

## The Relationship between Sleep Disturbance in Late Pregnancy and Labor Outcomes

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**Abstract:** Inadequate sleep is a common problem among women which resulted from 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.

**Research Design:** A prospective descriptive study was conducted at four settings in Menoufia Governorate. Non-probability sampling (Convenience sample) was used; the study sample includes 200 pregnant women. Data collection extended from (April 2013 to January 2014). Women representing about 10% of the total women admitted in the previous setting.

**The results:** revealed that most of the women in the studied sample (50%) suffer from sleep disturbance in late pregnancy at gestational age above 37 weeks and that only 24% suffer between 28-32 weeks. It takes 30-60 min for majority of the women in the studied 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. The study

**Concluded:** that healthcare providers should advice women during pregnancy to get adequate sleep duration (eight hours of bed time). Additionally they should include the sleep quantity and quality in prenatal assessments because it affects duration of labor and type of delivery. Further high quality's studies (e.g. experimental) are recommended to get strong evidence about the correlation between poor sleep and obstetric complications.

**Keywords:** Labor outcomes, late pregnancy, Sleep disturbance, sleep

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### I. Introduction

Sleep in women is influenced by many physiological (e.g. the menstrual cycle, puberty, menopause and pregnancy) and psychological changes (e.g. mood, and emotional state) that affect neuroendocrine hormones [1]. 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)[2]. One of the major problems faced by pregnant women is sleeplessness. Problems like, Insomnia, decreased quality of sleep, decreased duration of sleep, loss of daytime alertness is worth mentioning [3].

Pregnant women are likely to face sleep problems during the last few months of pregnancy. 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 [4]. 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 [5].

Poor sleep duration in late pregnancy can have negative effects on labor and delivery. A study conducted at San Francisco showed that sleeping  $\leq 6$  hour/night made women liable to have longer labors, high risk for 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 [6]. Sleep deprivation is a state that includes; inadequate sleep's quantity or quality, 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 the pregnancy and post partum period (the period following delivery). This resulted from lack of adequate good longitudinal studies [7,20]. Lack of knowledge about the adverse effect of inadequate sleep quantity and quality on health make many women do not get enough sleep. Therefore,

studies are needed to get knowledge about sleep deprivation during pregnancy (mainly those who is in third trimester). Further studies are needed to determine the influence of poor sleep on labor outcomes (maternal and fetal). These studies should identify the pregnant women's risk factors related to poor sleep (e.g. clinical, social, and behavioral risk factors). Knowledge regarding sleep deprivation during pregnancy helps physicians and health care providers enhance women health and intervene appropriately to prevent labor negative outcomes [7]. Another study was conducted to compare sleep quality using the PSQI and it targeted 150 pregnant women in the second-trimester, 150 women in late pregnancy and 300 non-pregnant. The study revealed that poor sleepers were more among pregnant women comparing to non-pregnant women. They also found that stress and depression in pregnant women was correlated with the sleep quality [13]. This study is an attempt to study the correlation between sleep duration in late pregnancy and labor outcomes through the following objectives: To identify the causes of sleep disturbance in late pregnancy, to pinpoint types of sleep disturbances in late pregnancy and to evaluate the impact of sleep duration in late pregnancy (third trimester) on labor.

## **II. 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 Menoufa Governorate namely Tala Central Hospital, Shebin El-kom Teaching Hospital, Maternal and Child Health Care Center (MCH) in Tala and Shebin El-kom. Non-probability sampling (Convenience sample) **Two** hundred pregnant women that represent about 10% of the total women admitted to the previous settings.

### **Inclusion criteria of the sample:**

Normal pregnancy, primigravida and gestational age between 28 and 40 week.

**Exclusion criteria:** Cesarean section-- Multi gravida - Primigravida with twins and High risk pregnant women such as (diabetes mellitus(D.M), hypertension, obesity, anemia, Urinary tract infection, cardiac disease.....etc). Egyptian community.

### **Data collection tools:**

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 setting based on extensive review of literature. Second and fourth tools (The Pittsburgh Sleep Questionnaire and newborn assessment sheet) were from foreign source, translated into Arabic, a language suitable for the

### **Tool 1: Consists of two parts as the following:**

**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, the reason for going the first time.

### **Tool 2: The Pittsburgh Sleep quality index (PSQI) Questionnaire:**

PSQI used to determine the sleep's quality and patterns among adults. It states the difference between "poor" and "good" sleep by measuring seven sleep's 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 scales from 0-3 on the Likert Scale of each of these seven domains of sleep whereby 3 represent the negative extreme. Poor sleep is indicated when a total sum PSQI of "5" or greater.

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 validity and reliability. The PSQI was used in this study to assess pregnant women sleep quality in late pregnancy. Four open-ended questions and 14 questions are the component of PSQI, written in an Arabic language, and they 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: Assessment sheet 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: Newborn assessment sheet to identify their neonate's outcomes:** 1-Apgar score was taken immediately after birth to quickly evaluate the health of newborn children. 2. Anthropometric measurements of the newborn included: (weight -head, chest circumferences and length....)

**Ethical consideration:**

The women were chosen according to the standards and criteria. The purpose of the study was explained to each of the women in the sample study according to the researchers' approach. An overview of the study was presented before participating in the study for each woman who gave orally consent. Rights of participants were confirmed (i.e. voluntary participation, withdrawal from the study, confidentiality and privacy) 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; it was carried out on 10% of each sample. The results of the pilot study were used to finalize the tool and schedule the time needed for the fieldwork. Some changes will be done in the questionnaire based on the finding of the pilot study.

**Results analysis:**

SPSS statistical package version 12 old version on IBM compatible computer were used to analyze the data. The level of significance is  $p < 0.05$ . Data was tabulated using the following: mean and standard deviation ( $x + SD$ ). Statistical tests; student t-test, chi square and ANOVA were used for comparison of two groups.

**III. Results**

**(Table 1):** the mean of age was  $24.2 \pm 4.3$ . The largest percentage (54%) were rural residents while the low percentage (46%) were urban residents. More than half (78%) were working women while the lowest percentage were house wives. The highest percentage (44.5%) were university graduates while the lowest percentage (13.5) could read and write .

**(Table 2):** The range of gestational age of pregnancy (28 - 40ws). The largest percentage (78.9%) had antenatal care at an out-patient clinic while the low percentage (7%) at hospital.

**(Table 3):** 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 1-8 h.

**(Table 4):** 54.5% of the women had apnea three or more times a week. Large percentage (66.5%) of the women had episodes of confusion during sleep three or more times a week, while low percent (3.5%) of the women did not during the past month. (98.5%) of the women were restless while asleep, while (1.5%) were not during the past month.

**(Table 5):** Shows that the current labor outcomes regarding type of labor, the largest percentage (60%) of the studied women had normal labor while the lowest percentage (6%) had premature birth. The duration of labor ranged from 9-27 h

**(Table 6):** Shows a significant difference between the type of birth and sleep hours. As shown in the table, women who sleep less than or equal to 3 h have the highest percentage (71.8%) of cesarean birth while lowest percent (10.3%) have premature birth.

**(Table 7):** Regarding women who sleep less than or equal to 3 h: more than half (59%) have their period of birth (normal) between 10-18 h while low percent (17.9%) have their period between 20-29 h women who sleep from 4 to 5 h: more than half (56.1%) have their period of birth (normal) from 10-18 h: while (12.9%) have their period of birth from 20-29 h. There is no significant difference .

**(Table 8):** show that the sleep hours in late pregnancy has significant differences with degree of Apgar score at one minute after birth and the weight at birth.

**(Table 9):** Showed a highly significant difference between the number of sleep hours and PSQI in late pregnancy.

**(Table 10):** a positive correlation between hours of actual sleep at night and apgar score degree of the baby at one minute after birth was found but not significant with duration of birth.

**(Table1):** Distribution of the study sample according to socio-demographic characteristic (n= 200)

Socio demographic characteristic	no	%
<b>Age classification/years:</b>		
< 20		
21-30	24	12
31-40	162	81
	14	7
<b>Age (years)</b>	(R=18-40)	24.2±4.3M ±SD
<b>Occupation</b>		

Worker	156	78
Housewife	44	22
<b>level of education</b>		
Read and write	27	13.5
primary	30	15
Secondary	54	27
University	89	44.5
<b>Residence</b>		
Urban	72	36
Rural	128	64

(Table 2): Distribution of the studied sample according to the current obstetrical history (n=200)

variables	No	%
<b>GA/W</b>		
(28-32)	48	24
(33-36)	52	26
Above 37	100	50
<b>GA/W</b>	Range (28 –40)	M ±SD 38.5±2.1
<b>Ante Natal Care</b>		
Hospital	157	78.9
private	28	14.1
MCH	15	7

(Table 3): Assessing the quality and quantity of sleep during last month of current pregnancy (n=200)

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

(Table 4): Distribution of the study sample according to the type of sleep disturbances during pregnancy (n=200)

Variable	N0	%
<b>Apnea during sleep.</b>		
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
<b>Episodes of confusion during sleep.</b>		
No episodes last month	7	3.5
Less than once a week	11	5.5
Once or twice a week	49	24.5
Three or more times a week	133	66.5
<b>Fell Restlessness while you are a sleep.</b>		
No restlessness last month	197	98.5
Three or more times a week	3	1.5
<b>Pittsburgh Sleep Quality Index</b>	Range 5-19	
	Mean ±SD15.82±7.34	

(Table 5): Distribution of the study sample according to labor outcomes (n=200)

Variables	N0	%
<b>Type of labor</b>		
normal	120	60
cesarean birth	68	34
premature birth	12	6
<b>Duration of labor</b>		
9-10 hours	59	29.5
10-18 hours	116	58
20-29 hours	25	12.5
<b>Duration of labor (hours)</b>	<b>Range</b>	9-27
	<b>Mean ±SD</b>	14.4±4.9

(Table 6): The relationship between Sleep in late pregnancy and type of birth

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

\* Significant difference if p<0.05

(Table 7): The relationship between sleep hours in late pregnancy and degree Apgar of neonate's birth and neonate's anthropometric measurement.

	Sleep hours			X <sup>2</sup>	P
	≥ 3 hours n=39	4 to 5 hours n=139	6 ≤ hours n=22		
Degree Apgar at 1minute				19.838	0.001*
3-5	20 (51.3%)	5 (3.6%)	1(4.5%)		
6-8	10(25.6%)	48(34.5%)	3(13.7%)		
above 8	9(23.1%)	86(61.9%)	18(81.8%)		
Degree apgar at 5 m				2.5	<b>.214</b>
3-5	2(5.1%)	0(0%)	0(0%)		
5-8	4(10.2%)	2(1.4%)	1 (4.5%)		
>8	33(84.7%)	138(98.6%)	21(95.5%)		
Neonate's weight at birth				24.2	<0.001**
<2.5kg	24( 61.5%)	20( 14.3%)	6( 27.3%)		
2.5-3kg	11(28.2%)	78( 56.2%)	14(63.6%)		
>3	4( 10.3%)	41(29.5%)	2( 9.1)		
The neonate's head circumference at birth				25.05	<0.001**
<33cm	29 (74.4%)	4 (2.9%)	2 (9.1%)		
33-35cm	7 (17.9%)	125 (89.9%)	16 (72.7%)		
>35cm	3 (7.7%)	10 (7.2%)	4 (18.2%)		
Neonate's chest circumference at birth				16.884	.002*
24-30cm	22 (56.4%)	17 (12.2%)	2(9.1%)		
30-33cm	13 (33.3%)	118(85%)	17(77.3%)		
>33	4 (10.3%)	4(2.8%)	3(13.6%)		

\* Significant difference if p<0.05

(Table 8): 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	<b>.026*</b>
Apgar score of the newborn at 5 minute	9.1±.9	9.4±.78	9.7±.45	7.567	<b>.046*</b>
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 9): Correlation between Pittsburgh Sleep Quality Index and Sleep hours in late pregnancy

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

#### **IV. Discussion**

Sleep disturbances and changes in sleep pattern begin occurrence 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 throughout pregnancy and are at peak at times, falling rapidly after delivery[9]. The study was limited to healthy nulliparous women. The aim behind this was to minimize or eliminate certain confounding factors; sleep disturbances caused by childcare and medical conditions [11]. PSQI was used to assess women's sleep. The result correlated with a recent and larger study on the assessment of sleep using the same tool. They found no differences in parameters of sleep parameters between pregnancies with and without negative outcomes [12]. In the present study, the range of gestational age of pregnancy was 28-40 weeks with the mean  $\pm$  SD  $38.5 \pm 2.1$ . This finding is consistent with Michele et al (2009) [14]. 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 1-8 h with mean  $\pm$  SD  $4.3 \pm 1.0$ . This is also in agreement with [8,20,16]. The research reveals that there is significant difference between type of birth and sleep hours. As shown in the (table 7), women who sleep three hours or less represent (71.8%) of cesarean birth. This is in harmony with Lee & Gay [15,24]. In an observational study that targeted 131 ninth month pregnant women, objective and subjective measures (48 h wrist cartography and sleep logs and questionnaires) were applied to estimate labor outcomes. The results showed that the woman who's slept at night was 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 in [15,21, 27]. Other studies have suggested that lack of sleep in pregnancy might be correlated with negative maternal consequences (e.g. gestational diabetes and hypertension, pre-eclampsia, depression)[16,19,26].

In the current study, measures of sleep 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 [10,18,25], Who suggested that a woman's prenatal self-assessment of her sleep may be associated with her wellbeing, but not possibly to have impact on her labor and delivery Our study showed that there was a significant difference between baby's Apgar score of the baby at one minute after its birth and actual night sleep duration, and there is a highly significant difference between the baby's Apgar score of five minutes after birth.

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, Khatib suggested that dystocia increases because of birth weight and the rates of cesarean deliveries increase among infants whose weight is less than 2500 grams or more than 4000 g [16,17,23].

#### **Limitation of the Study:**

Pregnant woman did not describe the duration of her sleep accurately as she was mainly concerned with sleep duration at night. Due to her lack of knowledge about the negative effects of sleep deprivation on her health, she was unable to describe exactly the reasons of her disturbance. She knew she was pregnant, but she had no idea about sleep disturbances.

#### **V. Conclusions**

Pregnant women need adequate rest and sleep to decrease negative labor outcomes, 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 and the type of birth and neonate's anthropometric measurements. More research is needed to assess risk factors associated with sleep disturbances. Further investigation will aid to improve nursing management and intervention for pregnant women to prevent adverse maternal and fetal outcomes.

#### **Acknowledgement**

I would like to thank all subjects, work institutions, all staff nurses and research teams.

#### **Conflict of interest**

None declared

#### **Funding**

Unfunded project.

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