ORIGINAL RESEARCH ARTICLE

Factors related to sleep quality in hospitalized antepartum women: A cross-sectional study

DOI: 10.29063/ajrh2024/v28i1.4

Pi-Feng Hsu[1] and Yu-Ying Lu[2]*

Department of Nursing, MacKay Memorial Hospital, Taiwan[1]; Department of Nursing, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan[2]

***For Correspondence:** Email: *yuyin@ntunhs.edu.tw*; Phone: 886-927014036

Abstract

This study investigated the sleep quality and its psychological correlates among hospitalized antepartum women. A cross-sectional correlation study design and convenience sampling were conducted in the gynecological ward of a medical center in northern Taiwan. A total of 101 hospitalized antepartum women were recruited. A self-administered structured questionnaire including demographic profiles, State-Trait Anxiety Inventory (STAI), Antepartum Hospital Stressors Inventory (AHSI), and Pittsburgh Sleep Quality Index (PSQI) was used for the study. Bivariate and multiple linear regressions were used to analyze the data. A majority of the participants had poor sleep quality (82.8%), based on the global PSQI score. Sleep quality correlated with age, marital and employment status, parity, method of conception, multiple gestation, history of pregnant complications, anxiety symptom and hospital stressors which explained 21% of the variance in sleep quality. This study found a high prevalence of poor sleep quality in hospitalized antepartum women. Anxiety symptom was a significant predictor of sleep quality. Healthcare providers should be encouraged to assess sleep and emotional status in antepartum women during hospitalization and provide them appropriate interventions to improve sleep and reduce anxiety symptoms and hospital stressors. *(Afr J Reprod Health 2024; 28 [1]: 31-38).*

Keywords: Antepartum, anxiety, hospital stressors, sleep quality

Résumé

Cette étude a examiné la qualité du sommeil et ses corrélats psychologiques chez les femmes hospitalisées en période antepartum. Une conception d'étude de corrélation transversale et un échantillonnage de commodité ont été menés dans le service de gynécologie d'un centre médical du nord de Taiwan. Au total, 101 femmes hospitalisées en période antepartum ont été recrutées. Un questionnaire structuré auto-administré comprenant des profils démographiques, l'inventaire des traits d'état d'anxiété (STAI), l'inventaire des facteurs de stress de l'hôpital avant l'accouchement (AHSI) et l'indice de qualité du sommeil de Pittsburgh (PSQI) a été utilisé pour l'étude. Des régressions linéaires bivariées et multiples ont été utilisées pour analyser les données. Une majorité des participants avaient un sommeil de mauvaise qualité (82,8 %), sur la base du score PSQI global. La qualité du sommeil était corrélée à l'âge, à la situation matrimoniale et professionnelle, à la parité, à la méthode de conception, aux grossesses multiples, aux antécédents de complications liées à la grossesse, aux symptômes d'anxiété et aux facteurs de stress hospitaliers, ce qui expliquait 21 % de la variance de la qualité du sommeil. Cette étude a révélé une prévalence élevée de mauvaise qualité du sommeil chez les femmes hospitalisées en période antepartum. Les symptômes d'anxiété étaient un prédicteur significatif de la qualité du sommeil. Les prestataires de soins de santé devraient être encouragés à évaluer le sommeil et l'état émotionnel des femmes antepartum pendant leur hospitalisation et à leur proposer des interventions appropriées pour améliorer le sommeil et réduire les symptômes d'anxiété et les facteurs de stress hospitaliers. *(Afr J Reprod Health 2024; 28 [1]: 31-38).*

Mots-clés: Antepartum, anxiété, facteurs de stress hospitaliers, qualité du sommeil

Introduction

Sleep disturbance is a common health problem experienced by pregnant women[1,2]. Poor sleep quality have substantial adverse short-term and long-term health consequences and is associated with adverse pregnancy outcomes, including increased risk for preeclampsia, gestational diabetes mellitus, cesarean delivery, depression and preterm birth[3,4,5]. Numerous factors contribute to sleep disturbances in pregnant women including physical, social-economic, hormonal and psychological changes[6,7]. In particular, anxiety and stress have been identified as significant

psychological correlates of poor sleep during pregnancy[8-10]. When a pregnant woman with unexpected hospitalization for high-risk issue that threatens the mother and fetus health, her sleep might become more problematic because of environmental factors, physical and psychological stress[11,12]. To the best of the author's knowledge, there has been a lack of research on sleep quality in hospitalized antepartum women as well as in Taiwan. Better understanding of sleep quality in hospitalized antepartum women will provide healthcare providers with knowledge that can be used to implement appropriate management strategies to improve quality of sleep in hospitalized antepartum women.

The purposes of this study were: (1) To assess the levels of self-reported sleep quality, perceived anxiety and hospital stressors among hospitalized antepartum women. (2) To investigate the relationship between sleep quality, anxiety, and hospital stressors among hospitalized antepartum women. (3) To identify factors associated with sleep quality among hospitalized antepartum women.

Methods

Study design

A cross-sectional correlational design was used for this study.

Samples and setting

Convenience sampling was used to recruited participants from a medical center in northern Taiwan. The inclusion criteria were: $\geq$ 20 years old, fully conscious without mental illness, able to communicate in Mandarin or Taiwanese, and admitted to the Obs-Gyn ward for high-risk issue. Pregnant women with maternal or fetal health-threatening conditions that required immediate delivery were excluded from this study. The required sample size was estimated using G*Power 3.1.2 software. The effect size was set at 0.2, type I error was 0.05, and power was 0.8 for a minimum sample size of 95. A total of 101 participants were enrolled in this study.

Measurements

Demographic/obstetric characteristics. Demographic profiles included maternal age, marital and employment status and Obs-Gyn related characteristics (e.g., gestational weeks, parity, method of conception, multiple gestation, history of pregnant complications and medical illness, current diagnosis for hospitalization, and treatment method).

Measurement of anxiety symptom. State-Trait Anxiety Inventory (STAI) was used to measure participants' level of anxiety[13]. This self-rating structured questionnaire consists of 20 items. Each item of the STAI is scored with a 4-point Likert scale from 1 to 4 (1= completely disagree, 4= completely agree), higher mean score represents a higher degree of anxiety symptom. The STAI has demonstrated a high internal reliability of 0.90 by Spielberger and colleagues[13]. In this study, the Cronbach's α for STAI was 0.93.

Measurement of hospital stressors. Antepartum Hospital Stressors Inventory (AHSI) was used to determine potential stressors that may occur while hospitalized during pregnancy[14]. In original questionnaire, 49 items generate seven component scores specific to hospital stressors: separation, environment, health status, communication with healthcare professionals, self-image, emotions and family status. Two items were omitted from this study to be appropriate for pregnant women on hospital bed rest. Each component is scored with a five-point Likert scale (0= no stress, 4= a great deal of stress) and summed for a total continuous score, with higher scores indicating greater stress. An excellent internal reliability has been reported in a previous study (Cronbach's α= .95) [15]. In this study, the Cronbach's α for AHSI was 0.94.

Measurement of sleep quality. The Pittsburgh Sleep Quality Index (PSQI) a 19-item, self-rated questionnaire, was used to measure participants' sleep quality[16]. The 19 items generate seven component scores specific to sleep quality: subjective sleep quality, latency, duration, efficiency, disturbances, use of medications, and daytime dysfunction due to sleepiness. Each of the sleep components yields a score ranging from 0 to

3, with 3 indicating the greatest dysfunction. The global PSQI score is the sum of the seven components and ranges from 0-21, with a total score > 5 indicating a "poor" sleeper. PSQI has been translated to Chinese version with an excellent internal reliability (Cronbach's α = 0.84)[17]. In this study, the Cronbach's α for the PSQI was .72.

Data collection procedure

Data were collected at the Obs-Gyn ward of a medical center in northern Taiwan. If pregnant women met the criteria for inclusion, they were invited to participate to the study. All participants were informed about the study aims and procedures in detail. After obtaining written consent, the participants answered the structured questionnaires by self-reporting. A gift was provided to all participants in appreciation of their time after they returned questionnaires to the primary researcher.

Data analysis

Data were analyzed using SPSS software package for Windows, version 22.0 (SPSS Inc, Chicago, IL). Descriptive and inferential statistics such as chi-square test, independent sample t test, ANOVA, Pearson product-moment correlation analyzed the level of sleep quality and its correlated factors. A multiple linear regression analysis was performed to determine the predictors of sleep quality. A *p*-value < .05 was considered statistically significant.

Ethical considerations

The study was reviewed and approved by the Institutional Review Board of the Mackay Memorial Hospital (IRB No. 14MMHIS078e). Informed consent was obtained from all participants. Participants were assured that they were free to withdraw from the study at any time without penalty. All data were confidential throughout the process of data collection and analysis.

Results

Table 1 presents the personal and Obs-Gyn characteristics of the study sample. The mean age of the 101 participants was 34.04 ± 3.97 years (range: 24-44). Majorities were married (94.1%), were employed (75.2%), and had no children

Table 1: Demographic and obstetric and gynecological characteristics of participants (N= 101)

Variables	N(%)	M±SD	Range
Age		34.03±3.97	24-44
Marital status			
Single/other	6 (5.9%)		
Married	95 (94.1%)		
Employment status			
housewife	25 (24.8%)		
employed	76 (75.2%)		
Gestational weeks		29.09±5.36	11.10-37.10
≤ 28weeks	38 (37.6%)		
> 28weeks	63 (62.4%)		
Parity			
o	53 (52.5%)		
≥1	48 (47.5%)		
Method of conception			
Nature	89 (88.1%)		
Artificial insemination	12 (11.9%)		
Multiple gestation			
1	91 (90.1%)		
>1	10 (9.9%)		
History of pregnant complications			
No	80 (79.2%)		
Yes	21 (20.8%)		
History of medical illness			
No	85 (84.2%)		
Yes	16 (15.8%)		

(72.3%). More than half of the participants were primigravidae (52.5%) and were in the third trimester in their gestational age (32.4%). Around 12% of the participants conceived by artificial impregnation, 9.9% were multiple gestation, 20.8% had reported a history of pregnant complications and 15.8% had a medical history. The common causes of hospitalization were uterine contractions (75%), followed by antepartum hemorrhage (22%) and premature rupture of membrane (13%).

Table 2 shows the distribution of anxiety symptom and hospital stressors according to the STAI and AHSI questionnaires. The mean STAI score in 101 participants was 45.20 ± 11.57 (range: 20-70); 66.3% of the participants experienced moderate to severe anxiety symptoms (score higher

Table 2: Distribution of anxiety, hospital stressors, sleep quality among participants (N= 101)

Items	M±SD	Range
STAI	45.20±11.57	20-70
AHSI: global average scores	1.76±0.63	0.20-3.26
Separation	1.86±0.75	0.14-3.43
Environment	1.70±0.75	0.00-3.33
Health status	2.06±0.68	0.00-3.89
Communication with healthcare professionals	1.45±0.78	0.00-3.67
Self-perception	1.96±0.71	0.25-4.00
Emotional state	1.70±0.91	0.00-3.40
Family status	1.53±0.92	0.00-4.00
PSQI: global scores	9.09±3.89	1-18
Subjective sleep quality	1.75±0.83	0.00-3.00
Latency	1.46±0.82	0.00-3.00
Duration	1.51±1.02	0.00-3.00
Efficiency	1.36±1.28	0.00-3.00
Disturbances	1.78±0.54	1.00-3.00
Use of medications	0.40±0.97	0.00-3.00
Daytime dysfunction	0.83±0.72	0.00-3.00

Note: STAI (State-Trait Anxiety Inventory); AHSI (Antepartum Hospital Stressors Inventory); PSQI (Pittsburgh Sleep Quality Index)

than 41). The main symptoms of anxiety were self-dissatisfaction, lack of self-confidence, and inability to relax. The mean AHSI average scores for all participants was 1.76 ± 0.63 (range: 0.20-3.26). The most severe form of hospitalization stressors was health status (M±SD: 2.06 ± 0.68), followed by self-perception (M±SD: 1.96 ± 0.71) and separation (M±SD: 1.86 ± 0.75).

The global PSQI score and seven component scores were presented in Table 2. The overall prevalence of poor sleepers was 82.2% (PQSI score > 5), with a mean PQSI score of 9.09 ± 3.89. The bed time of the participants was at 10:14 pm, whereas the average wake up time was 7:10 am. The average sleep duration for participants was 5.97 hours (SD: 1.71; range 2-10 hours). Around 39% of participants' sleep efficiency greater than 85%. The mean total time to fall asleep was 28.88 minutes (SD: 19.62). Almost all, 85.1% of participants had never used sleeping medication for their sleep disturbance, 68.3 % of the participants reported that their sleep quality affects their day-to-day function. In seven components of PSQI, sleep disturbances, subjective sleep quality, and duration were the main issues the participants experienced.

Bivariate analysis was done to identify factors associated with sleep quality among hospitalized antepartum women. Age, marital and employment status, gestational weeks, parity, method of conception, multiple gestation, history of pregnant complications and medical illness were found to be statistically associated with sleep quality at a p value less than 0.05. The results of this study showed that older, married, and employed participants, those with multigravida, greater gestational ages, conceived by artificial impregnation, multiple gestation, a history of pregnant complications, higher levels of anxiety symptom and hospital stressors had significantly worse quality of sleep.

Results of the multiple linear regression analysis are presented in Table 4 with the global PSQI score as dependent variable. Covariates of age, marital and employment status, parity, gestational weeks, method of contraception, multiple gestation, history of pregnant complications, anxiety symptom and hospital stressors were used as independent variables. Results indicated that these independent variables explained 21% of the variance for sleep quality and was mainly explained by anxiety symptom (F= 2.75, R^2 = .21, p< 0.01).

Table 3: Associations between demographic, obstetric and gynecological characteristics variables and sleep quality (N= 101)

Variables	PSQI-global scores	Subjective sleep quality	Latency	Duration	Efficiency	Disturbances	Use of medications	Daytime dysfunction
Age	*r*= .25*	*r*= .02	*r*= .17	*r*= .36**	*r*= .25*	*r*= .03	*r*= .16	*r*= -.05
Marital status	*t*= -.71	*t*= -.77	*t*= -.90	*t*= -2.15*	*t*= -.37	*t*= .13	*t*= 1.00	*t*= -.58
Employment status	*t*= .53	*t*= 1.25	*t*= .74	*t*= .05	*t*= .85	*t*= -.74	*t*= -3.53***	*t*= 1.28
Gestational weeks	*t*= -.69	*t*= .59	*t*= -.75	*t*= -1.33	*t*= .55	*t*= -2.20*	*t*= -.01	*t*= -1.03
Parity	*t*= -2.14*	*t*= -1.92	*t*= .02	*t*= -1.84	*t*= -2.89**	*t*= -.90	*t*= -1.01	*t*= 0.25
Method of conception	*t*= -2.34*	*t*= -1.10	*t*= -.55	*t*= -3.71***	*t*= -2.66**	*t*= -1.82	*t*= -1.03	*t*= -.01
Multiple gestation	*t*= -1.83	*t*= -.99	*t*= -.97	*t*= -1.44	*t*= -1.39	*t*= -1.99*	*t*= -1.05	*t*= -.31
History of pregnant complications	*t*= -1.82	*t*= -1.55	*t*= .05	*t*= -1.50	*t*= -2.89**	*t*= -2.11*	*t*= .80	*t*= .50
History of medical illness	*t*= .25	*t*= .01	*t*= .45	*t*= .87	*t*= .36	*t*= -1.26	*t*= -.75	*t*= .87
Anxiety	*r*= .37**	*r*= .19	*r*= .24*	*r*= .22*	*r*= .22*	*r*= .09	*r*= .05	*r*= .32**
Hospital stressors	*r*= .22*	*r*= .15	*r*= .06	*r*= .22*	*r*= .26*	*r*= .03	*r*= .08	*r*= .06

Note: Based on Independent t-test and Pearson's correlation; ***p value*< .01; ****p value*< .001

Table 4: Predictors of PSQI (N= 101)

Variables	B	St. Error	*β*	*t* value
Age	.15	.10	.15	1.41
Marital status	.49	1.54	.03	.32
Employment status	.28	.92	.03	.30
Gestational weeks	.59	.77	.07	.77
Parity	.68	.94	.09	.73
Method of conception	.30	1.46	.03	.20
Multiple gestation	1.39	1.54	.11	.91
History of pregnant complications	1.11	1.06	.12	1.04
Anxiety	.09	.03	.26	2.65**
Hospital stresses	1.02	.61	.16	1.68

Note: R^2 = .21, ΔR^2= .15, *F*-value= 2.75**; ** *p* value< .01

Discussion

Research on the sleep quality of hospitalized antepartum women, particularly in Taiwan, has been notably limited. This study's findings serve to bridge significant gaps within this field. Various demographic and psychological factors linked to sleep quality have been identified in this study that can guide the implementation of tailored management strategies aimed at enhancing sleep quality among hospitalized antepartum women. Our findings demonstrated that hospitalized antepartum women had poor sleep quality and perceived greater levels of anxiety and hospital stressors. Anxiety was the major predictor of sleep quality. Sleep disturbances were common in pregnant women. In the present study, up to 80% of hospitalized antepartum women had poor sleep quality. Sleep disturbances, subjective sleep quality, and duration were the highest component scores of the PSQI. Previous studies have indicated that approximately 40%-96% of pregnant women

experience sleep disturbances, mainly because they wake up easily in the middle of the night or early morning, need to go to the bathroom at night, or their sleep is affected by snoring[3,18,19]. As gestational age increases, quality of sleep deteriorates[20,21]. In addition, the finding of this study is consistent with Saadati *et al.*[22], in which 364 women who had mild preeclampsia and gestational diabetes were surveyed in their third trimester. Among these women, the proportion who experienced poor sleep quality was 96.4% (average total PSQI = 10.01), indicating that the sleep quality of women with high-risk pregnancies and requiring hospitalization was significantly worse than that of ordinary pregnant women.

Age, marital and employment status, parity, gestational weeks, method of conception, multiple gestation, and a history of pregnant complications were found to be associated with sleep quality in hospitalized antepartum women. Previous studies pointed out that older, married, and multiparous women are more likely to be affected by physiological and socio-cultural factors, leading to poor sleep quality[6,19,23,24]. In this study, hospitalized antepartum women who were employed reported the worse sleep quality than the counterparts. Studies have demonstrated that job characteristics, working conditions, and job-related stressors are associated with sleep quality[25,26]. Sleep quality among pregnant women who conceived by artificial impregnation with multiple gestation and had a history of pregnant complications reported poorer sleep quality. These results are consistent with other studies. Pregnant women with a history of stillbirth, miscarriage, and high-risk pregnancies tended to have poor sleep quality, as these conditions may aggravate women's anxiety and stress psychologically[22,27].

The present study found that hospitalized antepartum women with greater anxiety symptoms and hospital stressors lead to poorer sleep quality. Studies have shown that antepartum anxiety and stress can often lead to poor sleep quality. Stress may cause increased cortisol in pregnant women, resulting in an activation and over activity of the hypothalamic-pituitary-adrenal (HPA) axis, which in turn adversely affects sleep[6,28]. Previous studies revealed that hospitalized antepartum women with high-risk pregnancies had a sense of uncertainty about pregnancy outcomes and the length of hospitalization, and worried about their own and their baby's health. In addition, separation from family members and the need to rely on others caused more anxiety and stress in high-risk pregnant women than ordinary pregnant women, subsequently affecting their quality of sleep[11].

Healthcare providers should be advised to help pregnant women improve sleep quality by actively assessing anxiety, hospital stressors, and sleep problems during hospitalization using an appropriate assessment tool. Healthcare providers can provide related information, education, and psychological interventions for pregnant women who have sleep disturbances problems. In addition, risk factors for poor sleep quality identifying by this study should be assessed and corrected. In conclusion, early diagnosis and management of sleep disturbances can help improve pregnant outcomes both for mothers and unborn children.

Limitations

This study was a cross-sectional study and used a questionnaire survey; therefore, a causal relation cannot be established. In addition, subjects for the study were limited to a convenience sample of hospitalized antepartum women from a medical center in northern Taiwan. The sample may not be generalizable to all populations. It is suggested that future studies should expand the sampling scope and sample size to improve representativeness. Longitudinal or qualitative methods can be used to characterize the overall changes in sleep quality of pregnant women during hospitalization, thereby providing healthcare providers with more insights into the topic.

Conclusion

According to the results of this study, it is concluded that antepartum women suffer from high rates of sleep disturbances during hospitalization. Several demographic and psychological factors associated with sleep quality were determined in this study. Anxiety in hospitalized antepartum women was a major predictor of sleep quality. Healthcare providers should be encouraged to assess sleep and emotional status in antepartum women during hospitalization and provide them appropriate interventions to improve sleep and reduce anxiety symptoms and hospital stressors.

Contributions of authors

Ping-Feng Hsu and Yu-Ying Lu took part in research design, data collection, data analysis, interpretation, and manuscript development. Yu-Ying Lu gave critical revision of this research.

Funding

The authors did not get any funds to conduct this research.

Conflict of interest

All authors declare that they have no conflict of interest.

References

1. Silvestri R and Aricò I. Sleep disorders in pregnancy. Sleep Sci (Sao Paulo, Brazil) 2019; 12(3): 232-239.
2. Wang WJ, Hou CL, Jiang YP, Han FZ, Wang XY, Wang SB, Ng CH and Jia FJ. Prevalence and associated risk factors of insomnia among pregnant women in China. Compr Psychiatry 2020; 98: 152168.
3. Ahmadi Z, Bakouei F and Bakhtiari A. Maternal sleep quality in late pregnancy: The association between preterm birth and sleep quality. Casp J Reprod Med 2019; 5(1): 17-22.
4. Medic G, Wille M and Hemels ME. Short- and long-term health consequences of sleep disruption. Nat Sci Sleep. 2017; 9: 151-161.
5. Yang Z, Zhu Z, Wang C, Zhang F and Zeng H. Association between adverse perinatal outcomes and sleep disturbances during pregnancy: a systematic review and meta-analysis. J Matern-Fetal Neonatal Med 2022; 35(1): 166-174.
6. Anbesaw T, Abebe H, Kassaw C, Bete T and Molla A. Sleep quality and associated factors among pregnant women attending antenatal care at Jimma Medical Center, Jimma, Southwest Ethiopia, 2020: cross-sectional study. BMC Psychiatry 2021; 21: 469.
7. Sedov ID, Cameron EE, Madigan S and Tomfohr-Madsen LM. Sleep quality during pregnancy: a meta-analysis. Sleep Med Rev 2018; 38: 168-176.
8. Gao M, Hu J, Yang L, Ding N, Wei X, Lin L, Liu L, Ma Y and Wen D. Association of sleep quality during pregnancy with stress and depression: a prospective birth cohort study in China. BMC Pregnancy Childbirth 2019; 19: 444.
9. Pauley AM, Moore GA, Mama SK, Molenaar P and Downs DS. Associations between prenatal sleep and psychological health: a systematic review. J Clin Sleep Med 2020; 16(4): 619-630.
10. Polo-Kantola P, Aukia L, Karlsson H, Karlsson L and Paavonen EJ. Sleep quality during pregnancy: associations with depressive and anxiety symptoms. Acta Obstet Gynecol Scand 2017; 96(2): 198-206.
11. Lee KA and Gay CL. Improving sleep for hospitalized antepartum patients: a non-randomized controlled pilot study. J Clin Sleep Med 2017; 13(12): 1445-1453.
12. Xu X, Liu D, Zhang Z, Sharma M and Zhao Y. Sleep duration and quality in pregnant women: a crosssectional survey in China. IJERPH 2017; 14(7): 817.
13. Spielberger CD and Sydeman SJ. State-Trait Anxiety Inventory and State-Trait Anger Expression Inventory. In M. E. Maurish (Ed.), The use of psychological testing for treatment planning and outcome assessment. Hillsdale, NJ: Lawrence Erlbaum; 1994. P. 292-321.
14. White M and Ritchie J. Psychological stressors in antepartum hospitalization: Reports from pregnant women. Matern Child Nurs J 1984; 13(1): 47-56.
15. Maloni JA, Margevicius SP and Damato EG. Multiple gestation: side effects of antepartum bed rest. Biol Res Nurs 2006; 8(2): 115-128.
16. Buysse DJ, Reynolds 3rd CF, Monk TH, Berman SR and Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res 1989; 28(2): 193-213.
17. Liu XC, Tang MQ, Hu L and Wang AZ. Reliability and validity of the Pittsburgh Sleep Quality Index. Chin J Psychiatry 1996; 29(2): 103-107.
18. Huong NTT, Thuy NTH and Yen LTH. Quality of sleep among pregnant women. Int J Clin Med 2019; 10: 16-25.
19. Jemere T, Getahun B, Tadele F, Kefale B and Walle G. Poor sleep quality and its associated factors among pregnant women in Northern Ethiopia, 2020: a cross sectional study. PloS One 2021; 16(5): e0250985.
20. Effati-Daryani1 F, Mohammad-Alizadeh-Charandabi S, Mohammadi A, Zarei S and Mirghafourvand M. Evaluation of sleep quality and its sociodemographic predictors in three trimesters of pregnancy among women referring to health centers in Tabriz, Iran: A cross-sectional study. Evid Based Care J 2019; 9(1): 69-76.
21. Ertmann RK, Nicolaisdottir DR, Kragstrup J, Siersma V and Lutterodt MC. Sleep complaints in early pregnancy: a cross-sectional study among women attending prenatal care in general practice. BMC Pregnancy Childbirth 2020; 20(1): 123.
22. Saadati F, Shafaei FS and Mirghafourvand M. Sleep quality and its relationship with quality of life among highrisk pregnant women (gestational diabetes and hypertension). J Matern-Fetal Neonatal Med 2018; 31(2): 150-157.
23. Christian LM, Carroll JE, Porter K and Hall MH. Sleep quality across pregnancy and postpartum: effects of parity and race. Sleep Health 2019; 5(4): 327-334.
24. Yang Y, Mao J, Ye Z, Zeng X, Zhao H, Liu Y and Li J. Determinants of sleep quality among pregnant women in China: a cross-sectional survey. J Matern-Fetal Neonatal Med 2018; 31(22): 2980-2985.
25. Deng X, Liu X and Fang R. Evaluation of the correlation between job stress and sleep quality in community nurses. Medicine (Baltimore) 2020; 99(4): e18822.

26. Han Y, Yuan Y, Zhang L and Fu Y. Sleep disorder status of nurses in general hospitals and its influencing factors. Psychiatr Danub 2016; 28(2): 176-183.
27. Du M, Liu J, Han N, Zhao Z, Yang J, Xu X, Luo S and Wang H. Maternal sleep quality during early pregnancy, risk factors and its impact on pregnancy outcomes: a prospective cohort study. Sleep Med 2021; 79: 11-18.
28. Solomonova E, Lee Y, Robins S, King L, Feeley N, Gold I, Hayton B, Libman E, Nagy C, Turecki G and Zelkowitz P. Sleep quality is associated with vasopressin methylation in pregnant and postpartum women with a history of psychosocial stress. Psychoneuroendocrinology 2019; 107: 160-168.