Patterns of Sleep Disturbances among Healthy Nulliparous Women

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Abstract: The aim of this study was to identify Patterns of sleep disturbances during pregnancy among healthy primigravida women and their possible contributing factors. An exploratory descriptive study was carried out on a convenient sample of two hundred healthy primigravida women during their antenatal follow up visits to the ante-natal clinic at EL-Shatby Maternity University Hospital in Alexandria. A structured interview schedule and The Pittsburgh Sleep Quality Index (PSQI) were used for data collection. The results revealed that about three-quarters (74%) of the total study subjects reported sleep disturbances and demonstrated poor sleep quality throughout their current pregnancy. Poor sleep quality was significantly more common during their last trimester among young primigavida who were younger than 25 years. Nocturnal awakening was the most reported pattern of sleep disturbances among the study subjects followed by insomnia, lack of dream sleep and light sleep. Frequent nocturia, abdominal discomfort, breathing disorders, low backache and restless leg syndrome were the most given reasons for sleep disturbances among the suffered study subjects. The study concluded that poor sleep quality was prevalent among healthy primigravida women during their pregnancy and was significantly related to their demographic characteristics such as: age, educational levels, family type and income as well as adverse obstetrical disorders and psychosocial factors associated with their pregnancy.

1. Introduction

Sleep is absolutely essential for the human body to function properly. Lack of sleep affects daily functions and the thought process. Women are twice as likely as men to have difficulties falling asleep or staying asleep. (**Bourjeily, et al., 2010).** There are 5 stages of normal sleep: **Stage 1**; is considered a transition period between wakefulness and sleep. In which, the brain produces high amplitude theta waves, which are very slow brain waves. This period of sleep lasts only around 5-10 minutes. **Stage 2**; is the second stage of sleep and lasts for approximately 20 minutes. The brain begins to produce bursts of rapid, rhythmic brain wave activity known as sleep spindles. Body temperature starts to decrease and heart rate begins to slow. **Stage 3;** is a transitional period between light sleep and a very deep sleep, and there are deep, slow brain waves known as delta waves begin to emerge during stage 3 sleep. **Stage 4;** is sometimes referred to as delta sleep because of the slow brain waves known as delta waves that occur during this time. It is a deep sleep that lasts for approximately 30 minutes. **Stage 5;** is known as rapid eye movement (REM) sleep. Which is characterized by eye movement, increased respiration rate and increased brain activity as well as most dreaming occurs during this stage. (**Brandon Peters., 2010)**

For most women, pregnancy is a time of great joy, excitement and anticipation. Unfortunately, for many it can also be a time of serious sleep disturbances, even for women who have never had problems sleeping. In fact, pregnancy is a time of great change in a woman's life. Likewise, sleep is altered and may not return to pre-pregnancy quality for several years after birth of the child. Sleep disturbances are a harbinger of sleep disorders if they are not recognized and treated, there can be significant negative effects for the woman and her unborn child (**Sunil et al., 2004)**

There are various methods to classify and measure sleep disturbances. Sleep disturbances relevant to pregnancy are typically classified as: disturbed sleep quality, poor sleep continuity, short/long sleep duration, restless legs syndrome, and sleep disordered breathing**. (Lee et al., 2006**)

Although the timing and occurrence of different sleep disorders vary, they are most prevalent during the third trimester of pregnancy. According to the **National Sleep Foundation (1998)** , 78% of women report more disturbed sleep during pregnancy than at other times. Many women also report feeling extremely fatigued during pregnancy, especially during the first and third trimesters (**National sleep foundation, 2009)**.

About two thirds of pregnant women consider their sleep pattern abnormal. The main complaints are

connected to the anatomical and physiological changes associated with pregnancy and the size of the uterus **(Reite et al., 1992)**.One of the reasons for sleep problems during pregnancy is changing hormone levels. For example, rising progesterone levels may partly explain excessive daytime sleepiness, especially during the first trimester of pregnancy. Hormonal changes may also have an inhibitory effect on muscles, which may result in snoring. In obese women this increases the risk of developing sleep apnea and may be partly responsible for the frequent trips to the bathroom during the night. These interruptions as well as those caused by nausea and other pregnancy-related discomforts can result in significant loss of sleep. Many women experience insomnia due to emotions and anxiety about labor and delivery, balancing motherhood and work, or their changing relationship with their partner. This is especially true of first time mothers. For most women, getting a full night's sleep becomes even harder once the baby is born. It is very important for pregnant women to prioritize sleep and to find effective strategies for managing their sleep problems as early as possible in their pregnancy **(National sleep foundation, 2009)**.

Sleep disorder can adversely affect the health of the pregnant women as well as the health of their babies. It was found that women who slept fewer than 6 hours per night had longer labors and were 4-5 times more likely to have cesarean deliveries. Moreover, they are more likely to experience hypertension, preeclampsia and gestational diabetes **(Michele et al., 2009).**

Medical management of sleep problems during pregnancy is complicated by the fact that drug therapy can harm a developing fetus. Where most drugs that are used to treat insomnia carry some risk and are typically not recommended for women who are pregnant. Therefore, by practicing good sleep hygiene, most women are able to manage pregnancy-related insomnia. Also, prenatal vitamins that include folate and iron supplements may help reduce restless legs symptoms during pregnancy **(Sahota et al., 2003)**. Overweight or obese women who become pregnant, women who gain excessive weight and women who report snoring should be evaluated for sleep apnea. Continuous positive airway pressure (CPAP) is a safe and effective treatment for sleep apnea during pregnancy **(Pier et al., 2004).**

Although sleep disturbances are commonly reported in pregnancy, there have been few studies on sleep characteristics in pregnancy. Therefore, this study is intended to assess the prevalence and patterns of sleep disturbances during pregnancy among healthy nulliparous women as well as,   to assess the quality of their sleep and identify the presence of sleep disturbances during their pregnancy with its possible contributing factors.

Research question:
What are the patterns of sleep disturbance among nulliparous

Operational Definition:
Nulliparous in this research refer to primigravida

2. Subjects & Methods:
Research design:
An exploratory descriptive study was carried out, where pregnant women were interviewed individually during their ante-natal visit to the obstetrician. to assess the quality of their sleep and identify the presence of sleep disturbances during their pregnancy with its possible contributing factors.

Setting:
This study was executed at the ante-natal clinic in EL-Shatby Maternity University Hospital in Alexandria.

Subjects:
A convenient sample of two hundred healthy primigravida women attending the previously mentioned setting constituted the study sample.

Tools of data collection
Tool I:
An interview schedule was specifically designed and used by the researchers for data collection. **It included the following:**

- Socio-demographic and obstetric characteristics of the study subjects such as: their age, level of education, occupation, age at marriage, type of the family, family income, gravidity, current pregnancy duration, and number of abortion
- Patterns of sleep disturbance including: insomnia, light sleep, lack of dream sleep and nocturnal awakening with its possible causes.
- Factors contributing to sleep disturbance such as:
- physical, obstetrical and psychosocial factors.

Tool II:
1- The Pittsburgh Sleep Quality Index (PSQI): adopted from Carole, 2007. was developed to measure quality and patterns of sleep during the previous month and to discriminate between good and poor sleepers. Sleep quality is a complex phenomenon that involves several dimensions, each of which is covered by the PSQI. The covered domains include Subjective Sleep Quality, Sleep Latency, Sleep Duration, Habitual Sleep Efficiency, Sleep Disturbances, Use of Sleep Medications, and Daytime Dysfunction. The PSQI has internal consistency and a reliability coefficient (Cronbach's alpha) of 0.83 for its seven components. Scoring of women's responses was based on a 0 to 3 scale, whereby 3 reflects the negative extreme on the

Likert Scale. A global sum of "5" or greater indicates a "poor" sleeper.

Methods:

1. An official permission to carry out this study was obtained from the director of El-Shatby Maternity University Hospital.
2. The Pittsburgh Sleep Quality Index (PSQI) was translated into Arabic language by the researchers and verified by bilingual assessors specialized in the field.
3. A pilot study was carried out on 20 healthy nulliparous women, to ascertain the relevance of the questions and to detect any further problems peculiar to the sequence and clarity of the tool. Based on the results of the pilot study, the interview schedule was modified and made ready for use. The subjects of the pilot were excluded from the main study sample.
4. Each woman was interviewed individually and privately. An informed consent to participate in the study was obtained from the study subjects.
5. The Pittsburgh Sleep Quality Index (PSQI) was employed on each woman to measure the quality of her sleep. The scale was adapted to enable the pregnant women to respond verbally to each item on the scale. In this respect the researcher read each statement and recorded the response. Scoring of women's responses is based on a 0 to 3 scale, whereby 3 reflects the negative extreme on the Likert Scale. A global sum of "5" or greater indicates a "poor" sleeper.
6. Data were collected over a period of 4 months, starting from the beginning of July till the end of October, 2010, The average number of interviewee per day was 4-5. The average time needed to complete the interview schedule ranged between 15 to 20 minutes depending upon the degree of understanding and response of the interviewee.
7. The collected data were categorized, tabulated and made ready for analysis.

Statistical analysis:

The collected data were coded and analyzed using SPSS version 10 for windows. Patterns of sleep disturbances were examined for association with a various demographic and obstetrical characteristics of the study subjects such as age, education, occupation, family type as well as with the physical, obstetrical and psychosocial factors. Chi-square test was used to explore the level of significance ($p \leq 0.05$).

3. Results:

Table (I) shows that more than one – half (59%) of women aged less than 25years, and more than one-third (36%) aged between 25to less than 35 years. While, only 5% were more than 35year. It was observed that about one- third (33%) of the study

subjects were illiterate or just able to read and write, and about one- half (48%) of them had either primary or preparatory (25%) and secondary (23%) education respectively, while those who finished their university level of education constituted only 19%. It was also, noticed that the majority (85%) of study subjects were housewives and slightly less than three- fifth (59%) of them lived in nuclear family while the rest them (41%) lived in extended family. more than one-fifth (22%) of the study subjects reported having inadequate family income.

According to table (II) the majority of women (88%) had no history; less than two- thirds (64%) of them were in their third trimester while more than one-third (21%, 15%) of them was either in their second or first trimester respectively.

Table (III) shows that about three quarters (74%) of the study subjects pointed out that they had sleep disturbances throughout their current pregnancy with different patterns such as: nocturnal awakening (71.6%), insomnia (40.5%), lack of deep sleep (35.8%) and light sleep (14.9%). Frequent nocturnal (58.1%) , lower abdominal pain (39.2%), leg pain and cramp (37.8%) were the most given reasons for sleep disturbances among the total study subjects.

According to table (IV) more than one-third (34%) of study subjects had obstetrical factors that may contribute to sleep disorder such as: anemia, gestational diabetes, ante partum hemorrhage,. (85.3%, 55.9%, 44.1% respectively), while more than one-half (56%) of them reported psycho-social factors including fear of labor (58.9%), concerns about the fetus (48.2%), marital disharmony (37.5%) and financial problems.

Figure I illustrates that about three-quarters (74%) of the study subjects had poor sleep quality as defined by a Pittsburgh Sleep Quality Index.

Table (V) presents the relationship between socio-demographic data of the study subjects and their quality of sleep. Regarding age, it was noticed that more than one - half (57.7%) of women whose age 25 and more year reported good quality of sleep compared to 42.3% of those of women whose age was less 25 years. Considering educational level, it was observed that more than two - fifths (42.3%) of women who had university level of education were reported good sleep quality compared to only 3.8% and 23.1% of those who had illiterate and just read and write as well as primary and preparatory level of education respectively.

Concerning type of family, it was obvious that ware than two - third (69.2%) of women from extended family reported good sleep quality compared to 30.8% of those from nuclear family. In relation to family income, it was found that the majority (96.2%) of women who had enough family income reported good

sleep quality compared to only 3.8% of those who had not enough family income. A significant relationship was observed between quality of sleep and socio - demographic characteristics of the study subject as their age, educational level, type of family and family income. Where P=0.0355, 0.025, 0.035 & 0.023 respectively.

Table (VI) shows the relationship between sleep quality of their obstetrical and psycho – social factors of study subjects and their quality of sleep. It was observed that good quality of sleep were reported by the majority (92.3% and 94.2% respectively) of women who had no either pregnancy related factor and psycho – social factors. Compared to only 7.7% & 9.8% respectively of those who had the same factors. A significant relationship was observed between quality of sleep and their obstetrical and psycho – social factors associated with their pregnancy where P=0.00215 & 0.0001 respectively.

4. Discussion

Pregnancy represents a condition of intense physical and physiological changes that subject the pregnant woman to a number of potentially stressful situations, ultimately interfering with their quality of sleep **Gabriel et al., (2010).** Obtained results demonstrated that pregnancy can produces a profound changes in sleep patterns and quality. About three-quarters of the total study subjects reported sleep disturbances and demonstrated poor sleep quality, as defined by a Pittsburgh Sleep Quality Index, throughout their current pregnancy. This result is considerably supported by **Eliane et al., (2004)** who denoted that most women (78%) reported that their sleep is worse during pregnancy than any other time in their lives.

This study revealed that poor sleep quality, were significantly more common among young nulliparous women who aged less than 25 years especially during their last trimester. These results was incongruent with **Hedman et al., (2002)** who concluded that alterations in sleep do not seem to correspond to the mother's age, although during late pregnancy older mothers have shorter total sleeping times. On the other hand, similar result was observed by **Francescaet al., (2010)** who found that poor sleep quality became significantly more common as pregnancy progressed.

Nocturnal awakening was the most reported pattern of sleep disturbances among the study subjects followed by insomnia, lack of dream sleep and light sleep. This is in line with these obtained by **Hedman et al., (2002)** who found that the majority of women notice sleep alterations during pregnancy which are usually in the form of more awakenings and fewer hours of sleep, and becoming more pronounced in the third trimester. In addition; increased light sleep (stage 1 sleep) and suppression of dream sleep, as well as more awakenings .This can affect not only the sufferer's energy level but can also negatively impact their mood **Driver et al., (1992) and Lee et al (2000).** Moreover, **Sahota et al., (2003)** added that insomnia is very common and is usually due to awakening after going to sleep (sleep maintenance insomnia), this is likely due to a combination of physiological changes that occur throughout the pregnancy.

Mechanical factors are especially important in the third trimester and most women experience shortness of breath while in supine position. This has a significant impact on pregnant women's ability to initiate and maintain sleep. Backache and fetal movements may also cause disturbances in sleep **Feinsilver et al., (1992)**. Brief nap (less than 20 minutes) before 1 pm can be helpful in providing relief of the fatigue while longer naps close bedtime can exacerbate insomnia. Which could be improved using practicing relaxation techniques, avoiding caffeine, limiting fluid intake after 6 pm and managing low back pain with message, local heat application and pillow support **Santiago et al., (2001)**

Frequent nocturia, abdominal discomfort, breathing disorders, low backache and restless leg syndrome were the most given reasons for sleep disturbances among the suffered study subjects. Also headache was mentioned by more than one-third of them which may be attributed to the incidence of anemia associated with large proportion of the study subjects with obstetrical problems during their current pregnancy. These obtained results are in agreement with **Santiago et al., (2002) and Santiago et al., (2003**)

Obtained results also revealed that sleep quality was significantly related to adverse obstetrical disorders such as gestational diabetes, ante-partum hemorrhage, hyper-emesisgravidrium, pre-eclampsia and intra-uterine fetal death among slightly more than one-third of the total study subjects. This result is supported by other researches **Bourjeily G et al., (2010) and Chang J et al., (2009)** which denoted that symptoms of sleep disturbance are common in pregnancy and are associated with a higher likelihood of gestational hypertensive disorders, gestational diabetes and unplanned cesarean deliveries via its link with the increased inflammatory response during pregnancy.

During this investigation; more than half of the study subjects attributed their sleep disturbance to several psycho-social factors which included: fear of labor, concerns related to fetal outcome, marital disharmony, financial problems and exposure to domestic violence. Which were significantly associated with the quality of their sleep that may be related to the fact that physical, emotional and social variations in human beings' life may induce sleep disorders. The gravidic-puerperal cycle is a peculiar and exclusive

period of changes and new experiences for women. It may be as well an important determinant for pregnant women's sleep pattern alterations. Emotional state are frequent and important during pregnancy, being defined by organic changes, by the expectation created due to the new condition as mother, by the fear of professional life changes as consequence of maternity and by the apprehension connected to the new roles that she will be performing in the family context **Eliane et al., (2004).**

Table (1): Number and Percent Distribution of the Study Subjects According to Their Socio demographic Characteristics

General characteristics	No (200)	%
Age		
< 25	118	59.0
25 -	54	27.0
30 -	18	9.0
35 or more	10	5.0
Educational level		
Illiterate & Read and write	66	33.0
Primary & Preparatory education	50	25.0
Secondary education	46	23.0
University education	38	19.0
Working status		
Working	30	15.0
Not working	170	85.0
Age at marriage		
< 20	65	32.5
20 +	135	67.5
Numbers of marriage		
Once	182	91.0
Twice	14	7.0
Three or more	4	2.0
Type of the family		
Nuclear	118	59.0
Extended	82	41.0
Monthly income		
Enough	157	78.5
Not enough	43	21.5

Table (II): Number and Percent Distribution of the Study Subjects According to Obstetrical Characteristics

Obstetrical characteristics	No (200)	%
History of abortion		
None	176	88.0
Once	16	8.0
More than once	8	4.0
Duration of current pregnancy		
1st trimester	30	15.0
2nd trimester	42	21.0
Last trimester	128	64.0
Current ante-natal follow up		
Yes	182	91.0
No	18	9.0

Table (III): Number and Percent Distribution of the Study Subjects According to Their Patterns of Sleep

Patterns of sleep	N= 200	Percent
Sleep disturbances		
No	52	26.0
Yes	148	74.0
Patterns of sleep disturbances *N=148		
Nocturnal awakening	106	71.6
Insomnia	60	40.5
Lack of dream sleep	53	35.8
Light sleep	22	14.9
Causes of sleep disturbances*		
Frequent nocturia	86	58.1
Abdominal discomfort	72	48.6
Breathing disorders	62	41.9
Low backache	58	39.2
Restlessness leg syndrome	56	37.8
Headache	54	36.5

* More than one response

Table (IV): Number and Percent Distribution of the Study Subjects According to Factors Contributing to Sleep Disturbances

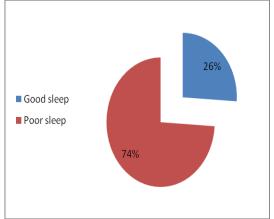| Factors contributing to sleep disturbances	N = 200	Percent
Obstetrical factors		
None	132	66.0
Yes	68	34.0
	N=68	
Anemia	58	85.3
Gestational diabetes	38	55.9
Ante partum heamorrahge	30	44.1
Hyperemesis gravidrium	26	38.2
Premature rupture of membrane	7	10.3
Preeclampsia	4	5.9
Intra- uterine fetal death	4	5.9
Psycho-social factors		
None	88	44.0
Yes	112	56.0
	N=112	
Concerns about the fetus	54	48.2
Marital disharmony	42	37.5
Financial problems	35	31.3
Domestic violence	18	16.1
Loss of significant person	6	5.4
Lack of social support	5	4.5

Figure (I): Quality of Sleep among the Study Subjects

Table (V): Relation between Sleep Quality and General Characteristics Of The Study Subjects.

General characteristics	Sleep quality				Total	
	Good quality		Poor quality			
	No.	%	No.	%	No.	%
Age						
< 25	22	42.3	96	64.9	118	59.0
25 -	12	23.1	42	28.4	54	27.0
30 -	16	30.8	2	1.4	18	9.0
35 or more	2	3.8	8	5.4	10	5.0
P	0.0355*					
Educational level						
Illiterate & Read and write	2	3.8	64	43.2	66	33
Preparatory education	12	23.1	38	25.7	50	25
Secondary education	16	30.8	30	20.3	46	23
University education	22	42.3	16	10.8	38	19
P	0.025*					
Working status						
Working	5	9.6	25	16.9	30	15
Not working	47	90.4	123	83.1	170	85
P	0.106					
Type of the family Nuclear	16	30.8	102	68.9	118	59.0
Extended	36	69.2	46	31.1	82	41.0
P	0.0035*					
Monthly income						
Enough	50	96.2	106	71.6	156	78.0
Not enough	2	3.8	42	28.4	44	22.0
P	0.023*					
Duration of current pregnancy						
1st trimester	10	19.2	20	13.5	30	15
2nd trimester	15	28.8	27	18.2	42	21
Last trimester	27	51.9	101	68.2	128	64
P	0.122					
Total	52		148			

Table (VI): Relation Between Incidence Of Sleep Disturbances And Its Contributing Obstetrical And Psycho-social Factors.

Factors contributing to sleep disturbances	Sleep quality					
	Good quality		Poor quality		Total	
	No.	%	No.	%	No.	%
Obstetrical factors						
None	48	92.3	84	56.8	132	66.0
Yes	4	7.7	64	43.2	68	34.0
P	0.00215*					
Psycho-social factors						
None	49	94.2	39	26.4	88	44.0
Yes	3	5.8	109	73.6	112	56.0
P	0.0001*					
	52		148			

In conclusion; that poor sleep quality was prevalent among healthy nulliparous women during their pregnancy and was significantly related to their demographic characteristics such as: age, educational levels, family type and income as well as adverse obstetrical disorders and psychosocial factors associated with their pregnancy.

Recommendation

The results of the study have both clinical practice and policy implications where there may be a need to:

- Health practitioners and maternal health nurse should be encouraged to discuss sleep concerns with their pregnant patients, as complaints are common and certainly may impact quality of life.

- Policy implications include ensuring appropriate sleep assessment and support within protocols of maternity nurses' practice.
- Further investigations are needed to determine whether poor sleep may be associated with obstetric complications and whether assessment and treatment of sleep disorders during pregnancy can improve outcomes.
- Further research with objective assessment of maternal sleep parameters and the adjustment of antepartum depression in the analysis is required for a better understanding of the relation between sleep deprivation during pregnancy and risk of postpartum depression.
- Further research to find out the association between sleep disturbance and gravidity as well as parity.

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