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Effectiveness of Prenatal Yoga on Improving Sleep Quality of Pregnant Women in the Third Trimester: A Quasi-Experimental Study

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Abstract

Background: Sleep disturbances are prevalent among pregnant women, particularly during the third trimester, and can adversely affect the health of both the mother and fetus. Non-pharmacological methods, including prenatal yoga, can enhance sleep quality safely and efficiently. **Objective:** To determine the effectiveness of prenatal Yoga on improving sleep quality, blood pressure, and breathing of pregnant women in the third trimester in the Bah Kapul and Simarimbun Health Centre work area, Pematangsiantar City. **Method:** This study used a quasi-experimental design with an intervention group (n = 30) and a control group (n = 30). The intervention in the form of prenatal Yoga was given to the treatment group for a specific period. Data were collected using a sleep quality and disturbance assessment instrument and analyzed using the SPSS application. **Results:** Before the intervention, most respondents from both groups had poor sleep quality. After the intervention, there was a significant increase in the sleep quality of the intervention group ($p < 0.001$), with a decrease in the proportion of severe sleep disturbances from 6.7% to 0%. The median sleep quality score increased by 1 point in the intervention group and by 0 points in the control group ($p = 0.010$). Sleep disturbance scores also decreased significantly ($p < 0.001$). **Conclusion:** Prenatal Yoga has been proven effective in improving sleep quality and reducing sleep disturbances in pregnant women in the third trimester. This intervention is recommended as part of the antenatal care program at the Puskesmas level.

Keywords: Prenatal Yoga, sleep quality, pregnant women, third trimester, sleep disorders

Introduction

Pregnancy is a special and precious moment for women. Feeling a miracle of nature in her body with the presence of the fetus in the womb, and the extraordinary happiness when her body "shares" with her fetus. During pregnancy, women have a golden opportunity to feel and realize the tremendous power within themselves (Husin, 2013).

The world has again formulated a global commitment in the health sector for the next 15 years. This time, it is named Sustainable Development Goals (SDGs), which will be achieved by 2030. SDGs, or Sustainable Development Goals, are here to replace the Millennium Development Goals (MDGs). As is known, until the end of the MGDs, Indonesia was included among the countries that failed to reduce maternal mortality (MMR). After more than two decades of effort and hard work, the MMR is still relatively high, reaching 359 per 100,000 / live births. Indonesia remains the highest in the ASEAN region, even though the MMR used has been moderated by the Ministry of Health to become 267 per 100,000 / live births.

Physiologically, pregnancy is a natural process in humans. The pregnancy period begins from the time of conception until the birth of the fetus. During pregnancy, there will be changes in the mother's body system, both physically and psychologically. However, physiological changes, if not understood by the mother and not handled, can cause discomfort that can be very disturbing during the pregnancy, childbirth and postpartum process. Women frequently endure physical discomfort manifested as leg cramps, respiratory difficulties, back pain, and frequent urination, alongside psychological responses such as depression, stress, anxiety, and sleep disorders, including insomnia or challenges in initiating sleep (Nugroho, 2019).

This assertion is grounded in Nugroho's theory that sleep exerts a physiological influence on the nervous system and other bodily systems. Sleep restores appropriate activity levels and equilibrium

within the neurological system. Sleep is essential for protein synthesis, facilitating the repair process. The concentration of the hormone melatonin in the body affects the sleep process. The body's natural detoxification process, involving the elimination of poisons, is currently taking place (Kotturshetti IB, 2021). Sleep problems can impair sleep quality in pregnant women and influence health conditions during gestation. Reduced sleep quality in pregnant women impedes the detoxification processes of the body's organs, particularly during the night. This leads to a deterioration in the health of pregnant women, resulting in heightened emotional volatility, diminished enthusiasm for activities, impaired hormonal function, and increased despair and stress, all of which can adversely affect the fetus. Furthermore, stress encountered by pregnant mothers will influence the development of the fetal brain. A kid born to a mother who endures significant stress during pregnancy is likely to exhibit aberrant behavior in the future (Yeboah, A., 2020).

Problems in the third trimester of pregnancy often interfere with the activities and quality of Sleep or rest of the pregnant woman. Problems that often occur include lower back pain, decreased Sleep (insomnia), aches, fatigue, shortness of breath, emotional irritability, worry, anxiety, frequent urination, restlessness, inability to concentrate and hesitation. Pregnant women frequently encounter sleep difficulties, particularly during the third trimester. Pregnant women encounter anxiety, leading to melancholy and sleep disturbances or insomnia. Insomnia in pregnant women may lead to reduced sleep duration. The third trimester of pregnancy is a critical phase for preparing the body for parturition. Pregnant women in the third trimester undergo significant physiological changes due to rapid fetal growth and the body's preparation for childbirth. Consequently, the emphasis of exercises is on spinal health and the strength and balance of the pelvis, encompassing muscles, joints, and ligaments.

The National Sleep Foundation (2017) reports that over 70 million individuals in America suffer from sleep disorders, with women experiencing sleep loss more frequently than males, and the prevalence escalates with age. Approximately 78% of women in America report experiencing sleep difficulties during pregnancy, in contrast to their non-pregnant state. A significant number of women report experiencing fatigue during pregnancy, particularly in the third trimester. Maternal health from pregnancy to delivery is influenced not only by the mother's nutrition but also necessitates mental tranquility, physical well-being, and readiness for childbirth, with the inner self playing a crucial role in facilitating the pregnancy and delivery process (Azward H, 2021).

Prenatal Yoga is anticipated to alleviate discomfort throughout pregnancy, particularly in the third trimester. Creating a serene environment for pregnant ladies and adequately preparing their physical bodies. Prenatal Yoga enhances mothers' awareness and understanding of their physically transforming bodies during pregnancy, fostering closer communication and bonding with the baby (Field T, 2013). Prenatal Yoga integrates intricate practices of stretching, movement, meditation, respiration, endurance, balance, and mindfulness. Practicing Yoga is fundamentally reliant on the incorporation of breathing techniques, as the alignment of breath facilitates oxygen distribution throughout the body, hence enhancing mental tranquility and optimizing oxygen reserves to their fullest potential. Yoga movements can help insomniacs start sleeping faster and increase sleep duration. The stimulating effect of yoga on the nervous system, especially the brain, can increase blood circulation to the hypothalamus as a sleep regulator, so it affects normalising the sleep cycle (Sidhu, P., 2014). Pregnant women can do Yoga 2-3 times a week for 60-90 minutes/session. (Sindhu P, 2014). Doing Yoga regularly can create physical and mental health that is stronger and more flexible, and it can help one adapt to various unpleasant situations during pregnancy. (Corrigan L, 2020).

The findings of this study correspond with numerous international research efforts demonstrating the efficacy of prenatal yoga in enhancing sleep quality among pregnant women in their third trimester. Research from (Azward et al., 2021). This quasi-experimental study comprised 60 pregnant women in their third trimester, allocated into two groups: a control group getting standard antenatal care and an intervention group engaging in prenatal yoga exercises four times over two weeks. The findings indicated a notable enhancement in sleep quality within the intervention group, as assessed by the Pittsburgh Sleep Quality Index (PSQI).

A study (Shamabadi et al., 2023) assessed the effect of mindfulness training on the sleep quality of pregnant women during the second and third trimesters. This study employed a randomized clinical trial design with 98 participants allocated to intervention and control groups. The intervention group participated in six mindfulness training sessions for a duration of two months. The findings indicated that the mindfulness intervention markedly enhanced the sleep quality of pregnant women ($p < 0.05$).

The mean scores for anxiety, stress, and sadness shown a substantial reduction throughout the several phases of the study ($p < 0.05$). These findings underscore that mindfulness serves as an effective non-pharmacological method to enhance the psychological well-being of pregnant women.

The study conducted by Ibrahim & Zulhijjah (2025) sought to evaluate the impact of prenatal moderate Yoga on anxiety levels among pregnant women in their third trimester. This research utilized a quasi-experimental design with a sample of 24 pregnant women. Participants engaged in light yoga sessions biweekly for a duration of four weeks. Anxiety levels were assessed with the Pregnancy Related Anxiety Questionnaire-Revised (PRAQ-R2) both prior to and during the intervention. The findings demonstrated a notable reduction in anxiety levels following the participation of pregnant women in the yoga program, suggesting that prenatal yoga is efficacious in alleviating anxiety.

Research by Makhija et al. (2021) demonstrated that the cohort engaging in integrated Yoga exhibited a notable reduction in both systolic and diastolic blood pressure relative to the control group. **Systolic Blood Pressure:** The study group exhibited an average reduction of 7.43 ± 5.86 mmHg, whereas the control group demonstrated a decrease of 2.50 ± 5.21 mmHg ($p = 0.002$). **Diastolic Blood Pressure:** Prior to delivery, the study group exhibited an average of 88.00 ± 3.71 mmHg, while the control group had an average of 92.20 ± 5.02 mmHg ($p = 0.001$).

The novelty of this study is that although the benefits of Yoga in pregnancy have been studied, a specific focus on sleep quality in the third trimester in quantitative and measurable terms (with sleep disturbance scores and categories) is still relatively rare, especially in the local Indonesian context. This adds a new dimension to understanding non-pharmacological interventions for sleep disturbances in pregnant women. This study evaluated the effectiveness of prenatal Yoga in a primary health care setting (Puskesmas) in Pematangsiantar City. Most similar studies were conducted in hospitals or private clinics, so this community-based approach adds new value to implementing Yoga as part of promotive interventions in primary health care facilities.

Thus, this international study's findings strengthen the study's results that prenatal Yoga is an effective and safe non-pharmacological intervention to improve sleep quality in pregnant women in the third trimester. Based on the description above, then the researcher intends to conduct research on pregnant women in the third trimester which aims to improve the health of pregnant women through "The Effectiveness of Prenatal Yoga on Improving the Sleep Quality of Pregnant Women in the Third Trimester in the Bah Kapul Health Center Work Area, Pematangsiantar City in 2024.

Research methods

1. Types of research

This study was conducted using the Quasi-experimental method with a pretest-posttest control group design approach to analyze the effect of prenatal yoga intervention on sleep quality, blood pressure, and breathing in mothers in the third trimester. This study was conducted in the Working Area of Bah Kapul Health Centre and Simarimbun Health Centre, Pematangsiantar City. The Target Population in this study was All Pregnant Women in the Third Trimester in the working area of the Bah Kapul Health Centre and the Simarimbun Health Centre, Pematangsiantar City. The sampling technique used in this study was consecutive sampling, namely, each research subject who met the research criteria was included in the study until a specific period and the number of research subjects required was met. Inclusion Criteria: Pregnant women in the second trimester with a pregnancy range of 28 weeks to 36 weeks, singleton pregnancy, able to do light physical activity, did not experience pregnancy complications and were willing to participate in the study by signing an informed consent. Exclusion Criteria: Pregnancy with complications (such as history of heart disease, history of lung disease, high blood pressure and multiple pregnancies) and Respondents who gave birth during the study.

2. Research process

This study began by forming two training groups, namely the intervention and control groups, through random sample selection based on predetermined inclusion criteria. All participants were pregnant women with an early gestational age of 28 weeks and had previously undergone an initial test (pretest) using a standard questionnaire instrument. The intervention group underwent prenatal yoga sessions three times per week with a duration of 60 minutes per session (≥ 12 sessions during the study). Meanwhile, the control group only received a prenatal yoga session once per week, lasting 30 minutes.

This intervention is based on Robert Gagné's information processing theory, which emphasizes that learning occurs through receiving, processing, and releasing information in the form of learning outcomes. Gagné outlined eight information processing stages: motivation, understanding, acquisition, storage, recall, generalization, performance (treatment), and feedback. The final evaluation (posttest) was conducted at 36 weeks of gestation using the same instrument as in the pretest. The entire research implementation process is briefly visualized in Figure 1.

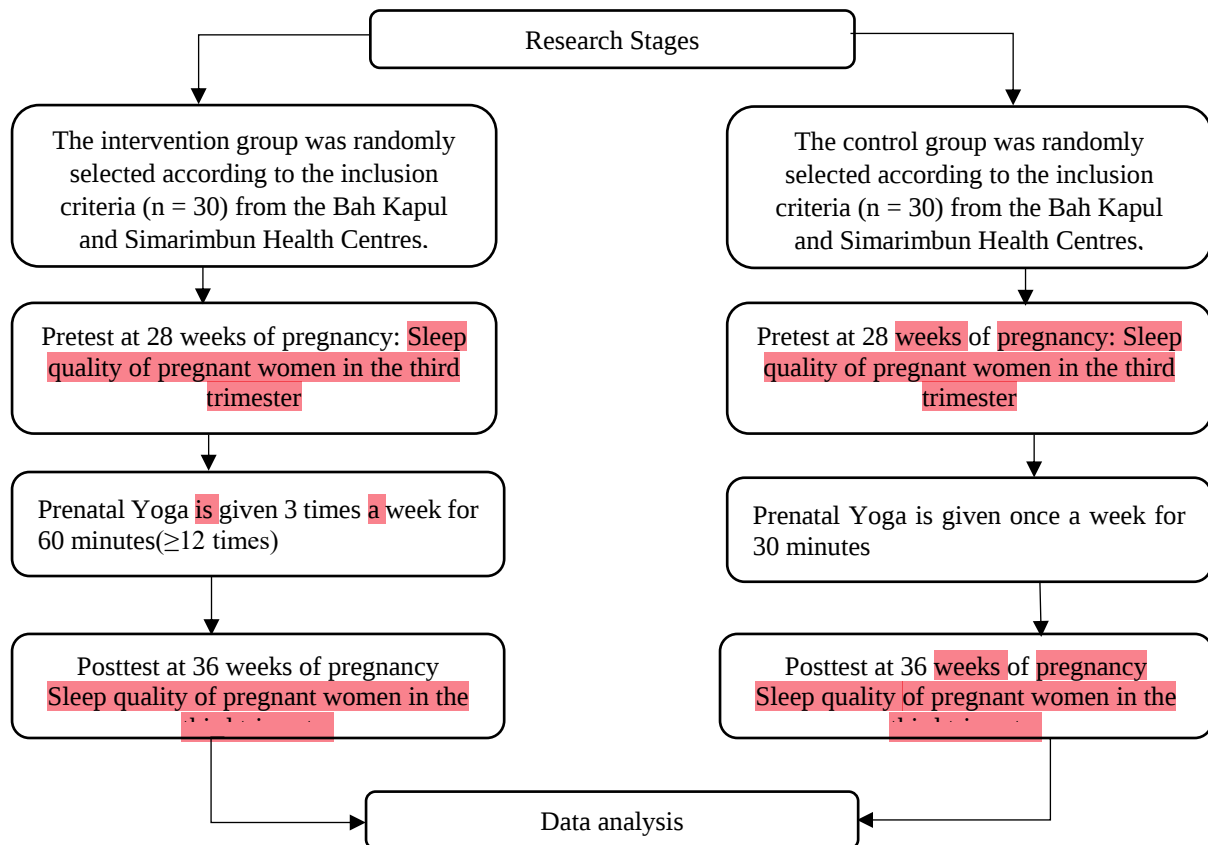


Figure 1. Research stage

3. Instrument

The research instrument used to collect data on sleep quality in this study was the PSQI (Pittsburgh Sleep Index) questionnaire. PSQI (Pittsburgh Sleep Index) is a tool that is used effectively to measure sleep quality and sleep patterns. The creation of the PSQI questionnaire is based on measuring the respondents' sleep patterns with a sleep span over the past month. Buysee et al (1989) grouped the PSQI measurement values into two groups; a) good sleep quality and b) poor sleep quality, both of which include seven aspects, namely subjective sleep quality, sleep duration, sleep latency, sleep efficiency, sleep disturbances, daytime sleep dysfunction, and use of sleeping pills. The answers to each question have a score between 0 and 3 (Likert scale), and each type of question has a different calculation method. The results are classified into two categories at the end of the summation of the scores from all questions. If the final score is <5, it is categorised as good sleep quality; if the final score is > 5, it is categorised as poor sleep quality. Researchers conducted questionnaire testing through validity and reliability tests. The validity test of the PSQI questionnaire showed the results of the validity test conducted on 30 respondents obtained results that were 18 valid question components and could be used to measure the sleep quality variables to be studied because rtable <r count with a significance level of 0.368. This validity test's range of r count values is 0.365-0.733. In this study, the reliability test used was the Alpha Cronbach technique, as follows: 0.812

Data analysis

Data processing and analysis were performed using IBM SPSS software. Univariate analysis was used to describe the distribution of respondent characteristics, including age, education level, type of employment, and antenatal care (ANC) examination. Categorical data were presented as a frequency distribution and a percentage. Bivariate analysis was performed to analyze the relationship between variables in the study. Differences in sleep quality improvement scores between the intervention and control groups were analyzed using the Mann-Whitney test. Meanwhile, the effect of prenatal Yoga on improving sleep quality in both groups was analysed using the chi-squared test. The level of statistical significance was determined based on a p-value <0.05.

Ethics declaration

Before conducting the research, the researcher obtained ethical approval from the Medan Ministry of Health Polytechnic Ethics Commission with No: 01.26 696 /KEPK/POLTEKKES KEMENKES MEDAN 2024. Each prospective informant and respondent is given an informed consent form after the researcher clearly explains the study's purpose, objectives, and procedures. The researcher guarantees the confidentiality of all information provided and ensures that the data is used only for research purposes. Prospective informants and respondents willing to participate are asked to sign the consent form. Conversely, if some are unwilling, the researcher respects the decision and does not continue the interview process or data collection.

Results and Discussion

Research result

This study was conducted in two Community Health Centres with the best KIA services in Pematangsiantar City, namely Bah Kapul Community Health Centre, Pematangsiantar City and Simarimbun Community Health Centre, Siantar Marihat District, Pematangsiantar City. The study on the effectiveness of prenatal Yoga on improving sleep quality in pregnant women in the third trimester was conducted on 30 people who received regular Prenatal Yoga as the intervention group and the group that received irregular Prenatal Yoga as the control group.

1. Characteristics of Research Subjects

The research subjects were grouped into two sample groups based on the study's objectives. The first group was the intervention group (30 pregnant women), and the second group was the control group (30 pregnant women). The recorded characteristic data included age, education, occupation, blood pressure examination, breathing and ANC examination. An examination of sleep quality and sleep disorders was conducted before and after the intervention, which was given for 3 months. The complete results of the study are presented in Table 1

Table 1: Characteristics of the Two Treatment Groups

Characteristics	Group		p*value)
	Intervention (n=30)	Control (n=30)	

1. Age (years) :			0.499
<20	3	6	
20-35	18	18	
>35	9	6	
2. Education :			0.466
Elementary ($\leq$ Junior High)	5	9	
Middle School (SMA)	16	14	
College/College	9	7	
3. Work :			0.108
Not working/housewife	16	22	
Work	14	8	
4. ANC check (times) :			0.244
Median (range)	5 (4-6)	4 (4-6)	

Information :*) based on the Chi-square test, except for the ANC examination with the Mann-Whitney test.

The table above presents the distribution of research subjects based on the characteristics of age, education, work and ANC examinations in pregnant women in the third trimester. From the age characteristics, the most pregnant women were on average 20-30 years old in the intervention and control groups, namely 18 pregnant women (5.4%). From the characteristics of the highest level of education, they were at the high school level, totalling 16 people (4.8%) in the treatment group and 14 people (4.2%) in the control group. From the characteristics of work, the average number of pregnant women was housewives (IRT), namely 16 people (4.8%) in the treatment group and 22 people (6.6%) in the control group and the Ante Natal Care (ANC) examination, the average in the intervention group was 5 times ANC examination and in the control group 4 times ANC examination.

The table above shows that the characteristic data includes age, education, occupation and ANC examination in pregnant women in the third trimester. The statistical test results of the characteristics of the two research groups showed a significant difference ($p>0.05$).

Table 2. Comparison Results of Blood Pressure and Respiratory Examination in the two research groups

Variables	Group		p*value)
	Intervention (n=30)	Control (n=30)	
Before Intervention:			
Systolic (mmHg)	120 (100-140)	115 (100-130)	0.098
Diastolic (mmHg)	80 (60-90)	80 (60-90)	0.812
Breathing	22 (20-26)	22 (18-24)	0.073
After Intervention:			
Systolic (mmHg)	120 (100-120)	120 (100-120)	0.274
Diastolic (mmHg)	80 (70-80)	80 (70-80)	1,000
Breathing	20 (18-22)	20 (18-22)	0.863

Information :*) based on the Mann-Whitney test; data are presented in median and range.

The table above presents descriptive statistical comparisons of the various variables studied from the two treatment groups, namely, systolic blood pressure, diastolic blood pressure, and respiration before and after treatment was given. The results of statistical tests showed that all variables measured in the two research groups did not show any significant differences ($p>0.05$). With the homogeneity of

the characteristics of the subjects and the measurements of the various variables studied, it is feasible to compare.

Table 3 Comparison of Sleep Quality Scores Before and After Treatment Given to the Two Research Groups

Sleep Quality (Score data)	Group		p*value)
	Intervention (n=30)	Control (n=30)	
Before intervention:			0.111
Median	1	1	
Range	1 – 2	1 – 2	
After intervention:			0.169
Median	2	2	
Range	1 – 2	1 – 2	
Comparison before vs after intervention	p <0.001**)	p =0.003*)	
Sleep Quality Score Increase:			0.010
Median	1	0	
Range	0 – 1	0 – 1	

Information :*) based on Mann-Whitney test; **) Wilcoxon test.
Sleep quality score: 1 = Poor; 2 = Good

The table above presents a comparison of sleep quality scores before and after the intervention was given. In the measurement before the intervention was given, the median sleep quality score did not show any significant difference ($p > 0.05$), and was categorized as poor. After the intervention was given, both the intervention and control groups showed a significant difference ($p < 0.05$). In the intervention group, there was an increase in the score with a median of 1 and in the control group with a median of 0; the comparison of the increase in sleep quality scores was statistically significant with the Mann-Whitney test ($p < 0.05$). The results of the assessment of sleep quality are based on the score category 1 = poor and score 2 = good, as shown in the table below. Before the intervention was given to the intervention group, 22 people (73.3%) and 17 people (56.7%) in the control group had poor sleep quality; At the same time, after the intervention was given to the intervention group, those who were categorized as poor sleep quality decreased to 3 people (10%), and in the control group 7 people (23.3%). The comparison between before and after the intervention was given to both research groups, showing a significant difference ($p < 0.05$).

Table 4. Comparison of Sleep Quality in the two research groups

Sleep Quality (Category)	Group		p*value)
	Intervention (n=30)	Control (n=30)	
Before intervention:			
Bad	22 (73.3%)	17 (56.7%)	0.176
Good	8 (26.7%)	13 (43.3%)	
After intervention:			
Bad	3 (10.0%)	7 (23.3%)	0.166
Good	27 (90.0%)	23 (76.7%)	
Comparison before vs after intervention	p <0.001**)	p =0.003**)	

Information :*) based on Chi-square test; **) Mc.Nemar test.

The table above compares sleep quality before and after the intervention, which was given to both research groups. Before the intervention was given to the intervention group, 22 people (73.3%)

and 17 people (56.7%) in the control group had poor sleep quality; At the same time, after the intervention was given to the intervention group, those classified as having poor sleep quality decreased to 3 people (10%), and in the control group 7 people (23.3%). The comparison of sleep quality between before and after the intervention was statistically analyzed using the Chi-square test in both research groups, showing a significant difference ($p < 0.05$).

Table 5 Comparison of Sleep Disturbance Scores in the Two Research Groups

Sleep Disorders (Score data)	Group		p*value)
	Intervention (n=30)	Control (n=30)	
Before intervention:			0.221
Median	12	12	
Range	5 – 19	5 – 20	
After intervention:			<0.001
Median	8	12	
Range	0 – 13	0 – 19	
Sleep Quality Score Increase:			0.019
Median	4	0	
Range	-5 – 13	0 – 9	

Information :*) based on Mann-Whitney test; **) Wilcoxon test.

Next, Table 4.1.5 shows that the examination of sleep disturbance scores before the intervention in both research groups showed no significant difference, with the same median value of 12. After the intervention was given to the treatment group, the median became eight while the control group remained 12, and this difference was statistically significant ($p < 0.05$). The increase in sleep quality scores in the treatment group was four, and in the control group, 0, and the difference in sleep quality scores between the two research groups was statistically significant. If the sleep disturbance score data is categorized into mild (score 1-9), moderate (score 10-18), and severe (score 19-27). The data is presented in Table 6. In the treatment group, there was a change in status from the previous severe category (2 people) to the moderate category after the intervention was given. In contrast, in the control group before the intervention was given, those included in the severe sleep disturbance category (7 people) became two people in the severe category and five people in the mild category.

Table 6. Comparison of Sleep Disturbances Before and After Intervention Given to Both Research Groups

Sleep Disorders	Group		p-value
	Intervention (n=30)	Control (n=30)	
Before intervention:			0.195
Light (score 1-9)	11 (36.7%)	9 (30.0%)	
Moderate (score 10-18)	17 (56.7%)	14 (46.7%)	
Heavy (score 19-27)	2 (6.7%)	7 (23.3%)	
After intervention:			<0.001
Normal (score 0)	5 (16.7%)	3 (10.0%)	
Light (score 1-9)	21 (70.0%)	6 (20.0%)	
Moderate (score 10-18)	4 (13.3%)	19 (63.3%)	
Heavy (score 19-27)	0	2 (6.7%)	
Comparison before vs after intervention	p<0.001**)	P=0.005**)	

Information :*) Chi-square test; **) Marginal Homogeneity Test.

Next, the table above shows that in the examination of the Comparison of Sleep Disorder Scores before the intervention in both research groups, there was a change in status in the treatment group, which was initially in the severe category of 2 people (6.7%) to the moderate category of 21 people (70.0%) after the intervention was given;. In contrast, in the control group before the intervention was given, those in the severe sleep disorder category were seven people (23.3%), two people (6.7%) in the severe category and six people (20.0%) in the mild category. The comparison of sleep disorders before and after the intervention was statistically analyzed using the Chi-square test in both research groups, showing a significant difference ($p < 0.05$).

DISCUSSION

1 Characteristics of Subjects in Both Research Groups

Distribution of Research Subjects based on Age, Education, Occupation and ANC Examination characteristics in pregnant women in the Third Trimester. From the characteristics of pregnant women, the average age is 20-30 years in the intervention and control groups, namely 18 people (5.4%). This means that the pregnant women who are respondents are at a safe age for pregnancy. Wikjosastro (2007) stated that the age of 20-35 years is a healthy and strong reproductive age to participate in activities compared to the age of mothers who are too old or over 35 years, who are at risk and are no longer strong enough to participate in activities during pregnancy. Sulistiyani's research (2019) indicates that women under 20 years of age have not fully developed their reproductive functions, rendering them unprepared for pregnancy and childbirth. Conversely, women over 35 years experience a progressive decline in the endometrium, which adversely affects the strength of contractions during labor and postpartum. According to Wiknjosastro (2007), this period is the optimal time for a woman to get pregnant because the woman's reproductive organs are currently ready and mature, as is the mother's psychology. In addition, a mature and healthy age will influence an individual to make decisions that refer to each of their experiences, especially experiences related to pregnancy, childbirth and postpartum period, and health education programs provided at a sufficient age in starting or entering marriage and pregnancy will help someone in maturity in facing problems or issues, in this case facing pregnancy and changes during pregnancy. While younger and older elements will face changes and adaptations during pregnancy, which are also related to the maturity and readiness of the reproductive organs.

Based on the results of the study, it was found that most of them had a high school education. Research conducted by Rahayu (2019) found that the level of education makes it easier for someone to understand the knowledge and follow the directions given by the researcher regarding the importance of health during pregnancy. With a person's education level, they will have a rational response when facing a challenge, and it will be easier to capture information so that more knowledge is received (Dewi, 2019).

The study's findings indicated that the majority of respondents were either unemployed or homemakers (IRT). Other studies corroborate the findings regarding the efficacy of Prenatal Yoga in enhancing sleep quality among pregnant women in their third trimester. Specifically, Rahayu and Astuti (2019) indicated that over half of pregnant women with leisure time to engage in Prenatal Yoga are not employed. Pregnant women who do not work will show no interaction with the broader community and organizational activity, with the assumption that pregnant women who work will have higher knowledge and receive information faster than mothers who do not work. Pregnant women who do not work or are homemakers will have free time to do activities more comfortably. According to Effendi (2019), the mother's work can affect sleep quality due to pressure and various stressors in the workplace. A workload that is too heavy or physical abilities that are too weak can cause a pregnant woman who works to experience disorders or diseases due to work, such as environmental conditions. Mothers who do not work will have more time and opportunity to prepare themselves by taking prenatal classes, searching for and learning about preparing for childbirth and becoming a mother in carrying out her new role compared to mothers who are still actively working (Corrigan L, 2020).

2. Sleep Quality in Pregnant Women in the Third Trimester

Subjective sleep quality: Pregnant women report enhanced sleep quality following prenatal yoga, as indicated by significant changes in data from pretest to posttest. There is a rise in the proportion of pregnant women who perceive their sleep quality as satisfactory, accompanied by a decline in instances of poor sleep quality. Consequently, subjective sleep quality is a determinant of overall sleep quality. As stated by Azward H (2021), prenatal yoga during pregnancy emphasizes comfort and safety in its practice. It offers numerous advantages, including enhanced sleep quality, alleviation of muscular tension, and mitigation of common physical ailments during pregnancy, such as back and lower back discomfort.

Research findings, including those by Meilinda & Alita Ayani (2020), indicate a notable difference in the average sleep quality of third-trimester pregnant women before and after yoga intervention. The study reveals that those who participated in yoga experienced an enhancement in sleep quality. This improvement is attributed to yoga's significance for pregnant women, aiding in alleviating discomfort during pregnancy and preparing for childbirth. According to the findings of Putri & Nur (2021), the enhancement of sleep quality in pregnant women during the third trimester, achieved after four yoga sessions over 14 days, resulted from increased comfort, tranquility, and serenity. This improvement is attributed to the body's engagement in guided movements and meditation, which facilitates a more efficient oxygen flow to the brain, thereby promoting a sense of freshness, calmness, improved concentration, and comfort during rest. Furthermore, research conducted by Sari & Kumorojati (2019) involving 34 pregnant women in their third trimester revealed that prior to engaging in prenatal yoga, 59.5% of participants exhibited poor sleep quality. Following the implementation of prenatal yoga, there was a notable improvement, with 73% of respondents reporting good sleep quality. The physiological alterations that transpire during pregnancy have pathogenic effects on expectant women. Physiological changes in pregnant women commence with the onset of nidation, during which some women's bodies react to alien entities. During the third trimester, pregnant women will experience discomfort due to belly expansion, structural alterations, and hormonal fluctuations (Amelia, 2018). These concerns encompass back pain, leg cramping, abdominal discomfort, frequent urination, respiratory issues, and sleep disturbances commonly encountered by pregnant women during their pregnancy. Sleep issues in pregnant women are frequently attributed to depression, which is exacerbated by hormonal fluctuations. The hormone serotonin, which induces stress in pregnant women, may also lead to sleeplessness in this population (Husin, 2017). Pregnant women may experience sleep abnormalities characterized by a reduction in the percentage of slow-wave sleep and REM sleep, with an increase in stage one sleep, particularly prevalent during the third trimester. During the third trimester, the prevalence of sleep disturbances increases due to discomforts such as back pain, frequent urination, and involuntary awakenings from sleep. Fetal movement, pyrosis, leg cramps, weariness, and difficulties initiating sleep. Yoga during pregnancy emphasizes comfort, stretching, and relaxation, yielding numerous benefits including enhanced energy, vitality, and endurance; alleviation of stress and anxiety; improved sleep quality; reduction of muscle tension; mitigation of common physical discomforts such as back pain, pelvic pain, and swelling; facilitation of healing and recovery post-delivery; stabilization of maternal emotions; reinforcement of determination and courage; bolstering of self-confidence and focus; cultivation of positive affirmations and mental fortitude during childbirth; and promotion of mental tranquility through relaxation and meditation (Sindhu P, 2019).

The study posits that prenatal yoga is a physical workout modality that emphasizes breath control and mental focus, facilitating relaxation in pregnant women and alleviating their reported discomforts. The sleep quality of pregnant women in the third trimester enhances following a yoga exercise intervention.

3. Sleep disorders in pregnant women in the third trimester

Symptoms or symptoms encountered by pregnant women arise during the second and third trimesters of gestation. Numerous pregnant women frequently awaken at night, encounter sleep

disturbances or insomnia, struggle to sustain sleep, and exhibit restlessness throughout the latter stages of pregnancy.

Common symptoms during the third trimester include back pain, leg pain, and frequent urination (Yang, T., 2020). The growth of the fetus might influence the rest duration and quality of sleep in pregnant women, since the enlarging fetus may exert pressure on the bladder, so limiting its capacity and prompting frequent urination. Physiologically, sleep disturbances in pregnant women arise from fetal movement and growth, which may exert pressure on the urine bladder, leading to increased urination frequency, weight gain, or alterations in spinal anatomy. This results in discomfort in the lower back region for pregnant women. This soreness also manifests in the extremities, accompanied by reports of cramps. This condition may induce psychological alterations in pregnant women, while the physical changes associated with pregnancy and the onset of labor can impact the quality of their sleep. Anxiety is a risk factor that might lead to diminished sleep quality during the third trimester of pregnancy (Situmorang, 2018).

Palifiana and Wulandari's research (2018) shown that physical discomfort during pregnancy correlates with the sleep quality of pregnant women in the third trimester. Discomfort due to ambient temperature and inadequate ventilation can also impact sleep. Several pregnant women reported that sleep quality is adversely affected by noise, particularly from a snoring spouse, and that room temperature significantly impacts comfort, especially for those who are overheated during pregnancy.

This is also supported by research results (Nadholta et al., 2023) conducted a randomized controlled experiment with 100 pregnant women in India. Participants in a 16-week prenatal yoga program exhibited significant decreases in stress, anxiety, and depression, alongside enhancements in overall quality of life relative to the control group. The major emphasis was on psychological wellness, although enhanced sleep quality was also observed as a beneficial side effect of the prenatal yoga exercise.

Findings from the research conducted by (Wulan, 2023) This study employed a pretest-posttest design with two groups to evaluate the impact of prenatal yoga on the sleep quality and anxiety levels of pregnant women in their third trimester. The findings indicated that prenatal yoga effectively enhanced sleep quality and diminished anxiety levels in pregnant women. Findings of the research (Nurlelawati et al., 2023). This study employed a pre-experimental design with a single-group pretest-posttest framework to evaluate the impact of prenatal Yoga on the sleep quality of pregnant women in their third trimester. The findings indicated a substantial enhancement in sleep quality following the prenatal yoga practice.

Kundarti et al. (2020) demonstrated that the prenatal Yoga group had a considerable reduction in anxiety levels, reduced cortisol levels, and enhanced sleep quality relative to the control group. The yoga group exhibited a substantial reduction in anxiety levels relative to the control group ($p < 0.001$). The yoga group exhibited a substantial reduction in plasma cortisol levels relative to the control group ($p < 0.001$). The yoga group exhibited a marked enhancement in sleep quality relative to the control group ($p < 0.001$). This study suggests that prenatal yoga is an effective approach to mitigate anxiety, stress, and sleep disruptions in pregnant women, endorsing its application as a non-pharmacological intervention in antenatal care.

Conclusion and Suggestions

The findings indicated that prenatal Yoga significantly enhanced the sleep quality of pregnant women throughout the third trimester. Prior to the intervention, the majority of individuals in both the intervention and control groups exhibited poor sleep quality. Following the intervention, the intervention group exhibited a substantial rise in the proportion of pregnant women with good sleep quality, increasing from 26.7% to 90.0% ($p < 0.001$), whereas the control group showed no statistically significant change. The sleep quality score in the intervention group shown a substantial enhancement relative to the control group ($p = 0.010$). Moreover, the intervention group exhibited a notable reduction in the sleep disturbance score, with the median score declining from 12 to 8 ($p < 0.001$), and no pregnant women reported severe sleep disruption post-intervention (a fall from 6.7% to 0%). Simultaneously, there was no notable variation in blood pressure and respiratory rate between the two groups before and after the intervention ($p > 0.05$), suggesting that essential physiological

parameters did not affect the enhancement of sleep quality, but rather the prenatal yoga intervention itself.

Reference