [44] explained that the combination therapy of music with aromatherapy is effective in reducing anxiety, stabilizing diastolic blood pressure and heart rate.

[45] stated that ginger aromatherapy can be used as an alternative medicine to reduce nausea and vomiting after chemotherapy. [13] explain the advantages of aromatherapy



based on its type such as rosemary will increase alertness and improve memory. The scent of lemon induces a calm feeling and reduces nausea and vomiting during pregnancy. The aroma of lavender essential oil reduces pain and peppermint aromatherapy will reduce nausea, vomiting during pregnancy [46].

[47] showed massage with lavender essential oil was effective in relieving pain and changing functional status. [48] explained that massage with lavender oil can significantly reduce pain and increase spinal mobility [49]. This happens because lavender aromatherapy massage is useful in symptomatic management such as infantile colic, dysmenorrhea, labor-induced pain, low back pain, acts as a sedative compound, and is anti-nociceptive [50]. Immunologically, aromatherapy also increases lymphocytes in peripheral blood vessels and increases CD8 and CD16 which play a role in the immune system. The content of linal, acetate, and linalool contained in lavender essential oil when inhaled can increase alpha waves in the brain to create a sense of relaxation.

#### **4.4. The effectiveness of the combination of effleurage massage with lavender essential oil aromatherapy in reducing low back pain scale in pregnant women**

[51] states that effleurage massage is effective in reducing lower back pain in the third trimester of pregnant women because the touch given can cause a sense of comfort, relaxation, and provide a pleasant sensation so that it can stimulate the nucleus in the brain to inhibit the process of pain impulse travel. [52] explains that the effleurage technique is effective for reducing back pain in the second and third trimesters of pregnancy. This happens because effleurage massage provides tactile stimulation by producing messages that are sent through the A-delta nerve fibers so that painful stimuli cannot be transmitted to the cerebral cortex. [53] also stated that effleurage massage using rose aromatherapy oil was effective in reducing dysmenorrhea pain. Hypoxia in the tissue will decrease because oxygen levels in the tissue automatically increase and pain decreases. In addition, it can improve blood circulation, reduce stress and muscle stiffness. The release of endorphins can reduce the sensation of pain.

[54] explain the mechanism of reducing pain intensity by giving effleurage massage using aromatherapy involving two procedures, namely aromatherapy triggering the limbic system which plays a role in reducing pain, and effleurage massage using essential oils can improve blood circulation and reduce spasms that cause pain. The effects of lavender aromatherapy are analgesic and antispasmodic. Aromatherapy oils are not only inhaled through the sense of smell but are also absorbed through the

skin and then enter the tissues and circulatory system. The oil is channeled to the part of the organ that requires treatment so that the pain is reduced. [55] stated that at a physiological level, this intervention was able to increase endorphins, stimulate nerves thereby reducing pain, increasing blood flow, and tissue oxygenation. The use of lavender oil which is an analgesic can reduce pain, control labor pain, and lower back pain because it contains a lavender linalyl acetate component which functions to relax smooth muscles [56] .

[57] explains that effleurage massage using essential oils plays a role in the social relationship component, namely by utilizing Social Gestures. Massage effleurage provides touch as a physical cue to increase the awareness of health workers in understanding the conditions being faced by clients. Touch provides peace so that it becomes the foundation in creating a sense of security. Clients will feel that they are getting attention through direct touch which will build closeness and deep interaction with clients. Massage effleurage with lavender essential oil aromatherapy can bridge two-way social relationships between health workers and clients through several components, namely positive eye contact, friendly facial expressions, rhythmic vocalizations, voice intonation, relaxing, and body movements.

[58] explained that massage touch can stimulate cutaneous mechanoreceptors and provide information on the largest pain nerve fibers in the spine to block the painful area. The pleasant sensation stimulates the nucleus in the brain to decrease spinal nerve activity and helps release endogenous opioids as inhibitors of pain response neurotransmitters in the brain so that the intensity of pain to the center is inhibited. [57] explains that effleurage massage plays a role in maintaining homeostasis against excessive sympathetic work by regulating the autonomic nervous system against baroreceptor reflexes. When blood pressure increases, impulses travel through baroreceptor afferent fibers resulting in relaxation of vascular smooth muscle, heart rate, and decreased myocardial contractility so that heart volume decreases. Blood flow to all body tissues can restore the body to a normal state of health, growth, and restoration.

Determination of the dose of lavender essential oil is effective in reducing the level of low back pain felt by pregnant women in the third trimester. [59] used 2 drops of lavender essential oil mixed with 1 ml of olive oil and carried out for 10 minutes then repeated for 10 minutes after the first 6 hours of massage. [60] used 2 drops of lavender aromatherapy, 1 drop of clary sage, 1 drop of rose, and 5 ccs of almond then massaged on the stomach. The results showed that dysmenorrhea was significantly reduced. [61] explained that the dose used must be considered to minimize irritation to the skin and ask for a history of allergies to lavender oil so as not to cause damage to the skin.

The use of essential oils is diluted at a concentration of 1.5% - 3.0% in the base oil. Meanwhile, if in contact with the facial area, the dilution should be increased to 0.2% - 1.5% to prevent adverse reactions on sensitive facial skin.

The dose of lavender essential oil used is 3 ml – 10 ml without being mixed with base oil or diluent because the lavender essential oil used is specially made for massage so it will not pose a risk of irritation to the skin and is carried out for 15-20 minutes. No pregnant women reported any signs of allergy or irritation to lavender essential oil. The results of the independent t-test that have been carried out even though the results of the statistical significance values are the same are able to reduce the intensity of the low back pain scale, but the results of the average difference after being given treatment for each group are different. In the intervention group, after being given a combination treatment of massage effleurage with lavender essential oil aromatherapy for 4 times, the results showed that the average difference in the intensity of the pain scale was greater, namely 4.13 compared to the control group, which was given the same treatment once at the end of the study, which was 0.56. So it can be concluded that the combination of effleurage massage with lavender essential oil aromatherapy is effective in reducing the level of low back pain in third trimester pregnant women. The limitation of this study is that the therapy is based on pain complaints and the determination of the sample is not random.

## 5. Conclusion

The combination of effleurage massage with lavender essential oil aromatherapy is effective in reducing low back pain scale in third-trimester pregnant women. This therapy is a choice for non-pharmacological pain management. Decreased pain complaints are expected to improve the quality of life of pregnant women because of the unique nature of pregnant women so that they require different handling. Nursing higher education can integrate complementary therapy materials in the educational curriculum. Health care facilities can implement this therapy integrated with maternal health services. Future research can identify other variables that can be changed through this therapy and identify other complementary therapies that can reduce pain complaints in pregnant women.

## References

- [1] Bobak, Lowdermilk J. Buku ajar keperawatan maternitas. Jakarta: EGC; 2012.

- [2] Tarsikah, Silfiana, Emy. Penerapan teknik mekanika tubuh untuk mengurangi nyeri punggung pada ibu hamil trimester III. *Matern Neonatal Heal J.* 2017;1(1):4–9.
- [3] Widatiningsih S, Dewi CHT. *Praktik terbaik asuhan kehamilan.* Yogyakarta: Trans Medika; 2017.
- [4] Triyana YF. *Panduan klinik kehamilan dan persalinan.* Yogyakarta: P. MEDIKA; 2013.
- [5] Kristiansson. *Epidemiology of back pain in pregnancy.* 2015;
- [6] Mafikasari A, Kartikasari RI. Posisi tidur dengan kejadian back pain (nyeri punggung) pada ibu hamil trimester III. 2015;7(2):26–34.
- [7] Kemenkes RI. *Data dan informasi profil kesehatan Indonesia.* Kurniawan R, Hardhana B, Yudianto, Siswanti T, editors. Jakarta: Kementerian Kesehatan Republik Indonesia; 2018.
- [8] M, Fraser D, A, M C. *Buku ajar bida myles.* Jakarta: EGC; 2009.
- [9] Katonis P, Kampouroglou A, Agglelopoulos A, et al. *Pregnancy - Related low back pain.* 2011;15(3):205–10.
- [10] Amazine. *Penyebab & penanganan back pain pada awal masa kehamilan.* 2017.
- [11] Mariza A, Haryati D. Pengaruh aromaterapi blend essential minyak lavender terhadap nyeri pada pasien pasca operasi sectio caesarea di RSUD pringsewu. *J Kebidanan.* 2018;4(3):124–8.
- [12] Andini DE. *Efektivitas kombinasi massage effleurage dan aromaterapi uap lavender terhadap perubahan tekanan darah pada penderita hipertensi di wilayah kerja puskesmas mranggen.* 2018.
- [13] Arwani, Sriningsih I, Hartono R. Pengaruh pemberian aromaterapi terhadap tingkat kecemasan pasien sebelum operasi dengan anestesi spinal di rs tugu semarang. *Pros Konf Nas PPNI Jawa Teng.* 2013;(1):83–7.
- [14] Reeder, Sharon J, Martin LL, Koniak D, Griffin. *Keperawatan maternitas (kesehatan wanita, bayi dan keluarga).* Jakarta: EGC; 2011.
- [15] Ekowati R, Wahjuni E., Alifah A. *Teknik massase effleurage pada abdomen terhadap penurunan intensitas nyeri pada disminore primer mahasiswi PSIK fkub malang.* 2012.
- [16] Fitriana LB, Vidayanti V. Pengaruh massage effleurage dan relaksasi nafas dalam terhadap nyeri punggung ibu hamil trimester III. *Bunda Edu - Midwifery J.* 2019:1 –6.
- [17] Indrati D. *Efektivitas terapi aroma lavender terhadap tingkat nyeri dan kecemasan persalinan primipara kala i di rumah sakit dan klinik bersalin purwokerto.* Jakarta: Fakultas Ilmu Keperawatan Universitas Indonesia; 2009.

- [18] Rejeki S, Nurullita U, Krestanti R. Tingkat nyeri pinggang kala i persalinan melalui teknik back - effleurage dan counter - pressure. *J Keperawatan Matern.* 2013;1(2):124–33.
- [19] Mirnawati. Hubungan usia kehamilan dengan kejadian nyeri pinggang bawah pada ibu hamil di rsia. Siti fatimah makassar. Makassar: Universitas Islam Negeri Alauddin Makassar; 2010. 2p.
- [20] Judha M, Sudarti, Fauziah. Teori pengukuran nyeri dan nyeri persalinan. 1<sup>st</sup> ed. Judha M, editor. Yogyakarta: Nuha Medika; 2012.
- [21] Firdayani D. Pengaruh senam hamil terhadap penurunan nyeri punggung bawah pada ibu hamil trimester II dan III. Jombang: STIKES Insa Cendekia Medika; 2018.
- [22] Manuaba. Ilmu kebidanan penyakit kandungan dan KB. Jakarta: EGC; 2013.
- [23] Potter, Perry. *Fundamental on nursing.* 3<sup>rd</sup> ed. Jakarta: Salemba Medika; 2010.
- [24] Ummah F. Nyeri punggung pada ibu hamil ditinjau dari body mekanik dan paritas di desa ketanen. 2012;3:13.
- [25] Pujiningsih S. Permasalahan kehamilan yang sering terjadi. Jakarta: Oryza; 2010.
- [26] Wiarto G. Nyeri tulang dan sendi. Yogyakarta: Gosyen Publishing; 2017.
- [27] Kovacs FM. Prevalence and factors associated with low back pain and pelvic girdle pain during pregnancy. *Heal Serv Res SPINE.* 2012;37.
- [28] Nufus H, Maulana N. Hubungan nyeri punggung dengan tingkat stress ibu hamil primigravida trimester III. *Midwifery J STIKes Insa Cendekia Med Jombang.* 2014;8(1).
- [29] Khafidhoh M. Hubungan nyeri pinggang dengan kemampuan aktivitas ibu hamil trimester II dan III di puskesmas ciputat. Jakarta: Fakultas Kedokteran dan Ilmu Kesehatan Universitas Islam Negeri Syarif Hidayatullah; 2016.
- [30] Salam B. Hubungan paritas dengan kejadian nyeri punggung bawah di poliklinik saraf rsudza. *Fak Kedokt Univ Syiah Kuala;* 2016.
- [31] Paramita I, Pramestyani M, Fitriannisa F. Efektivitas perlakuan pijat effleurage pada kala i fase aktif persalinan untuk mengurangi rasa nyeri pada ibu bersalin di BPM yusnaeni bulan mei tahun 2013. *J Keperawatan STIKes Guna Bangsa Yogyakarta.* 2013:12–4.
- [32] Sambara. Faktor yang berhubungan dengan stress kerja ibu hamil di puskesmas batua kota makassar. 2016.
- [33] Siwi RPY. Analisa kepatuhan kunjungan antenatal care terhadap sikap dalam deteksi dini komplikasi kehamilan pada ibu hamil di wilayah kerja puskesmas munjungan kecamatan munjungan kabupaten trenggalek. *J Keperawatan STIKes Surya Mitra Husada Kediri.* 2018.

- [34] Ibanez, Khaled, Renard, Rohani, Nizard, Baiz. Back pain during pregnancy and quality of life of pregnant women. *Prim Heal Care Open Access*. 2017;7(1):1–6.
- [35] Renityas, N N, Sari, L T, Wibisono W. Efektivitas acuyoga terhadap keluhan insomnia pada ibu hamil trimester III di masyarakat agiculture traditional di wilayah kerja puskesmas ngancar kabupaten kediri. *J Profesi Ners*. 2017;4(2):98–103.
- [36] Sousa V. Quality of sleep in pregnant woman with low back pain. *Fisioter Mov*. 2015;28(2):319–26.
- [37] Mawardika T, Mutohharoh W. Penerapan tehnik massage effleurage pada punggung terhadap penurunan intensitas nyeri haid. 2019;11:217–24.
- [38] Handayani RS, Mintarsih W, Rohmatin E. Perbandingan pengaruh aromaterapi mawar dan massage effleurage terhadap nyeri persalinan kala I fase aktif. *J Bidan “Midwifery Journal.”* 2018;4(2):66–72.
- [39] Wulandari P, Hiba PDN. Pengaruh massage effleurage terhadap pengurangan tingkat nyeri persalinan kala I fase aktif pada primigravida di ruang bougenville RSUD tugurejo semarang. *J Keperawatan Matern*. 2018;3(1):59–67.
- [40] Rahma FN, Sofiyanti I, Nirmasari C. Efektivitas teknik effleurage terhadap penurunan intensitas nyeri. *J Fak Kesehat Univ Ngudi Waluyo*. 2017.
- [41] Aini LN. Perbedaan massase effleurage dan kompres hangat terhadap penurunan nyeri punggung pada ibu hamil trimester III. *J Keperawatan*. 2016.
- [42] Jain R. *Pengobatan alternatif untuk mengatasi tekanan darah*. Jakarta: Gramedia; 2011.
- [43] Marwah A, Lestari KP, Indriati. Pengaruh kombinasi akupresur titik p6 dan aromaterapi jahe terhadap mual dan muntah pada pasien kanker post kemoterapi di RSUD moewardi Surakarta. *J Keperawatan Poltekkes Semarang*. 2017.
- [44] Kumala F, Fatmasari D, Lestari KP, Hadisaputro S. Music and aromatherapy: A good combination for reducing anxiety and stabilizing non - invasive hemodynamic status in patients in the intensive care unit. *Belitung Noursing J*. 2018;4(2):186–94.
- [45] Sriningsih I, Elisa, Lestari KP. Aromatherapy ginger use in patients with nausea & vomiting on post cervical cancer chemotherapy. *J Kesehat Masy*. 2017;13(1):59–68.
- [46] Kia YP, Safajou F, Shahnazi M, Nazemiyeh H. The effect of lemon inhalation aromatherapy on nausea and vomiting pregnancy: A double - blinded, randomized, controlled clinical trial. *Iran Red Crescent Med J*. 2014;16(3).
- [47] Nasiri A, Mahmodi M, Nobakht Z. Effect of aromatherapy massage with lavender essential oil on pain in patients with osteoarthritis of the knee. *Complement Altern Med*. 2016;25:75–80.

- [48] Lakhan S, Sheaffer H, Tepper D. The effectiveness of aromatherapy in reducing pain: A systematic review and meta - analysis. *Pain Res Treat.* 2016;2016(8158693).
- [49] Koulivand P, Khaleghi GM, Gorji A. Lavender and the nervous system. *Evid Based Complement Altern Med.* 2013;2013(681304).
- [50] Ghiasi A, Bagheri L, Haseli A. A systematic review on the anxiolytic effect of aromatherapy during the first stage of labor. *J Caring Sci.* 2019;8(1):51–60.
- [51] Wardhani ASK. Penerapan effleurage massage untuk mengurangi nyeri punggung bawah ibu hamil trimester III Di BPM Yospoeni Kecamatan Klirong Kabupaten Kebumen. Kebumen: STIKES Muhammadiyah Gombong; 2017.
- [52] Ningsih. Pengaruh teknik effleurage untuk mengurangi nyeri punggung pada kehamilan trimester II dan III di BPM Uut Sri Rahayu Kaligawe. Fak Ilmu Keperawatan; 2017.
- [53] Hikmah N, Amelia CR, Ariani D. Pengaruh pemberian masase effleurage menggunakan minyak aromaterapi mawar terhadap penurunan intensitas nyeri diseminore pada remaja putri di SMK Negeri 2 Malang jurusan keperawatan. *J Issues Midwifery.* 2018;2(2):34–5.
- [54] Marzouk T, El-Nemer A, Baraka H. The effect of aromatherapy massage on alleviating menstrual pain in nursing students: A prospective randomized cross-over study. *Evidence based complementary and alternative medicine. J Nurs.* 2013:1–6.
- [55] Lamadah SM, Nomani I. The effect of aromatherapy massage using lavender oil on the level of pain and anxiety during labour among primigravida women. *Am J Nurs Sci.* 2016;5(2):37–44.
- [56] Mohamed Abdel-Hamed Metawie. Effectiveness of aromatherapy with lavender oil in relieving post caesarean incision pain. *J Surg.* 2015;3(2–1):8–13.
- [57] Qurniasih N. Efektivitas masase effleurage terhadap penurunan intensitas nyeri persalinan kala I fase aktif di Puskesmas Kota Yogyakarta. 2017:1–14.
- [58] Sharma A, Verma D. Endorphins: Endogenous opioid in human cells. *J Pharm Pharm Sci.* 2015;4(1):357–374.
- [59] Purwati Y. The effectiveness of effleurage massage using oil lavender aromatherapy for menstrual pain relief. *J Heal Med Nurs.* 2018;49:104–9.
- [60] Hur M. Aromatherapy massage on the abdomen for alleviating menstrual pain in high school girls: A preliminary controlled clinical study. *Evidence-Based Complement Altern Med.* 2012;187163:3.
- [61] Antonelli M, Donelli D. Efficacy, safety and tolerability of aroma massage with lavender essential oil: An overview. *Int J Ther Massage Bodyw Res Educ Pract.* 2020;13(1).