Quantification Of Subjective Sleep Quality In Healthy Nulliparous Pregnant, Post Partum And Post Menopausal Women In Shiraz, Using The Pittsburg Sleep Quality Index

M Nami, A Saremi, G Madadi

Abstract

Quantification of subjective sleep quality in healthy nulliparous pregnant, post partum and post menopausal women in Shiraz, using the Pittsburg Sleep Quality Index

Aim: To quantify and compare various sleep quality indices and corresponding variates amongst nulliparous pregnant, post partum and post menopausal women referring to outpatient obstetrics and gynecology facilities at Shiraz university affiliated hospitals (July-December, 2010), in Shiraz, central southern Iran.

Materials and Methods: In this cross sectional survey, 200 women of which 120 were pregnant [40 first trimester (PrT1), 40 second trimester (PrT2) and 40 third trimester (PrT3)], 40 post partum (PP) and 40 post menopausal (PM) were asked to complete the self rated Pittsburg Sleep Quality Index (PSQI) questionnaire. Participants were matched on variables that could affect their sleep including age (PrT1, PrT2, PrT3 and PP), BMI, collar size, gestational age (for each trimester subjects separately) and, weeks post partum (PP).

Exclusion criteria were known medical or psychiatric conditions. PP cases were specifically assessed for post partum depression (PPD) using the post partum depression screening scale (PDSS). Obtained data were compared across groups using independent sample t-test and one way ANOVA through SPSS 17.0 analyzer.

Results: Global sleep quality score was most favorable in PrT2 subjects and showed to be poorest among PP cases (4.25±0.22 and 12.52±0.49, respectively). PM, PrT3 and PrT1 subjects in turn had poorer to more favorable total sleep quality. Concerning the PSQI components, worst sleep duration (PSQIDURAT), subjective sleep latency (PSQILATEN), sleep disturbance (PSQIDISTB), self rated overall quality (PSQIQUAL), medication use (PSQIMEDS) and dysfunctional days (PSQIDAYDYS) belonged to PP (5.1±0.16), PM (48.35±6.42), PP (2.55±0.07), PrT2 (1.00±0.05), PP (1.87±0.16), PP (2.2±0.16) groups, respectively. PP cases who suffered PPD had less effective sleep and reported more frequent wakes after sleep onset compared to those without PPD (p<.05).

Conclusion: Post partum women with or without PPD suffer significantly a poorer sleep than other groups studied. Post menopausal and third trimester pregnant women were shown to have poorer sleep indices to lesser extent. Sleep quality in PrT1 and PrT2 does deteriorate however not to the level affecting patients activities of daily living.

INTRODUCTION

Studying sleep in women has recently been turned into an interesting shared focus of attention for sleep and OB-GYN specialists. Other related disciplines such as neuroscience, endocrinology and pulmonology have also been contributing to the better understanding of sleep characteristics among women population. There has been growing number of researches in this previously less studied domain over the past twenty years and this has led to a clearer insight encouraging upcoming investigations.

Hormonal fluctuations and physiological alterations put females into different physiologic stages which occur within their life span. These stages which are unique to women include child bearing years and menstrual cycles, pregnancy, post partum and post menopausal states. Sleep in women can be described as a complex dynamic physiological process to restore physical agility and energy that varies with the physiological stages one may experience throughout her life. Realizing that sleep disturbances reported among women are highly prevalent, the National Sleep Foundation Poll in 2007 brought this fact to light [1]. In that report nearly three in ten women had a good night’s sleep only a few nights per months or less. Forty six percent of women stated that they had a sleep problem almost every night. More than one third (37%) said they had a difficulty falling asleep and/or wake up too early and could not get back to sleep (34%) at least a few nights a week. 84% of pregnant and post partum...
women had sleep problems at least a few nights per week.

During pregnancy in particular, there has been various reports in performed studies denoting difficulty in sleep in different trimester pregnant women. This can partly be attributed to the enlargement of the fetus, frequent urination and snoring. The point which makes sleep problem during pregnancy an important issue is that sleep disruption in pregnancy has been shown to increase pro-inflammatory markers which can negatively affect pregnancy outcomes[2,3]. The significance of sleep disorders during pregnancy has been so notable that the American Sleep Disorders Association has recognized pregnancy associated sleep disorders as a distinct entity since twenty years ago[4]. Moreover estrogen and post partum periods have been recognized as a vulnerable period for mood change. Anxiety and stress disorders and more importantly antenatal or post partum depression (PPD) affects many of pregnant and post partum women and these will in turn negatively impact their overall sleep quality.

To address the etiology for sleep disturbances during pregnancy (Pr), post partum (PP) and post menopausal (PM) periods, at first place we know that neuro-endocrinologic changes may be an important culprit. Before focusing on assessment of sleep quality and evaluating sleep characteristics in women of different physiologic stages, we would briefly bring the effect of sex hormones on sleep here. Progesterone acts as a sedating agent, acting in an agonistic manner on the same receptors (GABA\(_A\)) as benzodiazepines and barbiturates, though it may act in a unique binding site. Similar to these medications, this hormone also affects Rapid Eye Movement (REM) sleep, prolonging the latency to REM sleep and reducing the amount of REM sleep [5]. It appears to act via progesterone metabolites (5-alpha-pregnanolone and 5-beta-pregnanolone), apparently increasing the frequency and duration of chloride channel opening[6]. Estrogen on the other hand increases the turnover of norepinephrin in the brainstem, the hypothalamus, locus coeruleus and nucleus accumbens, which appears to be the method of REM sleep decrease. As well estrogen appears to interact with GABA and serotonin receptors. The effect of estrogen on REM sleep was demonstrated by oophorectomy in adult female rat, which caused an increase in REM sleep. This increase was suppressed by the exposure to estradiol [7,8].Women who are peri-menopausal and are treated with estrogen tend to report decreased sleep latency, decreased nocturnal waking and increased total sleep time[9]. When comparing human who are receiving estrogen exogenously with those who do not, they appear to have increased REM sleep time and decreased REM sleep latency [8]. Since these two main hormones are subjected to alterations during pregnancy, post partum and post menopausal states, sleep patterns and subsets of its quality tend to vary among women in each group.

To briefly outline what is known about women sleep quality, we would review some literature notes on sleep quality in pregnant, post partum and post menopausal women. In 2007, the National Sleep Foundation polled a group of pregnant women to assess their self reported severity of sleep disturbance. High prevalence of snoring, apneas and restless leg syndrome suggest that more attention could be spent evaluating and addressing these sleep disorders. Pregnant women were most likely to be awake a lot during the night (74%), and/or wake up too early and be unable to get back to sleep (46%). In fact 30% of pregnant women and 42% of post partum women report nearly or never getting a good night’s sleep, compared to 15% among all women. Among women who were pregnant the most frequently reported reasons for awakening were to go to bathroom (33%) or due to noise (29%). Notably only 1% of pregnant women reported consuming sleep aid medications. Pregnant (31%) and post partum (35%) women were significantly more likely than women in general (22%) , and specifically perimenopausal (18%) ,post menopausal (20%) and menstruating (21%) women, to say their sleepiness interfered with daily activities at least a few days a week[1,4].

The first trimester (PrT1) of pregnancy is notably for increasing progesterone levels. In addition, nocturnal sleep may be disrupted due to the physiological changes in woman’s body and the resultant effects. Sleep usually improves in the second trimester, followed by a return of sleep difficulties in the third trimester [10]. Generally, first trimester pregnant women (PrT1) experience an increased total sleep time(possibly due to sedative properties of progesterone) and meanwhile face with sleep disruptors including nausea, vomiting and frequent urination [11]. Among second trimester pregnant women (PrT2) many report improved sleep and daytime alertness, decreased nausea and normalization of total sleep time, While in third trimester they have decreased total sleep time, increased insomnia or nocturnal awakenings and increased daytime...
sleepiness. During the third trimester many women report more difficulty in falling asleep and maintaining sleep. Common complaints include general physical discomfort, frequent urination, back, joint and neck pain, vivid dreams, nasal congestion, leg cramps, fetal movements and contractions [12]. After delivery, women’s sleep does not return immediately to normality. This finding in post partum (PP) period may be related to the needs of the infant, but also may involve a number of physiological and psychological changes. PP women are more likely to wake up feeling un-refreshed (72%) and/or awake a lot during the night (68%). Overall, about three in ten women (29%) say they have used a sleep aid at least a few nights a week. The vast majority of post partum women say they are awakened during the night to give care to the child (90%). Forty seven percent report no one helping with kids, which may lead to significant sleep disruption and resultant day time sleepiness. From the time of peri-menopause the overall prevalence of sleep disturbances reported increases from the premenopausal prevalence of 16-42% to 39%.

By post menopause, the prevalence further increases to 35-60% of women surveyed. Part of this escalation in prevalence of sleep complaints may be explained by increased risk for sleep disordered breathing with menopause in the absence of hormone replacement therapy. It is also postulated that a major contributor to this prevalence is changing hormonal environment associated with menopause and its effect on the brain.

Assessment of the sleep quality in women has been done through subjective and objective measures. The objective assessment tool which is polysomnography at sleep laboratories is also considered as the gold standard for evaluation of sleep disorders in clinical setting. Subjective measures include self rated sleep quality questionnaires of which the Pittsburg Sleep Quality Index (PSQI; Buysse, Berman, & Kupfer, 1989) is a widely used tool [13].

In Iran, although there are a few reports aiming at the sleep quality in woman and in general [15,16], no survey has assessed and compared the sleep quality of pregnant, post partum and post menopausal women, and (b) Assessment of the presence of post partum depression among surveyed women and determination of its effect on sleep quality among them.

**MATERIAL AND MEASUREMENTS**

For this cross-sectional study, primarily we prepared educational leaflets in local language briefing the importance of sleep in women and placed them in large quantity at disposal for women referring to busy antenatal and gynecology outpatient clinics of four university affiliated hospitals in Shiraz city, central southern Iran. It was stated on leaflets that, this study is not solely focused on those who specifically suffer frank sleep difficulties and any one could contribute, in case willing to.

A convenience number of 200 subjects including 120 pregnant (40 PrT1, 40 PrT2 and 40 PrT3), and parallel groups of non pregnant (40 PP and 40 PM) were enrolled to the study on their own will. The purpose of the study was explained to them and they were all asked to complete Pittsburg Sleep Quality Index questionnaire. PP cases were also asked to complete the designated questionnaire to have them screened for post partum depression (PPD) symptoms. All subjects were matched on the variables which could affect their quality of sleep, including age (Pr.T1, Pr.T2, Pr.T3, PP), BMI, collar size, parity (Pr and PP), multiple vs. single gestation (Pr and PP), gestational age (Pr) and weeks post partum (PP).

The exclusion criteria were all pregnancy related disorders including hypertensive disorders of pregnancy, gestational diabetes mellitus, polyhydraminus and generally the presence of any marked underlying medical illness such as congestive heart failure, asthma and thyroid dysfunction. All candidates with neurologic or psychiatric morbidities were excluded from the survey.

After the study protocol was approved by the institutional review boards, data were collected from July to December 2010. Data were collected from participants on demographic information, sleep quality, post partum depression symptoms, using an investigator designed demographic form in local language (Farsi), the Persian translated version of Pittsburgh Sleep Quality Index and the Persian version of post partum depression screening scale questionnaire (PDSS: Beck and Gable, 2002) respectively.

Recorded demographic data of the surveyed subjects were age, marital status, Body Mass Index (BMI), collar size,
We used the self-rated 19-item PSQI (Buysse et al., 1989) questionnaire to assess the subjects’ sleep quality over the past month when surveyed. This widely applied questionnaire measures components of sleep quality including subjective sleep quality (PSQIQUAL), sleep latency (PSQILATEN), sleep duration (PSQIDURAT), sleep disturbances (PSQIDISTB), use of sleeping medication (PSQIMEDS), and daytime dysfunction (PSQIDAYDYS). Item questions are scored from 0 (without difficulty) to 3 (maximal difficulty). The cumulative scores of all components produce the global PSQI score (ranging from 0 to 21). The higher the total PSQI score, the poorer sleep quality will be. PSQI score of greater than 5 represents a diagnostic sensitivity of 90% and specificity of 87% in defining good and poor sleep [13]. In a validation study carried out by Salehi et al. (Modarres University, Tehran, Iran, 2010) PSQI Farsi version yielded a sound internal consistency reliability in 120 subjects studied. So in the present study the internal consistency of the same applied questionnaire format was high with a Cronbach’s $\alpha$ of 0.94[17]. Questionnaires were given to subjects incidence over the month prior to the evaluation time they were still in the same category (i.e. PrT1,PrT2,PrT3,PP and PM) which were labeled. Post partum subjects who were recruited were at their 6th to 10th week post partum. All recruited PP women were primiparous, breast feeding mothers. In this group specifically, we measured the severity of depressive symptoms using the post partum depression screening scale (PDSS: Beck and gable, 2002). PDSS is a 35-item self-rated scale with scores ranging from 35 to 175. Higher scores indicate greater PPD severity [14]. Scores of 35 to 39 are considered normal adjustment, 60 to 79 represent mild to moderate symptoms of postpartum depression, and scores of 80 to 175 indicate a positive screen for major postpartum depression. This questionnaire has been validated and used as an effective tool in measuring post partum depression. The alpha reliability for the entire scale in prior studies ranged from 0.93 to 0.98 [14]. Obtained data were then stratified and analyzed through the Statistical Package of the Social Sciences Program (SPSS) for Windows 17.0 (SPSS Inc., Chicago, IL). The research questions were answered by independent sample t-test and one way ANOVA. In analysis process a ‘p value’ of <0.05 was considered statistically meaningful.

RESULTS

Among all surveyed groups, PrT2 subjects reported the most favorable mean global sleep quality and were given the total mean score of less than 5 (4.25±0.22) which is associated with good sleep quality. Mean Total PSQI score showed to be poorest among PP cases (12.52±0.49). PM,PrT3 and PrT1 subjects in turn had poorer to more favorable total sleep quality (with Mean ±SEM global sleep quality score of 8.1±0.65, 6.19±0.94 and 5.75±0.21, respectively). Concerning the PSQI components, poorest sleep duration (PSQIDURAT), subjective sleep latency (PSQILATEN), disturbance (PSQIDISTB), self-rated overall quality (PSQIQUAL), medication use (PSQIMEDS) and dysfunctional days (PSQIDAYDYS) belonged to PP (5.1±0.16), PM (48.35±6.42), PP (2.55±0.07), PrT2 (1.00±0.05), PP (1.87±0.16), PP (2.2±0.16) groups, respectively. Whereas, the most favorable scores for each of the components mentioned above was for PrT2 (7.41±0.26), PrT2 (26±2.01), PM (1.55±0.09), PrT2 (1.00±0.05), PrT2 (0.00) and PrT2 (0.06±0.07) respectively. The mean values for each of the components is summarized in Table 2. Table 3 shows the analysis of variance of each component mean value and denotes a significant different between groups. Post partum group turned out to be of poorest sleep quality. The number and percentage of PP subjects who responded to each PSQI item question to self rate their sleep quality is outlined in Table 4. Since we aimed at exploring and showing details of sleep complaints amongst PP subjects and
define the effect PPD on their sleep quality we specifically brought the details of their scoring here (Table 4). In a separate analysis we found that 48% of post partum cases scored 80 and above in PDSS assessment for PPD. In addition, the analysis revealed that PP cases who suffered PPD had less effective sleep and reported more frequent wakes after sleep onset compared to those without PPD (p < 0.05). This data is summarized in Table 5.

**Figure 2**
Table 2: Mean values of PSQI components in different groups studied

<table>
<thead>
<tr>
<th>Component</th>
<th>Mean Square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective sleep latency</td>
<td>12.21</td>
<td>0.022</td>
</tr>
<tr>
<td>Wake up time</td>
<td>9.63</td>
<td>0.002</td>
</tr>
<tr>
<td>Efficient time slept</td>
<td>30.28</td>
<td></td>
</tr>
<tr>
<td>PSQI QUAL</td>
<td>5.12</td>
<td>0.000</td>
</tr>
<tr>
<td>PSQI MED</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>PSQI DISTR</td>
<td>0.83</td>
<td>0.000</td>
</tr>
<tr>
<td>PSQI DASYDYS</td>
<td>18.67</td>
<td>0.000</td>
</tr>
<tr>
<td>PSQI DASYS</td>
<td>0.79</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3**
Table 3: Analysis of variance within and between groups showing significant difference.

**Figure 4**
Table 4: Post partum subjects PSQI detailing, per number of subjects responding to each question subset

| Category: Post Partum (PP) | Number: 40 |
Mean duration in bed ± SEM: 7 hours and 4 minutes ± 1 hour and 39 minutes

Mean duration reported in effective sleep ± SEM (PAQIDURAT): 5.1 ± 0.16

**Figure 5**
Table 5: Differences in Psychiatric and Sleep Quality Variables Between Women With and Without PPD.

<table>
<thead>
<tr>
<th>Variable</th>
<th>With PPD (n=19)</th>
<th>Without PPD (n=21)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSQI Severity, M(SD)</td>
<td>37.38 (27.98)</td>
<td>42.35 (60.87)</td>
<td>-3.06*</td>
</tr>
<tr>
<td>Lifetime personal psychiatric history</td>
<td>14 (27.7)</td>
<td>4 (27.7)</td>
<td></td>
</tr>
<tr>
<td>Family psychiatric history</td>
<td>19 (94.1)</td>
<td>12 (57.1)</td>
<td></td>
</tr>
<tr>
<td>Periodic therapy</td>
<td>5 (22.7)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Antidepressants</td>
<td>11 (50.0)</td>
<td>9 (42.9)</td>
<td></td>
</tr>
<tr>
<td>Life stress</td>
<td>17 (75.3)</td>
<td>9 (42.9)</td>
<td></td>
</tr>
<tr>
<td>Tiredness</td>
<td>6 (26.1)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Wake after sleep onset M (SD)</td>
<td>13.80 (8.81)</td>
<td>11.55 (7.38)</td>
<td>-2.35*</td>
</tr>
<tr>
<td>Sleep latency M (SD)</td>
<td>12.98 (6.97)</td>
<td>11.83 (7.75)</td>
<td>1.41</td>
</tr>
<tr>
<td>Sleep efficiency M (SD)</td>
<td>87.64 (1.38)</td>
<td>87.17 (1.83)</td>
<td>2.06*</td>
</tr>
<tr>
<td>Wake episodes, M (SD)</td>
<td>10.29 (2.50)</td>
<td>9.50 (2.35)</td>
<td>1.66</td>
</tr>
</tbody>
</table>

*p<0.05
**p<0.001

Indices like bed and wake up time, sleep duration (PSQIDURAT) and subjective sleep latency (PSQILATEN) in different surveyed groups is shown in box plots in Figure 1. Sleep duration was least in PP group and subjective sleep latency was highest among PM cases. In our study PP subjects reported to go to bed later than other groups and tended to wake up earlier. Most of them and specifically those with PPD were complaining of frequent wakes after they fell asleep. Concerning the other important components of sleep quality including PSQIDISTB, PSQIQUAL, PSQIMEDS and PSQIDAYDYS, post partum subjects had poorest scores amongst all groups. Then it comes PM, PrT3 and PrT1 (Figure 2). Second trimester subjects, attaining the global PSQI of <5 had reported relatively a good sleep quality.

**Figure 6**
Figure 1: Box plots depicting the Mean±SEM in subjective sleep latency, duration, bed and wake up time in different groups

**Figure 7**
Figure 2: Bar graphs showing the mean values of different PSQI components. Mean scores in post partum (PP) group represent poorest sleep quality amongst all groups

**DISCUSSION**
Our results reveals that in Persian ethnicity women studied, post partum subjects with or without post partum depression are more likely to suffer sleep disorders since they scored the worst in self rated PSQI sleep quality assessment conducted in this study. The greatest disruption of sleep is encountered in post partum and may contribute to or resulted from post partum blues or frank depression [18]. In the current survey
Concerning the sleep architecture and quality during postpartum depression (PPD) (Table 5).

The use of sleep aid medications was highest among PPD cases while none of the PrT2 subjects reported the use of sleep aids medication over the month prior to evaluation. PP subjects surveyed in this study had difficulty going to sleep (75% with more than 30 minutes of sleep latency), frequent awakening (75% at least a few times a week) and fewer hours of night sleep (PSQIDURAT: 5.1 ± 0.16) (Table 4). These findings were in agreement with what reported by Lee et al., 2000 and Swain et al., 1977 [19, 20]. Trakada and colleagues in 2003 reported that the frequency of sleep disorder increases significantly in postpartum period [21]. Complying with this was our results which showed more than 55% of PP subjects reported at least a few episodes of uncomfortable breathing, coughing or loud snoring while slept per week. Women with PPD experienced poorer sleep quality compared to women without PPD. Worsening sleep quality (increased sleep latency, wake after sleep onset, poor sleep efficiency) also predicted PPD symptom severity. Thus poor sleep quality may have a significant negative impact on the severity of depressive symptoms in women with PPD.

In an early study done by Karacan et al in 1968, polysomnographic findings and subjective sleep quality assessment results suggested that women who experienced poor sleep efficiency would be more likely to develop postpartum depression [22]. Findings of the recent studies showing that postpartum women with depressive symptoms self-reported longer sleep latency and more wakes after sleep onset, resulting in a lower sleep efficiency and overall poor sleep quality compared to women without depressive symptoms, support the earlier data [23-25]. Thus results of the current survey using a subjective sleep quality assessment done in part for the Persian ethnicity postpartum women in central southern Iran, also supports previous studies using such a kind subjective measures of sleep quality (self-report) in postpartum women diagnosed with PPD (Table 5).

Concerning the sleep architecture and quality during menopause and the findings we arrive at in the present survey, in alignment with what Baker et al. stated on dissatisfactions with sleep quality in postmenopausal women, our PM subjects reported frequent spontaneous awakening, feeling drowsy in many days throughout the week and reported needing extra sleep. When comparing PM group with PrT1, the PM subjects showed to rate their sleep quality components such as subjective sleep latency (p < 0.0001), need for sleep medications (p < 0.0001) and dysfunctional days (p < 0.0001) worse than those by PrT1 cases. Through same comparison between PM group, PrT2 and PrT3, postmenopausal women rated their subjective sleep latency, wake up time, overall sleep quality, need for sleep medications and dysfunctional days generally worse than pregnant subjects (p < 0.0001). However, when comparing PM and PP groups, the only component which postmenopausal women reported to be worse than postpartum subjects, was the subjective sleep latency (p < 0.05). The above comparison data shows that following postpartum group the worst self-reported sleep quality is by postmenopausal women. The process of aging is associated with poorer sleep partly because light as a Zeitgeber may be less able to maintain the circadian cycle. Evidence suggests that this due to a combination of decreased light exposure due to decreased mobility. Possible age-related reduced photic input is due to macular degeneration, cataracts, and other pathologies of the eye and neural losses at the level of the suprachiasmatic nucleus (SCN). It is known that elderly with visual impairments are 30-60% more likely to have impaired nighttime sleep than those with unimpaired vision. The observation of frequent early morning awakening in the elderly resulted in the hypothesis that aging is associated with shortening of the circadian period. Melatonin associated homeostatic processes are also subject to change with aging. Weakening of both circadian and homeostatic processes interact to result in sleep disturbance in postmenopausal women. An additional factor influencing sleep and sleep quality in postmenopausal state is hot flashes. Hot flashes affect 75-85% of perimenopausal and postmenopausal women. For most the symptoms dissipate within 1 year but for 25% the symptoms may last 5 years and for small minority the rest of their life [26]. The hot flash is believed to be mediated through the preoptic area of the anterior hypothalamus and associated with an increase of brain norepinephrine metabolism and seems to be associated with luteinizing hormone pulses. However, studies show that between those PM women with and without hot flashes no difference in sleep stage measures is noted. Total sleep time
and number of arousals and awakenings are not different between groups [27]. Although estrogen replacement has demonstrated benefit in reduced sleep disturbances and improved quality of life in post menopausal women, the risk benefit ratio of hormone replacement therapy must be weighed heavily.

The other issue we need to discuss here is the findings we arrived at upon assessing the sleep quality of pregnant women. In our survey, PrT2 subject rated their sleep quality as the most favorable compared to other groups studied and among the pregnant subjects the poorest sleep quality global and component scores was in PrT3. We know that beginning early in pregnancy, due to the sedative effect of progesterone many women experience an increase need for sleep. Pien and Schwab in 2004 reported that during early pregnancy, sleep efficiency is diminished because REM sleep is decreased and non-REM sleep prolonged [28]. Many of the pregnant women at their first trimester complain of potential sleep disruptors such as nausea, vomiting and frequent urination. This is somewhat associated with poor sleep quality. By second trimester many report noticeably improved sleep and daytime alertness. This is what we also arrived at when reviewing and analyzing the PSQI questionnaires filled out by our PrT2 subjects. By late second trimester and the third, total nocturnal sleep duration is decreased, and women usually begin to complain of sleep disturbances again. Approximately half of our PrT3 subjects surveyed had loud snoring or experienced uncomfortable breathing. This finding was in agreement with what reported by Izcı and associates in 2005 [29]. Based on literature, although total nocturnal sleep time is similar to non pregnancy, sleep efficiency is perturbed and that is due to the reduction in REM sleep [18].

CONCLUSION
This cross-sectional study provides preliminary evidence in Persian ethnicity women population that post partum women between weeks 6-10 suffer significantly poorer sleep than other subgroups studied. Postmenopausal women and PrT3 cases were shown to have poor sleep quality indices to lesser extent. Sleep quality in PrT1 and PrT2 does deteriorate however not to the level affecting patient activity of daily living. Impaired Sleep quality of post partum women may be related to stress depression and need for infant care. In post menopausal cases this may be directly related to the changing hormonal environment and homeostatic processes and the resultant effects on the brain.

CLINICAL RELEVANCE
Evaluation for sleep quality and depression should be part of routine prenatal and post partum check-ups. Information on women's sleep quality, stress, and depressive status can be used to individualize interventions for women sleep disorder.

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Author Information

Mohammad Torabi Nami, MD,PhDc
Department of Neuroscience, Institute for Cognitive Sciences Studies, ICSS

Ali Akbar Saremi, PhDc
Department of Neuroscience, Institute for Cognitive Sciences Studies, ICSS

Gooya Madadi, MD
Department of Obstetrics and Gynecology, Shiraz Medical University