Effect of Sleep Hygiene Practices on Quality of the Sleep Pattern among Pregnant Women with Sleeping Disorders

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Abstract: The aim of the present study was to evaluate the effect of sleep hygiene practices on quality of the sleep pattern among pregnant women with sleeping disorders. Design: Randomized controlled trial was used. Setting: This study was conducted at the antenatal center of Mansoura University Hospital; from June to November 2018. Subjects: A total of 110 pregnant women with poor sleep quality total > 5 according to the Pittsburgh Sleep Quality Index were enrolled. They were divided equally by simple randomization into the intervention group (n=55) and the control group (n=55). Tools: A Structured interview schedule and Pittsburgh Sleep Quality Index. Results: Before the intervention, the subjective quality of sleep pattern is nearly the same in both groups. Sleep efficiency was less than 85.5% and 90.4% in the intervention and control group respectively. Both groups are nearly matched as regard sleep quality before intervention. Nevertheless, The average Pittsburgh Sleep Quality score is significantly decreased from the time of starting of intervention in 29 weeks, then at 33 weeks of gestation, whereas the Pittsburgh Sleep Quality average score is significantly less in the intervention than control group with 10.86±2.06 vs. 12.54±2.48 compared to 9.13±1.87 vs. 12.46±2.41 respectively. Also, The percentage of lowering the Pittsburgh Sleep Quality average is 15.3% at 29 weeks and 28.8% at 33 weeks of gestation. Conclusion: It was evident that following the sleep hygiene practices were an effective for improving the quality of sleep among pregnant women with sleep disorders. Recommendations: Sleep hygiene practices can be adopted to improve sleep quality among pregnant women with sleep disorders and providing proper antenatal counseling to all pregnant women regarding sleep hygiene practices for promoting physical, mental and social health.

Keywords: Quality,Sleep Hygiene Practices, Sleeping Disorders, Sleep Pattern.

1. INTRODUCTION

Pregnancy is a period that considered most cheerful and powerless times of a woman's life. It can have an affect on the sleep pattern of pregnant women and her capability for dealing with the daily acativities as a result of physical, mental, and hormonal changes during pregnancy *(***Rezaei1 et al., 2014***).* Sleep is a very important and vital part for every person. Actually, the significances of sleep are assumed to be conservation of the brain energy; protecting against body inflammation. Also, Sleep is necessary for the physical development, as well as memory and thermoregulation integeration **(Porkka-Heiskanen, 2013).**

Poor sleep quality during pregnancy are widespread, sleep problems may be a raised because of the presence of physical, metabolic and hormonal changes that appeared during pregnancy, such as increase the progesterone and prolactin level, full bladder, increase the size of the uterus, urinary frequency, fatigue and smoking **(Jahdi et al., 2013).**

Most of the pregnant women notifying poor quality of the sleep pattern and complaining of increasment of the awakeining periods during night, especially when they process labor. **Zaki et al., (2013**) have discovered that approximately ninghty eight percentage of pregnant women in late trimester reported night awakening , also around eighty six percentage reported sleep quality problems during pregnancy period. Sleep patterns changes during pregnancy can raise from (13 to

80 %) in the first trimester of (66 to 97 %) in the third trimester, lead to woman feeling of fatigue, daily dysfunction, loss of wellbeing. Subsequently, decrease the level of quality of life, and mental relaxation is induced insomnia, increased anxiety, fear of child care, and enduring maternal role in the family **(Rezaei et al., 2014).**

Additionally, sleep pattern changes that coorelated with pregnancy are prevalent. These changes incorporate diminshed rapid eye movement (REM) sleep, increase in the non-REM sleep, expanded evening feelings of arousals secondary to nocturia, heart burn, leg spasms, and contractions, as well as other physiological changes. These fluctuation lead to differences in the quality of the sleep pattern that pregnant women gain **(Morong & Hermsen, 2014)**

Moreover, Pregnant women with less than six hours sleep at night experienced increase the risk of pre-term labor, intra-partum problems, increase the risk of low birth weight, assisted delivery, cesarean sections, antepartm and postpartum depression, a negative impact on family and consequently, a financial burden to on the community **(Kamysheva et al., 2010).**

Improper sleep quality is categorized as a pathophysiological and clinical form of insomnia associated with day by day activitities and practices that do not bolster the upkeep of optimal sleep quality and daytime alertness **(American Academy of Sleep Medicine, 2014).** Poor sleep hygiene could aggrevate existing sleep disturbances in pregnant women, especially whose sleep is described by decrease in the sleep quality and duration as pregnancy proceed **(Facco et al., 2010; Hutchison et al., 2012).** Therefore, it was significantly observed that sleep hygiene is associated with a good recognision of sleep hygine and quality **(LeBourgeois et al., 2005).** It is potential that those women who have poor sleep quality could subsequently progress insufficient sleep habits, an irregular sleep program, and also sleep-related behaviors **(John et al., 2016).**

Sleep hygine practices are a series of strategies used to regulate behaviors and environmental factors that affect or interfere with sleep that focused on life style and habits to promote better sleep quality **(Irish et al., 2014).** Sleep hygiene practices incorporate different features of daily behavior and lifestyle as well as environmental factors such like noise, light and stabilization a sleep program **(Nishinoue, 2012)** and is anticipated to serve as a protective role in those without explicit sleep disturbances, permitting it to be profitably integrated into the health education **(Kakinuma et al., 2010).**

Moreover, sleep hygine practices can be established through following specific stragies consists of instruction about planning of sleep and food time in correlation to the exercise and environment of sleep **(Hauri, 2011)** include maintaing a regular near sleep time, decrease day napping, not practicing physically or mentally excessively close to bedtime, decreasing stress, restricting the hours of exposure to light especially before sleep time, not utilizing bed for anything than rather rest, keeping away from alcohol and caffeinated drinks four hours prior to bedtime, and having a comfortable and dark sleep environment **(Irish et al., 2014) & (Knowlden et al., 2012).**

Additionally, behavioral interventions by the following sleep hygiene measures for promoting healthy sleep are very significant for confirming proper sleep and regular lifestyle practices. There is increasing evidence that like non pharmacological methods produce credible sleep improvements. Comprehensive behavior is likely to consist of integration of sleep hygiene education, consisting the organization of the sleep and wake pattern across the day; stimulus control therapy; and cognitive treatment to address unaided sleep beliefs **(Tanaka & Tamura, 2016).** Sleep hygiene practices are an effectively approached and intervention strategy that is already recognized to use with patients complaining of sleep disorders **(Se & Ju, 2016).**

As well, sleep hygiene educational intervention was an effective strategy for improving sleep-onset latency, day time sleepiness and increase the sleep satisfaction. It provides proper information and adequate training that helps them to experience less complications during pregnancy **(Rezaei et al., 2015).**

American sleep apnea association (2011) reported that there are ten recommendations of good sleep hygiene practices as mainatain regular bedtimes, don't allow more than 45 minutes of sleep time as a a day nap, stop devouring alcoholic beverages before the bedtime by at least four hours stop smoking, avoid caffeine beginning before bedtime, keep away from sweety and heavy spicy foods, maintain regular exercise but however not directly before bed, utilize comfortable bedding, locate a convenient temperature and ventilated location, shut out all diverting clamor and hold your bed for rest as it were.

Significance of the study:

Around (79%) of the pregnant women in the world experience from sleep disorders **Rahimi et al., (2016)**. As sleep disturbances are frequent during pregnancy, and they can be predisposing factors for a number of significant pregnancy-related sleep disorders. Emerging evidence links insufficient sleep with gestational diabetes, pregnancy-induced hypertension, intrauterine growth retardation and postpartum depression (**Kay-Stacey & Attarian 2017).**

Considering sleep disorder as an ordinary part of pregnancy and pay no attention to it can affect the physical and mental health of the women and could lead to several disorders. Also, there is little research in this context in Egypt. To strengthen the concept stated "Healthy mother & Healthy child". In this sense, Reducing sleep issues and increasing sleep quality have an imperative role in producing a healthy pregnancy (**Jahdi et al., 2013).** Suggesting the need to instruct all pregnant women with sleep disorders about the value of sleep hygiene strategies instead of pharmacological methods for improving the sleep quality among pregnant women.

Aim of the study:

The aim of the study was to evaluate the effect of sleep hygiene practices on quality of the sleep pattern among pregnant women with sleeping disorders

Study hypothesis:

It was expected that pregnant women who followed the sleep hygiene practices exhibit an improvement in the quality of sleep pattern than those who didn't.

Operational Definitions:

Sleep Hygiene: In this study, it refers to teaching practices as establish fixed times for goning to bed and getting up, avoid caffeine, tea before bedtime, avoid heavy spicy or sugary foods before bedtime, mild, regular exercise, using comfortable bedding, bedroom should be well ventilated and suitable temperature and block out all distracting noise.

Sleep Disorders: In this study, it refers to fall a sleep difficulty, not get adequate duration in order to wake up feeling tired, and can endure their day suffering excessive daytime sleepiness.

2. SUBJECTS AND METHOD

Study design: Randomized controlled trial was used.

Study Setting: This study was conducted at the antenatal center of Mansoura University hospital; from June to November 2018.

Subjects of the study: All pregnant women (110 pregnant women) who fulfilled the following criteria:

Inclusion criteria:

- Have poor sleep quality according to the Pittsburgh Sleep Quality Index [PSQI] total > 5.

- Their gestational age between 16 to 20 weeks, according to the first day of the last menstrual period and ultrasound.

- Maternal age: Between 18- 40 years.

- Able to read and write and willing to participate in the study.

Exclusion criteria:

- Pregnant women with medical or mental illnesses.

- Sleeping drugs use.

- The occurrence of a traumatic event or loss during the study.

- Insignificant change in unpredictable conditions such as sleep, travel, working shifts, and diet, and taking any additional medication during the study.

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 1, pp: (265-276), Month: January - April 2019, Available at: **www.noveltyjournals.com**

Sample size:

Calculating sample size using Clin Calc.com sample size calculator web site, as the total quality of life score was 96.42 ± 13.15 in pregnant women (intervention group) and 87.82 ± 9.91 in pregnant women (control group) at one month after intervention **(Rezaei et al., 2014)** and at confidence 97.0% (∞ error 3.0%) and power of study 90.0% (β error 10.0%); the calculated sample size is 110 being 55 in each group.

Sampling Technique:

One hundred and ten pregnant women were randomly allocated into two groups that equally divided into intervention and control groups. From the prepared list the odd numbers were recruited as the intervention group and the even numbers are recruited as a control group. **In intervention group**: 55 women who received sleep hygiene practices during a four-hour session held in weeks 22, 23, and 24; then the women were followed up to fill out the PSQI in follow-up session at weeks 29 and 33 of pregnancy. **The control group**: 55 women who received only routine hospital prenatal care.

Tools of data collection:

Two tools were used for data collection:

Tool I: A Structured Interview Schedule: It includes two parts. **Part one:** Covers the general characteristics of the mother as age, education, occupation, socioeconomic status, body mass index and smoking**. Part two:** It includes the past history and current pregnancy data as previous delivery, history of fetal malformation in previous pregnancy, parity, gestational age, interval from previous pregnancies, desire for current pregnancy, fetal sex satisfaction of pregnant woman and her husband.

Tool II: Sleep Quality Assessment (PSQI):

The Pittsburgh Sleep Quality Index (PSQI) is an effective retrospective instrument adopted by **Buysse et al., (1989)**. It used to measure the quality and patterns of sleep in adults. It differentiates "poor" from "good" sleep quality. It consisted of nineteen self-rated questions. The 19 questions are consisted of seven component scores (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month); each component has a range of 0-3 points. Score zero indicates no difficulty, while score 3 indicates severe difficulty. Then the seven components score added to yield a global score ranging from zero to 21, with higher scores indicating worse sleep quality. If the woman PSQI score <5 was considered good sleeper and if it was >=5 was considered poor sleepers.

Tool's Validity

The tool was reviewed by a jury of 3 expertise's in the field of the study to test its contents and face validity.

Tools Reliability

According to **Buysse et al., (1989)** the PSQI has internal consistency and a reliability coefficient (Cronbach's alpha) of 0.83 for its seven components.

Ethical considerations

Written consent was obtained from the mothers who participated in the sample. They were reassured about the confidentiality of the information. They were informed about their rights to refuse participation or withdraw at any time. The study maneuvers couldn't entail any harm to participants.

A Pilot study

A pilot study was conducted on 11 (10%) subjects from the aforementioned setting to measure the feasibility of the study setting, content validity of the tools and time required for the completion of each tool. The results obtained were useful in the appraisal and modification of the tools. Some modifications of the tools were done as change of some words in the interview schedule to be easily understood. These subjects were later excluded from the study sample.

Method

-   Obtain official permission from the manager of the Mansoura University Hospital. The study was conducted from June to November 2018.

- The researchers presented themselves to the pregnant woman, clarified the purpose of the study and the informed consent was obtained before data collection.

- Firstly, the personal data, Pittsburgh sleep quality index was completed by the women in a noiseless room. Then reviewed the questionnaire and women who scored ≥ 5 according to PSQI were identified as suffering poor quality of sleep.

- After that, the intervention and control group were allocated by using the simple random method through using the closed envelope containing intervention or control group cards. The intervention group (55) and the control group (55).

- **In the intervention group**: The women were divided into 5 subgroups, each subgroup included 11 women they were educated about the sleep hygiene practices, 6 hour session held in weeks 22, 23, and 24, each session take 2 hour, using lecture with a data show presentation followed by group discussion, at the end of the sessions the women provided a color instruction booklet.

- The weekly schedule of the intervention group was organized as follows:

- **The First week**: Instructing pregnant woman regaring the pattern of normal sleep, sleep stages, total sleep time, and sleep changes associated with pregnancy and their reasons. Also, preparing the self measures of physical changes during pregnancy that cause sleep disturbances.

- **The Second week**: Educating mother about how to practice sleep hygiene, according to sleep hygiene guideline through two main points.

- **First, personal habits as**: Establish a regular bedtime routine, exercise regularly, eat healthy foods, do not eat too close to sleep time, avoid caffeine and nicotine close to sleep, eat appropriate amount of calcium and magnesium intake in the daily diet, drink a cup of warm milk aids get a good night's sleep, avoiding eating gas production or drinking too much water before going to bed.

- **Second, sleep environment as:** Connect your bedroom with sleep and sex only, let the electronics out of the room, keep your room dark, calm and cool, mattress, pillows should be comfortable, turn off the TV and other noise that can disturb sleep.

- **The control group:** Received a routine antenatal care as taking vital signs, ask woman about her complain, giving treatment.

- **Finally,** the researchers were conducted the first and second follow-up sessions in order to complete PSQI at weeks 29 and 33 of pregnancy to assess the consequence of sleep hygiene practices.
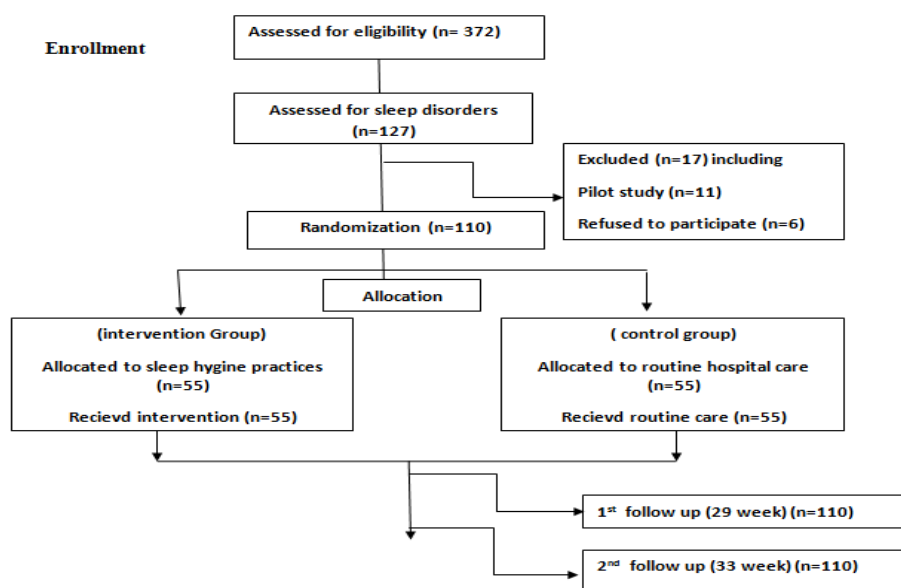

Figure 1: Flowchart of Research Method

Statistical Analysis

Data were coded, analyzed by using SPSS version 20.0. Data were presented using descriptive statistics in the form of frequencies & percentages and (χ2) test was used for comparison of qualitative variables. Quantitative variables were presented as means ± standard deviations and paired t test were used for comparison. Statistical significance was considered at p-value <0.05.

3. RESULTS

Table (1) Frequency distribution of the studied sample according to their general characteristics

Character	Items	Intervention Group (n=55)	Control Group (n=55)	Significance Test
Age	20-25 26-30 31-35 36-40	17 (30.9) 21 (38.2) 12 (21.8) 5 (9.1)	16 (29.1) 20 (36.4) 15 (27.3) 4 (7.3)	χ^2= 0.499, p = 0.919
Education	Primary Secondary Diploma College	9 (16.4) 13 (23.6) 14 (25.5) 19 (34.5)	5 (9.1) 19 (34.5) 19 (34.5) 12 (21.8)	χ^2= 4.606, p= 0.208
Occupation	Housewife Worker Employee Student	27 (49.1) 13 (23.6) 11 (20.0) 4 (7.3)	31 (56.4) 13 (23.6) 8 (14.5) 3 (5.5)	χ^2= 0.892, P = 0.827
Economic status	Good Moderate Bad	14 (25.5) 34 (61.8) 7 (12.7)	12 (21.8) 33 (60.0) 10 (18.2)	χ^2=0.698, P = 0.705
BMI	<25 (Average) 25- (over weight) 30+ Obese	16 (29.1) 20 (36.4) 19 (34.5)	12 (21.8) 27 (49.1) 16 (29.1)	χ^2=1.871, P = 0.392

Table (1) shows that there was no statistcial significant difference between the intervention and control group as regard to the age, educational level, occupation, economic status and body mass index. This means that the two groups are matched.

Table (2): Frequency distribution of the studied sample according to their obstetrical history.

Obstetrical history	Items	Intervention group (n=55)	Control group (n=55)	Significance
Gravidity	One Two Three 4+	20 (36.4) 20(36.4) 13 (23.6) 2 (3.6)	20 (36.4) 18 (32.7) 17 (30.9) 0 (0.0)	χ^2= 2.639, P= 0.451
Gestational age	16-<18 weeks. 18-20 weeks.	25 (45.5) 30 (54.5)	28 (50.9) 27 (49.1)	χ^2= 0.328,P= 0.567
Intra-pregnancy spacing	No interval (<1) One Two Three Four	20 (36.4) 3 (5.5) 20 (36.4) 7(12.7) 5(9.1)	21 (38.2) 3 (5.5) 20 (36.4) 4 (7.3) 7 (12.7)	χ2= 1.176, P=0.882
Previous delivery	No CS NVD	18 (32.7) 23 (41.8) 14 (25.5)	24 (43.6) 22 (40.0) 9 (16.4)	χ^2= 1.966, P =0.374
Tendency of pregnancy (husband)	Yes No	41 (74.5) 14 (25.5)	40 (72.7) 15 (27.3)	χ^2= 0.053, P= 0.829
Marriage status	Voluntary Mandatory	3 (5.5) 52 (94.5)	5 (9.1) 50 (90.9)	Fisher exact test, P =0.716

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 1, pp: (265-276), Month: January - April 2019, Available at: www.noveltyjournals.com
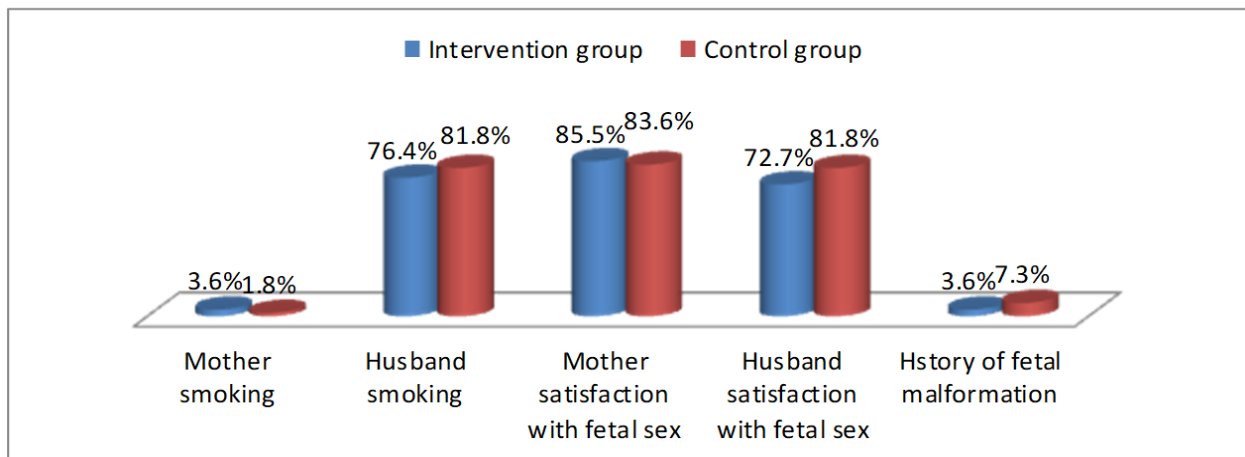
Figure (2): Smoking habit and the distribution of some fetal related factors in the studied sample.

Table (2) and figure (2) reveals that there was no significant difference between the intervention and control groups as regard gravidity, gestational age, inter pregnancy space period, types of previous delivery, the husband's tendency of pregnancy, smoking habit, satisfaction of fetal sex, history of malformation and marriage status. This means that the two groups are matched as regard all items of obstetric history and habits.

Table (3): Sleep quality and average score among the studied sample before the intervention.

Sleep quality	Items	Intervention group (n=55)		Control group (n=55)		Significance
		No	**%**	**No**	**%**	
Subjective sleep quality	Fairly good Fairly bad Very bad	21 12 22	38.2 21.8 40.0	25 13 17	45.5 23.6 30.9	χ^2= 1.032 P 0.597
Sleep latency	0 1-2 3-4 5-6	0 0 34 21	00.0 00.0 61.8 38.2	0 0 31 24	00.0 00.0 56.4 43.6	χ^2= 0.338 P 0.561
Sleep duration	> 7hrs. 6-7hrs. 5-6 hrs. < 5 hrs.	4 8 36 7	7.3 14.5 65.5 12.7	5 13 28 9	9.1 23.6 50.9 16.4	χ^2= 2.552 P 0.466
Sleep efficiency	> 85% 75-84% 65-74% <65%	0 0 8 47	00.0 00.0 14.5 85.5	0 0 5 50	00.0 00.0 9.1 90.9	χ^2= 0.785 P 0.376
Sleep disturbance	1-9 10-18 19-27	15 33 7	27.3 60.0 12.7	17 27 11	30.9 49.1 20.0	χ^2= 1.612 P 0.446
Use sleep medications	Yes No	0 55	00.0 100.0	0 55	00.0 100.0	-
Day time dysfunction	1-2 3-4 5-6	15 24 16	27.3 43.6 29.1	23 21 11	41.8 38.2 20.0	χ^2= 3.450 P 0.327
Sleep Quality Score	Mean ± SD	12.82±1.97		12.69±2.54		t=0.630 P 0.531

Table (3) shows the sleep quality average score among the studied sample before the intervention. The subjective quality of sleep pattern is nearly the same in both groups. More than one fifth of both groups had bad sleep quality and nearly 3 fifths had sleep latency 3-4 hours. About 3 quarters had a duration of sleep, 6 hours and less. Sleep efficiency was less than 85.5% and 90.4% in the intervention and control group respectively. Both groups are nearly matched as regard sleep quality before intervention.

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 1, pp: (265-276), Month: January - April 2019, Available at: **www.noveltyjournals.com**

Table (4): Sleep quality and average score among the studied sample at 29 weeks gestation

Sleep Quality	Items	Intervention Group (n=55)		Control Group (n=55)		Significance
		No	**%**	**No**	**%**	
Subjective sleep quality	Fairly good	28	50.9	26	47.3	χ^2= 2.510
	Fairly bad	21	38.2	17	30.9	P 0.287
	Very bad	6	10.9	12	21.2	
Sleep latency	1-2	10	18.2	0	00.0	χ^2= 11.011
	3-4	29	52.7	35	63.6	P 0.004
	5-6	16	29.1	20	36.4	
Sleep duration	>7hrs.	6	10.9	4	7.3	χ^2= 7.470
	6-7hrs.	22	40.0	13	23.6	P 0.058
	5-6 hrs.	25	45.5	29	52.7	
	<5 hrs.	2	3.6	9	16.4	
Sleep efficiency	>85%	0	00.0	0	00.0	χ^2= 30.10
	75-84%	11	20.0	0	00.0	P 0.000
	65-74%	23	41.8	7	12.7	
	<65%	21	38.2	48	87.3	
Sleep disturbance	0	8	14.6	0	00.0	χ^2= 18.34
	1-9	26	47.3	16	29.1	P 0.000
	10-18	19	34.5	28	50.9	
	19-27	2	3.6	11	20.0	
Use sleep medications	Yes	0	00.0	0	00.0	-
	No	55	100.0	55	100.0	
Day time dysfunction	0	10	18.2	0	00.0	χ^2= 11.950
	1-2	23	41.8	23	41.8	P 0.008
	3-4	16	29.1	22	40.0	
	5-6	6	10.9	10	18.2	
Sleep Quality Score	Mean ± SD	10.86±2.06		12.54±2.48		t=3.907 P < 0.001

Table (4) displays the sleep quality average score among the studied sample at 29 weeks gestation. The subjective quality of sleep pattern is significantly better in the intervention group, but the difference was not significant. There is a significant better sleep quality, sleep latency, duration of sleep and sleep efficiency in intervention than control group. Daytime sleep dysfunction is significantly less in the intervention group. The PSQ average score is significantly less in the intervention than control group.

Table (5): Sleep Quality and Average Score among the Studied Sample at 33 weeks of gestation.

Sleep quality	Items	Intervention (n=55)		Control (n=55)		Significance
		No	**%**	**No**	**%**	
Subjective sleep quality	Fairly good	39	70.9	26	47.3	χ^2= 16.890
	Fairly bad	14	25.5	18	32.7	P 0.0007
	Very bad	2	3.6	11	20.0	
Sleep latency	1-2	34	61.8	2	3.6	χ^2= 43.98
	3-4	17	30.9	34	61.8	P 0.000
	5-6	4	7.3	19	34.6	
Sleep duration	>7hrs.	8	14.5	4	7.3	χ^2= 25.35
	6-7hrs.	37	67.3	15	27.3	P 0.000
	5-6 hrs.	8	14.5	28	50.9	
	<5 hrs.	2	3.6	8	14.5	
Sleep efficiency	>85%	3	5.4	0	00.0	χ^2= 46.94
	75-84%	26	47.3	2	3.6	P 0.000
	65-74%	16	29.1	9	16.4	
	<65%	10	18.2	44	80.0	

Sleep disturbance	0	13	23.6	1	1.8	$\chi^2 = 30.84$
	1-9	29	52.7	15	27.3	P 0.000
	10-18	13	23.6	29	52.7	
	19-27	0	00.0	10	18.2	
Use sleep medications	Yes	0	00.0	0	00.0	-
	No	55	100.0	55	100.0	
Day time dysfunction	0	12	21.8	0	00.0	$\chi^2 = 16.90$
	1-2	24	43.6	25	45.4	P 0.0007
	3-4	17	30.9	21	38.2	
	5-6	2	3.6	9	16.4	
Sleep Quality Score	Mean ± SD	9.13±1.87		12.46±2.41		t=8.096 P 0.000

Table (5) shows the sleep quality average score among the studied sample at 33 weeks gestation. All items of sleep assessment were significantly better in the intervention group compared to controls. Also, the total sleep quality average score is significantly less in the intervention than control group.

Table (6): Changes in the total sleep quality score in the intervention group.

Item	Before intervention	At 29 weeks	At 33 weeks
Average PSQ score	12.82±1.97	10.86±2.06	9.13±1.87
Significant test	$t_1 = 3.907$, P <0.001	$t_2 = 8.096$, P 0.000	$t_3 = 4.613$, P <0.001
Decreased value		- 1.96	- 3.69
Decreased Percentage		- 15.3%	- 28.8%

(t_1: Before Vs At 29 weeks, t_2: Before Vs At 33 weeks, t_3: At 29 weeks Vs At 33 weeks)

Table (6) shows the average total sleep quality score at different times of the study in the intervention group. The average total sleep quality score was significantly decreased from the time of starting of intervention to 29 weeks, then at 33 weeks of gestation. The percentage of lowering the total sleep quality average was 15.3% at 29 weeks and 28.8% at 33 weeks of gestation.

4. DISCUSSION

The aim of the present study was to evaluate the effect of sleep hygiene practices on quality of the sleep pattern among pregnant women with sleep disorders. The findings of the study indicated that the sleep quality was significantly better in the intervention group compared to controls. Also, the PSQ average score is significantly less in the intervention than control group. Thus, these findings support the proposed research hypothesis.

Indeed, there is no significant difference existed between the intervention and control group regarding their general characteristics and the obstetric history. These findings may be an evidence of homogeneity existed between both study groups and it was assisted a fact to exclude any external factors.

As regards to the sleep quality and PSQ average score among the studied sample before the intervention. The study findings revealed that the subjective quality of sleep pattern and the other items of sleep questionnaire are nearly the same in both. This result may be due to the nearly matching that existed among the women in both groups and indicating that those women were complaining of the same degree of sleeping disorders.

These findings were supported by **Rezaei et al., (2015)** in their study about the sleep behavioral education and its effect on the depression among pregnant. It found that all sleep quality component and their general characteristics were fairly homogeneous between the study groups, including the subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances and daytime dysfunction.

Concerning to sleep quality average score among the studied sample in 29 and 33 weeks gestation. The study results showed that the sleep quality was significantly better in the intervention group compared to control group, whereas the sleep quality average score was significantly less in the intervention than control group after one and two months after

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 1, pp: (265-276), Month: January - April 2019, Available at: **www.noveltyjournals.com**

intervention. This indicated that following the sleep hygiene practices helped all participants to improve their sleep quality effectiveness. This result should serve as a valuable reference to assist improvements in the sleep quality of pregnant women.

The consequent results of this study were consistent with **Rezaei et al., (2015)** who showed that a statistically significant change was reported in the quality of sleep of the intervention group in comparison to the control group (29 weeks 33 weeks and 37 weeks). As well, the study results also certified the result of the study implemented by **Pao-Hui Chen et al., (2010)** about the effectiveness of sleep health education on women's sleep quality, which have proved significant effect of sleep health education on participants' sleep quality (p<0.001) across the six components of the PSQI.

Moreover, the results of the current study were in the same line with **Jahdi et al., (2013)** who conducted study for the pregnant women with sleep disorder concerning the effect of health behavior education on the sleep quality, who stated that the comparison of sleep quality 1 and 2 months after intervention illustrated a significant difference in the sleep quality compared to before, as the mean scores of sleep quality showed a reduction after intervention compared to before intervention.

The present results were congruent with **Yu Tsai et al., (2016)** who study the relation between the sleep quality and sleep hygine and its effect on pregnant women in third-trimester and reported that after practice of sleep hygiene, the sleep pattern of the pregnant women had significantly major variance of sleep onset latency, total nighttime sleep, and wake after sleep onset than good sleepers.

Moreover, Another study results conducted to assess the effect of sleep hygiene for executive functions and sleep quality by **de Almondes et al., (2017)** it was in agreement with the existing study findings where they found the sleep hygiene group had enhanced sleep quality, excessive daytime sleepiness and significant improvements in the insights, planning, attention and episodic memory.

The existing results also certified with study that was conducted by **Pao-Hui Chen et al., (2010)** who demonstrated significant effect of sleep health education on womens' sleep quality (p < 0.001), which the sleep quality of all participants improved after third and 5 meetings.

Furthermore, The results of the current study were consistent with **Stremler et al.,** studied in 2006 about a behavioral-educational intervention to promote maternal and infant sleep, showed that the sleep intervention was effective in promoting maternal and infant sleep in the early postpartum period, as evidenced by increased maternal nighttime sleep time.

Moreover, the current findings were confirmed the previous study that performed by **Da Costa et al., (2010)** about the impact of sleep problems on the physical and mental health, vitality, and social functioning domains on the SF-36 during pregnancy, they reported that the health behavior sleep education class had improvement in the component 2 and 7 of PSQI but, the improvement was observed in them within three months after attending the health behavior education class. This agreement that exists between the current findings and the previous studies explains the effectiveness of sleep hygiene practices and the sleep quality in addition to the clear and simple language that used for understanding the instructions. Also, the women were having curiosity regarding instruction given, this consequently reflected upon their practice of sleep hygiene.

While , the outcome results were in disagreement with the results of **Voinescu and Tatar (2015)** who study the sleep hygiene awareness and its effect on sleep quality and suggest that preferable sleep hygiene awareness does not needs guarantee better sleep quality. This difference could be clarified that the awareness is not enough to reach a positive result and it is important to be sure their understanding how to perform these practices in a proper and continuous way. Also, it may be due to the differences in sample size and culture.

5. CONCLUSION

The study concluded that the Pittsburgh Sleep Quality average score is significantly less in the intervention than control group. Consequently, it was evident that following the sleep hygiene practices were an effective for improving sleep quality among the pregnant women with sleep disorders.

6. RECOMMENDATIONS

In view of the findings arising from the present study, the researchers recommend that:

- Sleep hygiene practices can be adopted to improve sleep quality among pregnant women with sleep disorders.

- Integrate sleep hygiene practices in the maternity nursing curriculum.

- Combining hygiene practices for sleep in continuing education throughout the country for all maternity nurses.

- Providing proper antenatal counseling to all pregnant women regarding sleep hygiene practices in order to maintain physical, social and mental health.

- Future studies can be extended to using of sleep hygiene education in other diseases.

ACKNOWLEDGMENT

CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 1, pp: (265-276), Month: January - April 2019, Available at: **www.noveltyjournals.com**

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