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Full Length Research Paper

Sleep quality and related factors in pregnant women

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Abstract

The objective is to evaluate sleep quality and related factors in pregnant women. Pittsburgh Sleep Quality Index (PSQI), Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI) were administered to 102 healthy pregnant women in a face-to-face interview. The mean age was 25.5±3.8 (17-34) and the mean gestational week was 32.1±8.3 (12-41). Mean total PSQI score was 7.5±4.4, mean score in Beck Anxiety Inventory was 11.5±5.2 (2-22), the mean score in Beck Depression Inventory was 8.5±2.7 (3-15). Sixty one percent of the pregnant women had a global PSQI above 5. There was a strong positive correlation between mean PSQI total score and anxiety and weak positive correlation between mean PSQI total score and depression [(r=0.71, p<0.001), (r=0.31, p<0.001)]. No statistically significant correlation was found between age and mean PSQI total score (r=0.188, p=0.059). There was a significant relation between BMI and the mean PSQI (p<0.001). A positive weak correlation was found between gestational week and mean PSQI total score (r=0.389, p<0.001). A statistically significant difference was found between caffeine consumption and mean PSQI total score (p<0.001). There were no statistically significant differences between exercise and mean PSQI total score nor between gravida number and mean PSQI total score (U=1044.50, Z=-0.10, p=0.91). Sixty one percent of the pregnant women reported low sleep quality which was adversely affected by depression, anxiety, advanced gestational week, BMI and caffeine.

Keywords: Pregnancy, sleep quality, Pittsburgh sleep quality Index.

INTRODUCTION

Sleep disorders are common problems in developed countries (Moline et al., 2003). Accordingly an important factor that impacts daily life in pregnant women is sleep quality yet few studies were found that identified sleep disturbances in pregnancy and their relationships to the wellbeing of the pregnant women. Sleep is an essential and significant behavior, which is affected by many physiological or pathological changes in pregnancy period. Hormonal and physical changes that occur during pregnancy, increasing respiratory problems as a result of pressure that growing fetus makes to the diaphragm and some diseases like nocturia, back pain, leg cramps and restless leg syndrome effect sleep habits and sleep quality (Pien and Schwab, 2004; Lee, 1998). In addition, other factors that affect sleep quality and habits are psychiatric conditions such as anxiety and depression.

Recently, some other factors which affect sleep quality such as caffeine consumption and exercise have been investigated. On the other hand, the studies evaluated the sleep quality in pregnant women are limited. In evaluation of sleep quality, sleep questionnaires are frequently used to detect the common sleep problems and identify the need for further evaluation (Krishna et al., 2006). Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse et al. in 1989 and is considered as the most able instrument to determine the sleep quality (Buysse et al., 1989).

The purpose of this study is to assess the relationship of sleep quality to demographic factors, anxiety, depression, caffeine consumption and exercise in pregnant women.

MATERIALS AND METHODS

This study was carried out among 102 healthy pregnant women over 17 in Izmir Aegean Obstetrics and

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Table 1. Demographic data and mean score

Age (years)	25,5±3,7 (17-34)
Gestational week	32,1± 8,3 (12-41)
Mean PSQI score	7,5±4,4 (1-19)
Mean score in Beck Anxiety Inventory	11,5±5,2 (2-22)
Mean score in Beck Depression Inventory	8,5±2,7 (3-15)

Gynecology Training and Research Hospital between February 2010 and March 2010. Simple random sampling was used to select the population of 102 women. Pregnant women with any condition which may affect the sleep quality, i.e. noise, partnership and pet factor, TV-consumption, itching and etc. were not included in study.

The study was approved by the Hospital's Scientific Ethics Committee. Informed consent was obtained for all women.

"Pregnant Identification Form" was used to obtain identifying information about pregnant women: age, Body Mass Index (BMI), gravida, smoking history, caffeine intake and exercise status. We took the consumption at least a cup of regular coffee (200ml) or more in evening time as caffeine intake criterion, and any non-work, recreational regular activity or exercise, such as walking for exercise, swimming or dancing etc. as exercise criterion. Then both the "Pittsburgh Sleep Quality Index (PSQI)" and the "Beck Anxiety Inventory and Beck Depression Inventory' were administered.

Instruments

The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. This inventory was developed in 1989 by Buysse et al., 1989. Agargun et al., 1996 determined that PSQI was appropriate for the Turkish community (Agargun et al., 1996).

The PSQI inventory has 24 questions in total, 19 which are self-report questions and five are answered by the individual's spouse or roommate. These 5 questions were used for clinical information only (Agargun et al., 1996). The PSQI has 7 components: 1. subjective sleep quality, 2. sleep latency, 3. sleep duration, 4. habitual sleep efficiency, 5. sleep disorder, 6. sleeping pill use, and 7. daytime dysfunction. Each component is rated on a scale of 0-3, thus the score range is 0-21. The inventory shows sleep quality, not if there is a sleep disorder or prevalence of sleep disorders. If the total score is above 5, it is considered to be bad sleep quality. Overall sleep quality is rated as good with a score of 0-5 and bad with a score of 6-21. Diagnostic sensitivity is 89.6% and specificity is 86.5% (Agargun et al., 1996).

The Beck Anxiety Inventory (BAI) was used to assess frequency of anxiety systems and administered to adolescents and adults in groups (Beck et al., 1988). This likert-type inventory is composed of 21 items on a likert scale of 0-3, with higher scores indicating higher anxiety. The distribution of points is as follows: 0-7 minimal-level anxiety symptoms, 8-15 low-level anxiety symptoms, 16-25 middle-level anxiety symptoms and 26-63 points high-level anxiety symptoms.

The Beck Depression Inventory (BDI) is used to assess the severity of the symptoms of depression and may also be high with psychiatric disorders (Hisli, 1998). The higher the score, the greater the depression with distribution as follows: 0-9 minimal-level depression, 10-16 low-level depression, 17-29 mid-level depression, 30-63 high-level depression.

SPSS for Windows 15.0 was used to assess the data. Frequency and percentage scores were used to analyze distribution data; mean ± SD and Min-Max values were used to analyze numerical data. For the intergroup comparison of numerical data, normal distribution, T-test, and ANOVA were used. The Mann-Whitney test and Kruskal Wallis test were used to compare the numerical data with non-normal distributions. For the intergroup comparison of frequency, chi-square test and Pearson correlation analysis were used. The p value was set at 0.05.

RESULTS

Table 1 shows the demographic data and the mean scores. The Global PSQI score for 61% of the pregnant women was above 5 with a mean total PSQI score of 7.5±4.4 (Moline et al., 2003; Pien and Schwab, 2004; Lee, 1998; Krishna et al., 2006; Buysse et al., 1989; Agargun et al., 1996; Beck et al., 1988; Hisli, 1998; Rao et al., 2009; Hall et al., 2009; Lauderdale et al., 2006; Sahlin et al., 2009; Facco et al., 2010; Hall et al., 2009; Lee et al., 2007; Da Costa et al., 2010; Sahsıvar and Marakoglu, 2010; Skouteris et al., 2009; Youngstedt, 2005). The mean score of the PSQI sub-components can be seen on the chart (Table 2).

The mean score of the BAI was 11.50±5.23 (2-22), the mean score of the BDI was 8.5±2.7 (Lee, 1998; Krishna et al., 2006; Buysse et al., 1989; Agargun et al., 1996; Beck et al., 1988; Hisli, 1998; Rao et al., 2009; Hall et al., 2009; Lauderdale et al., 2006; Sahlin et al., 2009; Facco et al., 2010; Hall et al., 2009; Lee et al., 2007) (Table 1).

Table 2. Distribution of the mean PSQI total scores in pregnant women

SLEEP QUALITY (N=102)	X±SD
Global PSQI score	7,5±4,4
Subjective Sleep Quality	1,4±0,9
Sleep latency	1,6±1,0
Sleep duration	1,1±1,3
Habitual Sleep Efficiency	1,3±1,4
Sleep Disorder	1,2±0,6
Sleep Pill	0,6±0,4
Daytime Dysfunction	0,8±1,0

Table 3: Connection of some facts with PSQI

	N (%)	PSQI score	P value
Parity =1	73 (71,7)	7,5±4,6	0,91
Parity ≥2	29 (28,4)	7,6±4,0	
Caffeine Consumer	58 (51,7)	9,6±3,4	0,00
Caffeine Non-Cons.	44 (48,3)	5,9±4,2	
Exercise Maker	26 (32,2)	8,3±4,1	0,22
Exercise Non-Maker	76 (67,8)	7,2±4,5	

There was a strong positive correlation between the mean PSQI total score and anxiety ($r=0.71$, $p<0.001$) and a weak positive correlation between mean the PSQI total score and depression ($r=0.31$, $p<0.001$).

There was a significant relation between BMI and the mean PSQI ($p<0.001$) indicating that as BMI increases, the mean PSQI increases.

No statistically significant relation was found between age and mean PSQI total score ($p=0.059$).

Seventy-three women (72%) were nulliparous while the 29 (28%) were multiparous (Table 3). No statistically significant difference was found between gravida number and mean PSQI total score ($p=0.91$).

A positive weak correlation was found between gestational week and mean PSQI total score, indicating that the quality of sleep decreased with an increase in gestational week ($r=0.389$, $p<0.001$).

Fifty-eight (57%) women consumed caffeine while 44 (48.3%) did not consume caffeine (Table 3). A statistically significant difference was found between caffeine consumption and the mean PSQI total score ($p<0.001$), indicating that pregnant women consuming caffeine have lower sleep quality.

Seventy-six women did exercise while 26 (32.2%) did not exercise (Table 3). No statistically significant difference was found between exercise status of the pregnant women and mean PSQI total score ($p=0.229$).

DISCUSSION

In our study, we found that most of the women (61%) presenting to the outpatient clinic for pregnancy follow-up had poor sleep quality (PSQI score above 5). It was also found that once the level of anxiety increased, sleep quality decreased, and there was a similar but weaker correlation between level of depression and sleep quality.

No correlation was established between age, gravida, smoking habit, exercise and sleep quality, however, it was found that sleep quality deteriorated with increasing consumption of caffeine and gestational week. Despite the studies that there was a negative correlation between age and sleep quality, we did not find any kind of correlation between them (Rao et al., 2009; Hall et al., 2009; Lauderdale et al., 2006; Sahlin et al., 2009). Many of the studies about sleep quality are about non-pregnant women of wide range of age groups may explain why the result in our study is different from the literature. The age range of the patients in our study was between 17-34 and their mean age was 25, 5±3, 7. Facco et al. made a study with 202 healthy pregnant women and found a significant correlation between ages and sleep quality (Facco et al., 2010). However; although 31 of the patients in this study were above age of 35, there were no women above age of 34 in our study. This situation may explain why we could't find any significant relation between age and sleep quality.

It can be expected that women who experience pregnancy for the first time may have worse sleep quality due to reasons such as fear of the impending birth of the child. In a study made by Hall et al., 650 pregnant women with 35-39 gestational weeks between ages of 17-46 were evaluated; 25% of them had a fear of childbirth (Hall et al., 2009). However, no correlation was found between

multiparous pregnants (40%) and nulliparous pregnants (60%) in terms of sleep duration. Similarly in our study no difference was found between the two groups in terms of sleep quality including sleep duration. However; this result may be skewed in our study because the majority of the women (72%) were nulliparous.

Depression and anxiety are seen more frequently in pregnancy (Lee et al., 2007). In a study of 245 pregnant women by Da Costa et al., it was found that sleep disorders and depressive feelings were among significant parameters reducing health-related quality of life in pregnant women (Da Costa et al., 2010). Sahsıvar et al. studied 102 pregnant women and determined that as depressive symptoms increased the quality of life decreased in high risk pregnant women (Sahsıvar and Marakoglu, 2010). However, in our study we included only healthy pregnant women. Consequently; depressive symptoms determined among pregnant women in our study group may be attributed to the reasons beyond pregnancy. Skouteris et al. also evaluated 252 healthy pregnant women using the PSQI and BDI (Skouteris et al., 2009). They were separated into 3 groups according to BDI scores, no depression, low-level depression, and middle to severe depression. It was determined that sleep quality was worse in the group with severe depression. Similarly we found that depression increased when sleep quality decreased

It is an expected situation that problems with respiration, the gastrointestinal system, and sleep increase as a result of the pressure from the growing fetus on the thorax and abdomen as gestation advances. A statistically significant correlation between gestational week and sleep quality confirms this expectation. Accordingly; as gestational week increases, sleep quality decreases. Using PSQI scores, Facco et al. made a prospective study with 202 pregnant women and determined that sleep quality decreased with increasing gestational week (Facco et al., 2010). In their study, 39% of the women had scores above 5 in the first trimester and 53% in the third trimester. In our study we found that as BMI increased the sleep quality decreases. In our opinion this result parallels with decreased sleep quality with increasing gestational age. Similarly Facco et al. found that PSQI increases as BMI increases in above mentioned study.

There are many studies showing that exercise improves sleep quality (Youngstedt, 2005; Atkinson and Davenne, 2007; Quan et al., 2007). However, Borodulin et al. investigated 1259 pregnant women and found no correlation between exercises and sleep quality in pregnant women (Borodulina et al., 2010). In our study too, we found no correlation between exercises and sleep quality in pregnant women. The reason for this may be that pregnant women likely do less rigorous exercise than non-pregnant women.

According to our study results, the use of caffeine in pregnant women affects sleep quality in a negative way. Caffeine is included in many food items and particularly in coffee. Thus we evaluated only coffee drunk in evening hours. Oral intake of caffeine reaches plasma peak concentration in circa 30-75 minutes; its half-life is 3-7 hours and it metabolizes into paraxanthine at a rate of 80% while it is at a rate of 16% for theobromine and theophylline. It is paraxanthine in caffeine that is the primary stimulant (Roehrs and Thomas, 2008). There are a lot of studies showing that caffeine affects sleep quality, makes it difficult to sleep and causes sleep fragmentation (Smith, 2002; Youngstedt et al., 2000; Shilo et al., 2002). Shilo et al. have determined in their randomized controlled study that caffeine lessens the synthesis of melatonin primary hormone that regulates sleep, as well as that it deteriorates sleep quality (Shilo et al., 2002). Although these studies are unusual to be made over pregnant women, we have made a study over them and found out that it affects sleep quality of pregnant women in a negative way. On the other hand we could not evaluate the relationship between amounts of coffee and sleep quality.

In our study evaluating sleep quality and related factors in pregnant women, we have found that sleep quality is poor in pregnant women and it is adversely affected by caffeine, gestational week, BMI, depression, and anxiety.

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