Comparison of Sleep Quality in Athlete and Non-Athlete Pregnant Women

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Received: 2 May 2016
Revised: 2 Aug 2016
Accepted: 24 Sep 2016

Background: Recent studies have shown that physical activity is an effective factor in improving sleep quality. Therefore, this study aimed to compare the sleep quality of athlete and non-athlete pregnant women.

Methods: This cross-sectional descriptive analytical study was performed on 300 pregnant women in the last trimester of pregnancy, referred to prenatal care unit of Amiralmomenin Hospital in city of Zabol. After selection via convenience sampling, participants were divided into two groups of athletes and non-athletes based on their level of physical activity. Data were collected via a demographic form and Pittsburgh sleep quality and Baek physical activity questionnaires. Data was analyzed using descriptive statistics and t-test.

Results: The mean score of sleep quality in pregnant women was 8.51 ± 2.09. Overall, 81.2% of the subjects had poor sleep quality. The sleep quality of athlete (7.19 ± 1.68) and that of non-athlete (10.18 ± 2.28) pregnant women were undesirable. However, athlete pregnant women had significantly better sleep quality compared to non-athletes (P=0.003).

Conclusion: Based on the results and the high prevalence of sleep disorders in pregnant women, as well as the positive impact of physical activity on sleep quality, daily physical activity seems essential for improvement of sleep quality in pregnant women.

Keywords: Quality of Sleep, Pregnant Women, Physical Activity

This paper should be cited as: Azarniveh MS, Tavakoli Khormizi SA. [Comparison of Sleep Quality in Athlete and Non-Athlete Pregnant Women]. J Res Dev Nurs Midwifery. 2017;14(1):1-7.

Introduction

Pregnancy is one the most important and critical period of a woman's life (1). Adequate rest and sleep leads to mother's calmness and psychological comfort protecting the health of both infant and mother. The important functions carried out during sleep include energy store, division of skin and bone marrow cells, hormone regulation and secretion, immune system regulation and memorization of mental performance (2). Inadequate sleep reduces concentration, judgment, ability to perform daily activities, and increases irritability (3). Sleep disorder is a common problem during pregnancy. Women complain of delayed sleep, frequent awakenings, insomnia and reduced sleep quality beginning from the start of the 12th week of pregnancy up to 2 months after delivery (4).

Sleep disorder is caused by a variety of factors including psychosocial problems, physiological and pathological changes in the body, certain diseases, drug use or discontinuation and hormonal changes during pregnancy (2, 5). The quality and amount of sleep is different in different stages of pregnancy (6, 7). Most sleep disorders occur during the third trimester of pregnancy (8). In one study, 97% of the women suffered from sleep disturbance in the third trimester of pregnancy (9). Another study showed that 61.15% of the pregnant women had sleep disorders (10). In general, changes in sleep patterns increase from 13-80% in the first trimester of pregnancy to 66-97% in the third trimester (1). Nowadays, many researchers are interested in non-pharmacological and applicable methods affecting physical and mental health of pregnant women (11). One of the most effective non-pharmacological methods is sport or physical activity. Pregnancy may put pregnant women at risk of reduced physical activity. Pregnant women are usually prohibited from exercise and physical activity (12). Mean while, studies on the body's physiological response to training show that healthy pregnant women can balance between exercise and their physiological needs (13, 14). The benefits of exercise for mother includes physical and psychological changes such as reduced fatigue and swelling of the lower limbs, reduced insomnia, stress and depression. In addition to exercise, regular physical activity can prevent some of the negative consequences of pregnancy such as gestational diabetes, preeclampsia and musculoskeletal problems; maintain a healthy weight; and improve mental health (12, 15, and 16). Some studies have shown that the women who exercise during pregnancy are more likely to continue the activities after delivery. Thus, the beneficial effects of exercise are most likely to continue until the postpartum period, which improves health of the mother and the baby (17). The beneficial effects in various aspects have been observed in pregnant women who perform regular aerobic exercise. Exercise leads to improved glucose metabolism and insulin sensitivity during pregnancy (15).

According to the American College of Obstetricians and Gynecologists, all pregnant women except those with complex conditions should exercise at a moderate level, equivalent to 60-90% of age-predicted maximum heart rate (18). Barbara Estranfeld (2000) demonstrated that women with less physical activity suffer from more severe sleep disorders (19).

The previous studies on physical activity in pregnant women indicated a reduction of leisure, occupational and heavy physical activities. Most of these changes in the intensity and duration of physical activities occur during the third trimester of pregnancy. It seems that pregnant women replace heavy physical activity with a lighter and longer activity (16). Many studies showed the beneficial effects of physical activity on mother and fetus, providing a problem-free pregnancy. (20) Having a great deal of information about the physiological manifestations of exercise during pregnancy (21), there is no comprehensive and accurate understanding of the effects of exercise with different intensity and duration on the mother and fetus during pregnancy. As shown by study of Tiffany et al. (2012), aquatic exercise with moderate-intensity reduces back pain in pregnant women and determines the time of birth (22).

However, studies have reported some adverse effects for exercise during pregnancy that include fetal endangerment due to temperature rise in mother, reduced fetal growth due to declined blood supply to placenta, and reduced fetus access to glucose in response to the mother's lowered blood sugar (20).

Considering the limited number of studies on the effects of exercise on pregnancy and quality of sleep of mothers, as well as lack of attention to sleep disturbance in the third trimester of pregnancy, this study was conducted to compare sleep quality of athlete and non-athlete pregnant women.

Methods

This cross-sectional study was conducted on pregnant women admitted to prenatal care unit of Amiralmomenin Hospital in Zabol, from September to December 2014. Overall, 300 pregnant women in the last trimester (at least 28 weeks) of pregnancy were selected via convenience sampling and Morgan-Krejcie table. The participants were then divided into two groups of athletes and non-athletes based on their level of physical activity. The inclusion criteria were willingness to participate in the study, gestational age of 28 weeks, primiparous, singleton pregnancy, lack of physical and psychological disorders, and lack of use of drugs, tobacco, sleeping pills and hormones. The participants were assured of the confidentiality of the data and informed consent was obtained from all of them. Pittsburg Sleep Quality Index (PSQI) questionnaire and Baek habitual physical activity questionnaire were used to assess sleep quality and level of physical activity, respectively. All data were collected via daily interviews and completion of the questionnaires by the researcher and the research assistants at the hospital from 8 to 12 A.M.

The PSQI questionnaire was used to assess sleep quality of sleep problems during the past four weeks. The questionnaire has 19 questions and seven subscales: 1) general self-description of sleep, 2) delayed sleep, 3) length of efficient sleep, 4) sleep sufficiency (ratio of total time sleeping by the total duration of time in the bed), 5) sleep disorder (middle of the night insomnia), 6) amount of sleeping pills used, and 7) morning performance (problems experienced by an individual resulting from poor sleep during the day). Each scale of the questionnaire was scored based on a 4-point Likert scale (from 0 to 3). Reverse scoring method was used in some instances such as questions related to subscale 6. Total score, between 0 and 21 was obtained from the sum of each score. Overall score of > 5 indicated poor sleep quality (23). Sensitivity and specificity of the PSQI are 89.6 and 86.5%, respectively. In addition, the reliability of the questionnaire was validated in Iran (3). In the present study, Cronbach's alpha was used to determine the internal reliability of the questionnaire (r=0.82). Baek's physical activity questionnaire is an international standard questionnaire for assessment of physical activity level that was translated by scientific centers including the University of Tehran and Iran University of Medical Sciences. The questionnaire has been used in a number of studies in Iran and evaluates physical activity level via 16 questions that are scored based on Likert scale (24).

The participants with physical activity score of ≤ 2.40 were considered as non-athlete and the participants with score of ≥ 2.40 were considered as athlete (25). Based on the result of Cronbach's alpha, reliability of the questionnaire was determined as r=0.78. Normal distribution of the data was assessed by Shapiro-Wilk test;The data were analyzed using SPSS-19, descriptive statistics and t-test; and P-value ≤ 0.05 was considered as statistical significance level.

Results

In this study, 300 primiparous women in the last trimester of pregnancy (28 weeks) with mean [standard deviation(SD)]age of 21.78±3.89 were studied. The education level of most mothers was below high school diploma (73%). In addition, 71% of the participants were homemakers and 66 were athletes. Characteristics of the participants are shown in Table 1.

Table 1:Characteristics of Subjects Studied

Variable	Number (%)
Education Level	
Below high school diploma	219(73)
High School Diploma	43(14)
Bachelor degree	27(9)
Master's degree or higher	11(4)
Occupation	
Homemaker	213(71)
Employed	87(29)
Economic Status	
Good	39(13)
Moderate	189(63)
Poor	72(24)
Physical Activity	
Athlete	66(22)
Non-athlete	234(78)

In this study, 59 of the participants (19.8%) had good sleep quality and 243 (81.2%) had poor sleep quality. Sleep quality of pregnant women in the third trimester are shown in Table 2.

The mean score of sleep quality in women was 8.51 ± 2.09. A significant difference was observed between the two groups in the scales of delayed sleep (P=0.041), length of efficient sleep (P=0.002), sleep sufficiency (P=0.005) and sleep disorders (P=0.001), but that is not the case for other three scales. The mean overall score in the athlete and non-athlete participants was 7.19 ± 1.68 and 10.18 ± 2.28, respectively. Given that the score of higher than five indicated a poor sleep quality, both groups in the present study had poor sleep quality. The mean overall score of sleep quality in non-athletes was significantly higher than in athletes, indicating a poorer sleep quality in non-athlete subjects (Table 2).

Table 2: Mean total scores of sleep quality in the two groups

Group / Sleep quality scale	Athlete Mean ±SD	Non-athlete Mean ±SD	Total	P-value
General self-description of sleep	1.24±0.61	1.92±1.39	1.57±0.98	0.375
Delayed sleep	1.82±1.86	2.27±2.01	2.55±1.93	0.041*
Length of efficient sleep	2.03±0.65	2.71±0.98	2.39±0.80	0.002 *
Sleep sufficiency	1.14±1.55	1.61±1.40	1.39±1.46	0.005 *
Sleep disorder	0.97±0.72	1.79±0.26	1.37±0.45	0.001 *
Amount of sleeping pills used	0.11±0.09	0.13±0.58	0.12±0.22	0.081
Morning performance	0.79±0.98	0.97±1.12	0.88±1.02	0.314
Total Score	7.19±1.68	10.18±2.28	8.51±2.09	0.003

Discussion

The results showed that only 19% of the women studied had good sleep quality and the rest had poor sleep quality. The mean score of sleep quality was 8.51 ± 2.09. In a similar study by Ahmadinejad et al. (2014), the average quality of sleep in the third trimester was 8.27 ± 2.91, and 89.88% of pregnant women had poor sleep quality. They believed that the increased age of mothers and decreased physical activity were associated with poor sleep quality (26). In the study of Taskran et al. (2011), average sleep quality during maternity was 8.22 ± 3.02, and 89% of

pregnant women suffered from sleep disorders. It is noteworthy to mention that pregnant women with any gestational age were enrolled in their study (27). Moreover, Jahdi et al. (2013) reported the average sleep quality in the second trimester of pregnancy to be 7.78 ± 3.14, and poor sleep quality was observed in 87.2% of the participants (1).On the other hand, Alipour et al. (2012) evaluated the sleep quality of 156 pregnant women in their late pregnancy. They found that at the end of 28th week and 38th week of pregnancy, 56.3% and 65.7% of the women had poor sleep quality, respectively. This indicates deterioration in sleep quality as the pregnancy advances (6). Mindel et al (2010). also reported that pregnant women suffered from more severe sleep problems near the end of their pregnancy (4), which not only affected their mental and psychological health, but also increased their anxiety, fear of taking care of the baby and accepting the role of a mother in the family. In some cases, it causes grief and negative effects on the family after delivery, and indirectly imposes an economic burden on society (26). The results of the present study and other studies have some inconsistencies, which may be partly justified by differences in the exercise level, age and cultural and individuals characteristics of subjects studied. The present study evaluated the quality of sleep in athlete and non-athlete pregnant women and showed that athletes experienced a better sleep quality compared to non-athletes. Similarly, study of Ahmadinejad et al. (2014) reported that increased physical activity was associated with more desirable sleep quality patterns in pregnant women in their last trimester of pregnancy. Nevertheless, physical activity was defined as amount of daily exercise in form of slow walking, which may have had calming effects on the subjects of the mentioned study (26). While study of Rajabi (2014) found an association between intense physical activity and poor sleep quality in pregnant women in the third trimester, no association was found between sleep quality and daily physical activity at home or work and leisure activities (28). The inconsistency between the results of this study and the present study could be related to different research methods and number of participants.

Nowadays, sport trainings are considered as non-therapeutic procedures with positive effects that have been used in several studies in various forms. However, the biological mechanism of these positive effects on sleep quality and patterns remains unknown. Enhanced physical fitness following exercise is accompanied by an increase in electroencephalographic delta waves during the third and fourth stages of sleep. In addition, influence on the neuroendocrine system, particularly metabolic changes in the brain, may be associated with improved sleep quality (17). The present study also investigated the education level, employment status and economic status and found no significant association between these variables and quality of sleep in the two groups. However, study of Dabiran et al. (2009) showed that women with higher education level experienced better sleep quality because they were more physically active. The women with bachelor's or higher degree had better sleep patterns compared to women with less than high school diploma who had worse sleep quality (18). Most of the participants examined in the present study had less than a high school diploma that could justify their poor sleep quality to some extent. Most pregnant women in this study were homemakers with poor or moderate economic status (87%), which could be attributed for the poor quality of sleep and mental state of the participants.

A limitation of the study was the possible impact of unknown individual factors and other psychological and mental factors on mothers that could not be controlled by the researchers. This limitation was intended to be solved by increasing the number of participants.

Conclusion

The results of this study show that 81.2% of the pregnant women in their last trimester of pregnancy suffer from sleep disorders, indicating a high percentage of poor sleep quality during this period. However, athlete pregnant women have better sleep quality compared to non-athletes. Given the significant increase in severity of sleep disorders in the

last trimester of pregnancy that could cause serious problems for both mother and fetus, it is recommended to perform daily physical activities during this period to improve the sleep quality of mothers.

Acknowledgements

The study was derived from a research project with contract number P8/15830 (2013), approved by Zabol University. The author would like to express their appreciation to Vice Chancellor for Research, Zabol University, staff of maternity unit at Amiralmomenin Hospital and all the participants in this study.

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