ORIGINAL RESEARCH ORİJİNAL ARAŞTIRMA

DOI: 10.5336/nurses.2023-96174

# The Relationship Between Postpartum Poor Sleep Quality, Fatigue and Postpartum Depression: A Descriptive Research Study of the North West of Türkiye

## Kadınlarda Doğum Sonrası Kötü Uyku Kalitesi, Yorgunluk ve Postpartum Depresyon Arasındaki İlişki: Türkiye'nin Kuzey Batısında Tanımlayıcı Bir Çalışma

Sevde ÇUBUKÇU AKSU[a], Pelin PALAS KARACA[b]

[a]Department of Nursing, Balıkesir University Faculty of Health Sciences, Balıkesir, Türkiye
[b]Department of Public Health Nursing, Balıkesir University Faculty of Health Sciences, Balıkesir, Türkiye

**ABSTRACT Objective:** The study was conducted to examine the relationship between poor sleep quality, fatigue and depression prevalence in women in the 2nd and 6th weeks postpartum in Türkiye. **Material and Methods:** The research was planned as descriptive-correlational study. The study was conducted with 379 women. The study was conducted in three phases in a city hospital located in the Marmara Region of Türkiye. The data was collected using a form including the demographic/obstetric characteristics of the women, Visual Similarity Scale for Fatigue (VAS-F), Edinburgh Postpartum Depression Scale (EPDS) and Pittsburg Sleep Quality Index. **Results:** Of the women, 58.2% were multiparous and 50.2% gave birth with cesarean section. Midwives and nurses were involved in 4.3% of the prenatal care and 53.9% of postpartum care. The rate of poor sleep quality was 90.6% in the 2nd week of postpartum and 87.6% in the 6th week of postpartum. The rate of postpartum depression was 29.6%. The mean scores of the primiparous and multiparous women on "VAS-F" in the 6th week were higher compared to the mean scores in the 2nd week. The risk of postpartum depression increased with "VAS-F" in the 2nd week of postpartum and the "EPDS" scores were found to be high in all patients with poor sleep quality. **Conclusion:** It is recommended that each woman be evaluated individually regarding fatigue, depression and sleep quality in the postpartum period and an intervention plan should be developed for the identified causes.

**Keywords:** Postpartum; sleep quality; fatigue; postpartum depression

**ÖZET Amaç:** Araştırma, Türkiye'de kadınların postpartum 2 ve 6. haftalardaki kötü uyku kalitesi, yorgunluk ve depresyon prevalansı ile aralarındaki ilişkinin incelenmesi amacıyla yapılmıştır. **Gereç ve Yöntemler:** Tanımlayıcı tipte yapılan çalışmaya postpartum dönemdeki 379 kadın katılmıştır. Batı Marmara bölgesindeki bir şehir hastanesinde üç aşamalı yürütülen çalışmada veriler; kadınların demografik ve obtetrik özelliklerini içeren form, Yorgunluk Görsel Benzerlik Skalası [Visual Similarity Scale for Fatigue (VAS-F)], Edinburg Postpartum Depresyon Ölçeği [Edinburgh Postpartum Depression Scale (EPDS)] ve Pittsburg Uyku Kalitesi Ölçeği [Pittsburg Sleep Quality Index (PSQI)] ile toplanmıştır. **Bulgular:** Kadınların %58,2'si multipar olup, %50,2'si sezaryen ile doğum yapmıştır. Ebe ve hemşireler prenatal bakımın %4,3'ünde postpartum bakımın ise %53,9'unda yer almıştır. Kadınların doğum sonrası 2. hafta kötü uyku kalitesi %90,6 ve 6. hafta %87,6 iken, postpartum depresyon oranı %29,6 bulunmuştur. Primipar ve multipar kadınların 6. haftadaki "VASF" puan ortalamaları, 2. haftadaki puan ortalamalarına göre daha yüksek bulunmuştur. Doğum sonrası 2. haftada postpartum depresyon riski yorgunlukla artmış olup, kötü uyku kalitesi olanların tamamında EPDS puanları yüksek bulunmuştur. **Sonuç:** Postpartum dönemde yorgunluk, depresyon ve uyku kalitesi ile ilgili her kadının ayrı ayrı değerlendirilmesi ve belirlenen nedenlere yönelik bir müdahale planı geliştirilmesi önerilmektedir.

**Anahtar Kelimeler:** Postpartum; uyku kalitesi; yorgunluk; postpartum depresyon

In the postpartum period, health professionals give more importance to the health of newborns rather than mothers. This causes general problems such as poor sleep quality and fatigue to be perceived as part of the birth process. This situation also makes it difficult to determine the physical symptoms and

**Correspondence:** Sevde ÇUBUKÇU AKSU
Department of Nursing, Balıkesir University Faculty of Health Sciences, Balıkesir, Türkiye
**E-mail:** sevde.c@gmail.com

Peer review under responsibility of Turkiye Klinikleri Journal of Nursing Sciences.

***Received:*** 16 Feb 2023 ***Received in revised form:*** 10 Aug 2023 ***Accepted:*** 28 Aug 2023 ***Available online:*** 02 Nov 2023

health problems that may occur due to birth in time and to make effective follow-ups and treatments.[1-4] Previous scholars have revealed the negative short or long-term effects of the correlation between poor sleep quality, fatigue or depression, which are evaluated as general postpartum problems.[5-9] Postpartum fatigue that negatively affects the mothers' quality of life, partner relationships and infant care is known to be associated with the mothers' socio-demographic characteristics, labor characteristics, length of hospitalization, family relations, lifestyle, infant care, insomnia and diseases present in the mother such as anemia, thyroid disorders, mood disorders, etc.[1,5,6,10] Researchers show that poor sleep quality is an important component of postpartum fatigue due to external reasons such as insufficient sleep, sleep disorders and the irregular sleep hours of infants, breastfeeding at night and insufficient family support.[11-13] There are numerous health effects of postpartum fatigue and poor sleep quality on mothers and their families, including depression, early discontinuation of breastfeeding, reduced quality of life, and impaired infant development. They are more destructive than other health problems related to birth and are often ignored by healthcare providers.[6,13-15]

Sleep disorders and fatigue are common symptoms in individuals with depressive disorders and are in a two-way relationship with symptoms of depression. Postpartum depression may aggravate sleep quality that is already impaired because suffering from sleep-related difficulties is a symptom of depression.[13,16-18]

When all these effects are combined, it should not be forgotten that poor sleep quality and fatigue, which are defined as the general problems of the postpartum period, and depression, which may result due to these problems, will have expensive and destructive consequences in terms of the woman, her family, and health resources of the country unless effective follow-up, counseling, and treatment are provided to combat for these problems. Ninety-seven percent of births are delivered in health facilities; however, postpartum maternal health is the least known issue among healthcare professionals despite having access to the prenatal, delivery and postpartum care guidelines of the Ministry of Health of the Republic of Türkiye.[2] Whereas early involution time and rapidly-developing morbidity and mortality causes such as hemorrhage, infection, and eclampsia are given priority especially in postpartum visits, the general problems that decrease the postpartum quality of life are ignored and few studies have been carried out on this topic. The study was conducted to examine the relationship between poor sleep quality, fatigue and depression prevalence in women in the 2nd and 6th weeks postpartum in Türkiye.

## MATERIAL AND METHODS

### TYPE OF RESEARCH

The research is a descriptive study conducted to examine poor sleep quality, fatigue and the prevalence of depression in women in a city hospital located in the Marmara Region of Türkiye in their 2nd and 6th weeks of postpartum and the correlation between them.

### STUDY DESIGN AND SAMPLE

This study was carried out in a city hospital in the Marmara Region of Türkiye between January 2018 and December 2018. The universe of the study consists of 3,558 women who have given birth in the last year. Sample size, in G*power 3.1.9.2 (Computer Soft., Düsseldorf, Germany) program, in the level of 80% power, 5% Type I error, $R^2$: 0.55, 392 calculations. Women who were out of the scope of the study 10 women could not be reached, 2 women did not want to meet, 1 women died. The posthoc power analysis of the research was calculated using the G*Power 3.1.9.7 program. The correlation value of the research was calculated as -0.057 as a result of the calculation carried out using the research data in which the total sample number was 379, and the power of the research (1-β) was calculated as 0.95 with a 5% margin of error (a=0.05) for the correlation analysis. Women who had characteristics such as multiple pregnancies, diagnosed sleep disorders or mental diseases, substance use, partner violence, and neonatal intensive care treatment were excluded from the study.

## DATA COLLECTION

The study was carried out in third phases. In the first phase, the data was collected using the "data collection form related to women's descriptive characteristics", which included socio-demographic, prenatal and postpartum characteristics of women in the first 24 hours after birth, to the women in a city hospital located in the Marmara Region of Türkiye, who accepted to participate in the study. Women were made explanations on how to complete the scales they will use. In the second and third phase, the data was collected using the "Visual Similarity Scale for Fatigue-VAS-F," "Edinburgh Postpartum Depression Scale (EPDS)" and "Pittsburg Sleep Quality Index (PSQI)" by conducting telephone interviews with the mothers in the 2nd and 6th weeks of postpartum at home, who participated in the research. Of the women, 385 were reached at the postpartum 2nd week and 379 at the 6th week. The study was completed with 379 participants (96.6%) (Figure 1).

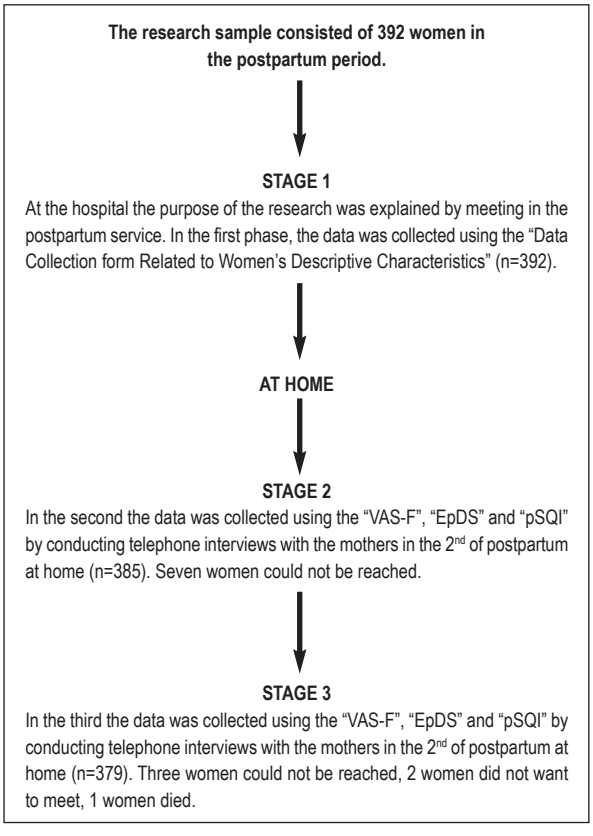


**FIGURE 1:** Flowchart of the research.
VAS-F: Visual Similarity Scale for Fatigue;
EPDS; Edinburgh Postpartum Depression Scale; PSQI: Pittsburg Sleep Quality Index.

The "VAS-F", which is used for the determination of fatigue status, was developed by Lee and Zaffke in 1990 and its Turkish validity and reliability study was conducted by Yurtsever. This scale consists of 18 items and 2 subscales; energy and fatigue.[19,20] The high score obtained from the fatigue subscale and the low score obtained from the energy subscale indicate that the severity of fatigue is high.

The "EPDS", which is used for identification women experiencing depressive symptoms in the postpartum period, was developed by Cox et al. in 1987 and its Turkish validity reliability study was conducted by Engindeniz et al. in 1996.[21,22] This scale consist of 10-item. EPDS scores ≥12, the standard cut-off score recommended when screening for probable major depression.

The "PSQI", which is used for evaluation sleep quality and sleep disorders over the past month and consists of 19 items and 24 questions, was developed by Buysse et al. and its Turkish validity reliability study was conducted by Ağargün et al.[23,24] Eighteen questions scored in the scale consist of 7 components. A total score greater than 5 indicates "poor sleep quality".

## STATISTICAL ANALYSIS

The data obtained was analyzed using the SPSS 21.0 (SPSS Inc., Chicago, IL, USA). In the statistical analysis, percentage and relative risk calculation, Fisher's exact chi-square test, chi-square test and logistic regression analysis were used. The change in the "VAS-F" and "PSQI" scores of the postpartum women in the 2nd and 6th weeks was investigated using non-parametric repeated measures two-way analysis of variance and npaRLD from R packages. In the evaluation of scores obtained from the scales, Mann-Whitney U test and one-way analysis of variance were used for the repeated measures; Pearson's correlation test was used to evaluate the correlation between fatigue, poor sleep quality and depression. Values were demonstrated as mean±standard deviation. A p value less than 0.05 was considered statistically significant.

## ETHICAL CONSIDERATIONS

The study was conducted in accordance with the principles of the Declaration of Helsinki and the consent

of the women was obtained for the study. For this study, the ethics committee (date: July 28, 2017, no: E-29319) approval has been obtained from the Ethics Committee of the Clinical Researches of the Faculty of Medicine of Balıkesir University.

## RESULTS

### SOCIODEMOGRAPHIC CHARACTERISTICS

The mean age of the women was 28.02±5.62, 7.7% were at the age of 19 years and below. Of the participants, 35.5% were primary school graduates, 73.2% were not employed, 57.2% had moderate income.

### PREGNANCY, BIRTH, AND POSTPARTUM CHARACTERISTICS

Multiparous women comprised 58.2% and 50.2% had a cesarean section of the study sample. Those who received prenatal care comprised 99.2% of the group, while the corresponding figure for postpartum care was 93.5%. Midwives and nurses were involved in 4.3% of prenatal care and 53.9% of postpartum care. The care consisted of infant care (22.0%), nutrition (14.0%), contraception (12.9%), health check (6.6%) and all of those (44.3%).

### FATIGUE-RELATED CHARACTERISTICS IN THE 2nd AND 6th WEEKS OF POSTPARTUM

The mean fatigue score in the primiparous women was 106.54±16.95 in the 2nd week and 109.13±14.47 in the 6th week. Parity was found to affect the "VAS-F" score which underwent a change from 2nd week to 6th week of postpartum (p=0.042). The mean scores of the primiparous and multiparous women on "VAS-F" in the 6th week were higher compared to the mean scores in the 2nd week (p<0.001). Fatigue score in the postpartum 6th week was found to be significantly higher than that in the postpartum 2nd week (Table 1).

### SLEEP QUALITY-RELATED CHARACTERISTICS IN THE 2nd AND 6th WEEKS OF POSTPARTUM

The mean "PSQI" score was 8.62±3.24 in the postpartum 2nd week and 8.35±2.91 in the 6th week. According to the women's "PSQI" score in the postpartum 2nd week, it was determined that 90.6% of the women had poor sleep quality. Similarly, according to 6th week "PSQI" score, 87.6% were found

**TABLE 1:** Comparison of VAS-F general and subscale scores measured in the 2nd and 6th weeks according to the parity status of the women included in the study.

| | | | | | Parity | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | X̄±SD/Median (Q1-Q3) | Test statistic | Df | Main effect p value | Primiparous X̄±SD/Median (Q1-Q3) | Multiparous X̄±SD/Median (Q1-Q3) | Test statistic | Df | Common effect p value |
| Visual similarity scale for fatigue | | | | | | | | | |
| 2nd week | 105.39±17.37/103 (90-119.5) | 141.103 | 1 | <0.001 | 106.54±16.95/105 (95-120) | 104.55±17.65/95 (90-119) | 4.122 | 1 | 0.042 |
| 6th week | 107.92±14.98/108 (92-125) | | | | 109.13±14.47/108 (95-120) | 107.02±15.32/105 (90-125) | | | |
| Fatigue | | | | | | | | | |
| 2nd week | 77.24±17.92/80 (70-86) | 351.047 | 1 | <0.001 | 78.69±17.23/80 (75-90) | 76.18±18.38/80 (70-86) | 0.004 | 1 | 0.948 |
| 6th week | 80.39±17.13/85 (75-90) | | | | 82.15±16.52/85 (75-95) | 79.09±17.5/85 (75-90) | | | |
| Energy | | | | | | | | | |
| 2nd week | 28.44±10.53/25 (23-35) | 0.657 | 1 | 0.418 | 27.91±7.28/25 (23-35) | 28.82±12.38/25 (23-35) | 0.495 | 1 | 0.482 |
| 6th week | 28.02±10.42/25 (20-35) | | | | 27.59±8.32/25 (23-36) | 28.33±11.75/26 (20-35) | | | |

Nonparametric analysis of variance test was used for repeated measurements. Descriptive statistics were presented as mean±standard deviation and median-interquartile width.
p values were accepted as statistically significant (p<0.05). Q1: 1st quartile, Q3: 3rd quartile; *An R software package npaRLD (Nonparametric Analysis of Longitudinal Data in Factorial Experiments); **Two-way repeated measures analysis of variance; SD: Standard deviation; Df: Degree of freedom; VAS-F: Visual Similarity Scale for Fatigue..

to have poor sleep quality. In Table 2, when the changes over time were considered, the difference between subjective sleep quality, sleep efficiency, sleep duration, daytime dysfunction and sleep disturbances subscale medians was statistically significant ($p<0.05$ for each). While 6th week subjective sleep disturbance, sleep quality and daytime dysfunction medians were lower than those in the 2nd week, sleep duration and sleep efficiency medians were higher (Table 2).

### CORRELATION BETWEEN FATIGUE AND SLEEP QUALITY

The 2nd week "VAS-F" energy subscale score of the women was not statistically significantly and linearly correlated with the "PSQI" total and subscale scores ($p>0.05$). There was a statistically significant and reverse correlation between the postpartum 6th week "VAS-F" energy subscale score and the total "PSQI" score ($r=-0.116$ and $p=0.024$). It was determined that there was a statistically significant and reverse correlation between the mean score of energy subscale of "VAS-F" applied to the women included at the end of the 2nd and 6th weeks of postpartum and the mean score of sleep duration subscale of "PSQI" ($r=-0.116$ and $p=0.023$, $r=-0.102$, and $p=0.047$, respectively). There was a statistically significant and reverse correlation between the mean score of energy subscale of "VAS-F" applied to the women at the end of the 2nd week of postpartum and the mean score of sleep disturbances subscale of "PSQI" ($r=-0.113$ and $p=0.026$) (Table 3).

### POSTPARTUM DEPRESSION SCALE RELATED CHARACTERISTICS

According to "EPDS" scores of the women, it was determined that 29.6% had depression and depression ratio according to age and income levels ($p<0.001$). According to the multiple logistic regression analysis results, the risk of depression was found to be higher in women who below the age of 19 [6.927 (1.649-29.098), $p=0.008$]; who had had 4 or more pregnancies [0 (0-0.049), $p=0.003$]; who had given 3 live births [569.657 (8.642-37549.793), $p=0.003$]; who had undergone curettage once [120.555 (4.313-3370.075)]; who had experienced a miscarriage once [26.382 (1.966-353.983), $p=0.013$]; who had experienced miscarriage twice [21.709 (1.297-363.307), $p=0.032$]; who had with a newborn weight less than 2,500 grams [0.129 (0.018-0.924), $p=0.041$]; who received postpartum nutrition care [0.179 (0.041-0.777), $p=0.022$] (Table 4). There was a statistically significant correlation in the same direction between the total "EPDS" total score of the women included in the study and the postpartum 2nd week total "VAS-F" score ($r=0.228$ and $p<0.001$). It was determined that there was a statistically significant and reverse correlation between women's total "EPDS" score and the 2nd week of postpartum "VAS-F" energy subscale score ($r=-0.459$ and $p<0.001$). A statistically significant correlation in the same direction was found between the total "EPDS" score and the postpartum 2nd week total "PSQI" score ($r=0.157$ and $p=0.002$). Likewise, there was a statistically significant correlation in the same direction between the total "EPDS" score and the 2nd week of postpartum scores obtained from subjective sleep quality ($r=0.194$ and $p<0.001$), sleep duration ($r=0.188$ and $p<0.001$), sleep disturbances ($r=0.124$ and $p=0.015$), and daytime dysfunction ($r=0.123$ and $p=0.016$) subscales of "PSQI".

## DISCUSSION

Adolescents composed 7.7% of the women in our study. Based on the 2018 data of the Turkish Demographic and Health Survey the reason of the fact that the ratio of adolescents in the Marmara Region of Türkiye is higher than 4.1% may be attributed to the migration coming into the region.[4] When looking at other countries, both US and England have seen rapid declines in pregnancy rates among adolescents since 2001.[25] The ratio of adolescents in our study's population is important in terms of the increased long-term risks of sleep, fatigue, and depression problems in the postnatal period.

The proportion of women who have been found to receive postnatal care was 93.5%, with involvement of midwives-nurses in the care process in 53.9% of the cases. According to the Turkish Demographic and Health Survey 2018 data, although 94.7% of the women received postpartum care, the ratio of health control was 79.8% in the first few hours after birth,

**TABLE 2:** Comparison of Pittsburgh Sleep Quality Index general and subscale scores measured in the 2nd and 6th weeks according to the parity status of the women included in the study.

| | | | | | Parity | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | X̄±SD/Median (Q1-Q3) | Test statistic | Df | Main effect p value | Primiparous X̄±SD/Median (Q1-Q3) | Multiparous X̄±SD/Median (Q1-Q3) | Test statistic | Df | Common effect p value |
| Pittsburgh Sleep Quality Index | | | | | | | | | |
| 2nd week | 8.62±3.24/8 (6-11) | 0.004 | 1 | 0.952 | 8.54±3.18/8 (6-11) | 8.68±3.28/8 (6-11) | 0.041 | 1 | 0.839 |
| 6th week | 8.35±2.91/8 (7-10) | | | | 8.36±2.91/8 (7-11) | 8.34±2.92/8 (6-10) | | | |
| Subjective sleep quality | | | | | | | | | |
| 2nd week | 1.58±0.53/2 (1-2) | 72.917 | 1 | **<0.001** | 1.56±0.52/2 (1-2) | 1.59±0.54/2 (1-2) | 0.023 | 1 | 0.878 |
| 6th week | 1.41±0.52/1 (1-2) | | | | 1.4±0.52/1 (1-2) | 1.42±0.53/1 (1-2) | | | |
| Sleep latency | | | | | | | | | |
| 2nd week | 0.74±1.02/0 (0-1) | 0.684 | 1 | 0.408 | 0.7±1.03/0 (0-1) | 0.76±1.02/0 (0-2) | 0.299 | 1 | 0.584 |
| 6th week | 0.67±0.92/0 (0-1) | | | | 0.66±0.95/0 (0-1) | 0.67±0.91/0 (0-1) | | | |
| Sleep duration | | | | | | | | | |
| 2nd week | 1.86±1.00/2 (1-3) | 24.079 | 1 | **<0.001** | 1.79±1.03/2 (1-3) | 1.91±0.98/2 (1-3) | 0.398 | 1 | 0.528 |
| 6th week | 2.00±1.01/2 (2-3) | | | | 1.97±1.04/2 (2-3) | 2.03±0.99/2 (2-3) | | | |
| Sleep efficiency | | | | | | | | | |
| 2nd week | 2.24±0.98/3 (2-3) | 4.046 | 1 | **0.044** | 2.29±0.96/3 (2-3) | 2.2±1/2 (2-3) | 0.003 | 1 | 0.956 |
| 6th week | 2.36±0.84/3 (2-3) | | | | 2.41±0.81/3 (2-3) | 2.32±0.86/3 (2-3) | | | |
| Sleep disturbances | | | | | | | | | |
| 2nd week | 0.93±0.35/1 (1-1) | 5.338 | 1 | **0.021** | 0.92±0.31/1 (1-1) | 0.94±0.38/1 (1-1) | 0.503 | 1 | 0.478 |
| 6th week | 0.90±0.30/1 (1-1) | | | | 0.9±0.3/1 (1-1) | 0.9±0.3/1 (1-1) | | | |
| Daytime dysfunction | | | | | | | | | |
| 2nd week | 1.28±0.8/1 (1-2) | 119.683 | 1 | **<0.001** | 1.28±0.81/1 (1-2) | 1.28±0.8/1 (1-2) | 0.000 | 1 | 0.983 |

Nonparametric analysis of variance test was used for repeated measurements. Descriptive statistics were presented as mean ± standard deviation and median-interquartile width.

p values were accepted as statistically significant (p<0.05). Q1: 1st quartile, Q3: 3rd quartile; *An R software package npaRLD (Nonparametric Analysis of Longitudinal Data in Factorial Experiments); **Two-way repeated measures analysis of variance; SD: Standard deviation; Df: Degree of freedom.

**TABLE 3:** The examination of the correlation between general visual similarity scale for fatigue, its subscales and Pittsburgh Sleep Quality Index.

| | | | 2nd week | | 6th week | |
|---|---|---|---|---|---|---|
| | | | r value | p value | r value | p value |
| Visual Similarity Scale for Fatigue | - | Pittsburgh Sleep Quality Index | -0.005 | 0.921 | -0.057 | 0.270 |
| Visual Similarity Scale for Fatigue | - | Subjective sleep quality | 0.005 | 0.929 | -0.054 | 0.296 |
| Visual Similarity Scale for Fatigue | - | Sleep latency | -0.003 | 0.948 | -0.035 | 0.500 |
| Visual Similarity Scale for Fatigue | - | Sleep duration | 0.014 | 0.786 | -0.019 | 0.716 |
| Visual Similarity Scale for Fatigue | - | Sleep efficiency | <0.001 | 0.994 | -0.008 | 0.873 |
| Visual Similarity Scale for Fatigue | - | Sleep disturbances | -0.061 | 0.235 | -0.021 | 0.678 |
| Visual Similarity Scale for Fatigue | - | Use of sleeping medication | - | - | - | - |
| Visual Similarity Scale for Fatigue | - | Daytime dysfunction | -0.027 | 0.594 | -0.058 | 0.259 |
| Fatigue | - | Pittsburgh Sleep Quality Index | 0.033 | 0.514 | -0.013 | 0.795 |
| Fatigue | - | Subjective sleep quality | 0.055 | 0.280 | -0.009 | 0.866 |
| Fatigue | - | Sleep latency | 0.015 | 0.775 | -0.019 | 0.713 |
| Fatigue | - | Sleep duration | 0.079 | 0.121 | 0.025 | 0.627 |
| Fatigue | - | Sleep efficiency | <0.001 | 0.985 | 0.006 | 0.912 |
| Fatigue | - | Sleep disturbances | -0.034 | 0.506 | -0.007 | 0.890 |
| Fatigue | - | Use of sleeping medication | - | - | - | - |
| Fatigue | - | Daytime dysfunction | -0.002 | 0.970 | -0.03 | 0.566 |
| Energy | - | Pittsburgh Sleep Quality Index | -0.098 | 0.055 | -0.116 | **0.024*** |
| Energy | - | Subjective sleep quality | -0.085 | 0.095 | -0.087 | 0.090 |
| Energy | - | Sleep latency | -0.066 | 0.197 | -0.06 | 0.243 |
| Energy | - | Sleep duration | -0.116 | **0.023*** | -0.102 | **0.047*** |
| Energy | - | Sleep efficiency | 0.015 | 0.771 | -0.006 | 0.906 |
| Energy | - | Sleep disturbances | -0.113 | **0.026*** | -0.051 | 0.323 |
| Energy | - | Use of sleeping medication | - | - | - | - |
| Energy | - | Daytime dysfunction | -0.069 | 0.176 | -0.083 | 0.105 |

*p<0.05 Spearman's rho coefficient was used.

decreased to 6% on the first day of postpartum and to 3.1% between the 7th and 41st days of postpartum.[4] This may be related to a number of factors such as the priority of family planning and infant care in postpartum follow-up and the lack of appropriate health policies for postnatal maternal health.[1,2] Martin et al. noted that women spend less time in hospital after giving birth, but they need additional support, guidance from medical professionals.[26] Healthy people 2020 aims to increase the proportion of women, across demographic and socioeconomic boundaries thereby highlighting postpartum care as a national priority to promote the health of women.[27] The ratio of midwives and nurses in postpartum care is important in terms of evaluating a mothers' fatigue, sleep, and depression levels during postnatal follow-ups in order to provide appropriate intervention and support.[13] Moreover, it is important for the future to include the detection and measurement of these problems in the health policies of the states among the routine postnatal health checks.

The mean "PSQI" score was 8.62±3.24 in the 2nd week of postpartum and 8.35±2.91 in the 6th week. Christian et al. found that women exhibited poor sleep quality, with 71% meeting criteria for clinically disturbed sleep.[28] In another study by Christian et al., the rate of poor postpartum sleep quality in African Americans was 80%, and 68% in European Americans.[29] Our study further substantiates the expected and previously described deterioration of subjective sleep quality in the majority (87.6%) of women assessed between 2 and 6 weeks postpartum, as reflected in other studies where PSQI scores (41.2%-72%) were determined.[8,13,15] Our results support that mothers perceive sleep problems as a major problem in the postpartum period and that they should be treated in the early period.[1,11] In addition, the fact that 6th week sleep duration and sleep

**TABLE 4:** Analysis of risk factors for depression by logistic regression analysis.

| | Univariate | | Multiple | |
|---|---|---|---|---|
| | OR (95% CI) | p value | OR (95% CI) | p value |
| Age | | | | |
| Below 19 years/30-34 | 1.566 (0.667-3.679) | 0.303 | 6.927 (1.649-29.098) | **0.008** |
| 20-24/30-34 | 0.469 (0.229-0.963) | **0.039** | 0.633 (0.217-1.848) | 0.403 |
| 25-29/30-34 | 1.039 (0.576-1.872) | 0.899 | 2.639 (0.729-9.555) | 0.139 |
| Over 35 years/30-34 | 2.87 (1.459-5.646) | **0.002** | 1.793 (0.395-8.146) | 0.449 |
| Income level | | | | |
| Moderate-high | 1.718 (10.689-2.762) | **0.025** | 2.002 (0.761-5.267) | 0.160 |
| Low-high | 0.134 (0.0175-1.031) | 0.054 | 0.107 (0.009-1.302) | 0.080 |
| Total number of pregnancies | | | | |
| One-two | 1.187 (0.686-2.054) | 0.539 | 11.317 (0.41-312.118) | 0.152 |
| Three-two | 6.87 (2.984-15.815) | **<0.001** | 0.024 (0-1.282) | 0.066 |
| Four and grater-two | 1.369 (0.699-2.68) | 0.359 | 0 (0-0.049) | **0.003** |
| Number of live births | | | | |
| One-two | 1.224 (0.708-2.115) | 0.469 | 0.112 (0.004-3.009) | 0.192 |
| Three-two | 2.274 (1.242-4.162) | **0.008** | 569.657 (8.642-37549.793) | **0.003** |
| Curettage | | | | |
| One-none | 4.215 (1.494-11.892) | **0.007** | 120.555 (4.313-3370.075) | **0.005** |
| Two-none | 0 (0-∞) | 0.981 | 0.001 (0-∞) | 0.996 |
| Number of miscarriages | | | | |
| One-none | 2.205 (1.045-4.651) | **0.038** | 26.382 (1.966-353.983) | **0.013** |
| Two-none | 4.685 (1.341-16.376) | **0.016** | 21.709 (1.297-363.307) | **0.032** |
| Newborn infant weight | | | | |
| <2,500 g/3,501-4,000 g | 0.344 (0.134-0.882) | **0.026** | 0.129 (0.018-0.924) | **0.041** |
| 2,500-3,000 g/3,501-4,000 g | 0.531 (0.306-0.924) | **0.025** | 0.598 (0.19-1.879) | 0.378 |
| 3,001-3,500 g/3,501-4,000 g | 0.331 (0.174-0.627) | **<0.001** | 0.187 (0.059-0.589) | **0.004** |
| >4,000 g/3,501-4,000 g | 2710000 (0-∞) | 0.981 | 7550000 (0-∞) | 0.988 |
| On which fields did you receive postpartum care? | | | | |
| Nutrition-all of them | 0.281 (0.119-0.664) | **0.004** | 0.179 (0.041-0.777) | **0.022** |
| Health control-all of them | 0.561 (0.211-1.491) | 0.247 | 0.44 (0.097-1.991) | 0.286 |
| Contraception-all of them | 0.345 (0.151-0.788) | **0.012** | 1.098 (0.346-3.486) | 0.875 |
| Infant care-all of them | 0.794 (0.448-1.408) | 0.430 | 2.371 (0.918-6.125) | 0.075 |

p values were accepted as statistically significant (p<0.05); OD: Odds ratio; CI: Confidence interval.

efficiency medians were higher compared to those in the 2nd week refers to the continuous change in sleep parameters; however, poor sleep quality ratios should be considered as a danger sign. Poor sleep quality increased in the 2nd and 6th weeks of postpartum, fatigue levels increased and energy levels decreased. Likewise, Doering and Dogan, Tobback et al. determined that women who experienced fatigue had poor sleep quality.[13,14] Moreover, according to the literature, postpartum fatigue is associated with maternal functions, breastfeeding, and postpartum depression and is considered as an obstacle to gaining maternal role.[1,5,10,30]

Due to postpartum depression, one in three women in our study reported self-concerns about receiving psychiatric treatment and having a lack of support from their spouses. Postpartum depression has become a considerable public health problem. World Health Organization found that the incidence of postpartum depression is 3 times greater than all of a woman's life.[31] The prevalence of postpartum depression varied from 4.0-48.3% in Asia, 5.0-63.9% in America, 4.4-22.8% in Europe, 7.2-50.3% in Africa, 6.0-32.8% in Australia, and 7.6-30.9% in New Zealand.[32] The prevalence of postpartum depression in different regions of our country has been

found between 13.3%-48.3%.[33-35] Postpartum depression of adolescent mothers may reflect in a possible increase in Türkiye.[1] This data is very important in terms of the follow-up of emotional problems and other related factors.[7] It is thought that this ratio determined in our study is due to the low ratio of support given by social and health personnel and the low ratio of women who had a planned pregnancy.

As the 2nd week of postpartum total "EPDS" score of the women increased, the total "PSQI" score increased, as well (r=0.157 and p=0.002). In studies have shown that there was a gradual correlation between sleep efficiency, depression, and maternal fatigue in the postpartum period.[9,14] Based on the similar results, Thomas and Spieker, Giallo et al. and Okun suggested that the early clinical diagnosis of women with fatigue, sleep problems and depressive symptoms should be encouraged in the postpartum period.[5,9,17] Women who have persistent postpartum difficulties related to sleep and their psychological state will need to be identified sooner or later to prevent them from having more serious chronic sleep problems and psychopathology.

## CONCLUSION

One of every three women in the postpartum period met the postpartum depression criteria. Responsibilities of nurses in hospital and home care services should be increased in order to maximize the effectiveness of interventions for women who have depressive symptoms and to improve their health outcomes. In conclusion, more comprehensive studies are required to determine whether the treatment of postpartum maternal sleep and fatigue problems reduces depression.

### *Acknowledgements*

*We would like to thank all the professionals working in Balıkesir City Hospital Gynecology and Obstetrics Clinic for their support.*

### *Source of Finance*

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

### *Conflict of Interest*

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### *Authorship Contributions*

***Idea/Concept:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca;* ***Design:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca;* ***Control/Supervision:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca;* ***Data Collection and/or Processing:*** *Sevde Çubukçu Aksu;* ***Analysis and/or Interpretation:*** *Pelin Palas Karaca;* ***Literature Review:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca;* ***Writing the Article:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca;* ***Critical Review:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca;* ***References and Fundings:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca;* ***Materials:*** *Sevde Çubukçu Aksu, Pelin Palas Karaca.*

## REFERENCES

1. Aksu S, Varol FG, Hotun Sahin N. Long-term postpartum health problems in Turkish women: prevalence and associations with self-rated health. Contemp Nurse. 2017;53(2):167-81. [Crossref] [PubMed]
2. Yucel C, Taskin L, Low LK. Validity and reliability of the Turkish version of the Optimality Index-US (OI-US) to assess maternity care outcomes. Midwifery. 2015;31(12):1135-42. [Crossref] [PubMed]
3. World Health Organization. WHO Technical Consultation on Postpartum and Postnatal Care. Geneva: World Health Organization; 2010. Cited: December, 2017. Available from: [Link]
4. Hacettepe University Institute of Population Studies [Internet]. [Cited: December, 2017]. Available from: [Link]
5. Thomas KA, Spieker S. Sleep, depression, and fatigue in late postpartum. MCN Am J Matern Child Nurs. 2016;41(2):104-9. [Crossref] [PubMed] [PMC]
6. Dennis CL, Brown HK, Brennenstuhl S, Haddad S, Marini FC, Stremler R. Trajectory and predictors of fatigue among chinese immigrant and chinese canadian-born women in the postpartum period. J Obstet Gynecol Neonatal Nurs. 2020;49(2):167-80. [Crossref] [PubMed]
7. Nurbaeti I, Deoisres W, Hengudomsub P. Association between psychosocial factors and postpartum depression in South Jakarta, Indonesia. Sex Reprod Healthc. 2019;20:72-6. [Crossref] [PubMed]

8. Wen SY, Ko YL, Jou HJ, Chien LY. Sleep quality at 3 months postpartum considering maternal age: A comparative study. Women Birth. 2018;31(6):e367-e73. [Crossref] [PubMed]
9. Okun ML. Disturbed Sleep and Postpartum Depression. Curr Psychiatry Rep. 2016;18(7):66. [Crossref] [PubMed]
10. Lai YL, Hung CH, Stocker J, Chan TF, Liu Y. Postpartum fatigue, baby-care activities, and maternal-infant attachment of vaginal and cesarean births following rooming-in. Appl Nurs Res. 2015;28(2):116-20. [Crossref] [PubMed]
11. Aksu S, Çatalgöl Ş. Kadınların doğum sonrası uzun dönem fiziksel sağlık problemleri ve algıladıkları sağlık düzeyi ile ilişkisi [Long term physical health problems of women after childbirth and their relationship with perceived health level]. Journal of Women's Health Nursing. 2017;3(2):22-42. [Link]
12. Doering JJ, Sims DA, Miller DD. How postpartum women with depressive symptoms manage sleep disruption and fatigue. Res Nurs Health. 2017;40(2):132-42. [Crossref] [PubMed]
13. Tobback E, Behaeghel K, Hanoulle I, Delesie L, Loccufier A, Van Holsbeeck A, et al. Comparison of subjective sleep and fatigue in breast- and bottle-feeding mothers. Midwifery. 2017;47:22-7. [Crossref] [PubMed]
14. Doering JJ, Dogan S. A postpartum sleep and fatigue intervention feasibility pilot study. Behav Sleep Med. 2018;16(2):185-201. [Crossref] [PubMed] [PMC]
15. Coo S, Milgrom J, Kuppens P, Cox P, Trinder J. Exploring the association between maternal mood and self-reports of sleep during the perinatal period. J Obstet Gynecol Neonatal Nurs. 2014;43(4):465-77. [Crossref] [PubMed]
16. Giallo R, Gartland D, Woolhouse H, Brown S. Differentiating maternal fatigue and depressive symptoms at six months and four years post partum: Considerations for assessment, diagnosis and intervention. Midwifery. 2015;31(2):316-22. [Crossref] [PubMed]
17. Giallo R, Gartland D, Woolhouse H, Brown S. "I didn't know it was possible to feel that tired": exploring the complex bidirectional associations between maternal depressive symptoms and fatigue in a prospective pregnancy cohort study. Arch Womens Ment Health. 2016;19(1):25-34. [Crossref] [PubMed]
18. Tham EK, Tan J, Chong YS, Kwek K, Saw SM, Teoh OH, et al. Associations between poor subjective prenatal sleep quality and postnatal depression and anxiety symptoms. J Affect Disord. 2016;202:91-4. [Crossref] [PubMed]
19. Lee KA, Zaffke ME. Longitudinal changes in fatigue and energy during pregnancy and the postpartum period. J Obstet Gynecol Neonatal Nurs. 1999;28(2):183-91. [Crossref] [PubMed]
20. Yurtsever S. Hemodiyaliz hastalarında yorgunluğun değerlendirilmesi [Evaluation of fatigue in individuals undergoing hemodialysis due to chronic renal failure]. Hemşirelikte Araştırma Geliştirme Dergisi. 2003;5(2):3-12. [Link]
21. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry. 1987;150:782-6. [Crossref] [PubMed]
22. Engindeniz AN, Küey L, Kültür S. Edinburgh Doğum Sonrası Depresyon Ölçeği Türkçe formu geçerlilik ve güvenilirlik çalışması. Bahar Sempozyumları. Ankara: Psikiyatri Derneği Yayınları; 1997. p.51-2.
23. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989;28(2):193-213. [Crossref] [PubMed]
24. Ağargün YM, Kara H, Anlar Ö. Pittsburgh Uyku Kalitesi İndeksi'nin Geçerliği ve Güvenirliği [Validity and reliability of the Pittsburg Sleep Quality Index]. Turkish Journal of Psychiatry. 1996;7(2):107-11. [Link]
25. Scott RH, Wellings K, Lindberg L. Adolescent Sexual Activity, Contraceptive Use, and Pregnancy in Britain and the U.S.: A Multidecade Comparison. J Adolesc Health. 2020;66(5):582-8. [Crossref] [PubMed] [PMC]
26. Martin A, Horowitz C, Balbierz A, Howell EA. Views of women and clinicians on postpartum preparation and recovery. Matern Child Health J. 2014;18(3):707-13 [Crossref] [PubMed] [PMC]
27. Healthy People [Internet]. [Cited: December, 2017]. Maternal, infant, and child health. Available from: [Link]
28. Christian LM, Kowalsky JM, Mitchell AM, Porter K. Associations of postpartum sleep, stress, and depressive symptoms with LPS-stimulated cytokine production among African American and White women. J Neuroimmunol. 2018;316:98-106. [Crossref] [PubMed] [PMC]
29. Christian LM, Carroll JE, Porter K, Hall MH. Sleep quality across pregnancy and postpartum: effects of parity and race. Sleep Health. 2019;5(4):327-34. [Crossref] [PubMed] [PMC]
30. Goldstein AN, Walker MP. The role of sleep in emotional brain function. Annu Rev Clin Psychol. 2014;10:679-708. [Crossref] [PubMed] [PMC]
31. World Health Organization [Internet]. ©2017 WHO [Cited: December, 2017]. Mental health action plan 2013-2020. Available from: [Link]
32. Arifin SRM, Cheyne H, Maxwell M. Review of the prevalence of postnatal depression across cultures. AIMS Public Health. 2018;5(3):260-95. [Crossref] [PubMed] [PMC]
33. Bolak Boratav H, Toker Ö, Küey L. Postpartum depression and its psychosocial correlates: A longitudinal study among a group of women in Türkiye. Women Health. 2016;56(5):502-21. Erratum in: Women Health. 2017;57(3):402-3. [Crossref] [PubMed]
34. Cankorur VS, Abas M, Berksun O, Stewart R. Social support and the incidence and persistence of depression between antenatal and postnatal examinations in Türkiye: a cohort study. BMJ Open. 2015;5(4):e006456. [Crossref] [PubMed] [PMC]
35. Turkcapar AF, Kadıoğlu N, Aslan E, Tunc S, Zayıfoğlu M, Mollamahmutoğlu L. Sociodemographic and clinical features of postpartum depression among Turkish women: a prospective study. BMC Pregnancy Childbirth. 2015;15:108. [Crossref] [PubMed] [PMC]