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Effect of Structured Physical Exercise on Sleep Quality in Third Trimester Pregnant Women

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ABSTRACT

Poor sleep quality is common among pregnant women, particularly in the third trimester, and may negatively affect maternal and fetal health. An initial survey conducted at the Ambacang Health Center revealed that 65% of pregnant women experienced sleep disturbances. This study aimed to examine the effect of structured physical exercise on sleep quality in third trimester pregnant women. A quasi-experimental study with a pretest–posttest design was conducted involving 20 third trimester pregnant women selected through purposive sampling in the working area of the Ambacang Health Center. The intervention consisted of structured physical exercise performed for three weeks, with a frequency of three sessions per week. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) before and after the intervention. The results demonstrated a significant improvement in sleep quality following the structured physical exercise intervention ($p < 0.05$). Most participants also reported feeling more refreshed and energized after participating in the exercise program. These findings indicate that structured physical exercise is an effective non-pharmacological intervention to improve sleep quality and reduce sleep disturbances in third trimester pregnant women. Therefore, structured physical exercise should be considered as part of routine prenatal care programs to enhance maternal well-being during pregnancy.

Keywords: *Structured Physical Exercise, Sleep Quality, Pregnant Women, Third Trimester*

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INTRODUCTION

Poor sleep quality is a problem that is often experienced by pregnant women, especially in the third trimester. During this period, the expectant mother faces various physiological and emotional changes that can affect the quality of her sleep. One of the main factors that cause sleep disorders are significant physical changes, such as an increase in the size of the uterus that puts pressure on the bladder, as well as changes in body position that reduce sleep comfort. In addition, high levels of the hormone progesterone, which serves to maintain pregnancy, can affect the sleep cycle and cause excessive sleepiness or waking up in the middle of the night. These sleep disorders often add to the burden for pregnant women who are already facing various physical and emotional challenges during pregnancy (Hernandez et al., 2020).

The hormonal changes that occur during pregnancy affect sleep regulation, which can lead to sleep disorders of various forms, such as insomnia or fragmented sleep. An increase in the hormone progesterone, which plays a role in muscle relaxation and stimulates drowsiness, can also affect the quality of sleep of pregnant women. In addition, increased anxiety and stress as Labor approaches contribute to sleep disorders. The anxiety that pregnant women feel can be caused by various factors, such as preparation for birth, physical changes, and uncertainty about the future. This leads to poor sleep quality, which can then affect the physical and mental well-being of the expectant mother (Chang et al., 2019).

Poor sleep quality can cause a variety of negative impacts for pregnant women. Decreased sleep quality is associated with an increased risk of hypertension, gestational diabetes, and other pregnancy complications. In addition, poor quality sleep can also increase the risk of premature birth and low birth weight. This impact is not only risky for the mother, but can also affect fetal development, including the development of the brain and nervous system (Chang et al., 2019).

Sleep disorders in the third trimester can also have a direct impact on the health of the mother and fetus. Disturbed sleep is associated with an increased risk of hypertension, gestational diabetes, and premature birth. In addition, poor sleep quality can also contribute to an increased risk of postpartum depression and other mood disorders. Inadequate sleep can cause pregnant women to feel more tired, anxious, and less energized, which can ultimately reduce overall quality of life. Therefore, it is important to identify and address sleep problems in pregnant women, in order to prevent negative impacts that can continue into labor and the postpartum period (Snyder et al., 2018).

Sleep disorders that occur in third trimester pregnant women also often cause psychological problems, such as anxiety and depression. Lack of sleep can worsen the mood of the expectant mother, increase feelings of stress and anxiety, and reduce the ability to cope with the stresses associated with pregnancy. Research shows that pregnant women who experience sleep disorders are at higher risk of postpartum depression (Snyder et al., 2018).

Various interventions have been proposed to treat sleep disorders in pregnant women, one of which is to perform structured physical exercise. Regular physical exercise can help improve sleep quality, reduce anxiety, and increase body comfort. In pregnant women, physical exercise is

not only beneficial for keeping fit, but also to help reduce back pain, leg swelling, and sleep problems that often appear in the third trimester (Mottola et al., 2019).

Structured physical exercise, such as pregnancy exercises or yoga, has been shown to provide many benefits in improving sleep quality in pregnant women. Structured physical activity, especially one that involves light to moderate movement, can stimulate the release of endorphins, chemical compounds in the brain that act as natural stress relievers and provide a feeling of calm. These endorphins play an important role in improving mood and reducing anxiety, which can contribute to better sleep. Structured physical exercise can also help reduce muscle tension, especially in the back and hip area, which is often a common problem for pregnant women, so that pregnant women feel more relaxed and comfortable before going to bed (Poyatos-León et al., 2021). In addition, physical activity can improve blood circulation and improve overall sleep quality.

Some studies show that light to moderate physical exercise has a significant positive impact on the quality of sleep of pregnant women. One popular type of exercise is prenatal yoga, which combines light stretching with deep breathing techniques to help deal with stress and physical strain. In addition to yoga, pregnancy exercises are also often used as physical exercises that can help pregnant women stay active in a safe way. These activities are not only beneficial for improving sleep quality, but also improve the physical fitness of pregnant women, reduce anxiety, and help regulate regular sleep cycles. This becomes especially important given that many pregnant women experience sleep disturbances due to physical discomfort or emotional stress (Poyatos-León et al., 2021).

However, although the benefits of structured physical exercise on the quality of sleep of pregnant women have been widely studied, the most effective types of exercise are still a topic of debate in research. Some studies show that light aerobic exercise, such as brisk walking or swimming, is more beneficial in improving sleep than strength training or weight lifting, which are more intensive. Aerobic activity is known to increase lung capacity and blood circulation, which plays a role in improving sleep quality. On the other hand, there are studies that show that the combination of aerobic and strength training can provide more optimal results, as they complement each other in improving overall physical health (Lassi et al., 2020). Therefore, it is important to evaluate the type of exercise that best suits the condition of the pregnant woman and its effectiveness in improving sleep.

In addition to structured physical exercise, changes in sleep habits and other relaxation techniques also need to be considered in order to improve the quality of sleep of pregnant women. Some pregnant women may feel more comfortable with different sleeping habits, such as avoiding large meals before bed or using certain sleeping positions to reduce discomfort. Relaxation techniques, such as meditation or deep breathing, can also help calm the mind and body before bed. While these approaches can be beneficial, structured physical exercise is often considered a more accessible and more structured intervention. Physical exercise is also more flexible to do at

home, for little cost or even without special tools, making it a very practical option for pregnant women who want to overcome sleep disorders (Sharma et al., 2017).

Given the many benefits provided by structured physical exercise and various other approaches, it is important to conduct further research to explore the types of exercise that are most effective for pregnant women in improving sleep quality. More in-depth research can help identify the specific mechanisms behind how physical exercise can affect sleep, as well as provide stronger evidence as to the best combination of exercises that can be applied in a maternal health program. In addition, evaluation of individual factors such as age, fitness level, and specific medical conditions also need to be considered in determining the type of exercise that is safe and effective (Sharma et al., 2017).

Q some recent studies have shown that the quality of sleep of pregnant women is also influenced by environmental factors, such as lighting, room temperature, and noise. Therefore, in addition to physical exercise, environmental factors that favor good sleep should also be considered in prenatal care. However, research on the relationship between environmental factors and sleep disorders in pregnant women is still limited and requires further attention (Bauer et al., 2022).

Overall, although there are various methods that can be applied to improve sleep in pregnant women, structured physical exercise offers an effective and accessible solution for many pregnant women, especially in areas with limited facilities. Further research on the effect of physical exercise on the quality of sleep of pregnant women in Indonesia, especially in the Puskesmas area, is still very much needed. It is important to develop evidence-based interventions that can improve the quality of life of pregnant women and fetal health (Rochman et al., 2021).

This research is expected to contribute in identifying practical solutions for sleep disorders in pregnant women, focusing on structured physical exercise as an affordable and acceptable approach by various groups of pregnant women. As understanding of the importance of quality sleep during pregnancy increases, it is hoped that this study can serve as a basis for better maternal health policies at the national and local levels.

METHODS

This study used a quasi-experimental design with pretest-posttest to test the effect of structured physical exercise on the quality of sleep in third trimester pregnant women. This design was chosen because it made it possible to observe changes in sleep quality before and after the intervention in the absence of a randomized control group. The sample consisted of 20 third trimester pregnant women who were selected purposively sampling from the Ambacang Health Center working area. Inclusion criteria participants were pregnant women between the ages of 20 to 35 years, had no history of chronic disease or severe sleep disorders before pregnancy, and were willing to follow a structured physical exercise program.

The intervention was given in the form of a structured physical exercise program consisting of pregnancy exercises and light stretching exercises performed for 3 weeks, with a

frequency of 3 times per week. Each training session lasts 30-45 minutes and is guided by a trained instructor. These exercises are designed to increase flexibility, improve posture, as well as reduce muscle tension that is often experienced by pregnant women. Before and after the exercise program, the quality of sleep of pregnant women was measured using the Pittsburgh Sleep Quality scale (PSQI), which consists of 7 components that include sleep duration, subjective sleep quality, sleep disorders, use of sleeping pills, among others. The PSQI is a valid and reliable instrument for assessing sleep quality in the adult population, including pregnant women.

The data obtained were analyzed using the paired t-test statistical test to determine significant differences in sleep quality scores before and after the intervention. Before the analysis, the sleep quality data obtained from the PSQI will be tested for normality to ensure the suitability of the analysis method. In addition, a description of sample characteristics such as age, parity, and education level will also be carried out to see the influence of demographic factors on the results of the study. With this approach, it is expected to provide a clearer picture of the effectiveness of structured physical exercise in improving the quality of sleep in third trimester pregnant women.

RESULTS

The results obtained on the effect of structured physical exercise on sleep quality in pregnant women in the third trimester of Ambacang Padang Health Center work area are as follows:

1. Characteristics of Respondents

The following table presents the characteristics of the respondents participating in the study, including age, parity, and education level.

Table 1. Characteristics of Respondents

Characteristics of Respondents	Total (n=20)	Percentage (%)
Age		
20-25 years old	8	40%
26-30 years old	10	50%
31-35 years old	2	10%
Parity		
Primigravida (first pregnancy)	12	60%
Multigravida (second or more pregnancies)	8	40%
Education		
ELEMENTARY/JUNIOR HIGH SCHOOL	2	10%
High school	12	60%
College	6	30%

This table shows that most respondents are between 26 and 30 years old (50%), which is an age group with a relatively high incidence of pregnancy. Most of the pregnant women involved were primigravids (60%), which indicates that many of the pregnant women in the study were first-time pregnant. In terms of education, the majority of pregnant women have a high school education background (60%), while only a small percentage have a higher or lower education. These characteristics can influence the understanding and acceptance of a given structured physical exercise intervention.

2. Quality of Sleep Before and After the Intervention

The following table shows a statistical description of the following table shows the distribution of sleep quality scores based on the Pittsburgh Sleep Quality scale (PSQI) before and after following 3 weeks of structured physical exercise.

Table 2. Quality of Sleep Before and After the Intervention

Sleep Quality	Before the Intervention (n=20)	After the Intervention (n=20)	P-value
PSQI score			
Mean (SD)	10,5 (2,4)	7,1 (2,1)	0,001
Poor Sleep Quality (Score > 5)	18 responden (90%)	8 responden (40%)	
Good Sleep Quality (Score Of 5)	2 responden (10%)	12 responden (60%)	

This table shows the significant difference in PSQI scores between before and after the structured physical exercise intervention (p = 0.001). Before the intervention, the majority of pregnant women (90%) had poor sleep quality with a PSQI score of more than 5. After the intervention, there was a significant improvement, with only 40% of respondents still showing poor sleep quality and 60% having good sleep quality. These improvements suggest that structured physical exercise can significantly improve the quality of sleep of pregnant women.

3. The Relationship Of Structured Physical Exercise With Changes In Sleep Quality

The following table shows the relationship between structured physical exercise and changes in sleep quality in third trimester pregnant women based on a bivariate analysis using the paired t-test.

Table 3.The Relationship of Structured Physical Exercise with Changes in Sleep Quality

Variable	Average PSQI score before (Mean)	Average PSQI score after (Mean)	P-value
Overall Respondents	10,5 ± 2,4	7,1 ± 2,1	0,001

This table shows the results of a bivariate analysis that tested changes in PSQI scores before and after the intervention. The results of the analysis with paired t-test showed that there

was a significant difference between the sleep quality score before and after the intervention of structured physical exercise (p = 0.001). The PSQI score decreased from an average of 10.5 before the intervention to 7.1 after the intervention, which indicates a significant improvement in the quality of sleep of pregnant women. This indicates that structured physical exercise can effectively improve the sleep quality of third trimester pregnant women.

4. Frequency if Sleep Complaints Before and After the Intervention

The following table illustrates the frequency of sleep complaints experienced by respondents before and after following structured physical exercise.

Table 4. Frequency of Sleep Complaints Before And After The Intervention

Sleep Complaints	Before The Intervention (n=20)	After The Intervention (n=20)
Difficulty Sleeping (Insomnia)	14 respondents (70%)	5 respondents (25%)
Waking Up In The Middle Of The Night	12 respondents (60%)	4 respondents (20%)
Not Sleeping Well	16 respondents (80%)	6 respondents (30%)
Easy To Wake Up In The Morning	10 respondents (50%)	3 respondents (15%)

This table shows a significant improvement in sleep complaints after the intervention. Before physical exercise, the majority of respondents experienced difficulty falling asleep, waking up in the middle of the night, and poor sleep. After following structured physical exercises, these complaints decreased significantly. For example, complaints of difficulty falling asleep (insomnia) decreased from 70% to 25%, and complaints of not sleeping well decreased from 80% to 30%. This indicates that physical exercise can reduce sleep disorders that are common in third trimester pregnant women.

DISCUSSION

1. Characteristics of Respondents

The characteristics of the respondents in this study showed that the majority of pregnant women involved were aged between 26 to 30 years (50%). This age is the most common age range in pregnancy, according to the findings of Hernandez et al. (2020) who noted that pregnant women at the age of 20-30 years tend to have a higher risk of sleep disorders. In addition, this age is also associated with a tendency to be more aware of health, including sleep quality. Most of the respondents (60%) are primigravids, that is, pregnant women who are expecting their first child. Primigravidian pregnant women are often more prone to anxiety and physical changes, which can lead to more frequent sleep disturbances, as found in the study of Snyder et al. (2018).

Respondents ' education also showed interesting variations. Most pregnant women have a high school level education (60%), while 30% have a college education. Only 10% have an

elementary or Junior High School Education. This suggests that most of the pregnant women in the study had a relatively high level of Education, which could have an effect on their understanding of physical exercise programs. Sharma et al. (2017) showed that the level of education can affect the ability of pregnant women to accept and follow evidence-based health programs, including physical exercise. With higher education, pregnant women may be more likely to access information on the benefits of physical exercise and increase motivation to participate in such programs.

These diverse age and educational factors can influence responses to physical exercise interventions. Lassi et al. (2020) noted that pregnant women with higher education levels tend to be more active in participating in health programs that can improve their sleep quality. This may be due to a better level of understanding of the importance of quality sleep for the health of the mother and fetus. Thus, these demographic characteristics are important to consider in designing more targeted interventions.

However, although most of the pregnant women in the study had a high school education, the group with lower education (elementary/junior high) also experienced an improvement in sleep quality after following the physical exercise intervention. This shows that structured physical exercise can be accessed and accepted by various educational groups, reflecting that the program can be used as a universal intervention option for pregnant women. Chang et al. (2019) also stressed the importance of providing an inclusive and accessible approach for all groups of pregnant women, regardless of their level of Education.

Overall, these characteristics of respondents provide a good overview of the background of pregnant women involved in the study and how age and education factors can affect the effectiveness of physical exercise interventions. Further research could explore more deeply how these demographic characteristics affect intervention outcomes and provide a more thorough understanding of the best strategies for improving sleep quality in pregnant women.

2. Quality of Sleep Before and After the Intervention

The results of this study showed that the quality of sleep of pregnant women experienced a significant improvement after following a structured physical exercise intervention. Before the intervention, the majority of pregnant women (90%) experienced poor sleep quality, with a PSQI score of more than 5, indicating a high level of sleep disturbance. Sleep disturbance in pregnant women in the third trimester is a fairly common problem and is often caused by several factors, including hormonal changes, physical discomfort, as well as increased anxiety.

Hernandez et al. (2020) explained that in the third trimester, an increase in the size of the uterus and a shift in the body's center of gravity can cause muscle tension that interferes with comfortable sleep. In addition, hormonal fluctuations, such as increased levels of progesterone and estrogen, can cause sleep disorders by increasing the frequency of urination or increasing anxiety that can interfere with restful sleep. Therefore, these findings reflect the high prevalence of sleep disorders in pregnant women, which can be risky for the health of the mother and fetus.

After following a structured physical exercise intervention for 3 weeks, the results showed a significant improvement in sleep quality, with only 40% of pregnant women still experiencing poor sleep quality (PSQI score > 5). As many as 60% of pregnant women reported significant improvements in sleep quality, with a PSQI ≤5 score. These changes suggest that physical exercise interventions, such as pregnancy exercises or yoga, have a positive effect on reducing sleep disorders in pregnant women. Poyatos-León et al. (2021) found that structured physical exercise, including pregnancy exercises, can stimulate the release of endorphins, which are chemical compounds responsible for reducing pain and anxiety, as well as improving sleep comfort. By reducing anxiety and body tension, pregnant women can feel more relaxed, so sleep becomes more restful and quality.

In addition, this decrease in PSQI scores reflected improvements in more specific aspects of sleep quality, such as sleep duration, the time it took to fall asleep, as well as the frequency of nighttime awakenings. Lassi et al. (2020) in his research also found that structured physical exercise can help improve physical and mental relaxation in pregnant women. Exercises such as pregnancy exercises and yoga not only focus on strengthening the body, but also on managing breathing and improving posture, which can reduce muscle tension, especially in the lower back and hip area, which are often the cause of sleep disorders. Reduced physical tension, coupled with improved mood resulting from physical exercise, allows the expectant mother to fall asleep faster and longer without frequent awakenings.

However, despite the results of this study showing significant improvements, some pregnant women still reported poor sleep quality after following a physical exercise intervention. This indicates that other factors, in addition to physical strain, also affect the quality of sleep of the expectant mother. Sharma et al. (2017) noted that sleep disorders in pregnant women are often influenced by psychological factors, such as anxiety or stress, which may not be completely overcome only by physical intervention. Stress and anxiety about childbirth or changes in life to come can affect the ability of expectant mothers to sleep well, even if they are already doing relaxing physical exercises.

In addition, certain medical factors, such as breathing disorders related to pregnancy (for example, sleep apnea in pregnancy) or acid reflux, may continue to interfere with the pregnant woman's sleep, even if structured physical exercise has been performed. Chang et al. (2019) also showed that sleep disorders in pregnant women can be influenced by other medical factors that require a more comprehensive approach. For example, sleep disturbances caused by physical discomfort such as hip pain or swelling in the legs often cannot be completely remedied by physical exercise without additional medical treatment. Therefore, a holistic approach that includes physical, medical, and psychological interventions is needed for more optimal results in improving the quality of sleep of pregnant women.

Nevertheless, the results of this study still confirm that structured physical exercise provides significant benefits in improving the quality of sleep of pregnant women, especially in reducing sleep disorders caused by physical tension and anxiety. Snyder et al. (2018) also revealed

that pregnant women who followed a structured physical exercise program reported feeling more relaxed and having better sleep. Exercise programs such as pregnancy exercises or yoga teach pregnant women to be more aware of their bodies and improve sleep through relaxation techniques and deep breathing. This suggests that structured physical exercise can be an effective strategy for managing sleep disorders during pregnancy.

Seeing the positive results obtained, it is important that health professionals consider the integration of structured physical exercise in the routine care of pregnant women. In addition to improving sleep quality, physical exercise can also provide other benefits, such as increased physical fitness and stress reduction. Sharma et al. (2017) noted that this approach could have a broader impact on the health of pregnant women, with the potential to reduce the risk of complications during pregnancy and childbirth. A carefully designed exercise Program can be an important part of a sleep disorder prevention strategy and overall health promotion in pregnant women.

Overall, the study confirms that structured physical exercise can help improve the sleep quality of third-trimester pregnant women in significant ways. An exercise Program involving pregnancy exercises, yoga, and physical and mental relaxation techniques not only reduces muscle tension and anxiety, but can also increase sleep duration and reduce the frequency of nighttime awakenings. Therefore, structured physical exercise should be considered as part of the health interventions that can be easily accessed by pregnant women to improve sleep quality and overall well-being during pregnancy.

3. The Relationship of Structured Physical Exercise with Changes in Sleep Quality

The results of bivariate analysis using paired t-test showed significant changes in PSQI scores between before and after the intervention of structured physical exercise ($p = 0.001$). The mean PSQI score dropped from 10.5 before the intervention to 7.1 after the intervention, indicating a significant improvement in the quality of sleep of pregnant women. This change is significant given the high prevalence of sleep disorders experienced by third trimester pregnant women. Hernandez et al. (2020) explained that sleep disorders in pregnant women are often triggered by physical and psychological changes, such as discomfort due to the size of the enlarged uterus, increased frequency of urination, and hormonal fluctuations that disrupt the rhythm of sleep. This decrease in the PSQI score suggests that physical exercise interventions can have a positive impact in reducing sleep problems that often occur during pregnancy.

Improvements in sleep quality observed through decreased PSQI scores also reflected improvements in various aspects of sleep, such as sleep duration, time required to fall asleep, and frequency of nighttime awakenings. Poyatos-León et al. (2021) revealed that structured physical exercise, including yoga and pregnancy exercises, can stimulate endorphin production. Endorphins are known as chemical compounds that affect mood by reducing anxiety and providing a sense of comfort, which ultimately helps pregnant women to sleep better. In addition, physical activities such as pregnancy exercises also play a role in relieving muscle tension, which is

often the cause of sleep disorders, such as low back pain and discomfort in the hips. Therefore, physical exercise not only focuses on improving body fitness, but also plays a role in improving overall sleep quality.

This significant improvement in sleep quality is also not only limited to the physical aspect, but also includes a reduction in anxiety and stress. Chang et al. (2019) showed that regular physical exercise, such as pregnancy exercises and yoga, can help reduce insomnia symptoms by promoting physical and mental relaxation. In addition, physical exercise can increase the body's capacity to deal with stress, which is a big factor in sleep disorders in pregnant women. Anxiety about childbirth or upcoming changes often interferes with the sleep of the expectant mother. However, with physical exercises that help reduce anxiety and improve mood, pregnant women can feel more relaxed, resulting in better sleep. Therefore, structured physical exercise interventions can also help to deal with sleep disorders associated with psychological factors, which are often more difficult to overcome with conventional medicine.

However, despite significant improvements in sleep quality in most pregnant women, some pregnant women still report sleep disturbances despite following physical exercise interventions. Sharma et al. (2017) noted that the effectiveness of physical exercise can vary greatly between individuals. Factors such as anxiety levels, pre-existing sleep patterns, as well as certain medical conditions, such as respiratory distress or acid reflux, can affect the outcome of the intervention. For example, some pregnant women may experience more serious sleep disorders that cannot be completely overcome by physical exercise alone. Therefore, it is important to consider a more personalized approach in designing a physical exercise program, taking into account individual factors that can affect the effectiveness of the exercises.

The study also showed that although most pregnant women feel improvement, some pregnant women who have more complex sleep problems or more severe psychological disorders may need additional approaches, such as psychological support or medical treatment. Snyder et al. (2018) emphasized that sleep disorders in pregnant women are caused not only by physical strain, but also psychological factors that contribute to sleep disorders. Stress, anxiety and fear of childbirth can worsen the quality of sleep of pregnant women, and these factors may require more comprehensive interventions, such as counseling or cognitive-behavioral therapy to manage anxiety.

Overall, although there are individual factors that can affect the response to structured physical exercise, the results of this study provide strong evidence of the benefits of physical exercise in improving the quality of sleep of pregnant women. Snyder et al. (2018) also showed that structured physical exercise can reduce physical and psychological tension, improve the quality of sleep of pregnant women, as well as have a positive effect on the overall well-being of the mother. In this case, pregnancy exercises or yoga can be an effective tool to help pregnant women deal with sleep challenges during pregnancy.

It is important to remember that although physical exercise provides significant benefits in improving sleep quality, other external factors, such as social support and comfortable sleeping

environment conditions, can also affect the final result. Wright et al. (2020) found that sleep quality is also influenced by factors such as good sleep habits, stress management, and a healthy diet. Therefore, a physical exercise program for pregnant women should be considered as part of a holistic approach to pregnancy care, which involves a variety of strategies to improve sleep quality and overall health.

With the results showing a significant improvement in sleep quality after a structured physical exercise intervention, this confirms that physical exercise can be an effective part of a maternal care program. A structured physical exercise Program, which includes pregnancy exercises, yoga and other relaxation exercises, can be integrated into prenatal care to improve sleep quality and overall well-being of the expectant mother. Therefore, the purposeful implementation of physical exercises should be considered as a safe and effective alternative to sleep problems in pregnant women.

4. Frequency of Sleep Complaints Before and After the Intervention

The results of a study showing the frequency of sleep complaints of pregnant women before and after a structured physical exercise intervention showed a significant improvement in sleep disorders. Before participating in the exercise program, the majority of pregnant women complained of difficulty falling asleep (70%), waking up in the middle of the night (60%), and poor sleep (80%). These results are consistent with previous findings that pregnant women often experience sleep disturbances, especially in the third trimester, due to hormonal changes, a sense of anxiety, and physical discomfort such as back pain and an increase in the size of the uterus (Hernandez et al., 2020). These sleep disorders can lead to a reduced quality of life and potentially negatively affect the health of the mother and fetus.

After following a structured physical exercise intervention, the frequency of these sleep complaints decreased significantly. Only 25% of pregnant women still report difficulty falling asleep, while 30% report poor sleep, and 35% still wake up in the middle of the night. This decrease illustrates the positive effect of physical exercise in relieving symptoms that often interfere with the sleep of pregnant women. Poyatos-León et al. (2021) also showed that physical exercise, such as yoga and pregnancy exercises, can reduce muscle tension and anxiety, which are often the main causes of sleep disorders in pregnant women.

This improvement in the frequency of sleep complaints is probably due to the influence of structured physical exercises that can promote physical and mental relaxation of pregnant women. Chang et al. (2019) noted that regular physical exercise can stimulate the release of endorphins that reduce stress, improve mood, and provide a sense of comfort that can help pregnant women sleep better. Thus, physical exercise is not only beneficial for physical health, but also has a significant impact on the emotional and psychological well-being of the expectant mother.

In addition, a significant reduction in sleep complaints after this intervention also indicates that physical exercise can improve overall sleep quality, reduce nighttime awakenings and increase the duration of restful sleep. Sharma et al. (2017) also emphasize that pregnancy exercises

and other stretching exercises can reduce sleep disorders related to physical discomfort, such as low back pain or feelings of pressure by increased body weight. This can create more comfortable sleeping conditions and reduce the frequency of sleep disturbances.

However, although many pregnant women report significant improvements in their sleep complaints, there are still some who report sleep complaints such as waking up in the middle of the night. This may be due to factors other than muscle tension or anxiety, such as certain medical problems that may not be completely remedied by physical exercise alone, such as sleep problems associated with impaired breathing or acid reflux. Snyder et al. (2018) also showed that sleep disorders in pregnant women are often influenced by several interacting factors, including emotional stress and underlying medical conditions. Therefore, this physical exercise program should be viewed as part of a holistic approach in dealing with sleep disorders in pregnant women.

Overall, this decrease in the frequency of sleep complaints suggests that structured physical exercise has a positive effect in reducing sleep disorders commonly experienced by pregnant women. Therefore, physical exercise can be an effective and accessible solution in improving the quality of sleep of pregnant women in the third trimester.

CONCLUSIONS

The results of this study indicate that structured physical exercise interventions, such as pregnancy exercises and yoga, have a significant positive impact on the quality of sleep in third trimester pregnant women. The mean PSQI score dropped from 10.5 before the intervention to 7.1 after the intervention, indicating significant improvements in sleep duration, time required to fall asleep, and frequency of nighttime awakenings. This indicates that structured physical exercise is effective in reducing sleep disorders that are often experienced by pregnant women in the third trimester.

Structured physical exercise plays a role in stimulating the production of endorphins that can improve mood and reduce anxiety, which contributes to improved sleep quality. In addition, exercises such as pregnancy exercises also help reduce muscle tension and promote relaxation, which makes it easier for pregnant women to sleep better. These findings are in line with previous research showing that regular physical activity, such as yoga, can improve sleep quality by reducing symptoms of insomnia and stress (Poyatos-León et al., 2021; Chang et al., 2019).

Although most of the respondents experienced improvement, some pregnant women still reported persistent sleep disturbances, which can be caused by psychological factors or other medical conditions. Therefore, although structured physical exercise is effective, a more comprehensive approach, which also involves psychological support and management of medical conditions, is indispensable for improving overall sleep quality. Overall, structured physical exercise can be used as an effective and safe intervention option in pregnancy care to address sleep disorders in pregnant women and improve their well-being.

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