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Poor Sleep Quality of Third-Trimester Pregnancy is a Risk Factor for Postpartum Depression

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Background: The aim of this study was to investigate whether poor sleep quality of third-trimester pregnancy is a risk factor for postpartum depression.





Material/Methods: Third-trimester pregnant women (T0, n=293) were tested using the first socio-demographic, Pittsburgh Sleep Quality Index, and Edinburgh Postnatal Depression Scale assessments, and received a diagnosis of depression. Three months (T1, n=223) after delivery, scale filling was finished and the structured interview was performed again.

Results: We found that 73 persons (32.7%) were low income, 84 persons (37.7%) were middle-income, and 66 persons (29.6%) were higher income. The overall prevalence of postpartum depression was 9.4% (21 persons). After controlling for other factors, age, household income, marital satisfaction, and sleep quality were significantly related to postpartum depression, in which age and sleep quality scores (a higher score was associated with poorer sleep quality) were positively related to postpartum depression, and household income and marital satisfaction were negatively related to postpartum depression. Moreover, third-trimester sleep quality score was positively related to postpartum depressive symptoms.

Conclusions: Poor third-trimester subjective sleep quality is a risk factor for postpartum depression.

MeSH Keywords: **Depression, Postpartum • Pregnancy Trimester, Third • Risk Factors**

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 2005  3  —  29



Background

Postpartum depression in the DSM-V (*Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*) is defined as onset of severe or mild depression 4 weeks after childbirth [1], but in actual clinical practice or studies, the defined timeframe range from 4 weeks to 1 year [2]. A systematic review in 2005 showed that within 3 months after childbirth, the prevalence of severe and mild depression was 19.2% (severe depression, 7.1%), with an incidence of 14.5% [3]. In 2008, a study found that 6 weeks after childbirth, the prevalence of depression was 9.8% [4], and another study found that 1 year after childbirth, the prevalence of depression was 9.6%, with an incidence of 6.8% [5]. These findings show that timeframe definitions and prevalence rates of postpartum depression are heterogeneous among different studies, but there is a consensus that postpartum depression is widespread among different regions, social strata, and cultures.

Like depression during other periods, postpartum depression causes pain to a patient and causes damage to her social function, but because a puerperant also bears the task of infant care, postpartum depression can also cause a negative impact on the infant's upbringing and may lead to short-term and even long-term damage to the infant's behavior, cognition, and health [2]. Postpartum depression is closely related to a patient's negative status [6], and may cause cognitive bias and more significant negative reaction to negative facial expression of the infant [7]. A mother suffering from postpartum depression may have narrowed attention due to uncontrollable negative ideation; therefore diminishing her ability to care for the infant, interact with the infant [8], and be responsible for family and work [9]. For example, she cannot sustain breastfeeding, places the infant in the wrong sleeping position, fails to get infants vaccinated on time, does not protect the infant's safety, becomes easily irritable, gives less comfort during early interaction with the infant, repeatedly has idea of hurting the infant [10], and even abuses the infant [11]. When a mother has postpartum depression, her infant may develop internal and external behavioral problems, general mental problems, and emotional problem [6,12–14], and the infant may have retarded development of language and cognition [15]. Therefore, it is very important to explore the pathogenic risk factors of postpartum depression and to take corresponding preventive or therapeutic measures for postpartum depression patients and their infants' healthy growth.

Previous studies have shown that risk factors for postpartum depression include prenatal depression, prenatal anxiety, stress in caring for the infant, life stress, less social support, melancholy, low marital satisfaction, previous history of depression, having a difficult to feed infant, low self-esteem, being a single mother, low social status, and having an unplanned/unwanted pregnancy [16]. Among these, prenatal depression, stress in

caring for the infant, life stress, less social support, low marital satisfaction, previous history of depression, unplanned/unwanted pregnancy, and certain personality traits (such as role conflict, immature defense style, and pursuit of perfection) can also lead to chronic postpartum depression [17]. In addition, due to the impacts of hormonal changes, back pain, frequent urination, and other factors during pregnancy, sleep rhythm and sleep quality of a pregnant woman are degraded, and these phenomena are especially more pronounced in the third trimester of pregnancy [18]. Some studies have investigated the correlation between pregnant women's sleep quality and postpartum depression, and reported that sleep quality of pregnant women in the third trimester was related to postpartum depression [19–22]. A large-scale study has shown that insomnia in the third trimester is significantly related to occurrence of postpartum depressive symptoms, but this correlation disappears after the impacts of mood status and previous depression history are removed [23]. This longitudinal study with a large sample size aimed to determine whether subjective sleep quality in the third trimester is a risk factor for postpartum depression.

Material and Methods

Study subjects

From May 2012 to October 2013, subjects were selected from third-trimester pregnant women who visited doctors or received follow-up in the Obstetrics and Gynecology Outpatient Ward of the Affiliated Hospital (Ningbo Third Hospital), Medical School of Ningbo University. Patients with hypertension, diabetes, or severe mental illness were excluded. Patients with fetal disorders or abnormality were also excluded. Subjects were told to avoid use of drugs, caffeine, tea, or coffee use that could affect sleep quality. After being informed of study purpose and confidentiality and providing signed informed consent, they were invited to complete a basic information questionnaire, including age, gestational age, work status, education level, marital satisfaction, and annual household income, as well as recent sleep quality status, depressive symptoms, and mood status scale, and DSM-IV-TR Axis I disorder, structured interview patient edition [24] (SCID-I/P) was used for depression diagnosis. Three months after childbirth, the subjects filled in the scales and received structured interview diagnosis again. When the first survey (T0) in the third trimester was performed, a total of 293 pregnant women were included in the study; when questionnaire survey and interview were performed again 3 months (T1) after childbirth, a total of 223 women agreed to continue to participate in the study.

Research scales

The Pittsburgh Sleep Quality Index (PSQI) is used to assess sleep quality of a subject in the last month. It consists of 19

self-assessments and 5 sleep peer-assessments, of which 18 items constitute 7 factors; each factor is scored by 0–3 points and the total score ranges from 0 to 21 points; a higher score indicates worse sleep quality. The Chinese version of the scale has good reliability and validity [25].

The Edinburgh Postnatal Depression Scale (EPDS) is a widely used depression assessment scale in the West. It has 10 items testing: mood, pleasure, guilt, anxiety, fear, insomnia, ability to cope, sadness, crying, and self-injury. In accordance with the severity of the relevant symptom, each item is divided into 0–3 points (i.e., 4 grades) and the total score ranges from 0 to 30 points. Studies have shown that the scale has good reliability and validity [26] in populations in mainland China. When the scale was used in this study, the “insomnia” item was removed to exclude its effect when exploring the correlation between third-trimester sleep quality and postpartum depressive symptoms.

Statistical analysis

Any missing value in the scales was filled by using the mean value of that item. Statistical description methods were used to calculate mean values, standard deviations, frequencies, prevalence rates, and confidence intervals. Chi-square was used to test differences in prevalence rates of postpartum depression among different socio-demographic factors. Correlation between socio-demographic factors, third-trimester sleep quality, and postpartum depression (DSM-IV-TR was used as diagnostic criteria) was analyzed by using the binary classification non-conditional logistic regression model test (2-sided $\alpha=0.05$). Linear regression method was used to analyze the correlation between third-trimester sleep quality (PSQI score) and postpartum depressive symptoms (EPDS score). The above statistical process only included the 223 pregnant women who had completed the study, and was performed by using Stata10.0 software.

Results

Socio-demographic characteristics and postpartum depression prevalence rate

The average age of the studied pregnant women and puerperants was 26.5 ± 3.0 years old (range 21–36 years old). When the first research was performed, the average gestational age was 31.8 ± 1.6 weeks (range 28–36 weeks). We found that 121 persons (54.3%) had college education and above, 102 (45.7%) had high school education or below, 143 (64.3%) took work and maternity leave, 80 (35.9%) had no job or were housewives, 151 (67.7%) had birth or midwifery, 72 (32.3%) had cesarean, 73 (32.7%) were low income, 84 (37.7%) were middle

income, and 66 (29.6%) were higher income. The overall prevalence rate of postpartum depression was 9.4% (21 persons). Other characteristics and postpartum depression prevalence rates are shown in Table 1.

Correlation between third-trimester sleep quality, demographic characteristics, and postpartum depression

To more accurately assess the correlation between sleep quality and postpartum depression, as well as to eliminate the effects of depression and depressive symptoms during pregnancy on postpartum depression results, the patients with depression during pregnancy and participants with pregnancy EPDS score of more than 10 points were excluded before conducting the statistical analysis. The analysis included 205 persons. The results showed that after controlling for other factors, age, household income, marital satisfaction, and sleep quality were significantly related to postpartum depression; among these, age and sleep quality score were positively related to postpartum depression, and household income and marital satisfaction were negatively related to postpartum depression. Moreover, third-trimester sleep quality appeared to be a risk factor for postpartum depression, and there was a causal relationship between these 2 factors. In addition, although there was no statistically significant correlation between social support and postpartum depression ($P=0.051$), good social support tended to be associated with low postpartum depression (Table 2).

Correlation between third-trimester sleep quality and postpartum depressive symptoms

This analysis included only 205 participants. The results showed that third-trimester sleep quality was related to postpartum depressive symptoms, and the correlation was statistically significant. Poorer sleep quality was associated with higher postpartum depressive symptom score (Table 3).

Discussion

In this study, DSM-IV-TR Axis I disorder structured interview patient edition (SCID-I/P) was used to diagnose depression of puerperants. The result showed that within 3 months after childbirth, the prevalence rate of postpartum depression was 9.4%, which is similar to the results of other domestic studies [27] but is slightly lower than the international average level [3]. In univariate analysis among socio-demographic factors, only the correlation between household income and postpartum depression was statistically significant, and when annual household income decreased, the probability of postpartum depression increased. International studies have shown that low social status is the risk factor for postpartum depression [16], similar to the result of the present study.

Table 1. Socio-demographic characteristics and postpartum depression prevalence rate.

Characteristics	Dummy variables	Classification	Number of persons (%)	Number of patients with postpartum depression (%)	P value
Age	0	<25	65 (29.1%)	3 (4.6%)	0.271
	1	≥25, <30	127 (56.9%)	15 (11.8%)	
	2	≥30	31 (13.9%)	3 (9.7%)	
Level of education	0	High school and below	102 (45.7%)	11 (10.8%)	0.521
	1	College and above	121 (54.3%)	10 (8.3%)	
Work status	0	Work and maternity leave	143 (64.3%)	12 (8.4%)	0.483
	1	No job/housewife	80 (35.9%)	9 (11.3%)	
Delivery mode	0	Birth or midwifery	151 (67.7%)	13 (8.6%)	0.550
	1	Cesarean	72 (32.3%)	8 (11.1%)	
Annual household income	0	<60,000	73 (32.7%)	12 (16.4%)	0.038
	1	≥60,000, or <120,000	84 (37.7%)	6 (7.1%)	
	2	≥120,000	66 (29.6%)	3 (4.6%)	
Marital satisfaction	0	Satisfied	111 (47.8%)	7 (6.3%)	0.183
	1	General	75 (33.6%)	8 (10.7%)	
	2	Unsatisfied	37 (16.6%)	6 (16.2%)	
Social support (Getting social support & real life help from family or friends during pregnancy)	0	Getting great help	86 (38.6%)	4 (4.7%)	0.074
	1	Getting general help	110 (49.3%)	12 (10.9%)	
	2	Getting little help	27 (12.1%)	5 (18.5%)	

Table 2. Non-conditional logistic regression multivariate analysis.

Study factors	Regression coefficient	Standard error	OR value	95% confidence interval	P value
Age	0.39	0.18	–	1.03–2.09	0.032
Level of education	–1.29	0.81	0.28	0.06–1.36	0.113
Work status	0.97	0.74	2.65	0.62–11.36	0.190
Delivery mode	0.73	0.76	2.08	0.47–9.15	0.331
Gestational week	–0.04	0.24	–	0.60–1.52	0.858
Annual household income	–1.74	0.73	0.18	0.04–0.73	0.017
Marital satisfaction	1.00	0.47	2.71	1.08–6.79	0.033
Social support	1.02	0.52	2.78	0.99–7.78	0.051
Sleep quality	0.67	0.27	–	1.16–3.29	0.012

After all study factors were included into the regression model and other affecting factors were adjusted, the result showed that the correlation between age, household income, marital

satisfaction, sleep quality, and postpartum depression was statistically significant. Among them, with increase of age, third-trimester sleep quality score increased and the probability of

Table 3. Linear regression analysis.

Study factors	Regression coefficient	Standard error	95% confidence interval	P value
Sleep quality	0.85	0.13	0.61, 1.10	<0.01
Constant term	0.33	0.17	-0.97, 3.63	0.255

postpartum depression increased. In addition, higher household income and higher marital satisfaction are protective factors for postpartum depression, and this finding is identical with the findings of international studies [16]. Moreover, because this was a longitudinal study and in statistical analysis the impacts of third-trimester depression and depressive symptoms were eliminated, it appears that poor third-trimester sleep quality is a risk factor for postpartum depression and there is causal correlation between them. In addition, there was no statistically significant correlation between social support and postpartum depression ($P=0.051$). However, combined with other domestic and foreign studies [18,28], we believe that good social support is a protective factor for postpartum depression. Finally, this study explored the correlation between third-trimester sleep quality and postpartum depressive symptoms, and the result showed that postpartum depressive symptom score increased with increase of third-trimester subjective sleep quality score and the correlation was statistically significant, similar to findings from outside China [19]. A study from outside of China found that after third-trimester insomnia is treated by trazodone or diphenhydramine, the incidence rate of postpartum depression is significantly lower than in the control group [29]. However, currently there are few similar reports on such studies in our country.

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Conclusions

In summary, poor subjective sleep quality in the third trimester can be a risk factor for postpartum depression. In addition, early intervention may have a positive impact on mothers and infants, and further studies are needed to confirm this.

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