

Sleep during high-risk pregnancy: an Egyptian study

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Introduction

Sleep problems during pregnancy are common. Most pregnant females suffer from impaired sleep quality and frequent awakening during night, particularly when approaching labor. Recent studies have mentioned that 80–97% of females in the third trimester of pregnancy reported waking up at night, and 60–85% had problems with sleep quality during pregnancy. The role of sleep in pregnancy is not fully understood, especially whether there are medical complications accompanying pregnancy, increasing the risk of health hazards of the pregnant mothers.

Aim

The aim of the present study was to examine sleep practices and sleep quality during high-risk pregnancy.

Materials and methods

Fifty-nine women with high-risk pregnancy were approached to participate in this study. All of them were admitted at the Antenatal Care Unit at Mansoura University Hospital. We collected information on demographic data, quality of sleep, night-time waking, and snoring. In addition, assessment of their medical conditions was reported. The Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, and Insomnia Severity Index were used as screening tools.

Results

The mean age of the 59 pregnant women was 28.9 ± 6.7 years, the mean gestational age was 30.26 ± 7.02 weeks, and the mean of pre-pregnancy sleeping time was 7.8 ± 2.16 h. The mean Pittsburgh Sleep Quality Index score was (7.12 ± 3) , and the mean Epworth Sleepiness Scale score was (8.68 ± 4.79) . Insomnia was a common complaint (59%). Respondents with high-risk pregnancy due to hypertension tended to have excessive daytime sleepiness, poorer sleep quality, and sleep problems before their pregnancy.

Conclusion

Sleep problems are common during high-risk pregnancy; screening for these problems during antenatal care visits should be a routine clinical practice.

Keywords:

high-risk pregnancy, insomnia, sleep, sleep quality

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Introduction

Pregnancy is usually associated with impairment in ordinary sleep patterns. Despite the fact that sleep is extremely essential for good health, it seems quite difficult to obtain satisfactory amounts of sleep during pregnancy. Several factors play a role in this impairment, such as gastroesophageal reflux, recurrent micturition, and dyspnea, which happen at night-time and leave residues during the daytime [1]. Poor sleep quality and decreased sleep time have a strong relationship with increased probability of preterm labor and complicated pregnancy outcomes [2,3]. In addition, progesterone and oxytocin levels increase during pregnancy and have been found to cause sleep fragmentation during night-time and excessive daytime sleepiness. Furthermore, the pregnant mother worries a lot about her future, about her well-being during labor, and about the health of the baby.

These worries are stressful and might cause the pregnant lady to stay awake at night being stressed, which eventually leads to inability to fall asleep [4]. Recent studies have reported that increased snoring and breathing problems during pregnancy may result in glucose intolerance, gestational diabetes [5,6], and pregnancy-induced hypertension [7,8].

Various studies have summarized the subjective sleep changes in pregnant women as follows: more sleep duration (SD), night awakenings, and sleepiness and frequent naps during the day. On the other hand, objective sleep changes included longer SD (early pregnancy) [1,9], lowered sleep efficiency, shortened stages 3 and 4 of non-rapid eye movement (REM) sleep, decreased REM sleep, prolongation of stage 1 of non-REM sleep, higher percentage of wake time after sleep onset, and less total sleep time (late pregnancy) [10].

Several investigators have mentioned the relationship between sleep disorders such as insomnia and sleep apnea and hypertension, coronary insufficiency, diabetes, and depression, especially in middle-aged and elderly groups [11,12]. Although many studies have found a relationship between sleep disorders and undesirable health outcomes [6,8], a few studies have assessed the effect of sleep disorders on the general medical condition of pregnant females [1].

Poor sleep quality and decreased time of sleep are linked to an increased rate of preterm labor, glucose intolerance, and diabetes in pregnancy [13]. In addition, several studies have mentioned that snoring and breathing-related sleep problems have the same harmful impact on pregnancy [14]. Women with severe snoring were at high risk for low fetal weight and growth restriction [15]. Females with sleep deprivation (≤ 5 h/day) were more prone to preterm delivery due to medical problems [14,16].

Limited data are available regarding the extent of the problem among Arab women in general and women in Egypt in particular. A recent study conducted in the United Arab Emirates reported that one in five females is more liable to have sleep apnea, even in the absence of pregnancy [17].

To our knowledge, profiling of sleep disorders among high-risk pregnant women in Egypt has not been conducted. This study estimated the prevalence of sleep problems among high-risk pregnant females. Sleep profiles and sleep quality in high-risk pregnant women were assessed, and self-reported sleep complaints were documented.

Patients and methods

Patients

Fifty-nine pregnant ladies were asked to join this study conducted at the Antenatal Care Unit of Mansoura University Hospital. The unit comprises 30 beds and admits only patients with risky pregnancy for close monitoring and immediate interference whenever needed. It serves Dakahlia governorate in addition to other cities in the Egyptian Delta area. High-risk pregnancy is diagnosed if pregnant women fulfill any of the following conditions: (a) hypertension, more than 140 mmHg systolic blood pressure and 90 mmHg diastolic blood pressure [18], presence of other risky health conditions such as diabetes and obesity, and/or positive family history of these medical conditions as they usually run in families [8]; (b) risky age, teenage mothers or older mothers above 35 years of age; (c) conditions of pregnancy such as eclampsia and preeclampsia, heart disease, risk of preterm labor, and multiple pregnancies. Preeclampsia is a condition accompanied by elevated blood pressure and high levels of protein in urine, resulting in harmful effects that can lead to seizures and death.

Exclusion criteria

We excluded patients with history of psychiatric or somatic disorders, recent administration of psychoactive,

sedative, or narcotic medications, and use of caffeine (> 8 cups of coffee or 16 cups of tea/day). We also excluded women with severe medical complications that prevented them from cooperating with the research team.

The present study took place from March 2012 to December 2012; participants completed the sleep questionnaires after giving informed oral consent, and ethics approval was obtained to carry out the study with the recruited women.

Questionnaires

The questionnaires were administered by the research team. Questions included demographic data, pre-pregnancy sleep time, and sleep quality, night-time waking, daytime tiredness, and napping during pregnancy, as well as medical problems in pregnant females. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) [19], a nine-question index for self-assessment of sleep problems and quality of sleep. It consists of 19 points providing seven scores for sleep quality, latency, duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The PSQI scores range from 0 to 21; a total score of more than 5 indicates poor sleep quality. In addition, pregnant females answered the Epworth Sleepiness Scale (ESS) [20] to evaluate daytime sleepiness by rating on a four-point scale (0–3) that determined the probability of falling asleep in eight different conditions during their daily life activities. Total ESS scores range from 0 to 24. A total score of 10 or more indicates excessive daytime sleepiness. [20]. The Insomnia Severity Index (ISI) [21] was also used; it has seven questions assessing the degree of insomnia.

The prevalence of sleep disorders was assessed using descriptive analyses. Variations in sleep patterns were compared using the χ^2 -test. Relationships were examined between sleep patterns and medical conditions of the pregnant females through the use of Spearman's bivariate correlation. Statistical analyses were performed using SPSS 20 statistical software (SPSS Inc., Chicago, Illinois, USA) [22].

Results

Demographic data

The mean age of the sample was 28.9 ± 6.7 ; most of the females were in their last trimester of pregnancy, as the mean gestational age was 30.26 ± 7.024 weeks as shown in Table 2. Approximately 37.3% of the sample had a single previous pregnancy. The percentage of illiterate participants was nearly equal to those who had received university education – 39 and 45.8%, respectively. Over half of the recruited sample had medical complications (50.8%), whereas only 20.3% had gestational hypertension and 45.8% had diabetes mellitus. Patient demographic data are summarized in Table 1.

Sleep characteristics of the recruited sample

The mean total score for ISI was 0.98 ± 1.137 , indicating the presence of insomnia in most of the recruited cases.

Table 1 Demographic data of the recruited sample

Variable	n (%)
Parity	
Nulliparous	4 (6.8)
Single pregnancy	22 (37.3)
Two pregnancies	19 (32.2)
Three pregnancies	9 (15.3)
Four pregnancies	5 (8.5)
Education	
Illiterate	23 (39.0)
Secondary education	9 (15.3)
High education	27 (45.8)
Hypertension	
No HTN	47 (79.9)
Positive HTN	12 (20.3)
Medical complication	
No	29 (49.2)
Positive	30 (50.8)
Family history of DM or HTN	
No	32 (54.2)
Positive	27 (45.8)

DM, diabetes mellitus; HTN, hypertension.

Table 2 Means and SDs of sample characteristics

	Minimum	Maximum	Mean \pm SD
Age	20	54	28.90 \pm 6.7
Pre-pregnancy sleep duration	3	12	7.88 \pm 2.16
Gestational age	13	40	30.26 \pm 7.024
Insomnia Severity Index	0	3	0.98 \pm 1.137
Epworth Sleepiness Scale	0	18	8.68 \pm 4.79
Pittsburgh Sleep Quality Index	2	13	7.12 \pm 3.006

The mean total score for ESS was 8.68 ± 4.79 , indicating a considerable amount of daytime sleepiness.

The mean score on PSQI was 7.2 ± 3.006 , indicating poor sleep quality among the pregnant ladies.

Summary of the scores obtained from the sleep questionnaires are summarized in Table 2.

Over half of the sample complained of snoring (56%). Nearly half of the sample had other sleep complaints such as waking up too early, not getting enough sleep, feeling sleepy during the day, and feeling nonrestful during the day (49.2, 47.5, 47.5, and 40.5%, respectively). Only 22% of the women complained of inability to fall asleep easily. The sleep complaints encountered during pregnancy are summarized in Table 3. We tried to classify the sample into good/bad sleep quality according to the PSQI scores, into normal, borderline, and abnormal levels of sleepiness according to the ESS scores, and into no, moderate, and severe insomnia according to the ISI scores.

Table 4 summarizes the effect of sample characteristics on the sleep profile of the participants, such as education level, having a medical complication during pregnancy, and having a positive family history of medical illness affecting sleep quality ($P = 0.02$, 0.012 , and 0.007 , respectively). It was also discovered that none of the reported factors had a statistically significant impact on the ESS scores. On the other hand, parity, having medical complications during pregnancy, and having a positive family history of medical illness resulted in higher levels

Table 3 Sleep complaints of the recruited sample

Variable	n (%)
Having trouble falling asleep	13 (22)
Feeling unrested during the day	24 (40.7)
Waking up too early	29 (49.2)
Sleepy during the day	28 (47.5)
Not getting enough sleep	28 (47.5)
Snoring	33 (56)

of insomnia scores ($P = 0.09$, 0.045 , and 0.022 , respectively).

Correlation among study variables

We used Spearman's Rho for correlation among different demographic, medical, and sleep data of the recruited sample. It was found that increased parity decreases pre-pregnancy SD ($r = -0.3$), and that higher the gestational age the more the complaint of getting up early ($r = 0.32$). Waking up frequently during the night was more prevalent in pregnant females who had hypertension ($r = 0.26$). Feeling unrested during the day was prevalent in women who had medical complications ($r = 0.31$) (Table 5).

Sleep quality was bad and insomnia was common in women with positive family history of DM, HTN, heart disease, and other medical complication and showed a statistical significant difference among groups. Despite the high tendency of daytime sleepiness in the studied sample, none of the groups showed statistical significance.

Discussion

This study found that sleep problems are common in high-risk pregnant females and is significantly related to hypertension during pregnancy. To our knowledge, this is the first study in Egypt that tried to assess sleep during pregnancy. Similar results were reported by Hedman *et al.* [23] that SD decreases in late pregnancy, whereas snoring and recurrent awakening actually increase during pregnancy.

The relationships between age, education level, medical diseases, family history of medical illness, and sleep in pregnancy were examined. Age was found to be related to poor sleep in pregnant females. Most of the included women reported having shorter SDs after pregnancy, finding it more difficult to sleep than before, and they became more sleepy during the day; all these factors might have been related to their medical status as well.

Increased parity was directly associated with reduced sleep. SD lower than 7 h during night correlated with parity, meaning that with successive pregnancies sleep is affected in a negative way and it becomes of poorer quality and shorter duration. This is consistent with the survey conducted by the National Health Interview Survey [24]. Certain studies have reported that decreased SD and sleep-disordered breathing are linked to

higher levels of inflammatory cytokines and oxidative stress mediators enhancing cellular damage and metabolic impairment, resulting in various medical conditions [5,25]. Moreover, a few recent studies have highlighted the relationship between sleep-disordered breathing and serious medical problems. [26].

In this study, over half the sample snored and this correlated with high-risk pregnancies, and these women have never been checked or examined before for treatment. Studies have shown that frequent snoring is a common complaint among pregnant women [27]. We had no data regarding the relationship between snoring and blood pressure of the studied sample, although it has been proved that they are both associated with adverse maternal and neonatal outcomes. Sleep quality was greatly affected by those who had a medical co-morbidity and those with high-risk pregnancies. It has been noticed that women with poor sleep quality are at higher risk of developing medical complications and deliver babies with poor health. These findings are similar to earlier studies [28,29] – quality of sleep was found to decrease at the end of pregnancy [16].

Table 4 Correlation between study variables

Significant paired correlations	<i>r</i>	<i>P</i>
Parity × pre-pregnancy sleep duration	-0.3	0.021
Education level × not getting enough sleep	-0.032	0.012
Hypertension during pregnancy × family history of complications	0.38	0.003
Hypertension during pregnancy × waking up during the night	0.26	0.044
Medical complications × feeling unrested during the day	0.27	0.045
Pre-pregnancy sleep duration × family history of medical disease	0.31	0.015
Gestational age × waking up too early	0.32	0.015

Statistical test, Spearman's bivariate correlation was used to calculate *r* (correlation coefficient and its significance *P*).

Sleep is not routinely evaluated in pregnancy. This should not be the case. This study and similar previous ones demonstrate the cause-effect relationship between pregnancies and sleep complaints. Where pregnancy exaggerate existing sleep problems, and by many psychophysiological mechanisms can lead to sleep disorders De novo diagnosed during the pregnancy period. It is important to screen and diagnose these disorders, as their impact on health of the mothers and the babies is mostly negative. Findings of this study are similar to the most recent review studies investigating sleep in pregnant ladies [30,31].

On the whole, results of the present study provide an estimate of the association between high-risk pregnancy and disturbed sleep; however, it had a number of limitations. The main limitation is that self-evaluation of sleep symptoms needs assessment by further studies. Objective quantification of sleep through polysomnography, actigraphy, or sleep tracking would have added more objectivity to the obtained data. In addition, other validated tools should be used; no validated sleep tools for use specifically in the pregnant population were developed at the time of this study. Another limitation is that pre-pregnancy sleep data were insufficient. In addition, the sample size was small and recruited from a single institution, limiting the generalizability. Stratified analyses to determine whether the associations we reported are present or different in certain populations (e.g. younger vs. older women) were not adequately explored, given the lack of power for informative subgroup analyses. This was an observational study and cannot infer causation. A follow-up of the studied sample to quantify the sleep changes during the course of pregnancy would have been highly plausible.

Conclusion

SD, sleep quality, or sleep-related breathing disorders can be considered strongly related to the medical complica-

Table 5 Demonstrates the response to sleep questionnaires based on the criteria of recruited sample

Variable	Sleep quality (PSQI)			Sleepiness degree (ESS)				Insomnia degree (ISI)			
	Good	Bad (%)	<i>P</i>	Normal	Borderline	Abnormal	<i>P</i>	No insomnia	Moderate	Severe	<i>P</i>
Previous pregnancies (parity)			7.4				0.25				0.09
Nulliparous	0	4		3	1	0		1	2	1	
Single pregnancy	6	16		12	7	3		2	11	9	
Two pregnancies	15	4		14	1	4		2	7	10	
Three pregnancies	3	6		4	1	4		2	3	9	
Four pregnancies	4	1		2	1	2		1	2	2	
Education Degree			0.02				0.85				0.48
illiterate	22	1		11	5	7		3	12	8	
Secondary education	6	3		5	2	2		2	4	4	
High education	17	10		19	4	4		7	12	8	
Hypertension during pregnancy			0.5				0.2				0.52
No HTN	35	12		30	7	10		7	25	17	
Positive HTN	10	2		5	4	3		1	2	7	
Medical complication during pregnancy (DM, heart disease)			0.012				0.27				0.045
Noncomplicated	11	18		21	4	4		5	7	10	
Complicated	27	3		14	7	9		10	14	13	
Family history of DM and HTN			0.007				0.1				0.022
No family history	12	20		23	4	5		9	12	12	
Positive family history	2	25		12	7	8		5	12	10	

DM, diabetes mellitus; ESS, Epworth Sleepiness Scale; HTN, hypertension; ISI, Insomnia Severity Index; PSQI, Pittsburgh Sleep Quality Index.

tions during pregnancy, especially hypertension. Another important finding is the presence of family history of sleep problems among the relatives of females with high-risk pregnancy.

These finding should encourage a routine assessment of sleep problems among pregnant females where prenatal sleep disorders may eliminate undesirable pregnancy outcomes. Physicians should evaluate sleep habits of their pregnant patients explaining the role of quality sleep on pregnancy.

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Conflicts of interest

There are no conflicts of interest.

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