

Article

## Combination Of Prenatal Gentle Yoga Exercises And Lavender Aromaterapy Inhalation To Improving Sleep Quality In Trimester Iii Pregnant Women

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### SUBMISSION TRACK

Recieved: Mar 03, 2020

Final Revision: June 23, 2020

Available Online: June 27, 2020

### KEYWORDS

Lavender, Pregnancy, Sleep quality, Yoga

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### A B S T R A C T

As gestational age increases, the quality of sleep can decrease. It was reported that about 60% of late trimester pregnant women experience fatigue and > 75% experience sleep disturbances. However, these complaints are often ignored, even though it can lead to an increased risk of gestational hypertension, diabetes, prematurity, and postpartum depression. Sleep disturbances can also cause depression and stress that affects the fetus. Mild stress causes an increase in fetal heart rate which, if left untreated, will make the baby hyperactive. Meanwhile, the consequences are depression and babies who are born have less time to sleep deeply. Efforts to overcome this sleep disorder are yoga and lavender aromatherapy inhalation. Purpose: Therefore, the researchers estimated that the application of a combination of prenatal gentle yoga and lavender aromatherapy would be more effective in affecting the quality of sleep in pregnant women, so it is hoped that it can reduce sleep disturbances in third trimester pregnant women. Results: There is a significant effect of the combination of prenatal gentle yoga and inhalation of lavender aromatherapy in improving sleep quality in the treatment group with a value of  $\alpha = 0.011$  or  $\alpha < 0.05$ . There was a significant difference in the quality of sleep in the group compared to the control group with a value of  $\alpha = 0.004$  or  $\alpha < 0.05$ . Conclusion: By practicing prenatal gentle yoga and regular inhalation of lavender aromatherapy, it will be able to improve sleep patterns without using sleeping pills which will affect the natural sleep cycle.

## I. INTRODUCTION

Sleep is a physiological need for humans, therefore the quality of sleep is considered an essential health variable because it can affect the quality of human life (Kızıllırmak et al., 2012). One of the main factors affecting sleep quality is different periods of life such as pregnancy (Moline et al., 2003). When pregnant, a mother experiences changes in her body both physiologically, psychologically and socially, so that this adjustment process often raises various complaints (Yanikkerem et al., 2006) (Aprianawati and Sulistyorini, 2007). Insomnia is a sleep problem that is often experienced during pregnancy. It is said that as the gestational age increases, the quality of sleep decreases (Kızıllırmak et al., 2012). It was reported that about 60% of late trimester pregnant women experience fatigue and > 75% experience sleep disturbances, decreased alertness and require sleep during the day (Tsai et al., 2012).

The decreased quality of sleep is caused by physical changes such as nausea, back pain, frequent urination, hormonal changes, fetal growth, increased stomach size and changes in breathing (Kızıllırmak et al., 2012). Psychological changes such as anxiety over childbirth, relationship conditions with husbands, and economic problems also contribute to worsening the quality of sleep (Jannah, 2012) (Safriani et al., 2019). Complaints about sleeping in pregnant women can include delayed sleep, waking up at night, often aroused, waking up in the morning, and waking up longer (Greenwood and Hazendonk, 2004). However, these complaints are often ignored by pregnant women, even though it can contribute to perinatal mood disorders and somatic complaints both short and long term (Beddoe et al., 2010). Adverse clinical outcomes are an increased risk of gestational hypertension, diabetes, prematurity, and postpartum depression (Tsai et al., 2012). Sleep disturbances can also cause fetal distress in the fetus, marked by an increase in the fetal heart rate which, if left untreated, will make the baby hyperactive and depressed (Renityas et al., 2017).

Efforts to overcome this sleep disorder are by exercising, taking drugs, hypnotherapy, sleep education and relaxation exercises (Hegaard et al., 2010). In predecessor research, yoga can reduce insomnia in the elderly and yoga can reduce complaints of pregnant women, including insomnia (Gudawati and Muhlisin, 2012, Rahmarwati et al., 2016, Mediarti et al., 2014). The movements in yoga have an effect on the parasympathetic from the central nervous system, thus reversing the effects of stress where the hormone that causes body dysregulation can be reduced and will slow down the work of other organs (Rahmarwati et al., 2016). Along with that, the body becomes more relaxed and the quality of sleep will improve. Apart from yoga, aromatherapy has been widely used to improve mood and relax the body. The scent of lavender induces thoughts to improve one's sleep quality (Wheatley, 2005) and can provide a mild topromote sedation effect (Goel et al., 2005, Lewith et al., 2005). Impaired sleep quality in pregnant women can be an important problem in pregnancy for both the health of the mother and the fetus. Therefore, researchers estimate that the application of a combination of prenatal gentle yoga and lavender aromatherapy will more effectively affect the quality of sleep in pregnant women, it is hoped that able to reduce sleep disorders in third trimester pregnant women.

## II. METHODS

This research design used a quasi experiment (two group pre-post test design). The population in this study were all trimester III pregnant women at the Independent Practice Midwives (BPM) Lita Anggraeni, Surabaya. The sample size was determined based on the inclusion and exclusion criteria determined by the researcher. The size of the target sample for the control and treatment groups was 15 each using purposive sampling technique. The study began with conducting a pre-test for each group to determine the sleep quality scale of the

respondents, then the treatment group was given prenatal gentle yoga and lavender aromatherapy inhalation. After completing the intervention of the two groups, a post test was carried out to determine changes in the scale of the respondent's sleep quality. The instruments used were the observation sheet and questionnaire. While the data scale used is ordinal based on the Indonesian version of the Pittsburgh Sleep Quality Index (PSQI) score to determine the sleep quality of respondents. The tools and materials needed are a mattress, yoga blocks, yoga straps, speakers, yoga music, lavender essential oil, diffuser and boiled water. Data analysis using univariate and bivariate analysis. Univariate analysis to obtain descriptive characteristics of respondents, in the form of distribution of frequency, percentage, mean, median, and standard deviation. Bivariate analysis to determine the effect and comparison of the pre test and post test. Because this research variable uses a categorical data scale, the researcher chooses the Wilcoxon and Mann Whitney test, with a degree of significance  $\alpha \leq 0.05$ , if  $p \leq \alpha$  then  $H_0$  is rejected and the hypothesis is accepted,

### III. RESULT

#### 1. Description of Respondent Characteristics

The description of the characteristics of the respondents in this study consisted of maternal age, parity, gestational age, occupation and education which can be seen in table 1, below:

Table 1. Description of Respondent Characteristics

Characteristics	Control Group				Treatment Group			
	Min	Max	Mean $\pm$ SD	N (%)	Min	Max	Mean $\pm$ SD	N (%)
Mother's Age (years)	22	35	28.5 $\pm$ 4.67	-	20	35	29.07 $\pm$ 4.18	-
Parity	1	3	1.87 $\pm$ 0.83	-	1	3	1.73 $\pm$ 0.7	-
Gestational Age (weeks)	32	36	33.53 $\pm$ 1.5	-	32	36	33.6 $\pm$ 1.4	-
Profession	IRT			7 (46.7)	IRT			4 (26.7)
	PNS			1 (6,6)	PNS			-
	Swasta			3 (20)	Swasta			5 (33.3)
	PNS / Polri / TNI			4 (26.7)	PNS / Polri / TNI			6 (40)
Education	SMA / SMA			9 (60)	SMA / SMA			9 (60)
	Diploma			2 (13.3)	Diploma			4 (26.7)
	Bachelor			4 (26.7)	Bachelor			2 (13.3)

Based on table 1 it can be seen that of the 15 pregnant women in the control group the mean age was obtained was 28.5  $\pm$  4.67 years with vulnerable age, the youngest respondent is 22 years old and the oldest is 35 years old. Respondents' mean parity is 1.87  $\pm$  0.83 times with the lowest number of pregnancies is 1 time and the highest is 3 times. The mean gestational age is 33.53  $\pm$  1.5 week with the youngest gestational age vulnerable is 32 weeks and the oldest gestational age is 36 weeks. Respondent's occupation the majority of IRTs amounted to 46.7%. The majority of respondents' education is SLTA / SMA, namely 60%.

#### 2. Special Data

##### 2.1. Identification of the Quality of Sleep of Third Trimester Pregnant Women at BPM Lita Angraeni, Surabaya in the Treatment Group and the Control Group

Table 2. Sleep Quality of Third Trimester Pregnant Women in the Treatment and Control Groups

		Group							
		Treatment				Control			
		Pre		Post		Pre		Post	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
Sleep Quality	Well	4	26.7	12	80	5	33.3	4	26.7
	Bad	11	73.3	3	20	10	66.7	11	73.3

Total	15	100	15	100	15	100	15	100
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Table 2 shows that the combination of prenatal gentle yoga and inhaled lavender aromatherapy can improve sleep quality in third trimester pregnant women. This is evidenced by the decrease in the number of third trimester pregnant women who have poor sleep quality, from 73.3% to only 20% in the treatment group before and after the combination of prenatal gentle yoga and lavender aromatherapy inhalation. When compared between the treatment group and the control group, the difference can be seen, namely where in the post test treatment group only 20% had poor sleep quality (3 people) while in the control group after the post test there was an increase in the number of people who had poor sleep quality. namely from 66.7% to 73.3%.

## 2.2. The Effect of the Combination of Prenatal Gentle Yoga and Lavender Aromatherapy Inhalation on Sleep Quality for Pregnant Women in the third trimester

Table 3. Results of Analysis of the Effect of Prenatal Gentle Yoga and Lavender Aromatherapy Inhalation on Sleep Quality for Pregnant Women in the third trimester of the Treatment Group.

Category	Pre	Post
Negative Rank	9	0
Ties	5	14
Positive Rank	1	1
Sign 2 Tail	0.011	0.317

Based on table 3 with the Wilcoxon statistical test, it is known that there is a significant effect of the combination of prenatal gentle yoga and lavender aromatherapy inhalation in improving sleep quality in the treatment group. This is evidenced by the value of  $\alpha = 0.011$  or  $\alpha < 0.05$ . Whereas in the control group the Wilcoxon statistical test results showed that there was no significant difference in the quality of the tidunya. This is evidenced by the value of  $\alpha = 0.317$  or  $\alpha > 0.05$ .

## 3. Differences in the quality of sleep of third trimester of pregnant women in the treatment group and the control group

Table 4. Results of the Analysis of Sleep Quality Differences in the Third Trimester of Pregnant Women in the Treatment Group and the Control Group

Statistics Test	
	Sleep Quality
Mann-Whitney U	52,500
Wilcoxon W.	172,500
Z	-2,878
Asymp. Sig. (2-tailed)	0.004

Based on Table 4 with the Mann-Whitney statistical test, it is known that there is a significant difference in sleep quality in the treatment group (which was given a combination of prenatal gentle yoga and lavender aromatherapy inhalation) compared to the control group. This is evidenced by the value of  $\alpha = 0.004$  or  $\alpha < 0.05$ . It can be concluded that the combination of prenatal gentle yoga and inhaled lavender aromatherapy significantly improves sleep quality in third trimester pregnant women.

## IV. DISCUSSION

### 1. Identification of Sleep Quality for Third Trimester Pregnant Women

The frequency distribution of sleep quality among pregnant women in the third trimester shows that during the pre-test, as in table 2 it can be seen that in the two study groups most of the pregnant women had poor sleep quality, respectively 11 respondents (73.3%) in the treatment group and 10 respondents (66.7%) in the control group. Furthermore, during the post test, there

was a change in sleep quality in the treatment group, namely most of them having good sleep quality, namely 12 respondents (80%) and in the control group only 4 respondents (2.67%) had good sleep quality.

Research says that 52% - 61% of pregnant women experience sleep disturbances, 97% of pregnant women reported waking up in the middle of the night in late pregnancy (Wang et al., 2020). The quality of sleep in pregnant women will decrease in line with the increase in the pregnancy trimester. It is said that the risk of insomnia in the third trimester has increased 2.03 times compared to other trimesters (Kızıllırmak et al., 2012). Poor quality sleep in pregnant women can be in the form of shorter sleep duration, usually less than 6 hours per night, the normal sleep time in healthy adults is about 7.5 hours per night. Then there is difficulty maintaining sleep or frequent waking because of the discomfort experienced by pregnant women, difficulty starting to sleep and waking up too early with the inability to sleep again (Felder and Lee, 2020). A decrease in the quality of sleep in pregnant women can result in waking up in the morning feeling not refreshed, tired throughout the day, drowsiness and falling asleep faster and not getting enough sleep at night (Kurnia et al., 2013). If this continues and becomes disturbing, the risk of health problems that can be caused to pregnant women can be in the form of hypertension, gestational diabetes mellitus, cardiovascular disease, IUGR, prolonged labor, greater risk of SC and psychiatric disorders such as depression and anxiety during pregnancy. (Sharma SK, 2016, Rogmo et al., 2016, Dørheim et al., 2014, Zhong et al., 2018, Osnes et al., 2019, Smyka et al., 2020).

The results of interviews with respondents about what conditions caused them to experience sleep disturbances, most of them said that they often wake up at night because BAK is more frequent, then body discomfort due to the larger pregnancy and pain in the back, they also find it difficult to start sleeping because tend to sleep long during the day. In accordance with the existing theory that there are several conditions that can contribute to sleep disturbances in pregnant women, including increased BAK frequency, nausea, vomiting, active fetal movement, back pain, back pain, excessive daytime sleepiness, discomfort during sleep, unfavorable environment, anxiety, (Wang et al., 2020, Smyka et al., 2020).

Alternative ways to deal with sleep disorders in pregnant women can be done pharmacologically or non-pharmacologically, including hygienic sleep training, relaxation exercises with yoga, the use of aromatherapy, and music therapy, all of which can be done with pharmacological treatment if there are medical indications. (Kurnia et al., 2013). However, the use of drugs for sleep induction certainly needs to be considered for pregnant women because they have disadvantages or limitations, one of which has toxic side effects to the fetus.

## **2. Identification of the Effect of the Combination of Prenatal Gentle Yoga and Lavender Aromatherapy Inhalation on Sleep Quality for Pregnant Women in the 3rd trimester**

In table 3 it can be seen that the treatment of giving a combination of Prenatal Gentle Yoga and lavender aromatherapy inhalation to 15 pregnant women has a significant effect. Wilcoxon's statistical test results showed that there was a significant effect of the combination of prenatal gentle yoga and lavender aromatherapy inhalation in improving sleep quality in the treatment group. This is evidenced by the value of  $\alpha = 0.011$  or  $\alpha < 0.05$ .

Changes in sleep quality in pregnant women obtained after giving a combination of prenatal gentle yoga and lavender aromatherapy inhalation can be seen in table 2. From the results of interviews with respondents in the treatment group, it is known that the increase in sleep quality that occurs in them is due to a sense of comfort, relaxation and peace. After performing prenatal gentle yoga and giving lavender aromatherapy. They told me that while doing yoga exercises and inhaling aromatherapy, the duration of their night's sleep changed to longer, then the condition when they woke up in the morning they also felt fresher than usual.

The movements in yoga can affect the parasympathetic nerves to reverse the effects of stress, so that the hormone that causes body dysregulation can be reduced and will slow down the work of other organs.(Rahmarwati et al., 2016), consequently the body will be more It is easy to sleep and rest so that the Supra-Chiasmatic Nucleus (NSC), which previously did not work normally because the sympathetic and parasympathetic nerves do not work can return to normal work, the NSC will again release the hormone regulating body temperature, cortisol, growth hormone which plays a role in waking up in sleep. when the stimulation of bright light enters through the eyes, when night falls the NSC will stimulate the release of the hormone melatonin so that people are sleepy and sleep, when the NSC runs normally, NREM and REM will be fulfilled so that the quality of sleep for people with insomnia will increase(Rahmarwati et al., 2016).In addition, according to researchers, poses on yoga can bring positive energy, so that it can make the soul fresh and calm. Along with that, the body becomes more relaxed and the quality of sleep will improve.

Apart from yoga, aromatherapy has been widely used to improve mood and relax the body. The scent of lavender induces thoughts to improve one's sleep quality(Wheatley, 2005) and can provide a mild topromote sedation effect(Goel et al., 2005, Lewith et al., 2005). Two important components in lavender are the content of linalool and linalyl acetate, which provide sedative and narcotic effects. This component stimulates the activity of the limbic and parasympathetic systems. Activation of the parasympathetic system in turn increases alpha waves in the brain, improves cardiovascular function and improves coronary artery perfusion.(Mahdavikian et al., 2020) so that creates the condition of the body more relaxed. According to other studies, it is said that inhaling lavender aromatherapy allows triggering the release of endorphins or hormones of happiness and relaxation which have an impact on creating a relaxed and comfortable condition in a person so that the person falls asleep easily.(Faridah, 2014).

Therefore, according to the researchers, giving a combination of prenatal gentle yoga and lavender aromatherapy inhalation can be considered as an alternative way to treat sleep disorders in pregnant women safely and easily rather than using stimulant drugs for sleep. According to the Food and Drug Administration, most prescription sleeping or sedative pills are categorized as a category of drugs considered unsafe for use during pregnancy.(Kalmbach et al., 2020). Antihistamine-type drugs, such as doxylamine and diphenhydramine, are safe to use for pregnant women, but such drugs are usually recommended for use in treating allergy symptoms and nausea during pregnancy.(Kalmbach et al., 2020)and no controlled trials have been conducted to thoroughly prove the efficacy and safety of this antihistamine for mother and child based on the dosage and duration of treatment needed to treat sleep disturbances during pregnancy. Therefore, according to the researchers, there is no sleep aid, drugs that are currently considered safe and efficacious for sleep disorders during pregnancy, as an alternative way of dealing with sleep disorders in pregnant women can be done with non-pharmacological therapies, including prenatal gentle yoga, acupuncture, aromatherapy, habit change, music therapy, art therapy, progressive muscle relaxation exercises, massage, reflexology, warm foot baths, dietary supplements, etc.(Yıldırım et al., 2020, Kalmbach et al., 2020).

### **3. Identification of the Differences in Sleep Quality of Pregnant Women in the Third Trimester of the Treatment and Control Groups**

Based on the results of the Mann-Whitney statistical test in Table 4, it shows that there is a significant difference in sleep quality in the treatment group (which was given a combination of prenatal gentle yoga and lavender aromatherapy inhalation) compared to the control group

with a value of  $\alpha = 0.004$  or  $\alpha < 0.05$ . It can be concluded that the combination of prenatal gentle yoga and inhaled lavender aromatherapy significantly improves sleep quality in pregnant women.

The movements in prenatal gentle yoga that are carried out and the giving of lavender aromatherapy inhalation to the respondents are intended so that pregnant women experience changes in the quality of their sleep. According to researchers, dynamic, flexible yoga movements and soothing lavender aromatherapy can make pregnant women feel calm, comfortable and peaceful so that they can reduce body and mind activities that lead to sleepiness so that it will eventually encourage the pregnant woman to fall asleep. Breathing techniques in yoga also provide a massage effect on the heart due to the diaphragm that fluctuates so that it can open blockages and blood circulation becomes smooth. With the increase in smooth blood circulation, the nutrients and O<sub>2</sub> in the brain also increase. So that it will stimulate the secretion of serotonin and make the body calmer and easier to sleep (Hariprasad et al., 2013, Bankar et al., 2013, Gudawati and Muhlisin, 2012).

The results of this study show an increase in the quality of sleep for third trimester pregnant women. The results of interviews with respondents before the treatment showed that pregnant women had trouble sleeping and were often awake at night. When I am awake and trying to go back to sleep, the mother has difficulty, so that when she wakes up in the morning, she feels unwell. By practicing prenatal gentle yoga and lavender aromatherapy inhalation regularly can improve sleep problems in pregnant women without using pharmacological therapy so that it is safer, easier and more effective for the health of the mother and the fetus.

#### IV. CONCLUSION

1. The sleep quality of pregnant women in the third trimester in the treatment group during the pre-test was 73% having poor sleep quality, then during the post-test ssw22 it changed to only 20% who had poor sleep quality. Meanwhile, the control group who had poor sleep quality was 66.7% during the pre-test and during the post-test, it increased to 73.3% who had poor sleep quality.
2. There is a significant effect of the combination of prenatal gentle yoga and inhalation of lavender aromatherapy in improving sleep quality in the treatment group with a value of  $\alpha = 0.011$  or  $\alpha < 0.05$ . Whereas in the control group there was no significant difference in the quality of tidunya with a value of  $\alpha = 0.317$  or  $\alpha > 0.05$ .
3. There was a significant difference in sleep quality in the group compared to the control group with a value of  $\alpha = 0.004$  or  $\alpha < 0.05$ .
4. Giving a combination of prenatal gentle yoga and lavender aromatherapy inhalation can be considered as an alternative way to treat sleep disorders in third trimester pregnant women that are safe and easy than the use of stimulant drugs for sleep.
5. By practicing prenatal gentle yoga and lavender aromatherapy inhalation regularly can improve sleep problems in pregnant women without using pharmacological therapy so that it is safer, easier and more effective for the health of the mother and the fetus.

#### REFERENCES

- APRIANAWATI, R. B. & SULISTYORINI, I. R. 2007. Hubungan antara dukungan keluarga dengan kecemasan ibu hamil menghadapi kelahiran anak pertama pada masa triwulan ketiga. *Yogyakarta: Universitas Gajah Mada*.
- BANKAR, M. A., CHAUDHARI, S. K. & CHAUDHARI, K. D. 2013. Impact of long term Yoga practice on sleep quality and quality of life in the elderly. *J Ayurveda Integr Med*, 4, 28-32.
- BEDDOE, A. E., LEE, K. A., WEISS, S. J., POWELL KENNEDY, H. & YANG, C.-P. P. 2010. Effects of mindful yoga on sleep in pregnant women: a pilot study. *Biological research for nursing*, 11, 363-370.

- DØRHEIM, S. K., BJORVATN, B. & EBERHARD-GRAN, M. 2014. Can insomnia in pregnancy predict postpartum depression? A longitudinal, population-based study. *PLoS One*, 9, e94674.
- FARIDAH, V. N. 2014. Penanganan Gangguan Kebutuhan Tidur pada Pasien Post Operasi Laparotomi dengan Pemberian Aromaterapi Lavender. *Surya Vol 01 No. XVII*.
- FELDER, J. N. & LEE, K. A. 2020. Insomnia During Pregnancy. *Sleep Disorders in Women*. Springer.
- GOEL, N., KIM, H. & LAO, R. P. 2005. An olfactory stimulus modifies nighttime sleep in young men and women. *Chronobiology International*, 22, 889-904.
- GREENWOOD, K. M. & HAZENDONK, K. M. 2004. Self-reported sleep during the third trimester of pregnancy. *Behavioral sleep medicine*, 2, 191-204.
- GUDAWATI, L. & MUHLISIN, A. 2012. Perbedaan Tingkat Insomnia Lansia Sebelum dan Sesudah Senam Yoga di Posyandu Lansia Desa Blulukan, Kecamatan Colomadu, Kabupaten Karanganyar.
- HARIPRASAD, V. R., SIVAKUMAR, P. T., KOPARDE, V., VARAMBALLY, S., THIRTHALLI, J., VARGHESE, M., BASAVARADDI, I. V. & GANGADHAR, B. N. 2013. Effects of yoga intervention on sleep and quality-of-life in elderly: A randomized controlled trial. *Indian J Psychiatry*, 55, S364-8.
- HEGAARD, H. K., KJAERGAARD, H., DAMM, P. P., PETERSSON, K. & DYKES, A.-K. 2010. Experiences of physical activity during pregnancy in Danish nulliparous women with a physically active life before pregnancy. A qualitative study. *BMC Pregnancy and Childbirth*, 10, 33.
- JANNAH, N. 2012. Buku ajar asuhan kebidanan kehamilan. *Yogyakarta: Andi*.
- KALMBACH, D. A., CHENG, P., O'BRIEN, L. M., SWANSON, L. M., SANGHA, R., SEN, S., GUILLE, C., CUAMATZI-CASTELAN, A., HENRY, A. L. & ROTH, T. 2020. A randomized controlled trial of digital cognitive behavioral therapy for insomnia in pregnant women. *Sleep Medicine*.
- KIZILIRMAK, A., TIMUR, S. & KARTAL, B. 2012. Insomnia in pregnancy and factors related to insomnia. *The Scientific World Journal*, 2012.
- KURNIA, A. D., WARDHANI, V. & RUSCA, K. T. 2013. Aromaterapi Bunga Lavender Memperbaiki Kualitas Tidur pada Lansia. *Jurnal Kedokteran Brawijaya*, 25, 83-86.
- LEWITH, G. T., GODFREY, A. D. & PRESCOTT, P. 2005. A single-blinded, randomized pilot study evaluating the aroma of Lavandula augustifolia as a treatment for mild insomnia. *Journal of Alternative & Complementary Medicine*, 11, 631-637.
- MAHDAVIKIAN, S., REZAEI, M., MODARRESI, M. & KHATONY, A. 2020. Comparing the effect of aromatherapy with peppermint and lavender on the sleep quality of cardiac patients: a randomized controlled trial. *Sleep Science and Practice*, 4, 1-8.
- MEDIARTI, D., SULAIMAN, S., ROSNANI, R. & JAWIAH, J. 2014. Pengaruh Yoga Antenatal Terhadap Pengurangan Keluhan Ibu Hamil Trimester III. *Jurnal Kedokteran Kesehatan: Publikasi Ilmiah Fakultas Kedokteran Universitas Sriwijaya*, 1, 47-53.
- MOLINE, M. L., BROCH, L., ZAK, R. & GROSS, V. 2003. Sleep in women across the life cycle from adulthood through menopause. *Sleep medicine reviews*, 7, 155-177.
- OSNES, R. S., ROALDSET, J. O., FOLLESTAD, T. & EBERHARD-GRAN, M. 2019. Insomnia late in pregnancy is associated with perinatal anxiety: A longitudinal cohort study. *J Affect Disord*, 248, 155-165.
- RAHMARWATI, F. P., DWI ROSELLA, K., ST FT, S. & KURNIAWATI, D. 2016. Hubungan Senam Yoga Dengan Kualitas Tidur Malam Hari Pada Anggota Yang Mengalami Insomnia Di Sanggar Senam RM7 Karanganyar. Universitas Muhammadiyah Surakarta.
- RENITYAS, N. N., SARI, L. T. & WIBISONO, W. 2017. The Effectiveness of Acuyoga to the Insomnia Complaints of Pregnant Women in Trimester III in Agriculture Traditional Community in Puskesmas Ngancar Kediri. *Jurnal Ners dan Kebidanan*, 4, 98-103.
- ROGNMO, K., SIVERTSEN, B. & EBERHARD-GRAN, M. 2016. Self-reported short sleep duration and insomnia symptoms as predictors of post-pregnancy weight change: Results from a cohort study. *Womens Health (Lond)*, 12, 465-474.
- SAFRANI, I., NUFUS, H. & NURMAYANTI, I. 2019. PENGARUH SENAM YOGA TERHADAP KUALITAS TIDUR IBU HAMIL TRIMESTER III (Studi Di Wilayah Kerja Puskesmas Plandaan, Jombang). *Jurnal Kebidanan*, 15.
- SHARMA SK, N. A., SINHA S, ET AL 2016 Sleep disorders in pregnancy and their association with pregnancy outcomes: a prospective observational study. *Sleep Breath. PubMed*, 20(1), 87-93.
- SMYKA, M., KOSIŃSKA-KACZYŃSKA, K., SOCHACKI-WÓJCICKA, N., ZGLICZYŃSKA, M. & WIELGOŚ, M. 2020. Sleep Problems in Pregnancy—A Cross-Sectional Study in over 7000 Pregnant Women in Poland. *International Journal of Environmental Research and Public Health*, 17, 5306.
- TSAI, S.-Y., LIN, J.-W., KUO, L.-T. & THOMAS, K. A. 2012. Daily sleep and fatigue characteristics in nulliparous women during the third trimester of pregnancy. *Sleep*, 35, 257-262.
- WANG, W.-J., HOU, C.-L., JIANG, Y.-P., HAN, F.-Z., WANG, X.-Y., WANG, S.-B., NG, C. & JIA, F.-J. 2020. Prevalence and associated risk factors of insomnia among pregnant women in China. *Comprehensive Psychiatry*, 98, 152168.
- WHEATLEY, D. 2005. Medicinal plants for insomnia: a review of their pharmacology, efficacy and tolerability. *Journal of psychopharmacology*, 19, 414-421.
- YANIKKEREM, E., ALTIPARMAK, S. & KARADENIZ, G. 2006. Review of the physical health problems experienced in pregnancy. Family and Community Education. *Culture and Research Journal*, 3, 35-42.
- YILDİRIM, D., KOCATEPE, V., CAN, G., SULU, E., AKIŞ, H., ŞAHİN, G. & AKTAY, E. 2020. The Effect of Lavender Oil on Sleep Quality and Vital Signs in Palliative Care: A Randomized Clinical Trial. *Complementary Medicine Research*, 1-8.
- ZHONG, C., CHEN, R., ZHOU, X., XU, S., LI, Q., CUI, W., WANG, W., LI, X., WU, J., LIU, C., XIAO, M., SUN, G., YANG, X., HAO, L. & YANG, N. 2018. Poor sleep during early pregnancy increases subsequent risk of gestational diabetes mellitus. *Sleep Med*, 46, 20-25.