

## Effect of Health Behavior Education on Quality of Sleep among Pregnant Women

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### Abstract:

**Background:** Pregnancy has special conditions that can affect sleep pattern. About two third of pregnant women have abnormal sleep pattern which can cause disorders during pregnancy, labor, and after delivery for the mother and fetus.

**Aim:** The aim of the study was to evaluate effect of health behavior education on quality of Sleep among Pregnant Women. **Design:** An intervention (quasi-experimental) study design was used

**Sample:** A purposive sample of eighty pregnant women attending at antenatal clinic at Elshik-Zaied Hospital.

**Tools:** Data were collected through two tools: A structured interviewing questionnaire sheet and Pittsburgh Sleep Quality Index to assess women's quality of sleep during pregnancy, in addition to, supportive material (Arabic educational booklet).

**Results:** The results of this study showed that there was highly significant improvement in quality of sleep among pregnant women at post and follow up of intervention as compared to pre intervention.

**Conclusion & recommendation:** the study concluded that health behavior education seemed to have positive effect on quality of sleep among pregnant women. The study **recommended that:** Conducting comprehensive health educational programs to raise awareness and promote women's health during pregnancy pertaining to sleep disturbances, its causes and healthy behavior to manage them, **Further researches** needed to evaluate effect of health behavior education on quality of sleep among post-partum women.

**Key words:** Health Behavior Education, Quality of Sleep, and Pregnant Women

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### I. Introduction

Pregnancy is the most sensitive and enjoyable event in a woman's life. Despite being a natural phenomenon, Pregnancy is associated with physiological, psychological and social changes both of which may have an effect on sleep pattern. In the first trimester, hormonal changes may disrupt sleep and in the third trimester the large baby and the anxiety regarding delivery may have associated effects on sleep quality. In fact, 78% of women report more disturbed sleep during pregnancy than at other times (1).

Disturbances in sleep pattern during pregnancy are typically classified as disturbed sleep quality, poor sleep continuity (fragmentation), short/long sleep duration, sleep latency, sleep efficiency and lack of sleep as daytime dysfunction. Sleep quality declines as pregnancy progresses, particularly as characterized by poor sleep continuity (2).

Sleep disturbances had been consistently reported during pregnancy such as variations in sleep duration and sleepiness, increase in nocturnal awakening, snoring and restless legs syndrome, and increase, decrease or stabilization in apnea and hypopnea. Hormonal modifications with pregnant women, the mechanical effects of an enlarged uterus, backache and fetal movement are involved in these sleep disturbance. (3).

Sleep pattern disturbance during pregnancy had negative effect on maternal and fetal outcomes. It represents an increased risk of maternal obesity, gestational hypertension/preeclampsia, gestational diabetes, intrauterine growth restriction, preterm birth, low birth weight; it is also associated with prolonged labor, using delivery instruments, cesarean section, and depression during pregnancy and after delivery (4).

The maternity nurse plays an important role to maintain and improve physical and mental health of pregnant women in prenatal care, one of the most important needs of pregnant women is improving quality of sleep, this will be achieved by nurse through proper assessment of sleep quality, as well as providing health education and counseling about the healthy behavior that will improve quality of sleep, such healthy behavior

will be adapted by women through increasing their awareness regarding feature of normal sleep, total sleep time, and sleep alternation in pregnancy and their causes(5).

Health education about management of minor discomfort during pregnancy that disturbed sleep as vomiting, headache, oversleep-fatigue, heartburn, backache, and stress is also crucial role of nurse. In addition, preparation a good sleep environment to be dark, quiet, comfortable and cool, cover or turn off items that may disrupt sleep. Moreover, instruct mother also to follow regular exercise, controlling diet and alcohol consumption will help the pregnant women to fall asleep more quickly. (6).

#### **Significance of study:**

Changes in sleep patterns during pregnancy may increase from 13% to 80 % in the first trimester, then from 66 to 97 % in the third trimester. About 79% of pregnant women suffering from sleep disturbance(7).

The significance of study is coming from the importance of sleep quality among pregnant women, based on a lot of studies that represented the relation between sleep disturbance during pregnancy and the increasing risk of preterm birth, low birth weight. Increased complications during pregnancy and delivery as: prolonged labor, assisted delivery, cesarean section, depression during pregnancy and after delivery (postpartum blues), as well as negative impact on families and society (2, 8). Health behavior education may be useful in management of sleep disturbances among pregnant women and improve their sleep quality. So the present study aimed to evaluate effects of health behavior education on quality of sleep among pregnant women.

#### **Aim of the study:**

The aim of this study was to assess effects of health behavior education on quality of sleep among pregnant women.

#### **Research hypothesis**

Health behavior education will improve quality of sleep among pregnant women.

## **II. Subjects and Methods**

#### **Research design:**

A quasi-experimental study design was used.

#### **Setting:**

The study was conducted at the antenatal clinic at Elshikh-Zaied Hospital, Cairo, Egypt.

#### **Subjects:**

**Sample type:** A purposive sample was used, with the following ***Inclusion criteria:***

- Pregnant women with gestational age of 12-28 weeks according to the first day of the last menstrual period and ultrasound during the first trimester of pregnancy.
- aged 20-40 years

#### ***Exclusion criteria:***

- History of physical or mental diseases.
- Pregnant women receive hypnotic medication
- High risk pregnancy
- No stressful events during the study period

**Sample size:** Eighty pregnant women were included in the study.

**Sample size Equation:** The researchers depended on the following equation to calculate the sample size: Steven Thimpson Equation

$$n = \frac{Z_{1-\alpha/2}^2 P (1-P)}{d^2}$$

#### **Tools of Data collection:**

The data was collected through using the following:

##### **I- Structured interview questionnaire:**

It was developed by the researcher after reviewing a related literature. It was divided into three parts: ***the first Part;*** was to assess socio demographic characteristics of the study sample such as age ,residence ,level of education, ***second part;*** include obstetric history as gravid, para, gestational age, mode of previous delivery, ***third part;*** it has involved current sleeping pattern ( sleeping hours at day and night, various sleep disturbances), and ***fourth part;*** include environmental & women's life style factors affect sleep pattern as; Lighting , ventilation ,diet, exercise, smoking and consumption of caffeine at night

**II- Pittsburgh Sleep Quality Index:(PSQI)**

It was adopted from Buysse et al (1989). It was modified by the researcher to assess quality of sleep among pregnant women. It consists of 19 items generating seven components of sleep; subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction(9).

**Pittsburgh Sleep Quality Index**

1. When have you usually gone to bed at night?
2. How long (in minutes) has it taken you to fall asleep each night? \_\_\_\_\_
3. When have you usually gotten up in the morning? \_\_\_\_\_
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) \_\_\_\_\_

5. During the past month, how often have you had trouble sleeping because you.....	Not during the past month (0)	Less than Once a week (1)	Once or twice a week (2)	Three or more times week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):				
6. During the past month, how would you rate your sleep quality overall?	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
9. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done	No problem at all (0)	Only a very slight problem (1)	Somewhat of a problem (2)	A very big problem (3)

**Scoring system: for Pittsburgh Sleep Quality Index (PSQI):**

**Component 1: Subjective sleep quality—question 6**

*Response to Q6                      Component 1 score*

- Very good                      0  
 Fairly good                      1  
 Fairly bad                      2  
 Very bad                      3

*Component 1 score: \_\_\_\_\_*

**Component 2: Sleep latency—questions 2 and 5a**

*Response to Q2                      Component 2/Q2 sub score*

- < 15 minutes                      0  
 16-30 minutes                      1  
 31-60 minutes                      2  
 > 60 minutes                      3

*Response to Q5a                      Component 2/Q5a sub score*

- Not during past month                      0  
 Less than once a week                      1  
 Once or twice a week                      2  
 Three or more times a week                      3

**Sum of Q2 and Q5a sub scores                      Component 2 score**

- 0                      0

1-2	1
3-4	2
5-6	3

**Component 2 score:** \_\_\_\_\_

**Component 3: Sleep duration—question 4**

Response to Q4	Component 3 score
> 7 hours	0
6-7 hours	1
5-6 hours	2
< 5 hours	3

**Component 3 score:** \_\_\_\_\_

**Component 4: Sleep efficiency—questions 1, 3, and 4**

Sleep efficiency = (# hours slept/# hours in bed) X 100%

# hours slept—question 4

# hours in bed—calculated from responses to questions 1 and 3

**Sleep efficiency    Component 4 score**

> 85%	0
75-84%	1
65-74%	2
< 65%	3

**Component 4 score:** \_\_\_\_\_

**Component 5: Sleep disturbance—questions 5b-5j**

**Questions 5b to 5j should be scored as follows:**

Not during past month	0
Once a week	1
Twice a week	2
Three or more times a week	3

**Sum of 5b to 5j scores    Component 5 score**

0	0
1-9	1
10-18	2
19-27	3

**Component 5 score:** \_\_\_\_\_

**Component 6: Use of sleep medication—question 7**

**Response to Q6    Component 6 score**

Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

**Component 6 score:** \_\_\_\_\_

**Component 7: Daytime dysfunction—questions 8 and 9**

**Response to Q8    Component 7/Q8 subscore**

Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

**Response to Q9    Component 7/Q9 subscore**

No problem at all	0
Only a very slight problem	1
Somewhat of a problem	2
A very big problem	3

**Sum of Q8 and Q9 subscores    Component 7 score**

0	0
1-2	1
3-4	2
5-6	3

**Component 7 score:** \_\_\_\_\_

**Global PSQI Score: Sum of seven component scores:** \_\_\_\_\_

- Each dimension represented a score ranging from 0 to 3, which a score of 3 showed the highest level of dysfunction. The total of the individual dimension scores (range 0 to 21) formed a global sleep quality score. Higher scores indicated poorer sleep quality. Usually a global score more than 5 is classified as poor sleep quality, and a score of 5 or less were classified as good sleep quality

- This tool was used three times for women to assess sleep quality, first time at initial assessment, the second time after one month, and the third time after 3 months of intervention.

**III- Developed supportive material (Arabic educational booklet):** It was designed by the researcher with simple Arabic language in order to facilitate for women to understand its contents. It consists of four parts; *the first part*; concerned with providing the women essential information about normal sleep, stages of sleep and sleep alternation in pregnancy and their causes. *The second part*; focused on information about common minor discomfort during pregnancy that cause sleep disturbance as vomiting, headache, oversleep-fatigue, heartburn, backache, foot spasm, flatulence, constipation and self care measures to manage it. *Third part*; include healthy behavior that improve quality of sleep as good sleep environment, good sleep habits, proper diet, follow regular exercise, avoidance of unhealthy behavior as alcohol consumption, and tobacco use.

### **III. Validity and reliability**

**Validity** of tools were tested through jury of 5 expertise from the professors' faculty of nursing, medicine, in maternity-gynecological nursing department and psychiatric department to test the content, knowledge, accuracy & relevance of tools for research title.

**Reliability** was measured using Cronbach's' Alpha coefficient where; Reliability of Questionnaire measuring sleep quality among pregnant women = 0.85

#### **Pilot Study:**

It was conducted on 10 % of the study sample (8 women). It was done to evaluate the efficiency and content validity of tools to find the possible obstacles that might face during data collection. The pilot sample was not excluded from the main study sample as no major modifications were needed on tools of data collection based on finding of pilot study.

#### **Administrative design:**

An official written approval letter clarifying the title, purpose and setting of the study was obtained from the Dean of Faculty of Nursing of Helwan University & director of Elshikh-Zaied Hospital, Cairo, Egypt

#### **Ethical considerations:**

Ethical approval from the Scientific Research Ethical committee in Faculty of Nursing at Helwan University was granted before starting the study, Informed consent obtained from participants after explaining the purposes of the study, no harmful methodology used with participants, each participant had right to withdrawn from the study at any time, Human rights were used, data would be confidential, and using coding system for data.

#### **Fieldwork:**

- The researcher visited the study setting for 3 days per week from 9 am to 2 pm until the completion of the pervious predetermined sample size. The data were collected through a period of 6 months, from January 2016 to June 2016.

#### **Preparatory phase:**

- At the beginning of the interview, the researcher introduced herself to the participants and they explained the aim of the study to them and reassure them that information collected would be treated confidentiality and that would be used only for the purpose of the study. Then verbal & written consent of women was obtained.

- The researcher starts to fill out the interviewing questionnaire sheet which includes general characteristics of women (**tool I**). Then the researcher assessed women's quality of sleep by using Pittsburgh Sleep Quality Index (**tool II**). The total time needed for interviewing questionnaire, and the Pittsburgh Sleep Quality Index, ranged from 20-25 minutes on an individualized base.

### **Implementation Phase**

- Women were trained on sleep health behaviors education in eight groups of 10 through lecture and a provided instructional booklet when they were waiting for the assigned follow-ups in a calm room.
- The health behavior education was educated in one hour at four sessions with one-week interval. Different content at each session include:

**The First session:** educating about the feature of normal sleep, stages of sleep and duration of stages, total sleep time, and sleep alternation (physical, psychological, and hormonal) in pregnancy and their causes.

**The Second session:** providing solution of physical alternation in pregnancy that disturbed sleep and pregnant women' common complications including vomiting, headache, oversleep-fatigue, heartburn, backache, foot spasm, flatulence, constipation, urgency, no daily activity because of fear the losing of pregnancy, and stress.

**The third session:** includes information about arranging a good sleep environment and habits. Participants were taught that room temperature and sounds should be optimized for relaxation. A quiet sleep environment was achieved by putting up heavy curtains, selecting comfortable mattresses and bedding, and encouraging participants to lie on their side to enhance feelings of safety and relaxation. Good sleep habits were cultivated, including regular bed/wake-up times, avoiding napping in bed, reducing exposure to light, which causes the release of melatonin and rising body temperature, reducing the time required to fall asleep, and increasing sleep duration, to improve sleep quality. If participants were unable to fall asleep after 30 minutes in bed, they were requested to leave the bedroom and read a book or watch TV until they felt sleepy. Participants were also asked to get up at a regular time, even if they did not have enough sleep the night before, reducing emotional stress, which would limits their ability to relax emotionally, affect sleep quality, and alter hormonal balances .

**The fourth session:** includes health education about controlling diet, alcohol consumption, and tobacco use. The researcher gave instruction on the proper intake of calcium and magnesium in the daily diet and advised that drinking a glass of warm milk with sugar would help to have a good night's sleep. Avoidance of eating gas-producing food or drinking a large volume of water before going to bed can reduce bloating/decrease urination during the night, both of which affect sleep quality. Caffeinated drinks such as tea or coffee should be consumed only in small quantities during the four to six hours before bedtime. Caffeine stimulates the central nervous system, increases heart rate, and excites brain functions, all of which reduce sleepiness and exercising regularly. The researcher provided information of the beneficial effects of Walking regular on sleep quality and its related factors. Regular exercise encourages the body to release endorphins, which promote sleep, relieve depression, and relax muscles. Exercise in the early evening can promote health, regulate physiologic and psychological stress, and improve quality of sleep .Exercise conducted in the afternoon or two hours before bedtime was would have the greatest positive effect on sleep quality .

- The researcher started all sessions with summarized to the last session and objectives of the new session, also, the sessions ended by a summary of its contents and feedback from the women was obtained to ensure that the women got the maximum benefits.

### **Evaluation phase:**

- The effect Health behavior education was evaluated by comparing women's quality of sleep before, after one and three months of intervention at outpatient clinic or by phone.

### **Statistical Design:**

Data were collected, coded, tabulated and analyzed, using the SPSS computer application for statistical analysis. Descriptive statistics was used to calculate percentages and frequencies for qualitative variables, mean and standard deviations for quantitative variables. The statistical tests such as chi-square test (X<sup>2</sup>) were used to estimate the statistical significant differences. A significant P-value was considered when P less than 0.05. And r-test was used for correlation co-efficient. The internal consistency (reliability) of the tools used in this study was measured by determining of Cronbach's alpha coefficient test.

## **IV. Results**

**Table (1):**displays the mean age of the studied sample was 29.04±2.970years.As well (36.2%)had secondary education. Additionally, (66.2%) of studied sample place of residence were rural areas. Whereas (65 %) of them were housewives, and (35%) of working women practiced simple work. Regarding the mean working hours of working women were 7.57 ± 1.260. As well, (55 %) of them reported that their income just

enough for their necessary needs, and (65%) of studied sample had extended family with mean family no. 3.74±1.076.

**Table (2):** shows that (52.5%) of studied sample were two to three gravid, while (35%) were primigravida. Regarding parity, 43 % of them were para two. Moreover, (38.7%) of studied sample gestational age per week was between 16-24 weeks, and (61.2%) of them had normal labor.

**Table (3):** indicates that (46.25%) of studied sample were sleeping two hours during the daytime, while (45 %) of women were sleeping less than 6 hours at night. Furthermore, (52.5%) of them wake up once or twice at night.

**Table (4):** portrays the frequency distribution of the study sample according to their various causes of sleep disturbances. It was noticed that (52.5%) of the study subjects always have difficulty to sleep in the first half an hour, while (38.75%), (61.25%) and (71.25%) respectively were always waking in midnight and early morning, waking up to go to the bathroom and experiencing disturbed sleep due to pregnancy-related symptoms. Sleep disturbances were attributed to breathing problems, cough and feeling of being too cold by (57.5%), (68.75%) and (60%) respectively. Conversely, (55%) always feel too hot, while (53.75%) had pain during sleep.

**Table (5):** shows that (73.8%) of studied sample hadn't heavy meal before bed time whereas, (62.5 %) of them didn't have drinks contain caffeine. Additionally, (93.8 %) hadn't practice any exercises, and (80%) of studied sample reported that they had inadequate sleep & rest. Also, (83.8%) of studied sample had unsuitable lighting, (87.5 %) of them had unsuitable ventilation, and 65% hadn't comfortable bed

**Figure (1) & table (6) :** proves that there was statistical significant improvement in total score level of sleep quality at post and follow up of intervention as compared to pre intervention, with  $P < 0.000$ . As (87.5%) of the studied sample had poor level of sleep quality at pre intervention reached to (76.2%, 60%) at post and follow up of intervention respectively.

**Table (7):** illustrates that there was statistical significant improvement in seven components of sleep quality level ; subjective sleep quality , sleep latency, sleep duration , habitual sleep efficiency, sleep disturbances , and daytime dysfunction at post and follow up of intervention compared to pre intervention ( $P < 0.000$ ).

**Table (8):** indicates that, there were a statistically significant relationship between total score level of sleep quality throughout intervention and all general characteristics of study sample except occupation, type of work and type of family.

**Table (1): Frequency distribution of study sample according to their general characteristics: (n=80).**

Characteristics	No.	%
<b>Age</b>		55.0
- 22-29	44	45.0
- ≥ 30	36	
<b>Mean±SD</b>	<b>29.04±2.970</b>	
<b>Educational level</b>		
- Primary education	17	21.2
- Preparatory education	10	12.5
- Secondary education	29	36.2
- University education	24	30.0
<b>Residence</b>		
- Rural	53	66.2
- Urban	27	33.8
<b>Occupation</b>		65.0
- House wives	52	35.0
- Working woman	28	
<b>Kind of working</b>		
- House wives	52	65.0
- Hard work	15	18.8
- Simple work	13	35.0
<b>Working hours</b>		
- House wives	52	65.0
- 4-6hours	9	11.2
- 7-10hours	19	23.8
<b>Mean±SD</b>	<b>7.57 ± 1.260</b>	
<b>Distance from work</b>		
- House wives	52	65.0
- Far	11	13.8
- Near	17	21.2

<b>Monthly income</b>		
- Not enough	27	33.8
- Just enough	44	55.0
- Enough and exceed	9	11.2
<b>Family type</b>		
- Extended	52	65.0
- Nuclear	28	35.0
<b>Family number</b>		
- ≤3	36	45.0
- ≥4	45	55.0
<b>Mean±SD</b>	<b>3.74±1.076</b>	

Table (2) Frequency distribution of study sample according to their obstetric history: (n=80).

Obstetric history items	No.	%
<b>Gravida</b>		
- 1	28	35
- 2-3	42	52.5
- ≥ 4	10	12.5
<b>Parity</b>		
- 1	15	30
- 2	23	43
- ≥ 3	14	27
<b>Gestational age (weeks)</b>		
- ≥12	28	35.0
- 16>24	31	38.7
- ≥24-28	21	25.3
<b>Mode of previous delivery</b>		
- Cesareansection	31	38.8
- normal labor	49	61.2

Table (3): Frequency distribution of the study sample according to their Current sleeping pattern: n= (80)

Current sleep pattern	No	%
<b>Duration of sleeping hours during day time</b>		
0	14	17.5
1	17	21.25
2	37	46.25
3-4	12	15
<b>Duration of sleeping hours at night :</b>		
Less than 6 hrs	36	45
6-8	28	35
More 8 hrs	16	20
<b>Sleep quality :</b>		
Continuous	14	17.5
Wake up once or twice	42	52.5
Wake up much	24	30

Table (4) Frequency distribution of the study sample according to theirvariousleepdisturbances pattern= (80)

Various causes of sleepdisturbances pattern	Never		Sometimes		Always	
	No	%	No	%	No	%
Difficulty to sleep in the first half hour	12	15	26	32.5	42	52.5
Waking up in the midnight or in the early morning	16	20	33	41.25	31	38.75
Waking up to go to the bathroom	9	11.25	22	27.5	49	61.25
Pregnancy symptoms cause problem during sleep	5	6.25	18	22.5	57	71.25
Breathing difficulty causes problem during sleep	27	33.75	46	57.5	7	8.75
Coughing causes problem during sleep	20	25	55	68.75	5	6.25
Feeling too cold causes problem during sleep	21	26.25	48	60	11	13.75

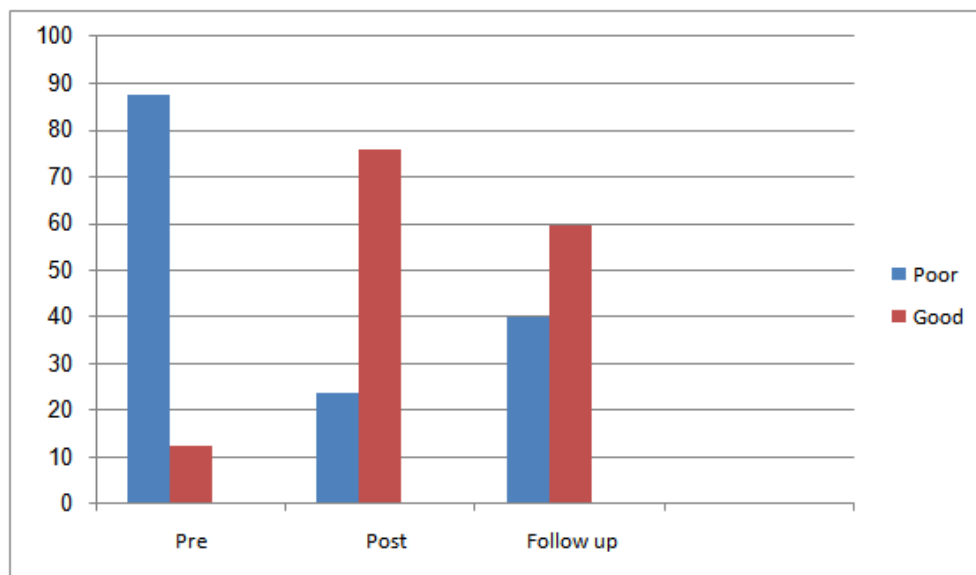


Feeling too hot causes problem during sleep	23	28.75	13	16.25	44	55
Bad dreams cause problem during sleep	16	20	55	68.75	9	11.25
Pain causes problem during sleep	13	16.25	24	30	43	53.75

**Table (5): Frequency distribution of the study sample according to factors affecting their sleep pattern during pregnancy: (n=80).**

Items	No.	%
<b>1-Factors related to women 'life style:</b>		
<b>Eating heavy meal before bedtime</b>		
- Yes	21	26.2
- No	59	73.8
<b>Drinks contain caffeine</b>		
Yes	30	37.5
No	50	62.5
<b>Exercises</b>		
- Yes	5	6.2
- No	75	93.8
<b>Smoking</b>		
- Active	0	0.0
- Passive	80	100.0
<b>Rest &amp; Sleep</b>		
- Adequate	16	20
- Inadequate	64	80
<b>2-Factors related to environment:</b>		
<b>Lighting:</b>		
Suitable	13	16.2
Not suitable	67	83.8
<b>Ventilation</b>		
Suitable	10	12.5
Suitable	70	87.5
Not suitable	28	35
<b>Comfortable bed</b>		
Suitable	52	65
Not suitable		

**Figure (1): Totalscore level of sleep quality among pregnant women pre, post, and follow up of intervention: n=(80)**



**Table(6): Total score level of sleep quality among pregnant women pre, post, and follow up of intervention :(n=80).**

Intervention groups	Total score of sleep quality					
	Good		Poor		χ <sup>2</sup>	P value
	N	%	N	%		

Preintervention	10	12.5	70	87.5	70.238	.000*
Post	61	76.2	19	23.8		
Follow up	48	60.0	32	40.0		

\*Significant (P<0.05)

Table(7): Comparison of seven components of sleepquality among study sample at pre, post and followupof intervention: (n=80).

PSQI	Pre		Post		follow-up		χ² & t-test	P value
	N	%	N	%	N	%		
<b>1- (Component 1) Subjective sleep quality</b>								
Very good	11	13.7	33	41.3	32	40.0	#160.703	.000*
Good	9	11.3	47	58.7	48	60.0		
Bad	45	56.3	0	0	0	0		
Very bad	15	18.7	0	0	0	0		
<b>2-(Component 1) Sleep latency</b>								
0	15	18.7	42	52.5	29	36.25	#97.590	.000*
1-2	21	26.3	36	45.0	49	61.25		
3-4	37	46.3	2	2.5	2	2.5		
5-6	7	8.7	0	0.0	0	0.0		
Mean±SD	1.45± 0.899		0.50± 0.551		0.66± 0.526			
<b>3-(Component 3) Sleep duration</b>								
>7 hrs	27	33.8	30	37.5	26	32.5	#42.435	.000*
6-7 hrs	10	12.5	43	53.8	54	67.5		
5-6 hrs	25	31.2	0	0	0	0.0		
<5 hrs	18	22.5	7	8.8	0	0.0		
Mean± SD	1.42±1.178		0.80± 0.833		± 0.4710.68			
<b>4-(Component 4) Habitual sleep efficiency</b>								
>85	20	25	34	42.5	33	41.2	#49.19	.000*
75-84	10	12.5	33	41.2	47	58.8		
65-47	40	50	0	0	0	0		
<65	10	12.5	13	16.2	0	0		
Mean± SD	1.42±1.178		0.80± 0.833		0.68 ±0.471			
<b>5- (Component 5) Sleep disturbance</b>								
Not during past month	11	13.8	36	45	35	12	#43.105	.000*
Less than once a week	9	11.2	40	50	44	55		
Once or twice a week	18	22.5	3	3.8	0	0		
Three or more times a week	42	52.5	1	1.2	1	1.2		
Mean± SD	1.59±1.99		.0.64±0.698		0.58±0.522			
<b>6- (Component 6) Use of sleep medication</b>								
0	20	25.0	30	37.5	25	31.2	#51.926	.000*
1	10	12.5	35	43.8	55	68.8		
2	37	46.2	0	0.0	0	0.0		
3	13	16.2	15	18.8	0	0.0		
Mean± SD	1.54±1.043		1.00±1.067		0.69±0.466			
<b>7- (Component 7) Use of sleep medication Day time dysfunction</b>								
0	16	20.0	37	46.2	37	46.2	#68.229	.000*
1-2	7	8.8	41	51.2	43	53.8		
3-4	36	45.0	0	0.0	0	0.0		
5-6	21	26.2	2	2.5	0	0.0		
Mean± SD	1.78±1.055		0.59±0.630		0.54±0.502			

\*Significant (P<0.05)

Table (8): Relationship between general characteristics of the study sampleand total score level of sleep qualityatpreintervention: (n=80).

General characteristics	Sleep quality throughout the intervention			
	Good %	Poor %	χ²	P value
<b>Age</b>				
20-29	6.3	48.7	66.063	.000*
≥ 30		38.7		
Total	12.6	87.4		
<b>Educational level</b>				
Primary education	3.7	16.3		

Preparatory education	2.5	10.0	66.813	.000*
Secondary education	3.8	33.8		
University education	2.5	27.5		
Total	12.5	87.5		
<b>Place of residence</b>				
Rural	10.0	56.2	66.436	.000*
Urban	2.5	31.3		
Total	12.5	87.5		
<b>Occupation</b>				
House wives	11.2	72.5	0.328	0.567
Working woman	1.3	15.0		
Total	14.5	87.5		
<b>Working hours</b>				
House wives	27.5	37.5	19.311	.000*
4-6hours	3.75	27.5		
7-10hours	0.0	3.75		
Total	31.3	68.7		
<b>Kind of working</b>				
House wives	8.75	56.25	0.610	0.737
Hard work	1.25	17.5		
Simple work	2.5	13.75		
Total	12.5	87.5		
<b>Type of family</b>				
Extended	10.0	55.0	1.130	0.288
Nuclear	2.5	32.5		
Total	12.5	87.5		

\*Significant (P<0.05)

## V. Discussion

Pregnancy is one of the most important periods in a woman's life (10). Significant changes happen in hormonal level during pregnancy, which affects the function of different systems of mothers (11). Hormonal changes not only directly affect sleep-wake cycle and sleeping structure, but it also causes certain physical and mental changes that may lead to sleep disturbance (11, 12).

Sleep disturbance is associated with poor pregnancy outcomes for both maternal and fetus. Both poor quality of sleep and abnormal sleep are associated with increased morbidity and mortality. It shows higher risk of pre-term delivery, low birth weight (LBW), an increase in pregnancy period and intrapartum problems, prolonged labor, assisted delivery, Cesarean sections, pregnancy and postpartum depression (13).

The lack of awareness regarding the impact of sleep disturbances as a risk factor for adverse outcomes among pregnant women and neonates results in health workers in maternity health care settings not assessing related symptoms, which could provide a target for intervention (14). Based on this important issue the present study was conducted to evaluate the effect of health behavior education on quality of sleep among pregnant women.

The current study revealed that approximately half of the study sample was sleeping two hours during the daytime and less than half of them were sleeping less than six hours during the night and majority of them wake up twice or much times during night. These findings were not in the same line with (Hassan, 2015) who conducted a study in Egypt on 200 parturient women in their latent phase of the first stage of labor to identify the relation between quality of sleep during pregnancy and birth outcomes among primipara and found that almost three-fifths of the study subjects had long sleep duration. Furthermore, less than one-third of them slept a two-hour napping addition to eight to nine hours at night, with mean number of 10.20 + 2.421 sleeping hours during the day and night (15). This may be due to the fact that all the study subjects in his study were primigravida and did not have many other duties. Conversely, a study conducted by (Zafarghandi, et al., 2012) illustrated that more than one-half of women had long sleep duration during pregnancy (16).

The current study showed that more than half of study subjects reported that they had sleep disturbances three and more times a week. The most common causes of sleep disturbances were explained by participants as frequency of micturition, pregnancy-related symptoms, breathing problems, cough and feeling of being too cold, feeling too hot at night and pain during sleep. On the other hand, the present study findings are similar to those of (Naghi et al., 2011), which explained that all women always have sleep disturbances during pregnancy; they described that sleep disturbances may be due to minor discomforts associated with pregnancy such as increased nocturia, gastro-esophageal reflux, and restless legs syndrome and leg cramps (17). In this context, the current findings contradict those of Pien (2012), who found that the fair mean total score of participants indicated that they never had sleep disturbances during pregnancy (18). The discrepancy between results may be related to differences in the sample characteristics, and also the differences in the data collection tools.

Previous studies suggest that pregnant women increase their total sleepingtime in early pregnancy and obtain less deep sleep, but the amount of total sleep starts to decrease after the first trimester (16, 14, and 19). Both poor quality of sleep and abnormal sleep duration (i.e., less or more than 7-8 hours of sleep per day) are associated with increased morbidity and mortality (20). Providing proper information and adequate training improve knowledge in pregnant women and help them to experience less complication during this time. In order to achieve this goal, behavior changes must be considered for all pregnant women through health education and counseling about healthy behavior that improve quantity and quality of sleep (20).

In relation to response of the parturient women to the Pittsburgh sleep quality index, the result of the present study revealed that, the majority of women had poor quality of sleep level at preintervention. This result may be found because more than two third of the study sample was at second and third trimester of pregnancy, which is particularly associated with profound sleep disturbance related to minor discomfort and pregnancy related symptoms. These results were supported by Chen et al (2012), who examined the length of sleep during the last trimester of pregnancy and reported that mean hours of sleep were 7.3, 7.6, and 7.3 at the seventh, eighth, and ninth months of pregnancy, respectively. Mothers indicated that the average amount of sleep they needed was 8.2 hours, indicating the presence of sleep deprivation during pregnancy (21). This highlights the importance of providing proper ante natal care, health education and useful guidance regarding healthy behavior to improve quality of sleep among pregnant women for maintaining and improving their health based on their social levels and needs.

However, there was highly significant improvement at post and follow up of intervention regarding total level score of sleep quality compared to pre intervention. This finding confirmed the positive effect of healthy behavior education by using supportive instructional booklet on quality of sleep among pregnant women

This is consistent with Fereshte, et al., (2013) who carried out the study to examine the impact of health behavior education on the sleep quality in the pregnant women with sleep disorder in Iran and reported that The PSQI scores for the pregnant women participating in his research ranged from 5 to 21, with an average of 8.7619 (SD =2.3354) before the education intervention. After one month of health behavior education, the PSQI score decreased to 7.3095 (SD =3.3385). After two month of health behavior education, the PSQI score decreased to 6.881 (SD = 3.0699). After three month of health behavior education, the PSQI score decreased to 6.619 (SD = 3.1696). Reduction in the mean values of sleep quality showed improvement in sleep quality. The researcher documented that four educational meetings helped all participants in his study to improve their sleep quality, effectively and this result should serve as a valuable reference for clinical management of insomnia, also this findings supported the efficacy of implementing at least a 4-week program in order to facilitate improvement in the sleep quality of pregnant women (20).

The current findings were also in agreement with (Rezaei, Behboodi & Hagani., 2015) who conducted a randomized clinical trial in Iran to evaluate the effect of sleep health behavioral education on the improvement of depression in pregnant women with sleep disorders. Results concluded that sleep health behavioral education improved depression in pregnant women who were experiencing insomnia. Findings from this study added support to the reported effectiveness of sleep health behavioral education in the prenatal care and clinical management of insomnia in pregnancy (22).

These findings were supported by another study carried out by (Kempler. L., Sharpe. L. & Bartlett. D., 2012) who conducted a study on 214 first time mothers during the last trimester of their pregnancy in New Zealand to assess the effectiveness of Sleep education during pregnancy for new mothers. Their results showed that improved scores of sleep quality and daytime sleepiness among intervention group compared with the control condition (23). This mean that format of activities should promote informational support to pregnant women during antenatal care from health care providers, with emphasis on educating them healthy behavior regarding improvement quality of sleep.

The current finding was coincided with a study done by (Rezaei. Et al., 2012) to evaluate the impact of sleep healthy behavior education on the quality of life in the pregnant women with sleep disorder. The study enrolled 112 pregnant women (intervention=56; control=56). Education of sleep health behavior was provided in the study group by the researcher during weekly four 1-h sessions. Control group only received conventional prenatal care, the result of this study revealed that the mean scores of quality of life showed an increase in 1 and 2 months after intervention in the study group compared to the control group. A significant difference was observed in the quality of life in the two groups, 1 month (P < 0.000) and 2 months (P < 0.001) after intervention (8). This concluded that education of sleep healthy behaviors was effective on the quality of life of pregnant women with sleep disorders.

The present study revealed a significant improvement in all components of PSQI which includes subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, and daytime dysfunction (P < 0.000) at post intervention as compared to pre intervention. This reflected the effect of education on behavior change were used for appropriate sleep behavior patterns during pregnancy and provided valuable knowledge about the response of pregnant women to health behavior education

The previous study findings were in the same line of **Fereshte, et al., (2013)** who reported that a statistically significant improvement in all components of PSQI among intervention group compared to the control group after four educational meeting regarding healthy behavior sleep pattern during pregnancy(20). Also, the present study certified the result of pilot study that **Chen et al. (2010)** was conducted About the efficacy of sleep health education on sleep quality in working women, which have demonstrated significant effect of sleep health education on participants' sleep quality ( $p < .001$ )(24). The sleep quality of all participants (worker women) improved after third and 5 meetings. The seven components of the PSQI (i.e., subjective sleep quality, sleep latency, habitual sleep efficiency, sleep duration, sleep disturbances, use of sleeping medication, and daytime dysfunction) also improved.

The current study revealed that a significant relation between Sleep quality levels and all general characteristics of studied sample except occupation, type of work and type of family. The previous findings were in respect of **Kızılırmak et al., (2012)** who conducted a study in Turkey on 486 women to investigate insomnia experienced by pregnant women and factors associated with it(25). The study proved that there were significant differences in quality of sleep related to age and education.

Incongruent with the current study finding, a study done by **Coban and Yanikkerem., (2010)** about Sleep quality and fatigue in pregnant women, and found that there was not significant relation between quality of sleep of pregnant women and their socio demographic data(26). The discrepancy among different study results might be attributed to methodological variations related to sampling and data collection

## VI. Conclusion

The result of the present study confirmed the positive effect of health behavior education on quality of sleep among pregnant women as there was significant improvement in total score level of sleep quality at post and follow up of intervention compared to pre intervention ( $P < 0.05$ ). Also, there was significant correlation between total score level of sleep quality and all general characteristics of the study sample except occupation, type of work and type of family.

In the light of the findings of the study, the following recommendations were suggested:

- 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, adverse outcomes on mothers and fetuses 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
- Apply health behavior education that improves maternal quality of sleep as a part of routine prenatal care by maternity nurses.
- Further research is needed to evaluate effect of health behavior education on quality of sleep among postpartum women.

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