

# Sleep Patterns and Disorders Among Low Risk and High Risk Pregnant Saudi Women

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## Abstract

**Aim:** of the study was to assess sleep patterns and disorders among low risk and high risk pregnant Saudi women.

**Methods:** A descriptive cross-sectional design was utilized for this study. The study was conducted at King Khalid National Guard Hospital, King Abdul-Aziz Medical City Jeddah. Participants were recruited during their antenatal visits. Simple random stratified sample of 300 pregnant women were recruited for the study, the study included pregnant women who were in the first, second and third trimesters of pregnancy, both low risk and high risk pregnant women. Data were collected with the use of self-administrated questionnaire that included three parts ; First part included questions related to the personal background data of the sample, 2<sup>nd</sup> part is the Modified Epworth Sleepiness Scale to collect data related to sleep pattern and disorders among pregnant women, and the 3<sup>rd</sup> part a structured questionnaire that included questions related to sleeping patterns and disorders.

**Results:** of the study indicated that More than half of the studied samples were low risk (61.3%) whereas (38.7%) were high risk. The most common problems among the high risk pregnant women were gestational diabetes that constituted (16%) , anemia ( 6.7%) , hypertension (2.3%), respiratory problems (3%) , urinary tract infection ( 2.3%) , ( 8.3%) had more than one problem .It was found that the overall dimensions of chance dozing mean score ranged from 5 to 11 with a mean of 5.49., women who were in the first quarter of pregnancy have highest mean score of weekday time sleep (8.62±3.80) as compared with women who were in the fourth quarter of pregnancy (5.96±4.48). As for symptoms of sleep apnea results indicated (42.67) sometimes have awaken chocking, (61.33%) The most common causes of difficulties falling asleep among low risk and high risk pregnant women were legs get restless , legs felt hot when going sleep, getting up and walked around and fetal movement.

**Conclusion:** There was a statistically significant difference between common sleeping problems and gestational age of pregnant women,. Moreover, the highest mean percentage of common sleeping problems was recorded for Leg cramps. Sleep disturbances and disorders are common throughout pregnancy and were experienced by the majority of pregnant Saudi women.

**Recommendations :** health education should be provided by the nurses to the pregnant women about sleeping disturbance and disorders , a thorough assessment of sleep pattern and disorders and the factors that may led to sleeping disturbance should be part of antenatal care.

**Key words:** Sleeping pattern; sleeping disorders; Saudi women; Low risk and high risk pregnancy

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## Introduction and Review of Literature

Sleep is absolutely essential for normal, healthy function. Its primary function is rest and restoring the body's energy levels. Further, sleep is an active process in which metabolism, tissue restoration, memory consolidation, and maintenance of general homeostatic balance occurs [1,2]. Women are about 1.6 times at higher risk for insomnia than males [3]. Pregnant women are far more likely to suffer from a sleep disorder due to hormonal, physical and physiologic changes [4,5].

Sleep is altered during pregnancy has been known for quiet sometimes [6]. The first trimester of pregnancy is commonly associated with increased daytime sleepiness [7] as well as total sleep time [8,9]. Rising hormones levels during this period may partially account for these changes. Progesterone is known to exert soporific effects [10] and administration of exogenous progesterone has been shown to reduce time of sleep onset and modify sleep [11].

Physiological changes that occur during pregnancy may predispose women to exacerbation of preexisting sleep disordered breathing or to the development of new diseases. The upward displacement of the diaphragm by the enlarging uterus causes a progressive decrease in Functional Residual Capacity (FRC), which decreases by 10 to 25% at term [12,13]. The decrease in FRC during pregnancy and the normal decline in FRC during sleep increase the likelihood of small airway closure. In addition, chest wall and total respiratory compliance are reduced in late pregnancy [14]. In the third trimester of pregnancy, most pregnant women experience shortness of breath while supine. The inability to assume a normal sleeping posture may have a significant impact on a pregnant woman's ability to initiate and maintain sleep.

Sleep patterns also depend on the duration of pregnancy. The amount of time spent in Slow Wave Sleep (SWS) was higher at 17 to

27 and 28 to 39 weeks gestation than at 8 to 16 weeks gestation [15]. During late pregnancy, there is a reduction in the percentage of time spent in REM sleep, and a significant increase in percentage of time spent in stage I sleep [16].

Beginning early in pregnancy, sleep can be disrupted by urinary frequency, nausea, leg cramps, and other discomforts [17]. As pregnancy progresses, risk factors for sleep disorders, such as increased weight and sleep disordered breathing (snoring, sleep apnea), or anemia and restless legs syndrome become more apparent [18,19]. During the third trimester, women typically report 2 to 3 awakenings during the night and about 7.5 hours of sleep, but some report sleeping as little as 3 or 4 hours, particularly if there are other children at home who are not yet sleeping through the night [20,21]. With more objective sleep measures, such as wrist actigraphy or polysomnography, pregnant women sleep about 30 minutes less than they subjectively report. Sleep disturbances (either insomnia or excessive sleepiness) begin and persist during the course of pregnancy and cannot be explained on the basis of other medical, mental, or sleep disorders.

Sleep disturbance is a common complaint during pregnancy, particularly in the third trimester. The occurrence of mid-sleep awakenings that is a main source of disturbed sleep during the latter part of pregnancy has been well described [17,21]. A longitudinal study by Baratte et al. [17] focused on the prevalence and sources of mid sleep awakenings in a sample of 25 women from preconception through the third trimester of pregnancy. Using data from sleep diaries, they found that the number of awakenings during the night was highest in the third trimester increasing 2 fold from the preconception period. Moreover, Lee et al. [20] found an association between poor sleep in the third trimester of pregnancy and obstetrical outcome in a sample of 131 women. Women averaging less than 6 hours of sleep per night had longer labor and a higher cesarean section birth rate than women getting more hours of sleep. One mechanism for these adverse outcomes related to sleep disturbances might be a reduced tolerance for the work of birthing and elevated perception of discomforts during labor.

### Significance of the problem

Scattered research evaluated sleep pattern as well as sleep disorders across pregnancy. However, sleep disorders remains under recognized in women of the Middle Eastern Arab population. This was contributed to the difference in clinical presentation, difference in tolerance to symptoms, and rate of usage and referral to sleep services. Alotair et al. [22] reported that 39.8 % of Saudi women suffered from insomnia as compared to 25.9 % of Saudi men. In a study by Bahaman [23] almost 4 out of 10 middle aged Saudi women are found to be at risk of obstructive sleep apnea. Further, to our knowledge little is known about sleep and sleep disorders during pregnancy in Saudi Arabia. Thus, the current study is designed to assess sleep patterns and disorders among low risk and high risk pregnant Saudi women. The study will contribute to a better understanding of sleeping patterns and disorders among pregnant Saudi women.

Therefore we hypothesize that sleep disturbances will be most prevalent at the beginning and end of pregnancy, further sleep disturbances is expected to be also prevalent in high risk as compared to low risk pregnancy.

### Aim of the Study

Aim of the study was to assess sleep patterns and disorders among low risk and high risk pregnant Saudi women.

### Research questions

1. What is the pattern of sleep among low risk and high risk pregnant Saudi women?
2. What are the common sleeping disorders among low risk and high risk pregnant Saudi women?

3. What is the difference in sleeping pattern and disorders in low risk and high risk pregnant Saudi women?

## Subjects and Methods

### Design

A descriptive cross-sectional design was utilized for this study as it suits the study purpose.

### Setting

The study was conducted at King Khaled National Guard Hospital, King Abdul-Aziz Medical City Jeddah. Participants were recruited from the following facilities:

» Out Patient Clinic (OPD) for Obstetric Gynecology that provides services for antenatal care and gynecology.

» Maternal Fetal Medicine Unit (MFMU), it provides services to the high risk pregnant women as three dimensions ultrasonography, none-stress test and evaluation for at risk fetuses by amniocentesis and bio-physical profile.

### Sample

Simple random stratified sample of 300 pregnant women were recruited for the study. Participants were selected from the list of patients visiting the previously mentioned clinics. Participants were recruited during regularly scheduled antenatal visits. They were divided into two groups' low risk and high risk from different trimesters of pregnancy. The study included Pregnant women who were in the first, second and third trimesters of pregnancy, both low risk and high risk pregnant women with age ranged between 20 to 35 and those who were willing to participate in the study

### Tools for Data collection

Data were collected with the use of a questionnaire that included three parts.

First part included questions related to the personal background data of the sample, obstetrical data as parity, mode of previous pregnancy, last menstrual period, last pregnancy and labor and any medical condition or complications that happened during previous pregnancies and labor. Second part is the Modified Epworth Sleepiness Scale [24] to collect data related to sleep patterns and disorders among pregnant women. The questionnaire is composed of questions that assess and measure daytime sleepiness. The Epworth sleepiness scale has demonstrated a validity [24]. It has been found to correlate significantly with objective measures of daytime sleepiness, including latency test ( $R= 0.39$  to  $0.69$ ) and to discriminate between normal patients and patients with sleep disorders [25]. Third part a structured questionnaire that included questions related to sleeping patterns.

### Ethical considerations

Participants were informed about the nature of the study. All women were informed that their participation is voluntary and they can withdraw from the study at any time. A written consent was obtained from all participants. All information that was provided by participants was confidential and anonymous.

### Pilot Study

Ten percent of the sample who met the criteria of inclusion was included in the pilot study in order to assess the feasibility and clarity of the tools and determine the needed time to answer the questions. The pilot study lasted for 1 month. Based on its result minimal changes were carried out. Pilot study revealed that the average length of time needed to complete the questionnaire was approximately 20 minutes with each pregnant woman. Sample included in the pilot study were excluded from the study sample.

## Data collection procedures

Acceptance to conduct the study was obtained from the King Abdul-Aziz Medical City Research Committee to maintain ethics of research. Participants were recruited during regular antenatal visit appointment. Each one participated only once in the study. Participants were recruited at one of three times during pregnancy to obtain a simple stratified cross section of pregnancy. A member of the investigating team (the PI or co investigator) were available in the outpatient clinic and MFMU to provide the participants with thorough explanation of the study and all questions in regards to the study were answered. All participants were provided with an open letter and informed written consent for signature. The PI or the co-investigator were present in both settings to read and explain the open letter and the consent form to all participants before they sign then the questionnaire was distributed to the participants who agreed to participate in the study. The participants were either interviewed or self-administrated the questionnaire.

## Data Management and analysis

Data were coded and analyzed using SPSS version 18. Descriptive analyses were conducted to determine the frequency distributions of the study variables. Pearson's Product Moment correlation coefficients were calculated to assess the relationship among the study variables.

## Results

### Results of the study are presented in three main sections

1. Personal background and obstetrical profile of the sample
2. Sleep pattern among low risk and high risk pregnant women
3. Sleeping disorders among low risk and high risk pregnant women

Table 1 presents the personal background of the sample. As regard the Studied sample age (44.7%) were in the range of 25 to less than 30 years old with a mean  $28.4 \pm 4.25$ . More than half of the sample have university education, (76%) were unemployed. As regard to BMI (36.7%) of the study sample were in the category of overweight, (34.7%) were in the category of obesity, Mean BMI  $29.1 \pm 12.01$

As regard to the parity, (33.7%) of the study sample were gravida 1, (26.3%) were gravida 2, (14%) were gravid 3, only (7.3%) were gravida 4. As for abortion, (65.7%) has no abortion before while (24.3%) had previous one abortion. Twenty one point seven percent has no children, (30.7%) has one child, (26.7%) has two children, (13.7%) has three children while only (7.3%) has four children. Eighty seven point seven has no previous preterm labor. More than half of the studied sample has normal vaginal delivery,

(20%) delivered previously with cesarean section. Seventy seven percent has no complications with previous labor.

Table 2 illustrated the distribution of the studied sample in relation to gestational age, fetal presentation and types of problems among high risk pregnant women. As regard to gestational age, (25.3%) of the studied sample were in early pregnancy between 5 to 19 weeks, (26.3%) were between 20 to 28 weeks, (35.3%) were between 29 to 36 weeks while (13%) were between 37 week to 42 weeks of pregnancy.

As regards to the fetal presentation (84.3%) were in cephalic presentation. More than half of the studied samples were low risk (61.3%) where (38.7%) were high risk. The most common problems among the high risk pregnant women were gestational diabetes that constituted (16%), anemia (6.7%), hypertension (2.3%), respiratory problems (3%), urinary tract infection (2.3%) while (8.3%) had more than one problem.

As regard to the dimensions of chance dozing which represents the daytime sleepiness on the Epworth sleeping scale, the mean daytime

**Table 1:** Distribution of the sample according to their personal background.

Age	No	%
< 20-	8	2.7
20 < 25	65	21.7
25 <30	134	44.7
30 <35	93	31.0
X±SD	28.49±4.25	
Marital Status		
Married	300	100.0
Educational level		
Not able to read or write	3	1.0
Elementary	17	5.7
Preparatory	26	8.7
Secondary	72	24.0
University	182	60.7
Occupation		
Employed	72	24.0
House Wives	228	76.0

**Table 2:** The obstetrical profile of the sample.

Obstetrical Profile of the studied sample	Pregnant women (n= 300)	
	No	%
Gestational age		
1 <sup>st</sup> quarter (5 -19)	76	25.3
2 <sup>nd</sup> quarter (20 - 28)	79	26.3
3 <sup>rd</sup> quarter (29 -36)	106	35.3
4 <sup>th</sup> quarter (37- 42)	39	13.0
Fetus presentation		
Cephalic	253	84.3
Breech	37	12.3
Shoulder	10	3.3
Problems during current pregnancy		
Low risk pregnancy	184	61.3
High risk pregnancy	116	38.7
Types of problems during current pregnancy		
Hypertension	7	2.3
Gestational diabetes	48	16.0
Respiratory problem	9	3.0
Anemia	20	6.7
UTI	7	2.3
Most of the problems	25	8.3

sleepiness was 9.35 during 1<sup>st</sup> quarters of pregnancy, 10 .6, 7.3 and 8.46 during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively, P = 0.05. Lying down to rest in the afternoon when the circumstances allowed dimension mean score ( $7.93 \pm 0.291$ ) was recorded as a slightly higher followed by Sitting quietly after lunch ( $9.37 \pm 0.196$ ). While the lowest mean score recorded for in a car while stopped for a few minutes in traffic ( $4.37 \pm 0.57$ )

Table 3a Illustrated the sleep pattern across pregnancy among low risk pregnant women according to their gestational age, results revealed that the mean number of sleeping hours at weekends were 7.47, 7.42, 7.37, 7.85. during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. No significance difference was found among the four quarters of

pregnancy  $P=0.471$ . As for the mean number of sleeping hours during weekdays, it was 8.41, 8.62, 8.39 and 8.23 during the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. No significance difference was found among the four quarters of pregnancy  $P=0.733$ . As for time to fall asleep, its mean was 2 hours, 1.95 minutes, 1.96 minutes and 1.64 minutes during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy. No significance difference was found among the four quarters of pregnancy  $P=0.197$ .

Table 3b illustrated the distribution of low risk pregnant women according to their nap during various gestational age  $n=184$ , result revealed that 87.74% always have nap during the 1<sup>st</sup> quarter of pregnancy versus 83%, 93% and 95.8% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. While 22%, 16.9%, 6.8% and 4.1% never get nap during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. According to the feeling after having a nap; 46.9%, 45.2%, 46.5% and 50% felt good after having nap during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively while 20.4%, 22.6%, 36.2% and 25% didn't feel good after a nap during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively.

Table 4a illustrated the sleep pattern across pregnancy among high risk pregnant women according to their gestational age, results revealed that the mean number of sleeping hours at weekends was 7.47 while the number of sleeping hours during weekdays was 8.58 with no significance difference among low risk and high risk pregnant women in relation to sleeping hours at weekend  $t=0.279$   $P=0.781$  and in relation to sleeping hours at weekdays  $t=-1.040$   $P=0.299$ . The mean time to fall asleep among high risk pregnant women was 1.84 minutes with no significant difference among low risk and high risk women  $t=1.39$   $P=0.166$ .

Table 4b illustrated the distribution of high risk pregnant women according to their nap during various gestational age, results indicated that 92.5% always have nap during the 1<sup>st</sup> quarter of pregnancy versus 92.3%, 93.7% and 93.3% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. While 7.4%, 7.6%, 6.25% and 6.6% never get nap during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. According to the feeling after having a nap; 62.9%, 53.8%, 54.1% and 60% felt good after having nap during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively while 37%, 46.1%, 43.7% and 40% didn't feel good after a nap during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. None of the pregnant women in both groups received medications to get sleep.

As shown in Table 5, twenty eight point fifty seven percent of low risk pregnant women snored during first quarter of pregnancy while 24.5%, 34.48% and 33.33% snored during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarter of pregnancy respectively. Forty four point eighty nine percent snored every night during first quarter of pregnancy while 41.5%, 43.1% and 25% snored during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Fifty three point sixty five reported awaken choking during 1<sup>st</sup> quarter of pregnancy compared with 35.84%, 37.93% and 33.33% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively.

Thirty eight point seventy seven percent reported that their breathing pauses during sleep during 1<sup>st</sup> quarter of pregnancy compared with 30.08%, 41.37% and 33.33% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Sixty three point twenty six percent reported that they breath from mouth during 1<sup>st</sup> quarter of pregnancy compared with 54.71%, 77.58% and 62.5% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively.

Table 6 represents the main causes of difficulties falling asleep among low risk pregnant women, dream while falling sleep was the cause of difficulties falling asleep among 85.71% of the pregnant women during 1<sup>st</sup> quarter; it constitutes 84.9%, 84.48% and 91.66% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Forty point eighty one percent of the low risk pregnant women reported that legs got restless was the main cause of difficulty falling asleep during the 1<sup>st</sup> quarter of pregnancy while 52.83%, 39.65% and 45.83% reported it during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Fifty one point two reported that got up and walked around was the main reason during 1<sup>st</sup> quarter of pregnancy, while 54.71%, 43.1% and 33.33% reported it during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Fetal movement was the major cause among 77.35%, 77.58% and 66.66% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy.

As shown Table 7 Twenty nine point twenty one percent of high risk pregnant women snored during first quarter of pregnancy while 30.76%, 37.51% and 26.66% snored during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarter of pregnancy respectively. Thirty three point thirty three percent snored every night during first quarter of pregnancy while 57.69%, 45.83% and 66.66% snored during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Forty point eighty one reported awaken choking during 1<sup>st</sup> quarter of pregnancy compared with 61.63%, 52.81% and 53.33% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Fifty one point eighty five reported that breathing paused during 1<sup>st</sup> quarter compared with 69.23% during 2<sup>nd</sup> quarter of pregnancy.

As shown in Table 8 the main cause of difficulties falling asleep among high risk pregnant was dream while falling sleep (92.59%) of the pregnant women during 1<sup>st</sup> quarter, it constitutes 92.3%, 87.51% and 100% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Fifty nine point twenty five percent of the high risk pregnant women reported that legs got restless was the main cause of difficulty falling asleep during the 1<sup>st</sup> quarter of pregnancy while 57.69%, 52.08% and 66.66% reported it during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Fifty five point fifty five reported that got up and walked around was the main reason during 1<sup>st</sup> quarter of pregnancy, while 50%, 54.16% and 33.33% reported it during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Sixty six point sixty six percent reported that legs feel hot when going sleep was the main cause of difficulty falling asleep during 1<sup>st</sup> quarter of pregnancy, while 69.23%, 45.83% and 40% reported it as the cause during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively. Fetal movement was the major cause among 84.61%, 68.75% and 85.18% during 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of pregnancy respectively.

**Table 3b:** Distribution of low risk pregnant women according to their Nap during various gestational age  $n=184$ .

Sleep patterns across pregnancy	Gestational age				F	P
	1 <sup>st</sup> quarter (n= 76)	2 <sup>nd</sup> quarter (n= 79)	3 <sup>rd</sup> quarter (n= 106)	4 <sup>th</sup> quarter (n= 39)		
	X±SD	X±SD	X±SD	X±SD		
Number of sleeping hours at weekends	7.47±2.0	7.24±2.16	7.37±1.90	7.85±1.86	0.843	0.471
Number of sleeping hours at weekdays	8.41±1.75	8.62±2.04	8.39±1.70	8.23±2.23	0.428	0.733
Numbers of pillows used	1.51±0.74	1.47±0.71	1.53±0.69	1.54±0.60	0.140	0.936
Time taking to fall asleep	2.00±0.83	1.95±0.89	1.96±0.97	1.64±0.81	1.570	0.197

**Table 4a:** Sleep patterns across pregnancy among high risk pregnant n= 116.

	1 <sup>st</sup> quarter (n=49)	%	2 <sup>nd</sup> quarter (n=53)	%	3 <sup>rd</sup> quarter (n=58)	%	4 <sup>th</sup> quarter (n=24)	%
I always have nap	43	87.74	44	83	54	93	23	95.8
I never get nap	6	22	9	16.9	4	6.8	1	4.1
I feel good after a nap	23	46.9	24	45.2	27	46.5	12	50
I do not feel good after a nap	10	20.4	12	22.6	21	36.2	6	25

**Table 4b:** Distribution of High risk pregnant women according to their Nap during various gestational age N= 116.

Sleep patterns across pregnancy	Problems during current pregnancy		t-value	P
	Low risk pregnancy (n =184)	High risk pregnancy (n =116)		
	X±SD	X±SD		
Number of sleeping hours at weekends	7.40±2.02	7.47±1.96	-0.279	0.781
Number of sleeping hours at weekdays	8.35±1.87	8.58±1.91	-1.040	0.299
Numbers of pillows used	1.52±0.70	1.50±0.69	0.197	0.844
Time taking to fall asleep	1.98±0.92	1.84±0.85	1.390	0.166

**Table 5:** Distribution of low risk pregnant women who experiencing snoring and symptoms of sleeping Apnea during various gestational age n= 184.

	1 <sup>st</sup> quarter (n=27)	%	2 <sup>nd</sup> quarter (n=26)	%	3 <sup>rd</sup> quarter (n= 48)	%	4 <sup>th</sup> quarter (n= 15)	%
I always have nap	25	92.5	24	92.3	45	93.7	14	93.3
I never get nap	2	7.4	2	7.6	3	6.25	1	6.6
I feel good after a nap	17	62.9	14	53.8	26	54.1	9	60
I do not feel good after a nap	10	37	12	46.1	21	43.7	6	40

**Table 6:** Causes of difficulties falling asleep among low risk pregnant women n=184.

	1 <sup>st</sup> quarter (n=27)	%	2 <sup>nd</sup> quarter (n=26)	%	3 <sup>rd</sup> quarter (n= 48)	%	4 <sup>th</sup> quarter (n= 15)	%
Snore during sleeping	28	57	13	24.52	20	34.48	8	33.33
Snore every night	28	44.89	22	41.5	25	43.1	6	25
Snore before pregnancy	16	32.65	14	26.41	17	29.31	2	8.3
Have a waken chocking	26	53.06	19	35.84	22	37.93	8	33.33
Breathing pauses during sleep	14	38.77	16	30.08	24	41.37	8	33.33
Breathing through mouth	31	63.26	29	54.71	45	77.58	15	62.5

**Table 7:** Distribution of high risk pregnant women who experiencing snoring and sleeping apnea.

	1 <sup>st</sup> quarter (n=49)	%	2 <sup>nd</sup> quarter (n=53)	%	3 <sup>rd</sup> quarter (n=58)	%	4 <sup>th</sup> quarter (n=24)	%
Dream while feeling sleep	42	85.71	45	84.9	49	84.48	22	91.66
Legs get restless	20	40.81	28	52.83	23	39.65	11	45.83
Get up and walk around	25	51.02	26	54.71	25	43.1	8	33.33
Walk up feeling paralyzed	12	24.48	11	20.75	16	27.58	7	29.16
Legs feel hot when going to sleep	27	55.1	21	39.62	27	46.55	10	41.66
Buckling in knees when angry	11	22.44	17	32.07	22	37.93	7	29.16
Fetal movement awaken me	35	71.42	41	77.35	45	77.58	16	66.66

**Table 8:** Causes of difficulties falling asleep among High risk pregnant women.

Causes of difficulties falling asleep among high risk pregnant women	1 <sup>st</sup> quarter (n=27)	%	2 <sup>nd</sup> quarter (n=26)	%	3 <sup>rd</sup> quarter (n= 48)	%	4 <sup>th</sup> quarter (n= 15)	%
	Dream while feeling sleep	25	92.59	24	92.3	42	87.51	15
Legs get restless	16	59.25	15	57.69	25	52.08	10	66.66
Get up and walk around	15	55.55	13	50	26	54.16	5	33.33
Walk up feeling paralyzed	6	22.22	9	34.61	15	31.25	3	20
Legs feel hot when going to sleep	17	62.86	18	69.23	22	45.83	6	40
Buckling in knees when angry	18	66.66	11	42.3	17	35.41	6	40
Fetal movement awaken me	13	86.66	22	84.61	33	68.75	23	85.18

**Table 9:** The differences between low risk pregnant women versus high risk in relation to Common sleeping problems.

Causes of difficulties falling asleep	Problems during current pregnancy		t-value	P
	Low risk pregnancy (n =184)	High risk pregnancy (n =116)		
	X±SD	X±SD		
Dream while falling asleep	2.29±0.60	2.06±0.58	3.209**	0.001
Legs ever get restless	1.65±0.64	1.50±0.59	2.178*	0.030
Need to get up to walk around	1.55±0.58	1.52±0.62	0.419	0.676
Walk up and feel paralyzed	1.29±0.48	1.28±0.52	0.176	0.860
Legs feel hot, burning, and itching	1.74±0.77	1.54±0.64	2.402*	0.017
Knees buckling and feel weak when angry, excited, or laughing	1.50±0.60	1.34±0.54	2.309*	0.022
Fetal movements	1.97±0.60	1.96±0.64	0.123	0.903

**Table 10:** Common sleeping problems among pregnant women according to their problems during current pregnancy.

Common sleeping problems	Problems during current pregnancy				Total	
	Low risk pregnancy (n =184)		High risk pregnancy (n =116)		No	%
	No	%	No	%		
An acid to taste in your mouth	5	2.72	10	8.62	15	5.00
A feeling of choking	9	4.89	14	12.07	23	7.67
Uterine contraction	5	2.72	7	6.03	12	4.00
Leg cramps	71	38.59	32	27.59	103	34.33
Shortness of breath	10	5.43	10	8.62	20	6.67
Urgency to urinate	40	21.74	19	16.38	59	19.67
Too hot , too cold	32	17.39	11	9.48	43	14.33
Headache	11	5.98	7	6.03	18	6.00
Palpitation	1	0.54	6	5.17	7	2.33
X <sup>2</sup>	25.97**					
P	0.001					

As shown in Table 9, A statistical significant difference was found between low risk and high risk pregnant women in relation to dream while falling sleep t = 3.209 P= 0.001, legs ever get restless t= 2.178 P = 0.030, Legs feel hot, burning, and itching t= 2.402 P= 0.017 and Knees buckling and feel weak when angry, excited, or laughing t= 2.309 P= 0.022.

As shown in Table 10, A statistically significant relationship was found between common sleeping problems and problems during current pregnancy for pregnant women in both groups (X<sup>2</sup> = 25.97 p<0.01). In addition, it was noticed that legs cramps problem recorded significantly higher mean percent among low risk pregnancy (38.59%) as compared to high risk pregnancy (27.59%). However, the lowest

mean percent for high risk pregnancy (5.17%) was significantly more than those for normal pregnancy (0.54%).

## Discussion

The discussion will be addressed within the following framework:

- Personal background and obstetrical profile of the sample,
- sleeping pattern among low risk and high risk pregnant women,
- Sleeping disorders among low risk and high risk pregnant women.

Results of the study indicated that less than half of the sample were in the range of 25 to less than 30 years, the mean age of the pregnant women in both group was 28.4 ± 4.25. More than half have university

education, three quarters were unemployed. These findings were in contrary to that reported by Beebe et al. [26] in studying sleep disturbance in late pregnancy and early labor, they found that eligible women were between the age of 18 and 40. However, findings were in consistent with Rezaei et al. [27] in their study "the impact of sleep health behavior education on the quality of life in the pregnant women with sleep disorders": A randomized control trial in the year 2012, who they found that half of the participants were in the age range of 20 to 30, less than half had university education and more than three quarters were housewives.

Regarding obstetrical profile current study results indicated that less than half were gravida one while one quarter were gravida two, more than one quarter has one child, one quarter has two children, these findings are in congruent with that of [27] in their study as they found that less than half of the participants were gravida one while more than one quarter were gravida two.

As regards gestational age, current study findings revealed that one quarter of the studied sample were in early pregnancy between 5 to 19 weeks, slightly more than one quarter were between 20 to 28 weeks, less than half were between 29 to 36 weeks while minority were between 37 week to 42 weeks of pregnancy, these findings were in consistent with that reported by Jodi et al. [25] whom they found that less than half of their study sample were between 8- 12 weeks of pregnancy, slightly more than one quarter were between 18-22 weeks pregnant, less than quarter were between 25- 28 weeks pregnant and less than half were between 35- 38 weeks pregnant, moreover, the current study findings are not similar to that were reported by [26] in which more than eighty percent were in gestational age that was ranged from 15- 17 weeks while more than half in the study group were in gestational age that was ranged from 18- 20 weeks.

As regard to sleep pattern among low risk and high risk pregnant Saudi women, results of the study indicated no significant difference in daytime sleepiness throughout pregnancy, the women reported moderate levels of day time sleepiness on the Epworth sleeping scale, these findings are consistent with that reported by [27] in their study, sleep disturbance during pregnancy as they found no significant difference in daytime sleepiness through pregnancy on Epworth sleepiness scale for the first trimester,  $m=7.83$  2<sup>nd</sup> trimester  $m=9.96$  3<sup>rd</sup>  $m=7.33$  4<sup>th</sup>  $m=8.46$ .

None of the participants in the study either among low risk or high risk women used sleeping medication, this finding is in congruent with that reported by Keeffe et al. [28]

Regarding sleeping disorders study results revealed that less than half of the study sample snored during the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and fourth quarters of pregnancy respectively, this finding is similar to that reported by Frances et al. [29] in which pregnancy has been linked to alterations in sleep. Insomnia, snoring, and restless legs syndrome are reported commonly by pregnant women. Moreover, Suzuki et al. [30] in their study of sleeping patterns during pregnancy among Japanese Women founded that in the third trimester, sleep disordered breathing symptoms as snoring, nocturnal apnea and daytime sleepiness. The increase in frequent snoring was particularly marked. Also, Zaki et al. [31] in their study of sleeping disorders in a sample of Egyptian high risk pregnant females reported that Insomnia and snoring was a frequent complaint. Candidates with Hypertension and other medical complications tended to have sleep problems prior to their pregnancy with excessive daytime sleepiness and poorer sleep quality

Results of the study indicated that the main causes of difficulties falling sleep among the majority of low risk and high risk pregnant women during the various trimester during pregnancy were getting up and walking around, legs getting restless, legs feel hot, burning, itching and fetal movement, these findings are in the same direction

with that reported by Bendad et al. [32] who reported that the causes of sleep disorders included physical problems as nausea, vomiting, heat intolerance, itching, fetal movement and leg cramp.

## Conclusion

Low risk and high risk pregnant Saudi women had average daytime sleepiness, both low risk and high risk pregnant Saudi women experienced snoring and signs of sleeping apnea as awoken choking, breathing pauses and breath through mouth. The most common causes of difficulty falling asleep were getting up and walking around, leg cramp and fetal movement.

## Recommendations

### Based on the study findings

The nurses who are dealing with pregnant women in antenatal clinics should provide health education to the pregnant women about sleeping disturbance and disorders, a thorough assessment of sleep pattern and disorders and the factors that may led to sleeping disturbance should be part of antenatal care.

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