Contents lists available at www.innovativejournal.in

INTERNATIONAL JOURNAL OF NURSING DIDACTICS

Homepage: http://innovativejournal.in/index.php/ijnd

ISSN: 2231-5454

Effect of Practicing Walking with Deep Breathing Exercises on Insomnia among Women in Third Trimester of Pregnancy

NahedFikry Hassan Khedr&Eman A. Fadel

Woman's Health and Midwifery Nursing, Faculty of Nursing, Mansoura University,Egypt

DOI: https://doi.org/10.15520/ijnd.v8i09.2292

Insomnia is a prevalent complaint among pregnant woman especially during last trimester of pregnancy with significant morbidity but, it often remains neglected.***Aim*:** The present study aimed to explorethe effect of practicing walking with deep breathing exercises on insomnia among women in third trimester of pregnancy.***Researchdesign*:**A quasi experimental research design was utilized to conduct the present study in Antenatal Clinics at Obstetrics and Gynecology Center in Mansura city.***Sampling*:** A purposive sampling technique was used to select sixty healthy pregnant women complaining from insomnia, at a gestational age from 28 to 32 weeks, have a single tone pregnancy and perform regular antenatal visits. **Data Collection Tools:** Two tools were used for data collection; the first tool was **a Structured Interview Schedule** designed by the researchers, it consisted of two parts to record personal data and reproductive history; the second tool was **Insomnia Sleep Index (ISI)** it composes of 7 components, it was adapted to measures the pregnant women's insomnia severity pre and post intervention. **Results:** The present study revealed that, the total score of insomnia severity index decreased for the majority of the women after practicing walking with deep breathing exercises at their third trimester of pregnancy**. Conclusion:** Practicing walking with deep breathing exercises has a positive effect on severity of insomnia during third trimester of pregnancy. **Recommendation:** Raising awareness of the pregnant women about the importance of practicing walking with deep breathing exercises to decrease insomnia severity during third trimester of pregnancy.

Keywords: Deep Breathing Exercise, Insomnia, Insomnia Severity Index,Walking exercise.

INTRODUCTION

Sleep is a physiological need for all human beings. It is referred as a prominent health variable that affects human's wellness and quality of life ***(Kızılırmak, Timur, &Kartal, 2012).***Pregnancy with its unique psychological, physiological and hormonal changes exposes the pregnant woman to the risk of disturbing the sleep pattern ***(Ding et al., 2014; McLafferty, Spada,&Gopalan, 2018).*** Sleep is a physiological state of self-regulation and is one of the basic inevitable daily activities and regulations of the body that helps in optimum restoration of many body functions especially the anabolic function ***(Kumar, 2017).*** In another word, without a good sleep pattern, mood is altered, mind is less adaptive and body loses the ability to accommodate with surrounding stressors ***(Alipour, Lamyian, &Hajizadeh, 2012).***

Healthy adults need to fall asleep in 5–10 minutes after switch off the light and sleep for at least 7 hours. Many factors affecting sleep pattern such as individuals' physical activity, age, gender, diet, health related condition and stressful events. All these factors are predictors for either poor or good sleep pattern. Good sleep pattern is characterized by appropriate sleep timing, adequate sleep duration, subjective sleep satisfaction, high sleep efficiency, and sustained alertness during waking hours ***(Buysse, 2014).*** Poor sleep pattern can be reported by pregnant women complain from certain difficulties such as decreased or increased rapid eye movement sleep, shorter sleep duration, increased night-time arousals, trouble in falling asleep and awakenings, and a lower sleep efficiency which all lead to insomnia ***(Morong , Hermsen , de Vries, 2014).***

Insomnia and poor sleep pattern become common complains among pregnant women ***(Sedov et al., 2018).***Both the definition and the evaluation of insomnia are difficult. Based on the International Classification of Sleep Disorders (ICSD), insomnia can be identified as an almost nightly complaint of an insufficient amount of sleep or not feeling comfortable after the habitual sleep episode ***(Zucconl&Ferrl, 2014).*** Insomnia and disturbance in sleep pattern during pregnancy are very common especially with advanced gestation, as a normal consequence of the increased level of pregnancy hormones and the dramatic physiological and psychological discomfort such as; heartburn, shortness of breath, leg cramps and contractions, restless legs syndrome, nocturia, frequency urination, and nightmares which have a direct effect on sleep pattern and quality ***(Okun, Buysse, &Hall, 2015;Hashmi et al., 2016).*** Managing insomnia during pregnancy is very important. Many strategies have developed such as teach woman sleep hygiene education, cognitive–behavioral therapy such as yoga or meditation, some alternative therapies also had been utilized such as acupressure and finally practicing simple exercises such as walking with deep breathing exercises which is a neglected issue of concern for pregnant woman, although its simplicity ***(Neri et al., 2016; Kay-Stacey &Attarian, 2017).***

In general, regular physical activity such as walking with deep breathing exercises is known to improve the quality of life and pattern of sleep and insomnia. Unfortunately during pregnancy, physical activity is decreased and quality of sleep is affected ***(Blanque et al., 2018).*** Walking with deep breathing exercises is considered as a simple form of exercise, which is recommended for all pregnant women to

practice at least 30 minutes of walking with deep breathing exercises for about 8000 steps/day for its beneficial effects both for the mother and the fetus***(Lamina &Agbanusi, 2013).***Practicing walking with deep breathing exercises can help in the prevention and in the control of some medical disorders that may be potentially harmful to both the mother and the fetus by reducing the gestational weight gain which have a positive effect on reducing childbirth demands, combating fatigue caused by pregnancy and reducing back pain (***Moore et al., 2012)***.

Significance of the study:

Healthy sleep provides a positive frame of reference for the pregnant women and all human well*b*eing ***(Buysse, 2014).*** Strong evidence shows that good sleep pattern is important for maintaining good physical and mental health ***(Guertler et al., 2015).*** Although the real incidence of insomnia for pregnant women is unknown, the incidence lowers at 12.6% at the start of pregnancy, and then increases as pregnancy advances. Around 73.5% of pregnant women display some degree of insomnia at a median of 39 weeks ***(Reichner, 2015).*** Good pattern of sleep during pregnancy is considered the most important predictor of pregnancy outcomes ***(Sharma, et al., 2016***). Also, poor pattern of sleep can increase the incidence of preterm birth and neonatal intensive care unit admission, gestational hypertension, gestational diabetes, and postpartum depression (***Micheli et al., 2011; Xu et al., 2014).*** Furthermore**,** a recent study found that, insomnia and poor sleep pattern also increase the risk for surgical delivery***(Teong et al., 2017).*** So, it is very important to improve sleep pattern for pregnant woman, considering the health benefits of good sleep, and the worse consequences of its poor quality. Yet the challenge lies in finding an adequate and safe management of poor sleep pattern and insomnia during pregnancy, by avoiding pharmacological management which is not recommended during pregnancy. Regular physical activity such as walking with deep breathing exercises is accepted as a safe healthy method for the management ***(Nascimento et al., 2015).*** In Egypt, the potential role of walking with deep breathing exercises in management of insomnia among pregnant women has not been studied in detail before. So, this study was conducted to evaluate the effect of practicing walking with deep breathing exercises on insomnia among women in third trimester of pregnancy.

Aim of the study:

This study aimed to exploretheeffect of practicing walking with deep breathing exercises on insomnia among women in third trimester of pregnancy**.**

Study hypothesis:Women in third trimester of pregnancy who practicewalking with deep breathing exercises have a lowered score of insomnia after intervention.

SUBJECTS AND METHOD

Subjects

Study Design:

A quasi experimental research design was utilized.

Study setting:

This study was conducted at Antenatal clinics at Obstetrics and Gynecology Center in Mansura city.

Subjects of the study:

A purposive sampling technique of sixty pregnant women was utilized.Subjectswere chosen according to the following criteria; healthy woman,able to read and write, aged from 18 to 35 years old, had singleton pregnancy, 28^{th} to 32^{th} weeks of gestation, attend regular antenatal care visits and accept to sign a written consent to participate in the study.

Sample size equation:

Based on data from a controlled randomized trial propose to assess the effect of exercises on sleep quality in pregnant women ***(Özkan&Rathfisch, 2018).***Considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula:$n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}]/ (\text{mean difference})^2$ where; SD = standard deviation. $Z_{\alpha/2}$: This depends on level of significance, for 5% this is 1.96. Z_{β}: This depends on power, for 80% this is 0.84. Therefore,n= [(1.96 + 0.84)2 × {2(3.66)2}]/ (1.88)2=59.4. Based on the formula, the sample size required is 60.

Tools of data collection:

Two tools for data collection were used; the first tool was a**Structured Interview Schedule** which developed by the researchers after reviewing the related literature. It consisted of two parts to assess the following;The first part was pregnant women'personal data such asage, height, weight, educational level, occupation, residence, income, and telephone number;the second part was pregnant women's reproductive history such as gravidity, parity, number of children and number of follow-up visits.The second tool was Insomnia Severity Index (ISI) which was adapted from ***(Morin, 1993***) to measures the pregnant women's insomnia severity. It is a brief self-report questionnaire, consists of seven questions. Scoring of answers is based on a 0 to 5 scale. The scores for all seven items are added and the total score categories were as the following; from zero to seven indicates no clinically significant insomnia; from eight to fourteen indicates mild insomnia; from fifteen to twenty-one indicates moderate insomnia and from twenty-two to twenty-eight indicates severe insomnia.

Method:

Ethical consideration:

An ethical approval Letter was attained from Research Ethics Committee, Faculty of Nursing,Mansoura University after that an official permission was taken from the director of Antenatal Clinics at Obstetrics and Gynecology Center in Mansoura Cityto conduct the study. A written consents were obtained from every pregnant women involved in the study after clarification of the purpose and nature of the study. All pregnant women were reassured about the anonymity, privacy, safety and confidentiality of the collected data. The right to refuse participation or withdraw from the study also had been disclosure.

Validity of the tools:Content validity was tested by three experts in the field of Obstetrics and Gynaecology of Nursing. The questionnaire was modified according to the expert's comments and recommendations.

Reliability:Reliability of ISI was done by using the Cronbach's alpha test. It was 90.1% which mean high reliability of the tool.

Pilot Study:

Pilot study was carried outatAntenatal Clinicsat Obstetrics and Gynecology Centre in Mansura city 10% of the sample size (6 pregnant women) to test the applicability and relevance of the research tools and the clarity of the designed questionnaire and the required modification were made. The modifications include paraphrasing of some sentences. The pilot sample was excluded from the study.

Field ofWork:

The enrolment of pregnant women in the study started according to the inclusion criteria, after attaining the study approval letter from Research Ethics Committee of Faculty of Nursing, Mansoura University and the official permission from the director of Antenatal clinics at Obstetrics and Gynecology Center in Mansoura City and also the written consents from the pregnant women to conduct the study. The required data were collected from the beginning of January 2018 to the end of June 2018. Data was collected three days per week from 9 am to 1 pm.At the baseline assessment an individualized interview for about 20-25 minutes was done and any clarification or interpretations were permitted. The two tools were filled by the pregnant women then a colored handout with illustrating photos was given for themto clarify how to walk with deep breathing exercise in which the pregnant woman take a deep breath from the nose and exhale it from the mouth. The researchers instructed the pregnant women to walkforabout half an hour per day for two weeks with practicing deep breathing exercise at early morning or at night in a walk at fresh air with a companionship in a wide street away from traffic crowdedness or to walk at home at wide rooms, if she cannot walk outside home daily. Then pregnant women were followed by telephone weekly to confirmpracticing of the exercises and to arrange the time forthe next antenatal care visitwhich is estimated to be after two weeks of practicing the exercises and another estimation of insomnia severity by Insomnia severity Index (ISI) were done at the determined antenatal visit.

Statistical analysis:

The collected data were coded, computed and analyzed statistically utilizing SPSS (Statistical Package of Social Sciences) version 21.0 (SPSS Inc., Chicago, IL, USA).All data were categorical data and were expressed in number and percentage. Chi-square analysis was used for non-continuous variables such as the ISI Pre and post intervention differences were determined by using chi-square test. The Cronbach's alpha was used to assess the reliability of a set of components of the ISI. Statistical significance was set at $p<0.05$.

RESULTS

Table (1) Presents thatnearly one- fifth (38.3%)of the pregnant women aged from25 – 29 yearswith the mean of age 24.7 ±4.1. Also one- third (33.3%) had secondary level of education. While more than one-half (55.0%) were overweighed house wives, nearly three-fifths (58.3%) had inadequate family income and three-quarters (75.0 %) were from rural residence.

Table (2) Showsthat around half (51.7%) of the pregnant women were primigravida, one-fifth (20.0%) were multi para and two- fifths (40.0 %) had from one to three children.

Table (3) Denotes that there were highly statistical significant differences between all component of Insomnia Severity Index pre and post intervention ($P <0.001$) except in the component of pregnant woman worry about the current sleep problem.

Figure (1) Illustrates that more than half (53.3%) of the pregnant women had sever insomnia pre intervention while only (3.3%) had sever insomnia after practicing walking with deep breathing exercises with highly statistical significant differences**.**

Table (4) Describes that there were statistical significant associations between total score of insomnia severity index post intervention and some personal characteristics such as advanced age, occupational status, body mass index and family income ($P <0.05$).

Table (5) Clarifies that there were statistical significant associations between total score of insomnia severity index post intervention and number of gravida and children ($P <0.05$).Also, there was a highly statistical significant association between total score of insomnia severity index post intervention and parity ($P <0.001$).

Table (1) Number and percentage distribution of the pregnant women according to their Personal Data (n= 60.

Personal Data	No.	%
Age		
< 20 years	8	13.3
20 -<25 years	21	35.0
25 – <30years	23	38.3
≥30 years	8	13.3
Mean ±SD	**24.7 ±4.1**	
Educational level		
Read and write	10	16.7
Primary	18	30.0
Secondary	20	33.3
Higher	12	20.0
Occupation		
Housewife	33	55.0
Employed	27	45.0
Residence		
Rural	45	75.0
Urban	15	25.0
Family income		
Adequate	25	41.7
Indequate	35	58.3
Body mass index (BMI)		
Normal	13	21.7
Overweight	33	55.0
Obese	14	23.3
Mean ±SD	27.6 ±3.7	

Table (2) Number and percentage distribution of the pregnant women according to their reproductive history n= 60

Reproductive history	No.	%
Gravida		
Primi	31	51.7
Multi	29	48.3
Parity		
Nulli	36	60.0
Primi	12	20.0
Multi	12	20.0
Number of children		
None	36	60.0
1 – 3	24	40.0

Table (3) Insomnia Severity Index (ISI) Pre- and Post-Intervention among Pregnant Women n= 60

Items of ISI	Pre- Intervention		Post- Intervention		Chi square test	
	No.	%	No.	%	X2	p
Difficulty falling sleep						
Mild	9	15.0	57	95.0		
Moderate	14	23.3	3	5.0		
Sever	37	61.7	0	0.0	79.027	<0.001**
Difficulty staying asleep						
Mild	7	11.7	52	86.7		
Moderate	35	58.3	8	13.3		
Sever	18	30.0	0	0.0	69.276	<0.001**
Problems waking up too early						
Mild	8	13.3	42	70.0		
Moderate	15	25.0	10	16.7		
Sever	37	61.7	8	13.3	42.809	<0.001**
Satisfied with current sleep pattern						
Satisfied	8	13.3	55	91.7		
Moderate	16	26.7	5	8.3		
Dissatisfied	36	60.0	0	0.0	76.825	<0.001**
Noticeable to others that insomnia impairing the quality of your life						
A little	0	0.0	58	96.7		
Somewhat	15	25.0	2	3.3		
Much	45	75.0	0	0.0	112.941	<0.001**
Worried about current sleep problem						
A little	51	85.0	51	85.0		
Somewhat	9	15.0	9	15.0	0	1.000
Sleep problems interfere with daily functioning						
A little	0	0.0	59	98.3		
Somewhat	10	16.7	0	0.0		
Much	50	83.3	1	1.7	116.078	<0.001**
Total Score						
Mild Insomnia	12	20.0	51	88.3		
Moderate Insomnia	16	26.7	5	8.3		
Sever Insomnia	32	53.3	4	3.3	51.683	<0.001**

****Highly Statistical significant at p ≤ 0.001**

Figure (1) Total score of Insomnia Severity Index pre and post intervention

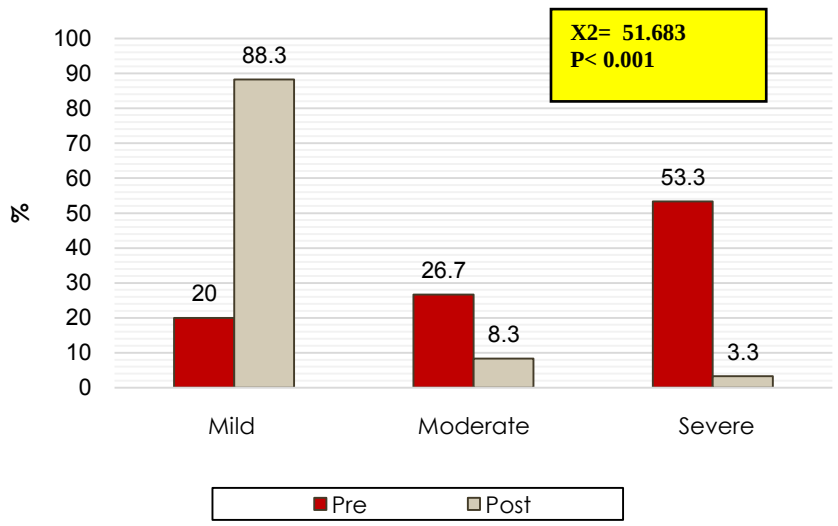

Figure (1) Total score of Insomnia Severity Index pre and post intervention

Table 4. Association between total score of Insomnia Severity Index post-intervention andPregnant Women's Personal Data (n= 60)

	Mild insomnia (n=51)		Moderate insomnia (n=5)		Severe insomnia (n=4)		Chi square test	
Personal Data	**No.**	**%**	**No.**	**%**	**No.**	**%**		
Age								
< 20 years	8	15.7	0	0.0	0	0.0		
20 -<25 years	19	37.3	2	40.0	0	0.0		
25 – <30years	20	39.2	2	40.0	1	25.0		
≥30 years	4	7.8	1	20.0	3	75.0	15.849	0.015*
Educational level								
Read and write	8	15.7	1	20.0	1	25.0		
Primary	17	33.3	1	20.0	0	0.0		
Secondary	15	29.4	3	60.0	2	50.0		
Higher	11	21.6	0	0.0	1	25.0	4.533	0.605
Occupation								
Housewife	31	60.7	2	40.0	0	0.0		
Employed	20	39.2	3	60.0	4	100.0	6.033	0.048*
Residence								
Rural	38	74.5	4	80.0	3	75.0		
Urban	13	25.5	1	20.0	1	25.0	0.073	0.964
Family income								
Inadequate	20	39.2	5	100.0	0	0.0		
Adequate	31	60.8	0	0.0	4	100.0	9.983	0.007*
BMI								
Normal	13	25.5	0	0.0	0	0.0		
Overweight	29	56.9	4	80.0	0	0.0		
Obese	9	17.6	1	20.0	4	100.0	15.901	0.003*

***Statistical significant at p ≤ 0.05**

Table 4. Association between total score of Insomnia Severity Index post-intervention and Pregnant Women's reproductive history

Reproductive history	**Mild insomnia (n=51)**		**Moderate insomnia (n=5)**		**Severe insomnia (n=4)**		**Chi square test**	
	No.	**%**	**No.**	**%**	**No.**	**%**		
Gravida								
Primi	30	58.8	1	20.0	0	0.0		
Multi	21	41.2	4	80.0	4	100.0	7.330	0.026*
Parity								
Nulli	35	68.6	1	20.0	0	0.0		
Primi	11	21.6	0	0.0	1	25.0		
Multi	5	9.8	4	80.0	3	75.0	23.180	<0.001**
Number of children								
None	34	66.7	1	20.0	1	25.0		
1 – 3	17	33.3	4	80.0	3	75.0	6.319	0.042*

***Statistical significant at p ≤ 0.05**

****Highly Statistical significant at p ≤ 0.001**

DISCUSSION

The present study aimed to explore the effect of practicing walking with deep breathing exercises on insomnia among women in third trimester of pregnancy. The hypothesis was achieved through the present study findings which revealed that, women in third trimester of pregnancy who practiced walking with deep breathing exercises had a lowered score of insomnia post intervention with a highly statistical significant difference. The present study revealed that more than half of the pregnant women had sever insomnia pre intervention while majority of them had a lowered score of insomnia after practicing walking with deep breathing exercises.

The present study finding revealed that, pre-intervention the more than half of the pregnant women experienced sever insomnia this may be attributed to the inflammation process of pregnancy and the effect of pregnancy physiological and psychological changes and discomforts on sleep cycle. These changes include nocturea, back pain and leg camps especially at night. The present study finding comes incongruent with a study conducted by ***NihalTaflkran, 2011,*** on 100 healthy pregnant women to assess sleep pattern and to determine and to define the affecting factors during pregnancy. He found that high proportion of the pregnant women had insomnia. In addition, a meta-analyses currently performed by ***Sedov et al., 2018*** on 11,002 participants in 24 article. They estimate the mean prevalence of insomnia during pregnancy average score to be 6.07, and that pregnant women experienced insomnia ranged from 36.5% to 55.2%. Also, ***Hassan et al., 2018*** who conducted a quasi-experimental study on 80 pregnant women in Mansoura City, Egypt to evaluate the effect of applying sleep guidelines on quality of sleep among pregnant women at last trimester of pregnancy. They founded that high proportion of the studied women had insomnia. Furthermore, ***Ahmed et al., 2015*** who conducted a quasi-experimental study on 90 pregnant women to investigate the effect of minor discomforts self-care guideline on women's health during pregnancy. They founded that insomnia is among the most common prevalent minor discomfort during pregnancy.

The present study revealed that the total score of insomnia decreased for the majority of the pregnant women after practicing walking with deep breathing exercises. This can be attributed to the positive effect of exercises such as walking or breathing exercises on the overall health either physical or psychological by improving the physical fitness, increasing the blood supply and the circulation to the brain leading to enhance the sleep cycle and improve the quality of sleep and decrease the insomnia symptoms. Besides, its known effect on tension and fatigue relieve.

The present study finding goes in the same line with a study conducted in ***Nigeria by Tella et al., 2011*** to explore the effects of aerobic exercises on the level of insomnia and fatigue in pregnant women. They founded that aerobic exercise can control insomnia in addition to control of fatigue also. Also, the present study finding was in agreement with a randomized controlled trial conducted by ***Rodriguez-Blanque et al., 2018***, on 140 pregnant women to determine association between moderate- intensity physical activity in an aquatic environment and quality of sleep. They found that water exercise improved the quality of sleep during pregnancy. Moreover, the present study finding is also parallel with a prospective study which conducted by ***Borodulin et al., 2010*** on 1259 pregnant women to examine associations between physical activity, stress, and preterm birth in prenatal clinics at the University of North Carolina Hospitals. They concluded that physical activity is a correlated factor which affects sleep duration and insomnia. Furthermore, a recent randomized controlled trial conducted by ***(Özkan&Rathfisch, 2018)*** on 92 pregnant women to assess the effects of relaxation exercises on subjective sleep quality of in third-trimester pregnant women. They founded that, performing relaxation exercises improved the global quality of sleep and also some components of quality of sleep.

The present study findings revealed that, there were statistical significant associations between total score of insomnia post intervention and some socio- economic characteristics such as advanced age, occupational status, body mass index and family income ($P < 0.05$).

Regarding the age, the present study finding revealed that insomnia was associated significantly with advanced age ($P=0.022$). this can be attributed to that advanced age women is commonly has more children with more responsibilities, also, advanced age hemostatic and hemodynamic condition is easily affected that young women with lesser responsibilities. The present study finding is supported by a study conducted by ***Robillard et al., 2010*** in Canada to evaluate the effects of age, sex and topography on slaw wave activity dissipation during sleep. They revealed that high prevalence of insomnia is more reported by older women than younger.

Concerning family income, the present study revealed that there was a significant association between inadequate family income and insomnia during pregnancy. This could be attributed to, the busy mind of pregnant women with inadequate family income about how to manage pregnancy, delivery and the daily living conditions. The present study finding goes in accordance with a study conducted by ***Patel et al., 2010*** to assess self-report about quality of sleep in relation to socioeconomic factors including poverty. They founded that sleep quality most significantly influenced in poor individuals than others.

In relation to body mass index, the present study revealed that there was a significant statistical association between high BMI and insomnia. This can be attributed to that higher body mass index can work as a barrier to engage in any form of exercises especially during final trimester of pregnancy, so, insomnia remains. Furthermore, ***Mirdha et al, 2017*** conduct a study to investigate the effects of body mass index on sleep quality and insomnia. They observed that obesity and overweight pregnant women had insomnia than others with normal BMI.

Finally, the present study revealed that, there was a highly statistical significant association between total score of insomnia post intervention and multi-parity. This can be due

to, the attributed effect of increased parity and children number on the ability of the pregnant women to participate in any form of exercises.

CONCLUSION

This study concluded that:

Practicing walking with deep breathing exercises has a positive effect on severity of insomnia during third trimester of pregnancy.

RECOMMENDATIONS

Based on the findings of this study the researcher recommended the following:

1. Raising awareness of the pregnant women about the importance of practicing walking with deep breathing exercises to decrease insomnia severity during third trimester of pregnancy.

2. Apply further research concerning effect of practicing walking with deep breathing exercises on pregnant women weight gain during pregnancy.

REFERENCES

[1]. Ahmed, W. Effect of minor discomforts self-care guideline on women's health during pregnancy. Mansoura University, Faculty of Nursing, Department of Woman's Health and Midwifery Nursing. 2015. pp. 58.

[2]. Alipour, Z., Lamyian, M., &Hajizadeh, E. Sleep quality in late pregnancy and postpartum depression. *Scientific Organization Database*. 2012; 14 (8), 39-74. Available at:http://www.sid.ir/En/Journal/ViewPaper.aspx?ID=261473

[3]. Blanque, R., García, J., Sánchez-López, A., Mur-Villar, N., Aguilar-Cordero, M. The influence of physical activity in water on sleep quality in pregnant women: A randomized trial. *Women and Birth*. (2018) e51–e58.

[4]. Borodulin, K., Evenson, K., Monda, K., Wen, F., Herring, A. & Dole N. Physical activity and sleep among pregnant women. *PaediatrPerinatEpidemiol.* 2010; 24(1): 45–52.

[5]. Buysse, D. Sleep health: can we define it? Does it matter? *Sleep.* 2014; *37*(1), 9-17. Available at:https://academic.oup.com/sleep/article/37/1/9/2454038.

[6]. Ding X., Wu, X., Xu, SH., Zhang,SH., Jia, X., & Zhu, R. A systematic review and quantitative assessment of sleep-disordered breathing during pregnancy and perinatal outcomes. *Sleep Breath.* 2014; 18:703–713.

[7]. Guertler, D., Vandelanotte, C., Short, C., Alley, S., Schoeppe, S., & Duncan, M. The association between physical activities, sitting time, sleep duration, and sleep quality as correlates of presenteeism. Journal of occupational and environmental medicine. 2015; 57(3), 321.

[8]. Hashmi, A., Bhatia, S., Bhatia, S., et al. Insomnia during pregnancy: diagnosis and rational interventions. *Pak J Med Sci*. 2016; 32:1030–1037.

[9]. Hassan, A. Guideline to improve sleep pattern among pregnant women in third trimester. Mansoura University, Faculty of Nursing, Department of Woman's Health and Midwifery Nursing.2018.pp 78.

[10]. Kay-Stacey, M., &Attarian, H. Managing Sleep Disorders During Pregnancy. GENDER AND THE GENOME. 2017; 1(1):34-45.Available at: http://journals.sagepub.com/doi/pdf/10.1089/gg.2016.0006.

[11]. Kumar, H. Sleep disorders in Pregnancy: Glycaemic implications. Journal of the Pakistan Medical Association *66*.(Suppl 1), 60-64. Available at: https://www.researchgate.net/profile/Kvs_Hari_Kumar4/publication/307600466_Sleep_disorders_in_Pregnancy_Glycaemic_implications/links/586d6f1c08ae8fce491b5c97/Sleep-disorders-in-Pregnancy-Glycaemic implications.pdf

[12]. Kızılırmak,A., Timur S,, &Kartal,P. Insomnia in Pregnancy and Factors Related to Insomnia. Scientific World Journal. 2012;197093.Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3349327/

[13]. Lamina, S., &Agbanusi, E. Effect of aerobic exercise training on maternal weight gain in pregnancy: a meta-analysis of randomized controlled trials. *Ethiop J Health Sci*.2013; 23: 59-64.

[14]. McLafferty, P., Spada, M., &Gopalan, P. Pharmacologic Treatment of Sleep Disorders in Pregnancy. *Sleep Med Clin*. 2018; 243–250.

[15]. Micheli, K., et al. Sleep patterns in late pregnancy and risk of preterm birth and fetal growth restriction. Epidemiology. 22, 738–744. Available at: https://doi.org/10.1097/EDE.0b013e31822546fd (2011).

[16]. Mirdha, M., Mallick, H., Tiwari, V., Viswakarma, L., Akhtar, N., & Nanda, R. Effects of body mass index on sleep quality and sleep disturbances. *Sleep Medicine.* 2017; *40*, e224-e225.

[17]. Morin, C. (1993). Insomnia: Psychological assessment and management. New York: Guilford Press. Available at: http://psycnet.apa.org/fulltext/1993-26854-001.html

[18]. Morong, S., Hermsen, B., de Vries, N. Sleep-disordered breathing in pregnancy: a review of the physiology and potential role for positional therapy. *Sleep Breath.* 2014; 18:31–37.

[19]. Moore, S., Patel, A., Matthews, C., Berrington de Gonzalez, A., Park Y., Katki, H., Linet, M., Weiderpass, E., Visvanathan, K., Helzlsouer, K., Thun, M., Gapstur, S., Hartge, P., and Lee, I. Leisure time physical activity of moderate to vigorous intensity and mortality: A large pooled cohort analysis. PLoS Med 2012; 9: e1001335. doi: 10.1371 /journal.pmed.1001335.

[20]. Nascimento, s., Surita, F., Godoy,A., Kasawara, K., &Morais S. Physical Activity Patterns and Factors Related to Exercise during Pregnancy: A Cross Sectional Study. PLOS/ ONE; 2015. 1:14.

[21]. Neri, I., Bruno, R., Dante, G., &Facchinetti, F. Acupressure on Self-Reported Sleep Quality during Pregnancy. *Journal of acupuncture and meridian studies*.2016; 9(1), 11-15.

[22]. NihalTaflkran. Pregnancy and sleep quality. Turk SocObstetGynecol 2011; 8: 181- 7.

[23]. Okun, M., Buysse, D., Hall, M. Identifying insomnia in early pregnancy: validation of the Insomnia Symptoms Questionnaire (ISQ) in pregnant women. *J Clin Sleep Med.* 2015; 11:645–654.

[24]. Özkan, S., &Rathfisch, G. The effect of relaxation exercises on sleep quality in pregnant women in the third trimester: A randomized controlled trial. *Complementary Therapies in Clinical Practice*.2018; 32, 79-84. Available at:https://www.sciencedirect.com/science/article/pii/S174388111830286X.

[25]. Patel, N., Grandner, M., Xie, D., Branas, C., &Gooneratne, N."Sleep disparity" in the population: poor sleep quality is strongly associated with poverty and ethnicity. *BMC Public Health.* 2010; 10(1), 475.

[26]. Robillard, R., Massicotte – Marquez, J., Kawinska, A., Paquet, J., Frenette, S., &Carrier, J. Topography of homeostatic sleep pressure dissipation across the night in young and middle aged men and women. *Journal of sleep research*. 2010; 19(3), 455-465.

[27]. Reichner, C. Insomnia and sleep deficiency in pregnancy.Obstet Med. 2015; 8(4): 168–171.

[28]. Sedov, I., Cameron, E., Tomfohr-Madsen, L. Sleep quality during pregnancy: A meta-analysis. Sleep Medicine Reviews. 2018; 38: 168e176.

[29]. Sharma, S., Nehra, A., Sinha, S., et al. Sleep disorders in pregnancy and their association with pregnancy outcomes: a prospective observational study. *Sleep Breath.* 2016; 20: 87–93.

[30]. Tella, B., Sokunbi, O., Akinlami, O.,&Afolabi, B. Effects of aerobic exercises on the level of insomnia and fatigue in pregnant women. The Internet Journal of Gynecology and Obstetrics 2011; 15: DOI: 10.5580/549.

[31]. Teong, A., Diong, A., Omar, A., Tan, B. The Impact of Self-Reported Sleepon Caesarean Delivery in Women Undergoing Induction of Labour: A prospective study. 2017; 7: 12339.

[32]. Xu, T., Feng, Y., Peng, H., Guo, D. & Li, T. Obstructive sleep apnea and the risk of perinatal outcomes: a meta-analysis of cohort studies. *Scientific reports*.2014; 4, 6982, https://doi.org/10.1038/srep06982 (2014).

[33]. Zucconl, M., &Ferrl, R. Sleep Medicine Textbook. Assessment of sleep disorders and diagnostic procedures. Classification of sleep disorders. *European Sleep Research Society. 2014; 95-109.* Available at: https://www.esrs.eu/fileadmin/user_upload/publications/ESRS_Sleep_Medicine_Textbook_Chapter_B1.pdf