

## Original Research

### Soaking Feet Using Warm Water to Improve Quality of Sleeping Among Pregnant Women

Ayu Wulandari<sup>1</sup>, Gita Kostania<sup>2\*</sup>

<sup>1</sup>Departement of Midwifery of Poltekkes Kemenkes Surakarta, Indonesia

<sup>2</sup>Departement of Midwifery of Poltekkes Kemenkes Malang, Malang, Indonesia

#### ABSTRACT

**Background:** Sleep is a basic need that must be fulfilled by human. Sleep disorders often occur in pregnant women which has an impact on the quality of sleep. Soaking feet using warm water/ hydrotherapy can be applied by pregnant women to improve sleep quality. This study aims to analyze the effect of soaking feet using warm water towards the quality of sleep among pregnant women.

**Methods :** This study used a quasi-experiment design with a nonequivalent control group design approach. The sampling technique used total sampling with 40 respondents who were in accordance with the eligible criteria. Interventions are given for 7 consecutive days. Measurement of sleep quality score using the Pittsburgh Sleep Quality Index questionnaire. The difference in sleep quality scores was analyzed by Mann Whitney test, and scores of each component were analyzed by using Wilcoxon test.

**Result :** The results of this study indicate that there was the effect of soaking feet using warm water towards sleep quality of pregnant women before and after the intervention ( $p = 0.007$ ;  $\alpha = 0.05$ ).

**Conclusion:** There was an improvement in quality of sleeping among pregnant women after soaking their feet using warm water.

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#### CONTACT

Gita Kostania



[kostania.gita@gmail.com](mailto:kostania.gita@gmail.com)

Jurusan Kebidanan Poltekkes  
Kemenkes Malang, Jl. Besar Ijen  
No.77C, Oro-oro Dowo, Kec.  
Klojen, Kota Malang, Jawa Timur  
65119.

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## INTRODUCTION

Pregnancy is a crisis period in a woman's life process. The crisis period make changes to all body systems, including cardiovascular, respiratory, hormonal, astrotintestinal, and musculoskeletal systems (Kemenkes RI, 2014) The number of changes that occur during pregnancy will affect the fulfillment of sleep needs because of the difficulty in determining sleep positions. Other than that, hormonal changes can cause psychological changes in pregnant women, so that it is difficult to initiate or maintain sleep (Dewiani, 2017).

According to the National Sleep Foundation (2017), as many as 78% of women in America report sleep disorder during pregnancy compared to when they are not pregnant. Many women also report that they are feeling very tired during pregnancy, especially in the third trimester. About 25% of pregnant women complained sleep disorders in the first trimester and continue increasing to 75% in the third trimester (Okun, Schetter, & Glynn, 2011). Sleep disorders in pregnant women include excessive daytime sleepiness, snoring or sleep obstructive apnea, restless legs syndrome, insomnia, and reduced sleep duration. These sleep disorders will make the quality of sleep for pregnant women disturbed or to be worse (Khazaie, 2013).

Decreased quality of sleep in pregnant women causes a body's organs detoxification process stopped especially at night. This effect causes declining the health condition of pregnant women, emotionally explosive, not enthusiastic about doing activities, inhibits hormonal function, depression and stress which can adversely affect the fetus. In addition, stress that is also experienced by pregnant women will affect the development of the baby's brain. A child born from a pregnant women who experiences excessive stress during pregnancy triggers deviant behavior in the future (Hani, 2011).

Sleep is an important factor in overall health. Improving sleep quality can be done in many ways, including by using pharmacological and non-pharmacological techniques. Pharmacological method is a common therapy given to people with sleep disorders which functions to reduce levels of anxiety, stress and provide calm. But not for pregnant women, because this has the potential to increase the risk to the fetus and its impact on fetal growth and development. Therefore, the choice of using a non-pharmacological method is more appropriate, because its use has less side effects compared to pharmacological methods (Golmakani, Sadat, Ahmadi, Taghi, & Pour, 2015)

One of the non-pharmacological techniques that can be given to treat sleep disorders in pregnant women is including relaxation techniques like yoga, progressive muscle relaxation, massage, music therapy, warm water therapy, meditation, swimming, deep breathing and walking techniques (Yuliarti, 2010)

One of the warm water therapy is by soaking the feet with warm water. Soaking the feet is carried out at a temperature of 38 ° C- 39 ° C. Soaking the feet is carried out at a temperature of 38 ° C- 39 ° C. The basic principle of soaking your feet in warm water can improving vasodilation of blood vessels which results in smooth blood flow so that muscles can relax (Damarsanti, 2018). Damarsanti Research (2018) proves that soaking feet with warm water can reduce anxiety levels in third trimester pregnant women. A related research was conducted by (Utami, 2012) by applying a foot bath with warm water to elderly people who experience insomnia. (Morgana et al., 2012) also states that soaking feet in warm water can improve sleep quality and physical function in fymbromyalgi patients. Previous researchers have used the target elderly and patients with fymbromyalgia, whereas in this study the aim was to determine the effect of hydrotherapy soaking feet with warm water on improving the quality of sleep performed in pregnant women.

## **MATERIALS AND METHOD**

This type of research is experimental research using quasy experimental design with non equivalent control group design approach. This research was conducted in the area of the Gantiwarno Health Center, Klaten, from January to May 2019. The target

population was all pregnant women in the area of the Gantiwarno Health Center, Klaten.

Meanwhile, the actual population is 62 third trimester pregnant women in the area of the Gantiwarno Health Center. In this study, author also determined the criteria for normal third trimester pregnancy and not in therapy of sleep disorders. The sampling technique used Purposive Sampling, with the sample size used by each group calculated based on the *Isac and Michale formula* from 62 population. The total sample used was 41 respondents, with a sample size of 20 and 21 respondents.

The treatment group (intervention group) received soaking feet using warm water/ hydrotherapy intervention for 7 consecutive days every 15 minutes before sleeping. Meanwhile, the control group was given health education on how to relieve a sleep disorders in pregnancy. The measurement of sleep quality score used the *Pittsburgh Sleep Quality Index Questionnaire (PSQI)*, which consists of 19 questions that form 7 assessment components. The components of the assessment include: subjective sleep quality, sleep latency, sleep duration, daily sleep efficiency, sleep disturbances, use of sleep medications, and activity dysfunction during the day. The sum of the scores of these seven components results in one global score. A global PSQI score more than 5 provides a diagnostic sensitivity of 89.6% and a specificity of 86.5% in differentiating good or poor sleep quality. The interpretation of the resulting score is good sleep quality if the total score is less and equal with 5 and poor sleep quality if the total score is more than 5. (Potter, P.A & Perry, 2016)

Data analysis used SPSS version 21st. To determine the quality of sleeping among pregnant women in each group, then the pre-test and post-test values were seen, then analyzed using the Wilcoxon test. Furthermore, to determine the effect of soaking feet with warm water/ hydrotherapy in improving the quality of sleeping among pregnant women, using the Mann-Whitney test. The author has also obtained a proper ethical clearance by Health Polytechnic of Surakarta

## RESULTS

The result about respondent characteristic (table 1) shows that the majority of the ages in the two groups (intervention and control) are almost the same. In intervention group, the age between 20-35 years (75%) while in the control group the majority of respondents are 20 to 35 years old (85.7%). Characteristics of respondents based on occupation, most of the housewives were 16 respondents (80%), while in the control group the majority of respondents' occupations were housewives, 76.2%. In the intervention and control groups, the majority were multigravidas 55% and 76.2%. In this research, age more than 35 years old, have the risk of poor sleep quality (OR 1.00, 95.2%, CI=0.80-12.55). Whereas for the category of housewives, there were 1.4 times more risk of poor sleep quality (OR 1.44, 95.2%, CI= 0.10-19.21, p=0.78). Then, multigravidas were 1.2 times more likely to have poor sleep quality (OR 1.28, 95.2%, CI=0.14-11.54, p=0.82).

**Table 1.** Frequency distribution of respondent characteristics by age, occupation and gravidas

No	Respondent Characteristic	Group				OR	95,2% CI	p
		Intervention		Control				
		Total	Percentage (%)	Total	Percentage (%)			
1	Age a. <20 years old	0	0	0	0	0	0	0

b. 20 - 35 years old	15.0	75.0	18.0	85.7	1.44	0.12 - 17.23	0.76
c. >35 years old	5.0		3.0	14.3	1.00	0.80 - 12.55	0.76
Total	20.0	100.0	21.0	100			
<b>Job</b>							
a. Housewife	16.0	80.0	16.0	76.2	1.44	0.10 - 19.21	0.78
b. Civil Servants	0	0	0	0	0	0	0
2 c. Private Employee	0	0	3	14.3	0	0	0
d. Entrepreneur	1.0	5.0	2.0	9.5			
e. Other	3.0	15.0	0	0			
Total	20.0	100.0	21.0	100.0			
<b>Gravida</b>							
3 a. Primi	9.0	45.0	5.0	23.8	0.76	0.82- 6.9	0.82
b. Multi	11.0	55.0	16.0	76.2	1.28	0.14 - 11.54	0.82
Total	20.0	100.0	21.0	100.0			

The differences in sleep quality of pregnant women before and after being given soaking feet using warm water/ hydrotherapy (intervention group) shows in table 2. Variable score of sleep quality before and after hydrotherapy are having abnormality data (tested with Shapiro-Wilk with  $p = 0.013 < 0.05$ ), so the hypothesis test used the Wilcoxon. The number of respondents who were given hydrotherapy is 20 people, the median result (middle value) after treatment is smaller than before treatment ( $5 < 8$ ), with a sleep quality score of 0-2. Comparative test before and after hydrotherapy with a value of  $\alpha = 0.05$ , namely  $p = 0.001 < 0.05$ . So it can be concluded that there are differences in sleep quality before and after hydrotherapy.

**Table 2.** Differences in sleep quality of pregnant women before and after being given soaking feet using warm water (hydrotherapy)

Sleep quality	N	Median (min-max)	Mean $\pm$ s.d.	<i>p value</i>
Before hydrotherapy	20	8 (5-13)	8.20 $\pm$ 1.99	0.001
After hydrotherapy	20	5 (3-11)	5.35 $\pm$ 2.00	

Data on sleep quality of pregnant women before and after being given health education (control group) shows in table 3, were normally distributed (tested by Saphiro Wilk with  $p = 0.001 < 0.05$ ), so the comparative test for the health education group was carried out using the pair t-test. The number of respondents who were given health insurance was 21 people, obtained median results (middle value) after the same treatment than before treatment (7), with a sleep quality score of 0-21. Comparative test before and after health education with a value of  $\alpha = 0.05$ , namely  $p = 0.013 < 0.05$ . So it can be concluded that there are differences in sleep quality before and after health education.

**Table 3.** Differences in sleep quality of pregnant women before and after health education

	<b>N</b>	<b>Median (min-max)</b>	<b>Mean ± s.d.</b>	<b>p value</b>
Before being given health education	21	7 (4-10)	7.23 ± 1.51	0.013
After being given the health education	21	7 (4-9)	6.61 ± 1.47	

Sleep quality data for pregnant women in the group that given hydrotherapy and health education were not normally distributed (tested by Saphiro Wilk with  $p = 0.001 < 0.05$ ), so the comparative test to test this hypothesis used the Mann-Whitney test (table 4). Based on the analysis of the results of sleep quality data using the Mann-Whitney test for unpaired data in the two groups after being given treatment to determine whether or not the effect of hydrotherapy soaking feet with warm water on sleep quality of pregnant women, that testing using the SPSS 21 program, obtained that  $p$ -value = 0.001 where  $p < 0.05$ , so the hypothesis is accepted (table 4).

**Table 4.** Differences in soaking feet using warm water (hydrotherapy) and health education on the quality of sleeping among pregnant women

	<b>N</b>	<b>Median (min-max)</b>	<b>Mean ± s.d.</b>	<b>p value</b>
Hydrotherapy	21	2 (0-8)	1.83 ± 2.10	0.001
Health Education	21	1 (0-4)	0.52 ± 0.91	

These results are also supported by pre-test and post-test data from the intervention group and the control group, which is tested using the Wilcoxon test, namely hypothesis testing at 2 paired groups to compare sleep quality of pregnant women. The number of respondents who were given hydrotherapy and health education for each was 21 people, had a different median (mean) for improving sleep quality, namely 2 and 1 with sleep quality scores 1-21. As for the comparative test in two unpaired groups with a value of  $p = 0.001 < \alpha = 0.05$ . So the conclusion, there is a difference in the quality of sleeping among pregnant women in the group that was given soaking feet using warm water/ hydrotherapy with those that were given health education.

## DISCUSSION

In the control group, providing health education with leaflets about overcoming sleep disorders in pregnant women had a difference (negative) or a decrease in sleep quality scores by 9 respondents, while the control group with ties value was 11 respondents with the same sleep quality condition. The smaller the sleep quality score indicates that the quality of sleeping is getting better or better. So, intervention of soaking the feet in warm water can improve sleep quality. The results of this study showed that most of the pregnant women who give treatment hydrotherapy are aged 20-35 years as many as 18 (85.7 %). This is in accordance with what was stated by (Manuaba, 2012) that the safest age or it can be said that the time for healthy reproduction is between the ages of 20 - 35 years. Maternal age is one of the risk factors

related to the quality of her pregnancy. In addition, sleep quality also deteriorates with age (Madrid-valero, Martínez-selva, Ribeiro, Sánchez-romera, & Ordo, 2017)

The results of this study have previously been explained in (Hashmi & Bhatia, 2016), that in pregnancy, especially the third trimester, pregnant women will experience physical changes, namely stomach enlargement, anatomical changes, and hormonal changes that will cause complaints to pregnant women. One of the complaints that experienced by the pregnant women is a sleeping disorder, although the pregnancy is through normal.

Some attempts to overcome the difficulties of sleeping on pregnant women by (Schitter, Nedeljkovic, Baur, Fleckenstein, & Raio, 2015), among others by exercise, and consume drugs. Drugs are safe for the pregnant women. The others are hypnotherapy, warm water therapy, educational sleeping (*sleeping education*) and relaxation exercises. The relaxation can use warm water as a therapy, namely hydrotherapy. Hydrotherapy soaking feet with warm water using water in a temperature of 38°C-39°C. The basic principle of soaking feet in warm water can lead to vasodilation of blood vessels which results in smooth blood flow, so that the muscles can relax (Damarsanti, 2018).

The number of respondents who were given soaking feet using warm water/hydrotherapy and health education were 21 people each, having a different median (mean) for improving sleep quality, namely 2 and 1 with sleep quality scores 1-21. As for the comparative test in two unpaired groups with a value of  $p = 0.001 < \alpha = 0.05$ . So the conclusion, there is a difference in the quality of sleeping among pregnant women in the group that was given hydrotherapy with those that were given health education.

The results of data analysis using the *Man-Whitney* test showed that the mean difference in sleep quality scores was significant ( $p = 0.001$ ) where  $p < 0.05$ , which means that the intervention of soaking feet in warm water has an effect on sleeping quality. Thus, soaking the feet in warm water can lower the PSQI score, in other words, improve the quality of sleeping among pregnant women. Related research also shows that the effect of soaking feet with warm water on sleep quality, such as (Morgana et al., 2012) who found that sleep quality improved after (indoor warm pool) in elderly with fibromyalgia was marked by a decrease in scores between before and after intervention ( $p = 0.001$ ).

Most of the respondents who had done soaking feet using warm water/hydrotherapy for 7 days experienced an increasing in the quality of their sleep. A total of 18 respondents experienced changes in the quality of sleeping that were good at *posttest*. According to (Potter, P.A & Perry, 2016), said that soaking feet in warm water can create a relaxing atmosphere which will increase serotonin production and then converted into melatonin, so that they feel drowsy and maintain a restful sleep. The treatment time for soaking the feet with warm water is at night with the reason that when it gets dark, the *pineal gland* starts to convert serotonin into melatonin. The pineal gland does not store the melatonin it produces, but rather pumps this hormone directly into the bloodstream. Melatonin will begin to be produced when night falls, which then coordinates the body's functions into a harmonious system.

In the intervention group, there is one respondent who experienced a decline in the quality of sleeping and first respondent who has a score of sleep quality remains the same after doing soaking feet in warm water/hydrotherapy. This is due to the activity, environment and physical condition of the respondents which resulted in them being unable to rest enough at night. It is in line with the theory that expressed

by the (Dewiani, 2017) that the activity physically can cause disruption of sleep. The more tired person, the shorter REM sleep cycle path. Meanwhile, one respondent still has poor sleep quality due to environmental factors that are less calm. According to Potter, P.A & Perry (2016), the level of sound in the environment affects a person's sleep stages. In the control group, there were 9 respondents who experienced an increase in sleep quality after being given health education on how to deal with sleep disorders in pregnant women. During the interview, the respondents for seven days applied the methods described at the time of providing health education, including improving sleeping position, eating high-carbohydrate foods and doing exercise and light relaxation before going to bed. According to the study (Schitter et al., 2015) that exercise and relaxation techniques can be helped temper improve sleep quality of pregnant women.

Based on the results of this study, soaking feet with warm water/ hydrotherapy is a method for relaxation that has been shown to be influential in improving the quality of sleeping for third trimester of pregnant women. Midwifery services should not only focus on pharmacological action, but must innovate with complementary non-pharmacological therapies or also called complementary therapies. According to research the application of complementary therapies by midwives is still low. So, hydrotherapy soaking feet with warm water which is one of the complementary therapies is expected to be a consideration for midwives in midwifery services.

## **CONCLUSION**

There is a difference in the average score of sleeping quality between before and after the intervention of 2.85. The results of the Mann Whitney test analysis showed a significance value,  $p = 0.001$  where  $p < 0.05$ . Soaking feet with warm water/ hydrotherapy can improve the quality of sleeping among pregnant women.

Information about how to deal with sleep disorders can be shared with other pregnant women to improve the quality of sleeping for pregnant women. It is expected that a midwife can improve the quality of service of obstetrics, particularly in terms of health promotion, related discomfort during pregnancy (sleep disturbance/ disorder) with complementary therapies, by using soaking feet method using warm water/ hydrotherapy. This information also can be applied in a class of pregnant women in order to provision of information more effective.

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