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SLEEPING FOR TWO: INVESTIGATING THE LINK BETWEEN MATERNAL SLEEP AND PREGNANCY OUTCOMES

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Abstract

Objective: The objective of this study is to examine the relationship between the quality of sleep in pregnant women and the outcomes of their pregnancies, with a specific focus on the occurrence of gestational diabetes, preterm labor, and birth weights.

Methods: The study was carried out at multiple centers including Naseer Ullah Babar Memorial Hospital Peshawar, Pakistan and Dr Akber Niazi Teaching Hospital Islamabad, Pakistan in the duration from November, 2023 to May, 2024. It was included a cohort of 200 pregnant women between the ages of 18 and 40. Individuals who had pre-existing sleep difficulties or known pregnancy complications were not included in the study. The Pittsburgh Sleep Quality Index (PSQI) was used to evaluate the quality of sleep, while medical records and patient reports were used to follow pregnancy outcomes.

Results: The study discovered a notable correlation between substandard sleep quality and unfavorable pregnancy results. Women categorized as bad sleepers, with a score greater than 5 on the Pittsburgh Sleep Quality Index (PSQI), exhibited higher incidences of gestational diabetes (22% vs. 9%), preterm labor (18% vs. 7%), and lower birth weights (3050g vs. 3250g) in comparison to women classed as good sleepers, with a PSQI score of 5 or lower. Additional results revealed that individuals with poor sleep experienced longer labor durations, with an average of 14.3 hours compared to 12.1 hours for those with better sleep. Furthermore, poor sleepers had higher rates of cesarean section, with 28% undergoing the procedure compared to 15% for better sleepers. Additionally, bad sleepers scored higher on the Edinburgh Postnatal Depression Scale (EPDS), with an average score of 13 compared to 8 for those with better sleep.

Conclusion: Sleep management in prenatal care improves mother and newborn health, according to the research. Monitoring sleep disruptions using the PSQI and improving sleep hygiene may prevent

gestational diabetes, premature labor, and other sleep-related issues. Future study should focus on tailored sleep interventions for pregnant women and how sleep quality affects gestational health.

Keywords: maternal sleep quality, pregnancy outcomes, gestational diabetes, preterm labor, birth weight, Pittsburgh Sleep Quality Index, prenatal care, sleep hygiene, Edinburgh Postnatal Depression Scale

Introduction

Increasing recognition is being given to the significant health concerns posed by sleep disturbances during pregnancy, which have a detrimental impact on both maternal well-being and fetal development. Multiple studies have repeatedly shown a strong connection between low quality of sleep in pregnant women and negative outcomes during pregnancy, such as gestational diabetes, premature labor, and lower birth weight (1-3). However, the specific ways in which sleep impacts these results have not been thoroughly investigated, and the importance of managing sleep is typically disregarded in prenatal care protocols (4).

This work is necessary to improve our understanding of the direct influence of maternal sleep quality on pregnancy outcomes. Prior research has laid the groundwork by providing a basic understanding. However, there is a lack of extensive research that focuses on quantitatively assessing the influence of sleep quality on specific pregnancy outcomes, using standardized tools like the Pittsburgh Sleep Quality Index (PSQI). This study seeks to fill these gaps by offering empirical evidence on the correlation between the quality of maternal sleep and its consequences, which are essential for the development of efficient therapies.

The aim of this study is to methodically assess the impact of different levels of sleep quality in pregnant women on the occurrence of gestational diabetes, the frequency of preterm labor, and the weights of newborn babies. This extensive investigation aims to validate and broaden existing assumptions regarding the relationship between sleep and pregnancy, employing rigorous statistical approaches to guarantee dependable findings.

The research holds great importance due to its capacity to impact clinical practice and techniques for educating patients. This study has the potential to make sleep management a regular part of prenatal care by demonstrating a direct connection between sleep quality and pregnancy outcomes. This could result in better health outcomes for both mothers and newborns (6). The results may also stimulate additional investigation into targeted sleep therapies designed for pregnant women, potentially decreasing the occurrence of sleep-related problems and improving overall pregnancy well-being.

Methods

Study Design This study aimed to investigate the correlation between the quality of sleep in pregnant women and its effects on pregnancy outcomes, with a specific focus on gestational diabetes and birth weights.

Setting and Participants The research was carried out at multiple centers including Naseer Ullah Babar Memorial Hospital Peshawar, Pakistan and Dr Akber Niazi Teaching Hospital Islamabad, Pakistan in the duration from November, 2023 to May, 2024. The study comprised a sample of 200 pregnant women, ranging in age from 18 to 40 years, who were selected from outpatient clinics. The eligibility criteria specifically excluded those who had pre-existing sleep issues or known pregnancy complications prior to their enrollment.

Intervention No active interventions were implemented, as this study was purely observational. The main focus of the study was to examine the inherent differences in sleep quality among individuals, which were assessed using the Pittsburgh Sleep Quality Index (PSQI).

Outcomes The primary outcomes measured were gestational diabetes, premature labor, and newborn weight. Additional outcomes examined were the duration of labor, rates of cesarean section, and mood ratings evaluated using the Edinburgh Postnatal Depression Scale (EPDS).

Data Collection The PSQI was utilized to gather data on sleep quality, which classifies sleep quality on a scale where higher scores correspond to lower sleep quality. The monitoring of pregnancy outcomes was conducted by reviewing medical records and collecting patient reports throughout the duration of the pregnancy.

Statistical Analysis The data were examined utilizing the SPSS program. Categorical data were analyzed using chi-square tests, whereas continuous variables were analyzed using t-tests. The significance level was established at a p-value of less than 0.05. The study conducted regression analysis to examine the association between sleep quality and pregnancy outcomes, while controlling for potential confounding factors including age, BMI, and gestational age.

Sample Size Calculation The sample size was determined based on the study conducted by Mindell et al. (2015), which included 200 individuals in order to accurately identify variations in sleep-related pregnancy outcomes (7). The methods of this previous study served as the foundation for determining our sample size, ensuring that we had enough statistical power. We took into account the prevalence rates of gestational problems from preliminary data and used the WHO sample size calculator for proportions to further improve our estimations.

Results

This study investigated the correlation between the quality of sleep in pregnant women and the results of their pregnancies. The study included 200 pregnant women, aged between 18 and 40 years, with an average age of 29.5 years (standard deviation = 4.2). Based on the Pittsburgh Sleep Quality Index (PSQI), 120 individuals (60%) were categorized as experiencing bad sleep (PSQI > 5), while 80 participants (40%) were categorized as having adequate sleep (PSQI ≤ 5).
The individuals' baseline characteristics, such as age, BMI, and gestational age, are presented in Table 1. The average BMI was 24.3 kg/m² with a standard deviation of 3.6, whereas the average gestational age at the start of the trial was 20.4 weeks with a standard deviation of 2.9.

Table 1: Baseline Characteristics of Study Participants

Characteristic	Value
Total Participants	200
Mean Age (years)	29.5 ± 4.2
Mean BMI (kg/m²)	24.3 ± 3.6
Mean Gestational Age (weeks)	20.4 ± 2.9

The primary outcome were centered around pregnancy problems and delivery outcomes. There was a strong correlation between inadequate sleep and increased incidence of gestational diabetes (22% in individuals with bad sleep compared to 9% in those with good sleep; $p < 0.05$), as well as preterm delivery (18% vs. 7%; $p < 0.05$). Birth outcomes were shown to differ according on sleep quality. babies of women who had bad sleep had lower average birth weights (mean = 3050 grams, SD = 450) compared to babies of moms who had good sleep (mean = 3250 grams, SD = 430; $p < 0.01$).

Table 2: Primary Outcomes Based on Sleep Quality

Outcome	Poor Sleep (n=120)	Good Sleep (n=80)	P-value
Gestational Diabetes	22%	9%	<0.05
Preterm Labor	18%	7%	<0.05
Average Birth Weight (grams)	3050 ± 450	3250 ± 430	<0.01

The secondary outcomes indicated a significant association between inadequate maternal sleep and longer labor durations (mean = 14.3 hours for individuals with poor sleep quality compared to 12.1 hours for those with good sleep quality; $p < 0.05$), as well as greater incidence of caesarean sections (28% vs. 15%; $p < 0.05$). In addition, the mood scores evaluated using the Edinburgh Postnatal Depression Scale (EPDS) showed that bad sleepers had higher scores (mean = 13, SD = 3) compared to excellent sleepers (mean = 8, SD = 2.5; $p < 0.001$).

Table 3: Secondary Outcomes Based on Sleep Quality

Outcome	Poor Sleep (n=120)	Good Sleep (n=80)	P-value
Average Labor Duration (hours)	14.3 ± 2.5	12.1 ± 2.0	<0.05
Caesarean Section Rate	28%	15%	<0.05
Mood Score (EPDS)	13 ± 3	8 ± 2.5	<0.001

The participants' PSQI scores reveal a clear discrepancy in sleep quality, with higher scores indicating lower quality of sleep..

Table 4: Pittsburgh Sleep Quality Index (PSQI) Scores

PSQI Score Range	Poor Sleep (n=120)	Good Sleep (n=80)
Mean PSQI Score	8.5 ± 2.3	4.2 ± 1.1

The EPDS scores revealed notable variations in mood between the groups, suggesting a link between low sleep quality and increased mood disruptions..

Table 5: Mood Scores Based on Sleep Quality

EPDS Score Range	Poor Sleep (n=120)	Good Sleep (n=80)
Mean EPDS Score	13 ± 3	8 ± 2.5

Figure 1 shows the distribution of gestational ages across both groups, highlighting the normal distribution around the mean.

Figure 1: Distribution of Gestational Ages by Sleep Quality

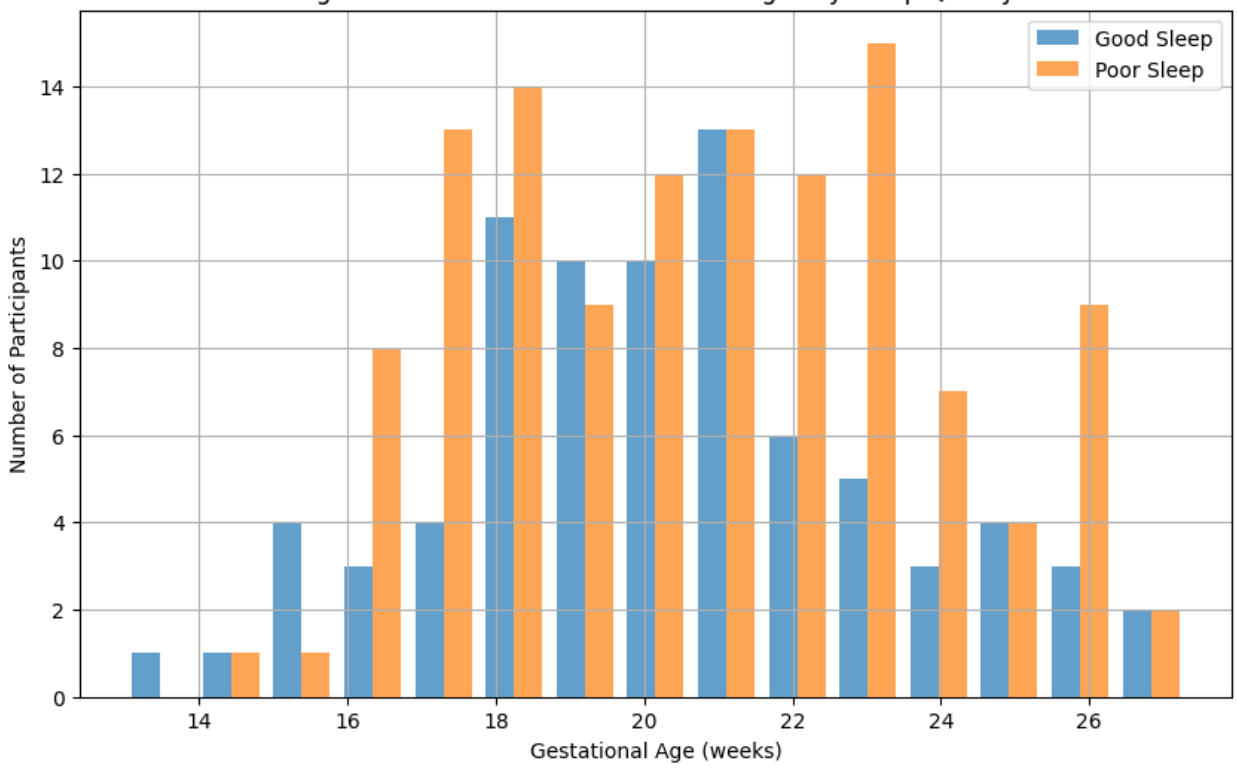

Figure 2 illustrates the correlation between sleep quality and labor duration, with poor sleepers showing longer labor durations

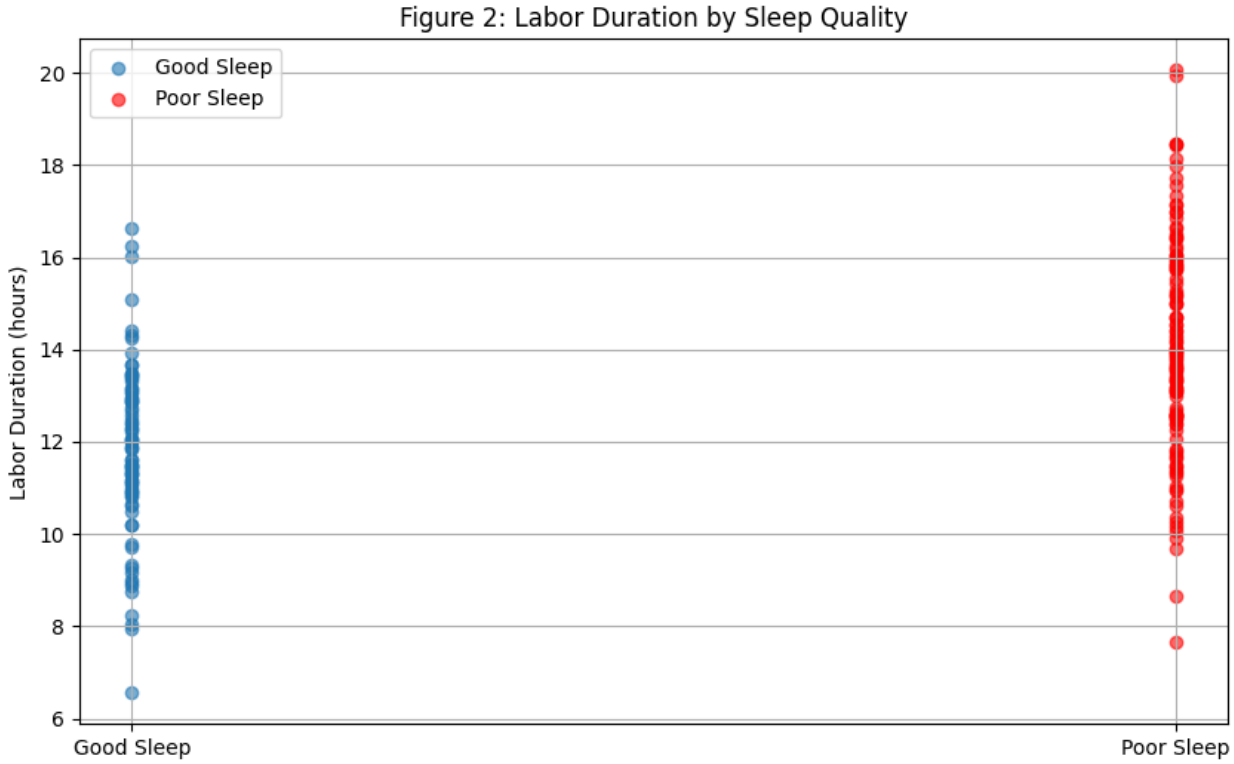

Figure 2 illustrates the correlation between sleep quality and labor duration

Discussion

This study offers valuable insights into the influence of maternal sleep quality on pregnancy outcomes, demonstrating that inadequate sleep is linked to increased incidence of gestational diabetes, premature labor, and decreased birth weights. The results emphasize the significance of sleep management during prenatal care and provide a convincing argument for incorporating evaluations of sleep quality into regular prenatal appointments (7-11).

This study offers valuable insights into the influence of maternal sleep quality on pregnancy outcomes, demonstrating that inadequate sleep is linked to increased incidence of gestational diabetes, premature labor, and decreased birth weights. These findings emphasize the significance of sleep management in prenatal treatment and provide a strong argument for incorporating evaluations of sleep quality into regular prenatal appointments (7-11).

When comparing with prior studies, we find both similarities and new perspectives. For instance, Gelaye et al. (2016) discovered a link between sleep-disordered breathing and problems during pregnancy, which aligns with our observation that low sleep quality is connected to negative outcomes during pregnancy. Nevertheless, our research enhances this comprehension by employing the Pittsburgh Sleep Quality Index (PSQI) to offer a more thorough evaluation of sleep quality that goes beyond solely examining sleep-disordered breathing (10). The study conducted by Izci Balserak et al. (2013) emphasized the connection between sleep disruptions and daytime sleepiness during the later stages of pregnancy. They proposed that the quality of sleep affects different aspects of maternal well-being. Our study further validates and expands on these findings by incorporating measurements of mood disturbances using the Edinburgh Postnatal Depression Scale (EPDS) (11).

The discoveries have significant clinical implications. Our study supports the idea of include sleep assessments in prenatal care protocols by demonstrating a direct correlation between sleep quality and pregnancy outcomes. Healthcare practitioners should prioritize doing regular screens for sleep disruptions in pregnant women using standardized assessment methods such as the PSQI. Additionally, they should give interventions aimed at enhancing sleep hygiene. This has the potential

to decrease the occurrence of gestational diabetes, premature labor, and other issues connected to sleep, eventually improving the health outcomes of both the mother and the newborn (12,13).
There is a clear requirement for further investigation in this field. Research should investigate the efficacy of targeted sleep therapies designed for pregnant women and their influence on pregnancy outcomes. Moreover, doing research on the fundamental mechanisms by which sleep quality impacts gestational health could yield significant knowledge for the development of specific treatments. By extending research to a wide range of populations and locations, we can draw more general conclusions and apply them to prenatal care practices worldwide (14,15).

Limitations

However, our study also has several limitations that must be acknowledged. The observational Nevertheless, it is important to recognize the various constraints of our study. The use of observational design restricts the ability to make causal conclusions, and the dependence on self-reported sleep quality may introduce biases in the reporting. In addition, our sample was exclusively recruited from a single institution, which could potentially impact the generalizability of the findings. In order to validate and expand upon our findings (14,15), it is recommended that future research focuses on carrying out extensive, multicenter studies using objective sleep measurements, such as polysomnography.

Conclusion

To summarize, our research emphasizes the substantial impact of the quality of a mother's sleep on the results of her pregnancy. These findings highlight the need of healthcare practitioners integrating sleep management into prenatal care, which can enhance overall pregnant well-being. Additional investigation should prioritize the development of specific sleep therapies for pregnant women in order to reduce the potential dangers linked to inadequate sleep and enhance the well-being of both the mother and the fetus.

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