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Research paper

The relationship between sleep disturbance in late pregnancy and labor outcomes

Aida Abd El-Razek [1]*, Gamila Ayoub [2]. Abdul-Monim Batiha [1], Ibtisam Al-Zaru [3], Fadwa Alhalaiqa [1], Hoda Farahat [2] Mohammed AlBashtawy [4]

[1]*Philadelphia University, faculty of nursing, Jordan*
[2]*Menoufyia University, Faculty of Nursing, , Egypt*
[3]*Jordan University of Science & Technology, Faculty of Nursing, Jordan*
[4]*Al al-Bayt University, , Faculty of Nursing, , Jordan*
**Corresponding author E-mail: aalrazek@philadelphia.edu.jo*

Abstract

Background: Inadequate sleep is a common problem among women, in part as a result of a deficiency of information about its influence on health; particularly, the effect of sleep deprivation during pregnancy on labor outcomes (maternal and fetal).
Objective: To study the correlations between sleep duration and labor outcomes among women in late pregnancy.
Method/ Material: A prospective descriptive study was conducted at four settings in the Menoufiya Governorate of Egypt. A convenience sample technique was used. The study sample involves 200 pregnant women. Data collection extended from April 2013 to January 2014.
Result: The results revealed that: a) most of the women in the studied sample (50%) suffered from sleep disturbance in late pregnancy at gestational age above 37 weeks and b) that only 24% suffered sleep disturbance between 28-32 weeks. It takes 30-60 min for majority of the women in the research sample (42.5%) to fall asleep at night; only (10%) take <5 min to fall asleep at night. No significant difference between the total hours of sleep and birth duration was found in this study.
Conclusion: The study concluded that healthcare providers should advise women during pregnancy to get adequate sleep duration of at least eight hours and provide prenatal assessments include the sleep quantity and quality because they both affect the duration of labor and type of delivery.

Keywords: *Labor Outcomes; Late Pregnancy; Sleep Disturbance; Sleep.*

1. Introduction

Sleep in women is influenced by many physiological (e.g. the menstrual cycle, puberty, menopause and pregnancy) and psychological (e.g. mood, and emotional state) changes that affect neuroendocrine hormones (Moline et al., 2003). Entire sleep time increases throughout the first trimester to 8.2 hours, decreases throughout the second trimester to 8.0 hours, and remains the same from antepartum sleep time at 7.8 hours in late pregnancy (in the third trimester) (Hedman et al., 2002). One of the major problems faced by pregnant women is sleeplessness. Problems like insomnia, decreased quality of sleep, decreased duration of sleep and loss of daytime alertness, are all worth mentioning (Steptoe et al., 2006).
Pregnant women are likely to face sleep problems during the last few months of pregnancy, as pregnancy and sleep problems go hand-in-hand. Some women may find it difficult to fall asleep; some may be troubled by nightmares or unpleasant dreams. These problems during pregnancy may be due to the physical and mental changes that the body undergoes (Foley et al., 2004).
Several factors contribute to sleep duration during pregnancy; some are common problems such as leg cramps, urinary incontinence, shortness of breath, and intense backaches. Some women may also have difficulty in finding the right position to sleep because of the growing uterus, a very active baby, and unnecessary worries about the baby and themselves (Nabil et al., 2008).
Poor sleep duration in late pregnancy can have negative effects on labor and delivery. A study conducted in San Francisco, USA, showed that sleeping <= 6 hours a night made women liable to have longer labors, high risk of preterm births and they were 4.5 times more likely to undergo Cesarean section. Additionally, the risk of fetal-growth-restricted neonates is increased for women who snored severely in late pregnancy (Magee, Iverson & Caputi., 2009).
Sleep deprivation is a state that includes inadequate quantity or quality of sleep, voluntary or involuntary insomnia (sleeplessness) and circadian rhythm sleep disorders. There is little known about the effect and relation of quantity and quality of normal sleep on pregnancy and the post-partum period (the period following delivery). This dearth of information is the result of a lack of adequate longitudinal studies (Kathryn et al., 2015; Signal et al., 2007;). Lack of knowledge about the adverse effect of the inadequate quantity and quality of sleep on an individual's health may mean that many women do not get enough sleep. Therefore, studies are needed to obtain knowledge about sleep deprivation during pregnancy; particularly those in their third trimester. Further studies are needed to determine the influence of poor sleep on labor outcomes; both maternal and fetal. These studies should identify the pregnant women's clinical, social, and behavioral risk factors

related to poor sleep. Knowledge regarding sleep deprivation during pregnancy helps physicians and health care providers enhance women's health, as well as facilitating appropriate interventions to prevent negative labor outcomes (Kathryn et al., 2015;).
Another study was conducted to compare sleep quality using the Pittsburgh Sleep Quality Index (PSQI). The research targeted 150 pregnant women in their second-trimester, 150 women in late pregnancy and 300 who were not pregnant. The study revealed there were more poor sleepers among pregnant women than non-pregnant women. They also found that stress and depression in pregnant women was correlated with the sleep quality (Jane et al., 2007).
This research is an attempt to study the correlation between sleep duration in late pregnancy and labor outcomes through the following objectives: i) to identify the causes of sleep disturbance in late pregnancy, ii) to pinpoint types of sleep disturbances in late pregnancy and iii) to evaluate the impact of sleep duration in late pregnancy (third trimester) on labor.

2. Methodology

A prospective descriptive study design was utilized for identifying the correlation between sleep disturbance and labor outcomes (maternal and fetal) among women in late pregnancy.
The study was conducted at four settings in the Menoufiya Governorate of Egypt (?): Tala Central Hospital, Shebin El-kom Teaching Hospital, the Maternal and Child Health Care Center (MCH) in Tala, and Shebin El-kom Hospital.
A convenience sample of two hundred pregnant women was taken that represented about 10% from the total women admitted to the previous settings where the study was conducted.
The inclusion criteria of the sample were: normal pregnancy, primigravida and gestational age between 28 and 40 weeks. Meanwhile the exclusion criteria were: Cesarean section, multigravid, primigravida with twins, and high risk pregnant women, such as those suffering from diabetes mellitus (D.M), hypertension, obesity, anemia, urinary tract infection, and cardiac disease.

3. Data collection tools

The first and third tools (structured interview questionnaire form and assessment sheet following delivery) were designed for the purpose of collecting data from each subject in the study, based on an extensive review of the literature.
The second and fourth tools (the Pittsburgh Sleep Questionnaire and newborn assessment sheet) were translated into Arabic, a language suitable for the Egyptian community.
Tool 1 consists of two parts:
Part 1: Socio-demographic data: this includes mother's name, age, occupation, level of education, address, socioeconomic level.
Part 2: Current obstetric history: includes detailed about the current pregnancy & labor including last menstrual period, gestational age, expected date of delivery, place of follow up, started antenatal care.
Tool 2: The Pittsburgh Sleep Quality Index (PSQI) questionnaire:
the PSQI questionnaire was used to determine the quality and patterns of sleep among adults. It identifies the difference between "poor" and "good" sleep by measuring seven sleep domains: subjective quality, latency (the time it takes to fall asleep), duration, habitual sleep efficiency (the ratio of total sleep time to time in bed), disturbances, use of sleep medication, and daytime dysfunction over the last month.
Client Likert-type scales, ranging from 0-3, of each of these seven domains of sleep were employed, whereby 3 represent the negative extreme. Poor sleep is indicated when a total sum PSQI score of 5 or greater is recorded.
The PSQI has good internal consistency and a reliability with Cronbach's alpha of 0.83. Therefore, it has been used globally in different studies among a variety of adult populations, which supported the PSQI's validity and reliability.
The PSQI was used in this study to assess pregnant women's sleep quality in late pregnancy. Four open-ended questions and 14 'closed-ended' questions, written in an Arabic language, made up the PSQI. The 18 items were to be answered using the frequency of the event and semantic scales (i.e. the latter use paired words of opposite meaning, such as good-bad).
Tool 3: An assessment sheet, to be presented to the mother following delivery, was designed by the researchers. It included three questions about birth experience of the mother, birth weight of the newborn, duration of the labor (the time from onset of regular contractions to the time of birth), and mode of delivery (i.e. spontaneous vaginal, assisted vaginal, preterm labor or Cesarean).
Tool 4: A newborn's assessment sheet was employed to identify the neonate's outcomes: (1) an Apgar score was taken immediately after birth to quickly evaluate the health of newborn children. (2) Anthropometric measurements of the newborn were recorded, including weight of head, chest circumferences and length.
A pilot study was conducted to test the feasibility, clarity and applicability of the tool, and to estimate the time needed to collect the data; The results of the pilot study were used to finalize the tool and schedule the time needed for the fieldwork. Some changes were made to the questionnaire based on the findings from of the pilot study.

SPSS statistical package, version 17, was used to analyze the data. The level of significance is $p<0.05$. Data was tabulated using the following: mean and standard deviation. The student t-test, chi square and ANOVA statistical tests were used for comparison of the two groups.

4. Ethical considerations

The women were chosen according to the standards and criteria set out above. The purpose of the study was explained to each of the women in the sample study. An overview of the study was presented to each woman who gave oral consent before she participated in the study. Rights of participants, involving their voluntary participation, withdrawal from the study, confidentiality and privacy, were confirmed.

5. Results

The mean of age of the research population was 24.2 years, ± 4.3. The largest percentage (54%) were rural residents, while the remaining 46% were urban residents. More than half (78%) were working women while the lowest precentage were house wives. The highest percentage (44.5%). The range of gestational age of pregnancy was from 28 to 40 weeks. The largest percentage (78.9%) had antenatal care at the hospital.
Table 1 shows that the range of time (in minutes) usually taken at night by pregnant women to fall asleep was 1-160 min and the range of actual sleep's hour was from 1 to 8 hours.
Table 2 indicates 54.5% of the women had apnea three or more times a week. A large percentage (66.5%) of the women had episodes of confusion during sleep three or more times a week. 3.5% of the women had not experienced any sleeping problems during the past month, whereas 98.5% of the women were restless while asleep. 1.5% had not been restless during the past month.
Table 3 shows t the current labor outcomes regarding type of labor: the largest percentage (60%) of the women had a normal labor, while the lowest percentage (6%) had premature birth.
Table 4 shows a significant difference between the type of birth and sleep hours. Women who sleep less than, or equal to, 3 hours have the highest percentage (71.8%) of Cesarean births, while 10.3% had premature births.
Table 5 indicates that of the women who sleep less than, or equal to, 3 hours a night, more than half (59%) have their period of birth (normal) between 10-18 hours. While have their the sleep hours in late pregnancy has sigificant differences with degree of Apgar score at one minute after birth and the weight at birth.
Table 6 showed a highly significant difference between the number of sleep hours and PSQI scores in late pregnancy.

Table 1: Assessing the Quality and Quantity of Sleep During Last Month of Current Pregnancy (N=200)

Variable	No	%	Mean (SD)
How long does it usually take to fall asleep at night (in minutes)?			
<5 min	20	10	
5-30 min	64	32	56.7(32.01)
30-60 min	85	42.5	
More than 60min	31	15.5	
How long do your sleep (in hours)?			
Less than 2 hrs	17	8.5	
2-4 hrs	61	30.5	
4-6 hrs	92	46	4.3(1.07)
> 6 hrs	30	15	
Frequent times you could not sleep			
Within 30 minutes	2	1	
Not during the past month	7	3.5	
Less than once a week	11	5.5	
Once or twice a week	180	90	
Three or more times a week			
How often do you wake up at night or in the early morning			
Less than once a week	2	1	
Three or more timed a week	198	99	
How do you rate the quality of your sleep during the last month?			
Fairly will	5	2.5	
Fairly badly	22	11	
Very badly	173	86.5	

Table 2: Distribution of the Study Sample According the Type of Sleep Disturbances During Pregnancy (N=200)

Variable	N0	%No %	Mean(SD)
Apnea during sleep.			
No sleep apnea last month	2	1	
Less than once a week	12	6	
Once or twice a week	77	38.5	
Three or more times a week	109	54.5	
Episodes of confusion during sleep.			
No episodes last month	7	3.5	
Less than once a week	11	5.5	15.82(7.34)
Once or twice a week	49	24.5	
Three or more times a week	133	66.5	
Felt restlessness while you are asleep.			
No restlessness last month	197	98.5	
Three or more times a week	3	1.5	

Table 3: Distribution of the Study Sample According to Labor Outcomes (N=200)

Variables	N0	%	Mean(SD)
Type of labor			
Normal	120	60	
Cesarean birth	68	34	
Premature birth	12	6	
Duration of labor			
9-10 hours	59	29.5	
10-18 hours	116	58	14.4(4.9)
20-29 hours	25	12.5	

Table 4: The Relationship Between Sleep in Late Pregnancy and Type of Birth (N=200)

	Sleep duration/ hours				
Type of birth	≥ 3 hours n=39	4 to 5 hours n=139	6 ≤ hours n=22	X^2	P-value
Normal	7(17.9%)	97(69.8%)	16(72.7%)		
Cesarean birth	28(71.8%)	34(24.45%)	5(22.8%)	9.4	0.018*
Instrumental	4(10.3%)	8(5.75%)	1(4.5%)		

* Significant difference if p<0.05

Table 5: The Relationship between Number of Sleep Hours in Late Pregnancy and Period of Birth and Neonate's Anthropometric Measurement.

Variables	≥ 3 / h n=39	4 to 5/ h n=139	6 ≤ / h n=22	F	P
Duration of delivery	14.6±5.3	14.5±5.1	12.9±3.1	.587	.558
Apgar score of the newborn at one minute	7.1±1.05	7.6±.9	7.6±.9	3.739	.026*
Apgar score of the newborn at 5 minute	9.1±.9	9.4±.78	9.7±.45	7.567	.046*
Weight at birth	1.6±.32	2.3±.56	2.6±.46	10.14	<0.001*
Head circumference at birth	31.7±3.37	29.6±6.19	32.16±2.04	.835	.441
Chest circumference at birth	24.6±2.6	24.7±2.2	26.1±1.8	1.284	.286
The length of the baby at birth	37.7±11.7	41.4±2.8	42.6±2.06	1.969	.151

* Significant difference if p<0.05

Table 6: Correlation Between Pittsburgh Sleep Quality Index and Sleep Hours in Late Pregnancy

	Sleep hours				
	≥ 3 hours n=39	4 to 5 hours n=139	6 ≤ hours n=22	F	P
Pittsburgh Sleep Quality Index	18.1±1.13	14.8±3.7	7.2±1.6	22.96	<0.001**

6. Discussion

Sleep disturbances and changes in sleep patterns begin to occur during the first trimester of pregnancy and are likely to be influenced by some of the dramatic changes in reproductive hormone levels that accompany pregnancy. Levels of estrogens and progesterone rise to the highest level during all trimesters of pregnancy throughout pregnancy and falling rapidly after delivery (Lee et al., 2000).

The aim behind this was to minimize or eliminate certain confounding factors; sleep disturbances caused by childcare and medical conditions (Meir et al., 2011).

The PSQI was used to assess the participating women's sleep. The results correlated with a recent and larger study on the assessment of sleep using the same tool. They found no differences in sleep parameters between pregnancies with and without negative outcomes (Cappuccio et al., 2010).

In the present study, the range of the gestational age of pregnancy was from 28 to 40 weeks. This finding is consistent with Michele et al. (2009, 2010).

According to the quality and the quantity of sleep during the last month of current pregnancy, the range of hours of actual sleep at night was 1 to 8 hours this is also in agreement with (Buysse et al., 1989; Signal et al., 2007; Ariel et al., 2009).

The research reveals that there are significant differences between type of birth and sleep hours. As shown in Table 4, women who sleep three hours or less represent 71.8% of those having a Cesarean birth. This is in harmony with Lee & Gay (2004), Lee et al., (2000) and Shao-Yu et al. (2013). In an observational study that targeted 131 ninth month pregnant women, objective and subjective measures 48 hour wrist cartography, sleep logs and questionnaires were applied to estimate labor outcomes. The results showed that the woman who slept at night for less than six hours had extended labors and more 4.5 times extra liable to have cesarean deliveries. Women who had seriously disturbed sleep had more time labors and were 5.2 periods more likely to go through Cesarean deliveries. In the current study the findings revealed that there is no significant difference between the number of actual sleep hours at night and the duration of birth. This is not in agreement to what was reported by Lee & Gay (2004), August et al. (2013) and Stone et al. (2014). Other studies have suggested that lack of sleep in pregnancy might be correlated with negative maternal consequences, such as gestational diabetes and hypertension, pre-eclampsia and depression. (Ariel et al., 2009; Claudio et al., 2008; Facco et al., 2010;).

In the current study, measures of quality and quantity of sleep were used to assess labor duration and type of delivery, whereas measures of evening and morning fatigue were not studied. As measured by cartography monitoring, women who sleep less or who experienced disturbed sleep, had longer hours of labor and they were more likely to undergo Cesarean deliveries than women who slept longer hours and had less disrupted sleep. These findings do not agree with what was stated by Evans et al. (2008), Beebe & Lee (2007), Park et al. (2010) who suggested that a woman's prenatal self-assessment of her sleep may be associated with her wellbeing, but may not impact on her labor and delivery. This current study has shown that there was a significant difference between Apgar scores of the babies at one minute after birth and the mothers' actual night sleep duration. There is also a highly significant difference between the baby's Apgar score of five minutes after birth (Park et al., 2010).

In the present study, birth weight was related to labor outcomes; there was a highly significant difference between birth weight and duration of sleep at night. Women who had larger infants needed longer hours of labors and they were likely to have Cesarean deliveries. Preceding research states that weight at birth is connected with dystocia and the types of delivery. In his study that covered more than 14,000 births, suggested that dystocia increases because of birth weight and the increased rates of Cesarean deliveries among infants whose weight is less than 2500 grams or more than 4000 grams (Ariel et al., 2009; Moline et al., 2004; Lee and Gay, 2004).

7. Limitation of the study

The convenience sample and the study were limited to healthy nulliparous women. A pregnant woman is not able to describe the duration of her sleep accurately, as she is mainly concerned with sleep duration at night. In general, due to their lack of knowledge about the negative effects of sleep deprivation on their health, the pregnant women were unable to describe exactly the reasons for their disturbances. Although they knew they were pregnant, they had no idea about the causes of, or reasons for, sleep disturbances.

8. Conclusions

Pregnant women need adequate rest and sleep to decrease negative labor outcomes, as well as to enhance their infant's growth and development. Sleep disorders are common problems among pregnant women. Research has revealed that sleep duration and quality can affect the type of delivery and labor outcome; therefore it should be assessed during prenatal evaluations. There is a significant difference between sleep hours, the type of birth and the neonate's anthropometric measurements.

More research is needed to assess pregnant women's risk factors associated with sleep disturbances. Further investigation will aid the improvement of nursing management and intervention for pregnant women, in order to prevent adverse maternal and fetal outcomes.

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Conflict of interest

None declared

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