

The Effect of Sleep Disturbance during Pregnancy on Maternal and Fetal Outcomes and its Related Nursing Management

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Abstract

Background: Sleep disturbance during pregnancy is an essential part of public health and a key feature of human development. **Aim of this study** to assess the effect of sleep disturbance during pregnancy on maternal and fetal outcomes and its related nursing management. **Research design:** Descriptive design. **Setting:** Ante natal care unit at El Shiekh Zaid Hospital in Cairo city-Egypt. **Sample:** A purposive sample consisted of hundred pregnant women was selected according to inclusion and exclusion criteria. **Tool:** Data was collected through an interviewing questionnaire, The Pittsburgh Sleep Quality Index and Nursing management of sleep disturbance during pregnancy. **Result:** This study reveals that sleep disturbance during pregnancy affect on maternal and fetal outcomes and good maternal behavior from near half pre- intervention to majority in post intervention, The difference was highly significant statistically ($P=0.000$). **Conclusion:** The present study concluded that, the sleep disturbance during pregnancy already affect on maternal and fetal outcomes as: gestational hypertension and low birth weight. As well as the many of studied pregnant women's behavior of nursing intervention was changed improvement in posttest compared with the pretest and showed highly significant statistically between pretest and posttest (P Value 0.000). The result of this study supports the research question. **Recommendations:** Conducting comprehensive health educational programs to raise awareness and promote women's health during pregnancy pertaining to sleep disturbances and healthy behavior to manage them.

Keywords: sleep disturbance, pregnancy, maternal and fetal outcomes.

Introduction

Sleep is defined as "a reversible behavioral state of perceptual disengagement from and unresponsiveness to the environment". Yet, sleep is a complex interaction of both physiologic and behavioral processes. normal sleep in humans is composed of two states that alternate cyclically across a sleep episode: non-rapid eye movement (NREM) and rapid eye movement (REM) sleep (Hsuan-Man Hung, Shu-Hua Koa nd Chung-Hey Chen ,2014)

Pregnancy is the most sensitive and enjoyable part of a woman's life, but this period is often accompanied by stress, physiological and psychological changes. In fact, pregnant women's sleep quality may be faced with some challenges due to the systematic changes caused by hormonal, psychological, emotional and physical factors that happen during pregnancy. It is claimed that 79% of pregnant women are faced with the painful challenge of sleep deprivation (Reshadat et al.,2018).

In first trimester of subjective symptoms of sleep during pregnancy are: Increased total sleep time, increase in naps, Increased nocturnal insomnia and objective symptoms (polysomnography) are: Increased total sleep time, decreased stage 3 and 4 non-REM sleep. Second trimester subjective symptoms are: normalization of total sleep time, increased awakenings and objective symptoms are: normal total sleep time, decreased stage 3 (Coo, Milgrom and Trinder, 2014).

In third trimester subjective symptoms are: decreased total sleep time, Increased insomnia, Increased nocturnal awakenings, Increased daytime sleepiness and objective symptoms are: decreased total sleep time, Increased awakenings after sleep onset, Increased stage 1 non-REM sleep, Decreased stage 3 and 4 non-REM sleep, decreased REM sleep (Park, Meltzer-Brody and Stickgold, 2013).

In the United States over 1 million pregnancies each year result in adverse outcomes that increase maternal and infant morbidity. The most frequent adverse outcomes include preeclampsia, intra-uterine growth restriction (IUGR), and preterm birth (Longo and Lawrence, 2018).

Nursing intervention for sleep disturbance during pregnancy is non-pharmacological interventions like sleep hygiene and education should be considered as the first line strategies. It is educational to know that most of the sleep problems experienced by pregnant women tend to improve with child birth. sleep hygiene strategies can significantly improve the quality of sleep without the need to resort to medications: eg (prefer daytime naps in the earlier part of the day, if needed, If medically appropriate exercise 30 minutes every day preferably 4 to 6 hours prior to bed time and the

environment of your bedroom should be comfortable) (Hashmi, et al., 2016).

Significance of the study

Maternal sleep is important for fetal growth and well-being because the secretion of growth hormone and utero placental blood flow are at their peak during sleep. thus persistent poor sleep may alter the uterine environment and adversely affect fetal development. changes in sleep patterns during pregnancy may increase from 13 to 80% in the 1st trimester, then from 66 to 97% in the 3rd trimester. according to the National Sleep (2007), 79% of the pregnant women in the world suffer from sleep disorders. More than 72% of pregnant women experience frequently waking up during the night (Rezaei et al., 2014).

Nursing management of sleep disorders are confirmed benefit for improving short and long term maternal and fetal health outcomes. nursing management of sleep disturbances during pregnancy aim to inform women about the importance of sleep, the value of sleep hygiene and non-pharmacologic methods as first line therapeutic interventions, and the likely temporary nature of the disturbance during pregnancy (Stremler et al., 2013).

Aim of the study

The aim of the present study was to assess the effect of sleep disturbance during pregnancy on maternal and fetal outcomes and its related nursing management.

Research Question:

Is the sleep disturbance during pregnancy affecting maternal and fetal

outcomes and its related nursing management?

Subjects and Methods

Descriptive design was carried out in ante natal care unit at El Shiekh Zaiid Hospital in Cairo city-egypt. A purposive study sample consisted of hundred pregnant women was selected according to inclusion and exclusion criteria as following:

Inclusion criteria:

- 1-Pregnant women suffering from sleep disturbance during pregnancy.
- 2 -Pregnant women with single fetus.

Exclusion criteria:

- 1- Pregnant women with high risk pregnancy.
- 2- Pregnant women with medical and surgical conditions.

Sample size:

One hundred pregnant women were selected according to the criteria of selection to participate in this study. The researcher depended on the following equation to calculate the sample size $n = \frac{[DEFF * N_p(1-p)]}{[(d2/Z21-\alpha/2*(N-1)+p*(1-p)]}$.

Tools of Data Collection:

Three tools were used for data collection:

Tool I: Structure Interviewing questionnaire: An Arabic interviewing questionnaire was developed by the researcher based on the recent related literature review (**Hung, Hsuan-Man Ko, Shu-Hua Chen and Chung-Hey ,2014**) and experts' opinion to collect data that cover the aim of the study. It included

two parts: **Part one:** It was used to assess socio-Demographic characteristics of pregnant women as age, occupation, level of education, and socioeconomic level. **Part two:** It was used to assess present obstetric history such as:- last labor, number of para, number of gravida and gestational age.

Tool II: The Pittsburgh Sleep Quality Index (PSQI): This index was developed by Buysse, et al., 1989, revised by Smyth.C2012 and it will be used to measure the quality and patterns of sleep. This index consists of seven domains: (sleep quality, sleep latency, sleep duration, sleep efficiency, night sleep disturbance, use of sleep medication, and daytime sleepiness over the last month).

Scoring system

Each domain scored from zero to three, which results in a global score that range from zero to 21. Scores from 0 -4 suggested "good sleep quality" and higher scores (5 -21) indicated " poor sleep quality"

Tool III: Nursing management of sleep disturbance during pregnancy : It was developed by the researcher based on the recent related literature review (**Kızılırmak et al .,2012**) (**Kazemi, Farideh, Fatemeh Nahidi, and Nourossadat Kariman ,2016**) and experts' to assess sleep pattern during pregnancy and reassessment after giving nursing management.

Scoring system

Nursing management of sleeping disturbance was measured through 21 assessment items each was three points Liker scale (0 – 2) as (0) for "not done", (1) for "sometimes done", and (2) for "done".

Validity and reliability:

The questionnaire sheet was developed by the researchers after reviewing the related literature. Tools were tested for content validity by 3 experts in the field and they were structured interview questionnaire sheet.

Administrative design:

An official permission was granted by submission of an official letter from the Faculty of Nursing -Helwan university to the director of ante natal care unit at El Shiekh Zaied Hospital in Cairo city-egypt. before starting the study to obtain their permission for data collection.

Ethical considerations

All ethical issues were taken into consideration during all phases of the study; the researcher maintained an anonymity and confidentiality of the subjects. The research approval was being obtained from scientific ethical committee in the faculty of nursing -Helwan university & the director of ante natal care unit at El Shiekh Zaied Hospital in Cairo city-Egypt and from pregnant women by oral consent before starting the study.

A pilot study:

A pilot study was conducted on a sample of 10% of cases, to test the feasibility of different and help in time planning no necessary modifications were carried out and tools finalized, so they were included in the study sample.

Field work:

The field work started at the beginning of December 2017 after obtaining all official permissions. It was

completed by the end of June 2018, consuming 6 month. The study was carried out in the following stages.

Preparing and planning stage:

At this stage tools of data collection were developed, and the administrative permissions were obtained to carry out the study. The researcher reviewed international & national articles and text book related to the research point.

Implementation stage: the researcher visited the study setting one day per week from 10 am to 1 pm as the studied pregnant women were selected, and the researcher explained the aim of the study and obtained a verbal consent from the studied women to participate in the study, ask women do you suffering from sleep during pregnancy. Then the data collection stage was carried out in 3 steps as following:

I) Pre-test: assessment structured interviewing questionnaire was taken and assess women's sleep pattern during pregnancy. Fulfilling of the pretest consumed 20 minute.

II) The educational session: was given individualize about sleep pattern during pregnancy based on previous assessment of women's performance of sleep pattern (e.g., avoid caffeine, regular exercise, eliminate noise from the sleeping environment, maintain a regular sleep schedule). Simple Arabic language was used to fit all women's level of education. was given by oral and written by purchase, The duration of the session consumed around 15 minutes and follow it by phone to performance of sleep pattern .

III) test: then was calculate of Pittsburgh Sleep Quality Index and nursing management at home Pittsburgh Sleep Quality Index consist of seven domains:

(sleep quality, sleep latency, sleep duration, sleep efficiency, night sleep disturbance, use of sleep medication, and daytime sleepiness over the last month).

Evaluation stage: The results of posttest was used to evaluate the effect sleep disturbance on maternal and fetal outcomes immediate after delivery , and evaluate of performance of nursing management regarding sleep disturbance by phone again to identified improvement nursing management .

Statistical design:

The collected data in pretest and posttest were organized, categorized, tabulated according to the type of each data

Statistical analysis:

The Statistical Package for the Social Sciences (SPSS, version 20) was used for data analysis. Descriptive statistics were employed to summarize the demographic data, which was presented using frequency tables and expressed as percentages, mean and standard deviation. Chi-square test was used to test the associations among the under studied qualitative variables. Statistical significance was considered at P-value < 0.05 and highly significance at P-value < 0.001.

Results

Table (1): demonstrate that the majority of studied pregnant mothers were in young age group (15 - <25years)(60%), with mean of 24.6 ± 3.2 years, half of them had elementary education , and more than quarter of them had University degree

(27%). As regards occupation, 86% of them were house wives and 12% were employee. Concerning distance between house and work, 12% of them were working in far places from their houses. Nine percent of pregnant mothers were working in evening work (3pm to 9 pm), while only 3% of them were working in morning shifts (8 a.m. to 3 pm). Majority of participants's husbands were had free work (67%). Approximately two thirds of studied pregnant mothers had just enough monthly income (59%). Majority of studied pregnant mothers have small family size of 2- 4 (91%), and only 4% of them had family member who needs special care.

Table (2): show distribution of studied pregnant mothers according to their obstetric and gynecological health. The table revealed that 43% were primi-gravida, while 37% were had 3 and more gravida , and 20% had 1 – 2 gravida. Majority of pregnant mothers have no abortions (86%), while only 14% had 1 – 2 abortions. Approximately half of pregnant mothers delivered 1-2 times (49%), while 8% delivered 3 & more times with more than half of them have 1-2 living children (51%), and 39% of them have a youngest child with age of 1-2 years. Among delivered mothers (N=57), approximately, two thirds (59.6%) delivered cesarean, while 40.4% delivered normal. Regarding previous delivery neonatal condition, 43% were alive with good health, while 14 % were complaining either respiratory problems (3%), jaundice(3%), heart problems (3%), and others(3%).

Fig. 1 highlighted the effect of sleep disturbance during pregnancy on maternal outcome. Approximately one third of mothers of poor sleep quality (27%), had a normal maternal outcome (good health). Hypertensive disorder

during pregnancy was the highest poor maternal outcome among poor sleep disturbance mothers (63%), followed by preterm labor (8%), and the lowest percentage was prolonged labor with only 2%.

Fig (2): highlighted the poor fetal outcome among mothers of poor sleep quality (79%). Fetal respiratory problems were observed among poor sleep mothers only (4%), while neonatal jaundice and LBW were observed higher among those mothers (20%, and 55%).

Table (3): reveals the good effectiveness of the nursing management intervention regarding maternal performance post intervention. The good performance of low sleep quality mothers increased from 48.7% pre intervention to 98.7% post intervention. In addition, the good performance of lowest sleep quality mothers increased from 33.3% pre

intervention to 95.8% post intervention. On the other hand, poor performance of low sleep quality mothers were decreased from 51.3% pre intervention to 1.3% post intervention. Furthermore, poor performance of lowest sleep quality mothers were decreased from 66.7% pre intervention to 4.2% post intervention. The difference among low sleep quality mothers regarding performance between pre and post intervention was highly significant ($P=0.000$). Also, the difference among lowest sleep quality mothers regarding performance between pre and post intervention was highly significant ($P=0.000$).

Table (4): The table highlighted that majority of pregnant mothers had low sleep quality (76%), while approximately one quarter of them had lowest sleep quality (24%). The good sleep quality was not present among studied pregnant mothers (0%).

Table (1): Socio-demographic characters of studied pregnant mothers (N = 100).

Socio-demographic characters	Frequency	Percent
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Age groups :	15 - < 25 years	60	60
	25 - <35 years	36	36
	≥ 35 years	4	4
Mean ± SD		24.6 ± 3.2 years	
Education	Illiterate	8	8
	Elementary	50	50
	Secondary	15	15
	University	27	27
Occupation :	Housewife	85	85
	Employee	13	13
	Student	2	2
Distance between house & work	No work	86	86
	Near	2	2
	Far	12	12
Time of work	No work –	86	86
	Morning –	3	3
	Evening	9	9
	Others	2	2
Husband occupation	No work	1	1
	Employee	27	27
	Free work	67	67
	Pension	5	5
Monthly income	Just enough	59	59
	Not enough	41	41
Family size	2 – 4	91	91
	5 – 7	9	9
Any family member needs special care	No	96	96
	Son	2	2
	Mother in low	2	2
	Total	100	100

Table (2): Distribution of studied pregnant mothers according to their Obstetric and Gynecological health data (N = 100).

Reproductive health	Frequency	Percent
Number of Gravida: Prim-gravida	43	43
2	20	20
3 & more	37	37
Number of Abortions: Zero	86	86
1 – 2	14	14
Number of Deliveries: Zero	43	43
1– 2	49	49
3&more	8	8
Number of living children: 0	43	43
1 -2	51	51
3&more	6	6
Age of youngest child: No children	43	43
<1 year	8	8
1-2 Y.	39	39
>2 years	10	10
Type of last delivery:		
Normal	23	23
Cesarean	34	34
No labor	43	43
Previous delivery neonatal condition		
No delivery	43	43
Alive with good health	43	43
Respiratory problems	5	5
Jaundice	3	3
Heart problems	3	3
Others	3	3
Total	100	100%

Fig(1): Effect of sleep disturbance during pregnancy on Maternal outcome.

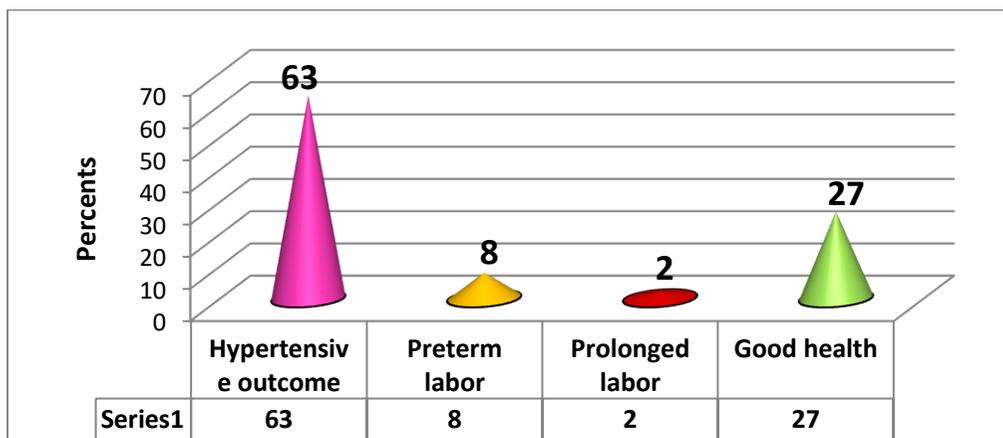


Fig (2): Effect of sleep disturbance during pregnancy on fetal outcome .

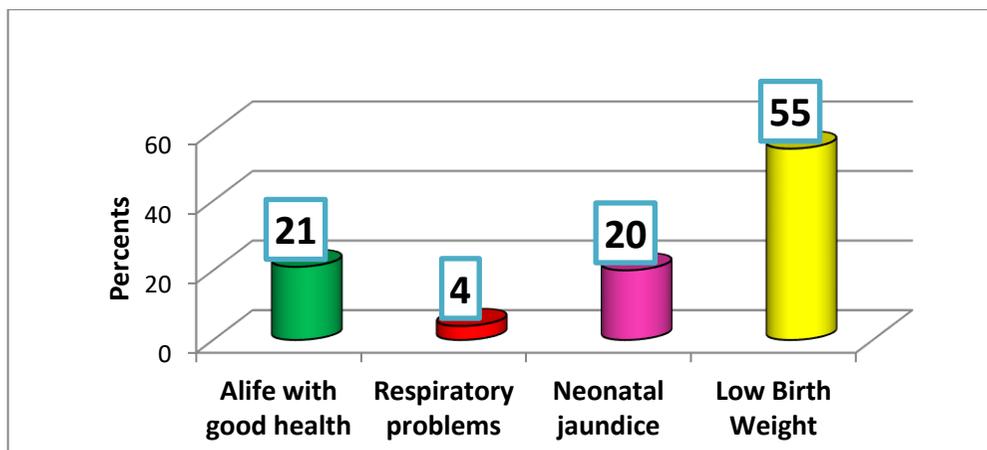


Table (3): Relation between Sleep Quality index and total nursing management groups pre and post intervention.

Sleep Quality index groups	Pre intervention				Post intervention				Test of sig.	P value
	Poor performance (0 - 21)		Good performance (22 - 42)		Poor performance (0 - 21)		Good performance (22 - 42)			
	No	%	No	No	No	%	No	No		
Low sleep quality (5 - 10)	39	51.3	37	48.7	1	1.3	75	98.7	X ² =48.2	P=0.000 HS
Lowest sleep quality (11-21)	16	66.7	8	33.3	1	4.2	23	95.8	X ² =20.1	P=0.000 HS
Total	55	55	45	45	2	2	98	98		

Table (4) : Total score groups of sleep quality index among studied pregnant mothers (N=100).

Groups of sleep quality index	Frequency	Percent
Good sleep quality (0 – 4)	0	0
Low sleep quality(5-10)	76	76
Lowest sleep quality(11 – 21)	24	24
Total	100	100

Discussion

Sleep is essential for our well-being, affecting our daily functioning and overall health. Unfortunately, sleep disturbances and/or disorders are common throughout pregnancy. a majority of women (66% to 97%) in the world report sleep problems during pregnancy, resulting from the hormonal, anatomic, and physiologic changes necessary to maintain pregnancy (Erwin and Andrea, 2017).

Disturbed sleep is frequently treated as a common discomfort, and its importance to maternal and fetal health is overlooked. With refinement of diagnostic criteria, recent studies have linked sleep disturbances with adverse pregnancy outcomes. thus, management of sleep disturbances may decrease the incidence and severity of pregnancy-related health problems (Nodine and Matthews, 2013).

According to the socio demographic characteristics of the studied pregnant women; the current study reveals that the majority of them hadn't university education, highly statistically significant correlation between their level of education and their level of awareness with management of sleep disturbance during pregnancy. This explained that whenever increased education, awareness

increase. And this result agree with the results of (Oyiengo et al., 2014), who studied (Sleep disorders in pregnancy) in USA found that there was directly proportion correlation between level of education and aware with management of sleep disturbance during pregnancy

Regarding pregnant women's occupation, this study showed that the majority of studied pregnant women were house wife's, this result confirm that positive relation between women's house wife and sleep disturbance during pregnancy. On the same line (Crude et al., 2013) who studied (quality of life in pregnant women with sleep disorders) in Brazil showed that the pregnant women's employees wasn't associated with sleep disturbance during pregnancy. This may be explained by, there are more than half of studied received low education and this does not qualify to work outside the home.

Conversely (Abd El-Razek et al., 2015) who studied (The relationship between sleep disturbance in late pregnancy and labor outcomes) in Egypt which demonstrate that, the lowest percentage were house wives with sleep disturbance during pregnancy.

The findings of the current study show that, about approximately near half of studied subject are prim gravida, The

results of the present study are agreement with the study (Foley et al., 2015) who studied (Characteristics of insomnia severity during the prenatal period in a Discussion 50 pregnancy sleep study) in American which mentioned that were significantly parity affected by sleep disturbance during pregnancy. The researcher suggests that this difference may be due to low experience with signs and symptoms of pregnancy and how deal with it, fear from delivery and responsibility of a baby.

According to gestational age show majority of sleep disturbance during pregnancy in third trimester, This result are agreement with the of (Hashmi et al., 2016) who studied (Insomnia during pregnancy: Diagnosis and rational interventions) in Pakistan. Which mentioned that, the majority of women experience sleep problems in the third trimester with over 98%. The researcher suggests that this result may be due increase physiological changes during the third trimester as; the weight of the fetus gaining puts extra pressure on the bladder then occur frequent bathroom visits during night lead to sleep disturbance.

The findings of the current study show that, about approximately near half of studied subject prim gravida The results of the present study are agreement with the study (Foley et al., 2015) which mentioned that were not significantly parity affected by sleep disturbance during pregnancy.

The present study revealed that sleep disturbance during pregnancy most effect on maternal and fetal outcomes .The results of the present study are agreement with the study of (Zaky, et al., 2016) who studied (The Relationship between Quality of Sleep during Pregnancy and Birth Outcome among Primiparae) in Egypt

which mentioned that sleep disturbances are a harbinger of sleep disorders if they are not recognized and treated, and they can have significant negative impacts on the maternal and her fetus. The researcher suggests that this result may be due to the Discussion 54 secretion of growth hormone and utero placental blood flow are at their peak during sleep.

On the same line, This results agree with (Kim et al., 2012) who studied (Sleep pattern change, sleep complaints and pregnancy outcome in Korean) which mentioned that sleep problems might affect pregnancy outcome, including low birth weight or serious maternal complication such as preeclampsia as well as inducing daytime dysfunction.

The present study revealed that the majority of fetal outcomes are low birth weight among pregnant women with sleep disturbance, The results of the present study are agree with the study of (Fung et al., 2012) who studied (Maternal sleep health and fetal outcomes) in American which mentioned that, low birth weight among pregnant women with sleep disturbance

On the same line (Deye et al., 2016) who studied (Maternal sleep position: What do we know where do we go?) in Australia confirmed that over half of the most important risk factors for stillbirth, such as maternal hypertension, gestational diabetes, and fetal growth restriction, have been shown to be associated with maternal sleep disruption. Conversely (Howe et al., 2014) who studied (Sleep in late pregnancy in relation to infant birth weight and fetal distress) in California found that there was no evidence of associations between sleep disturbance in late pregnancy and infant birth weight.

According to maternal outcome the present study revealed that more than one third of pregnant women have gestational hypertensive disorder during pregnancy. The results of the present study agree with the study (**Haney and Okun, 2012**) who studied (Sleep disturbances in early Discussion 55 gestation are associated with increased blood pressure) in USA and (**Aggarwal et al., 2018**) who studied (Effects of inadequate sleep on blood pressure and endothelial inflammation in women: Findings from the American Heart Association) in New York which mentioned that, Insufficient sleep during pregnancy affect on blood pressure (gestational hypertensive disease).

On the same line (**Bazalakova, Bianchi and Stanic, 2014**) who studied (Sleep deprivation and pregnancy) which mentioned that, poor sleep quality during pregnancy affected on maternal blood pressure during pregnancy.

According to maternal outcomes, This result revealed that majority of pregnant women delivered caesarean section, The results of the present study are agreement with the study (**A Reichner Cristina, 2015**) who studied (Insomnia and sleep deficiency in pregnancy) in the USA which mentioned that sleep disturbance during pregnancy increased rate of cesarean sections.

In relation between sleep disturbance during pregnancy and neonatal jaundice, it was found that approximately about more than a quarter of the studied subject have neonatal jaundice as fetal outcome. This result was in contrast with (**Pamidi et al., 2014**) which mentioned that no result confirm Discussion 56 that sleep disturbance during pregnancy wasn't affected on neonatal jaundice.

Knowledge has an important role in increasing awareness of performance about sleep disturbance during pregnancy. According to performance sleep pattern during pregnancy before intervention, the current study revealed that; the majority of pregnant women reported that low performance sleep pattern during pregnancy. The results of the present study agree with the study of (**Tsai and Lee, 2015**) who studied (Sleep hygiene and actigraphic sleep characteristics in pregnant women) in the USA which mentioned that, low women's sleep hygiene practices and mood status during pregnancy routine prenatal care.

The present study revealed that a highly significant improvement in the management of sleep disturbance during pregnancy after nursing management, this result agree with (**Nodine and Matthews, 2013**) who studied (Common Sleep Disorders: Management Strategies)and (Pregnancy Outcomes) in the American College of Nurse-Midwives. Which mentioned that, management of sleep disturbance during pregnancy, there were highly significant improvement in nursing management as compared to pretest.

This finding might be explained by two explanations. First, sleep disturbance during pregnancy affect on maternal and fetal outcome. Second, low knowledge and awareness with normal sleep pattern and how to deal with it during pregnancy lead to sleep disturbance, thus this nursing management very important in this studied pregnant women.

Conclusion

In the light of the present study findings, some important facts could be concluded that, the sleep disturbance

during pregnancy already affects on maternal and fetal outcome as: gestational hypertension and low birth weight. As well as the many of studied pregnant women's behavior of nursing intervention was changed improvement in posttest compared with the pretest and showed highly significant statistically between pretest and posttest (P Value 0.000). The result of this study supports the research question.

Recommendations

In the light of the present study findings, the following were recommended that:

- Conducting comprehensive health educational programs to raise awareness and promote women's health during pregnancy pertaining to sleep disturbances and healthy behavior to manage them.

- In-service education programs are needed for maternity nurses to provide them with the updated essential knowledge and practice regarding sleep disturbances during pregnancy, its causes, and adverse outcomes for mothers, fetus, and healthy behavior to improve sleep quality.

- Nurses should have a more positive role in raising the awareness of pregnant women about healthy behavior that improve sleep quality through developing mothers class programs, and preparation of health education materials for them. Future Recommendations

- Further studies are needed for replication of the study with program in other antenatal clinic.

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