Original article

Quality of Sleep in Third-Trimester Pregnancy and Non-Psychotic Postpartum Depression

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SUMMARY

Introduction/Aim. Quality of sleep (QoS) in the third-trimester of pregnancy has been suggested as a potential risk factor for the onset of non-psychotic postpartum depression (NPPD). The aim of the paper was to investigate whether the quality of sleep in the third-trimester of pregnancy is a risk factor for non-psychotic postpartum depression (NPPD) in women without a diagnosed psychiatric disorder.

Method. In the third-trimester of pregnancy, 218 pregnant women completed a questionnaire constructed for research purposes as well as the Pittsburgh Sleep Quality Index (PSQI). Four weeks after childbirth, the participants filled in the Edinburgh Postnatal Depression Scale (EPDS) and received structured interview diagnoses.

Results. High risk for NPPD (score on EPDS $\geq$ 13) was found in 21 (9.63%) participants. Higher rates on the EPDS were noticed in single, unemployed, housewives, women who were getting little social support, women who were dissatisfied with their annual household income and with unwanted pregnancy (p < 0.05). Social support and QoS were positively related to NPPD, whereas annual household income and marital satisfaction were negatively related to NPPD. The third-trimester QoS was related to NPPD symptoms, and the correlation was statistically significant (p < 0.05).

Conclusion. Poor third-trimester QoS is a risk factor for NPPD.

Keywords: **quality of sleep, non-psychotic postpartum depression, risk factors**

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INTRODUCTION

Motherhood is considered the most beautiful but also a potentially stressful event, which, in addition to changes on the somatic level, causes some significant changes in psychological and social functioning, especially in the domain of sleep. Throughout pregnancy, and especially in the third-trimester of pregnancy, women face problems with timing, reduced sleep duration, and maintaining good quality of sleep (QoS) (1).

Postpartum is a particularly vulnerable period for the development of non-psychotic postpartum depression (NPPD) in the first four weeks after childbirth (2). A current comprehensive literature review on the global epidemiology of NPPD, which in the final analysis included a total of 565 studies from 80 different countries or regions, gives an overall prevalence of 17.22% (3). NPPD has been shown to have an impact on attachment, behavioral and cognitive development of the growing baby, the relationship with the partner, and the functionality of the family as a whole (2, 4).

Up to date, the factors that have been associated with the occurrence of NPPD are difficult and prolonged childbirth accompanied with complications, subjective experience of lack of social support, fear of abandonment, unplanned/unwanted pregnancy, maternal age, level of education, and depression, anxiety and stress during pregnancy (2, 5). Poor QoS in the third-trimester of pregnancy has been suggested as a potential risk factor for the onset of NPPD, in the antepartum depressed women (6). Insufficient and disturbed sleep affects memory, decision-making, as well as mood during and after pregnancy (6). Longer-term sleep disorders can represent a prodrome, but also a risk factor for the later development of NPPD, allowing the possibility of early intervention (1, 6).

The aim of the paper was to investigate whether the poor quality of sleep in the third-trimester of pregnancy is a risk factor for NPPD, in a sample without a diagnosed psychiatric disorder.

METHOD

Study subjects

The research was designed as a prospective study with two observation periods, in the third-trimester of pregnancy and the fourth week postpartum. From January 2019 to June 2019, 236 pregnant women who attended the Parenting school at the Department of Gynecology and Obstetrics in Primary Health Center Niš were invited to participate in the research. Of the total number, six women initially refused to participate for private reasons, and 18 women did not meet the inclusion criteria.

Participants with previously and/or during pregnancy detected psychiatric disorders, application of drugs of any type and any detected somatic process, which could potentially be an etiological factor and explain the presented symptomatology (primarily endocrinological, inflammatory, or auto-immune process) were excluded. We advised them to avoid the use of tea or coffee inasmuch not to affect the quality of sleep.

Pregnant women who were excluded did not differ significantly in terms of age, marital status, unplanned pregnancy, or unemployment, nor did they have a lower level of education compared to the observed sample, so it was unlikely that they were exposed to a greater risk than the participants in the research. Also, the rate of refusal to participate in the study was relatively low, which suggests that our study was representative of women who managed their pregnancy in the given period in the Primary Health Center in Niš. Two hundred and eighteen pregnant women gave their verbal and signed informed consent after a detailed explanation of the research concept.

In the third-trimester of pregnancy, they were invited by trained staff to complete a questionnaire constructed for research purposes (which included questions related to sociodemographic, health and pregnancy data) and Standard Pittsburgh Sleep Quality Index (PSQI). Four weeks after childbirth, the participants filled in the Edinburgh Postnatal Depression Scale (EPDS) and received structured interview diagnoses. The data obtained from the participants were additionally confirmed by examining the medical documentation. They were also explained that participation was fully on voluntary basis.

In the group of test participants, a psychiatric diagnosis was established by a specialist psychiatrist, based on the diagnostic criteria of the available classification systems, confirmed by the use of the Serbian version of the Mini International Neuropsychiatric Interview, version 6.0, which is used both in clinical and research work (7-11).

The design of the study was approved by the Ethics Committee of the Faculty of Medicine of the University of Niš and the Ethics Committee of the Health Center in Niš. All research procedures carried out in the course of this research were under the ethical standards of the Declaration of Helsinki from 1975, revised in 2013, Basics of Good Clinical Practice and the Law on Health Care of the Republic of Serbia.

Research scales

Sociodemographic and pregnancy-related questions included their age, educational level, satisfaction with perseived social support, marital satisfaction, annual household income, employment status, partners' employment status, place of residence, wanted or unwanted pregnancy, number of children, the age of their youngest child, sex of the child, and type of delivery. Participants were asked to indicate their diagnosed illnesses and any history of psychiatric disorders, such as NPPD. Finally, the participants were asked whether they had any complications with this pregnancy, and whether they were physically active, consumed alcohol or smoked.

The PSQI quality of sleep questionnaire consists of 19 self-rated questions, i.e., nine questions, and the fifth question contains 10 items (12). These 19 self-rated questions are classified into seven groups, each scores from 0-3, and the total score scale varies from 0 to 21. A total score of 5 or greater is indicative of the poor quality of sleep, and a higher score indicates the worse quality of sleep. It assesses a one-month interval and provides data useful both in clinical and scientific work, as it measures the QoS, duration and latency of sleep, common efficacy of sleep, and functionality during the day. PSQI is a widely used instrument for subjective QoS assessment which is translated and standardized in Serbia (13-15). The Serbian version of the scale has good reliability and validity (15). PSQI is understandable to the examinees and applicable in everyday clinical practice.

EPDS is a generally accepted and widely used assessment scale for postpartum depression (16). It is a reliable and valid screening method for detecting symptoms in the postpartum period, which indicate the risk of developing postpartum depression, tested on different populations, validated in Serbia (17-21). It is a 10 item self report scale, testing: mood, contentment, feeling guilty, anxiety, dread, insomnia, re-

sourcefulness, grief, tearfulness, and self-injury. Each item is divided into 0–3 points and the total score ranges from 0 to 30 points. The final score greater than 10 is a risk of postpartum depression, and those who scored ≥ 13 were considered as NPPD women.

Statistical analysis

All data were statistically processed with IBM SPSS statistical software (version 21) for the Windows operating system. Numerical data were presented as mean ± standard deviation. Sociodemographic characteristics data were evaluated by their number and percentage of dispersion. Statistical description methods calculated mean values, standard deviations, frequencies, prevalence rates, and confidence intervals. For initial analysis, a Student's t test was used to determine statistical differences in continuous variables between the groups. A Chi-square tested difference in the prevalence rates of postpartum depression among different socio-demographic factors. The correlation between socio-demographic factors, third-trimester sleep quality, and postpartum depression was analyzed by using the binary classification non-conditional logistic regression model test. Linear regression method was used to analyze the correlation between third-trimester sleep quality and postpartum depressive symptoms. Results were evaluated at a 95% confidence interval, and significance was evaluated at $p < 0.05$.

RESULTS

Sociodemographic characteristics and NPPD prevalence rate

Participants with a high risk for NPPD had the score on EPDS ≥ 13 (Figure 1). When filling out the assigned questionnaires for the first time, the average gestational age was 31.8 ± 1.6 weeks (range 32–36 weeks). Sociodemographic features of participants are presented in Table 1.

Statistically significant correlations between EPDS scores and additional characteristics of the participants are presented in Table 2. No statistically significant influence was noted in terms of their partners' employment status, or place of residence. Also, we did not find a statistically significant correlation between scores obtained on EPDS with type of the delivery, number of children, the age of their youngest child, and sex of the child.
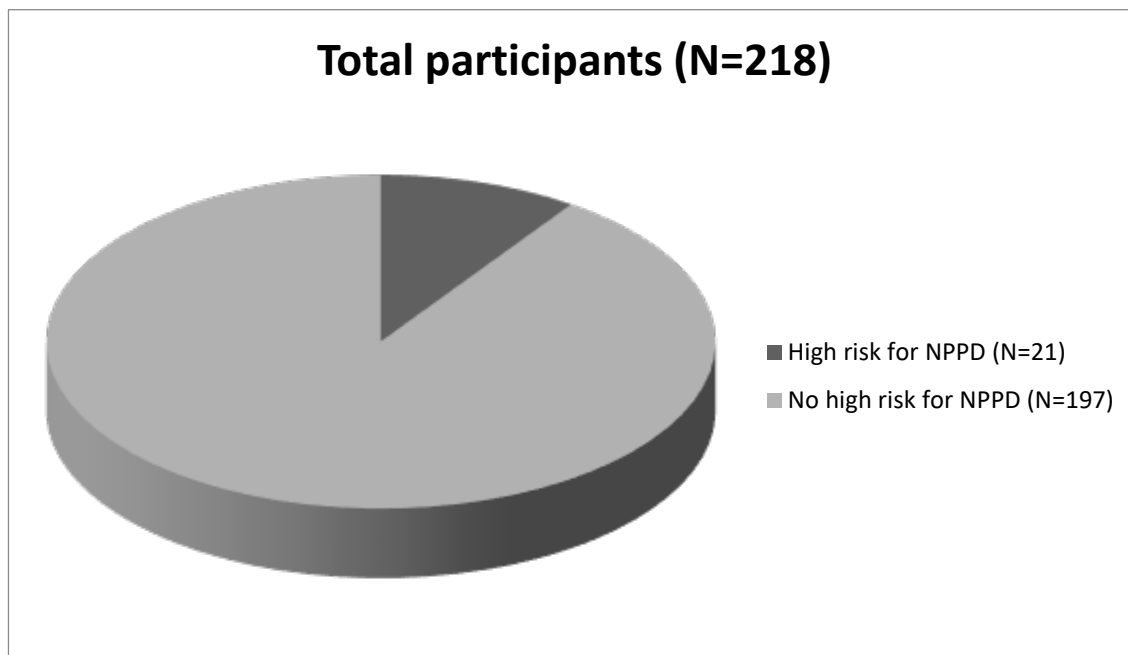
Figure1. *Participants with and without high risk for NPPD*

Table1. *Sociodemographic characteristics of participants (N = 218)*

Feature	Value
Gestational age (mean ± SD, median (min - max), weeks)	31.8 ± 1.6; (32-36)
Faculty and above (%)	53.22
High school education or below (%)	46.79
Took work and maternity leave (%)	36.69
Had no job or housewives (%)	63.31
Low income (%)	33.48
Middle income (%)	24.77
Higher income (%)	41.75

Table 2. *Correlation between EPDS scores and additional characteristics of participants*

		Single	Unemployed and housewives	Little social support	Dissatisfied with incomes	Unwanted pregnancy
EPDS scores	R_p	0.142	0.189	0.193	0.186	0.202
	p	< 0.05*	< 0.05*	< 0.05*	< 0.05*	< 0.05*

p < 0.05*

Third-trimester quality of sleep, demographic characteristics, and NPPD

The results demonstrated that emotional status, employment status, social support, annual household income, marital satisfaction and QoS were significantly related to NPPD; among these, social support and QoS were positively linked to NPPD, and annual household income and marital satisfaction were negatively related to NPPD. Third-trimester QoS was linked to NPPD symptoms, and the correlation was statistically significant. Poorer QoS was associated with higher score on EPDS. As a causal relationship was observed between QoS in the third-trimester of pregnancy and a high score on the EPDS (≥ 13), QoS could be considered as a prospective risk factor for the NPPD.

DISCUSSION

Our findings showed that within four weeks after delivery, the prevalence of NPPD was 9.63% in a sample without antepartum mood disorder, which is a relatively similar value obtained in research on this population in Serbia, however, it is lower than the values reported by meta-analyses (3, 17, 20, 22). NPPD in our research was significantly associated to emotional and employment status, social support, annual household income, marital satisfaction, and QoS.

In our study, we found the causal correlation between poor QoS in the third-trimester of pregnancy and NPPD, in a sample without diagnosed any psychiatric disorder, particularly antepartum depression. Studies have associated so far sleep disorders, particularly insomnia in the third trimester of pregnancy with mood disorders during pregnancy and postpartum, due to the changes in physiologic sleep-wake cycle and more cortical arousal (1, 22, 23). In addition, research conducted on a group of pregnant and currently non-depressed women, but with a history of mood disorders, found a connection between the QoS in late pregnancy and the recurrence of a depressive episode (1).

Poor QoS is so far associated with several sociodemographic factors in Serbia, but according to the data available to us, it has not been observed as a risk factor or investigated in the population of pregnant and postpartum women (13, 14). The latest data from the field of sleep disorders indicate that especially the QoS is important for the mental health of women in the first months after childbirth, as it could have a negative impact on the severity of depressive symptoms in NPPD women, including the risk of suicide (24). In a study of non-depressed postpartum women, results on polysomnography found increased deep restorative stage and decreased full sleep time, indicating that their sleep was more efficient and suggesting that women with poor QoS are vulnerable to mood disorders (25).

Being single, unsatisfied in marriage, bad economic situation, unemployment and lack of own income had been shown to be significantly contributing risk factors for the occurrence of NPPD in previous research, which our study confirmed (2, 26). Also, higher rates on the EPDS were noticed in women who were getting little social support and with unwanted pregnancy.

The most cited is the correlation between dysfunctional partner relations and the absence of social support and postpartum depression, which explains the Beck's interpersonal model of postpartum depression of the mismatch between expected and desired social support. Satisfaction with perceived and received social support is thought to be a protective factor against the development of NPPD, and studies have linked the lower social support with NPPD, similar to the result of the present study (2, 5, 17).

The importance of this research is great. Namely, according to the data available to us, this is the first prospective research designed in this way in our country, which contributes to better understanding the QoS as an important component of preserving the mental health in this vulnerable population and as a potential risk factor for the NPPD.

Admittedly, the research has several limitations. First, we did not use polysomnography for objective assessment, because we wanted to examine the relationship between subjective QoS assessment and NPPD. Second, the research did not assess cognitive bias before completing the self-assessment questionnaire. The third participation in the research was exclusively on a voluntary basis.

CONCLUSIONS

The results of our research showed a correlation between poor QoS in the third-trimester of pregnancy and several sociodemographic factors and a high score on the EPDS. QoS can be routinely measured in daily clinical work, using the PSQI questionnaire, thus potentially preventing NPPD.

Well-developed longitudinal studies with larger samples are needed for better understanding potential risk factors, severity of NPPD, and early preventive measures.

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Kvalitet spavanja u trećem tromesečju trudnoće i nepsihotična postporođajna depresija

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S A Ž E T A K

Uvod. Kvalitet spavanja (engl. *quality of sleep* – QoS) u trećem tromesečju trudnoće može se smatrati potencijalnim faktorom rizika za nastanak nepsihotične postporođajne depresije (engl. *non-psychotic postpartum depression* – NPPD).

Cilj. Cilj našeg istraživanja bio je da istražimo da li je kvalitet spavanja u trećem tromesečju trudnoće faktor rizika za nastanak nepsihotične postporođajne depresije kod žena kod kojih nije postavljena dijagnoza psihijatrijskog poremećaja.

Metode. 218 trudnica u trećem tromesečju trudnoće, popunilo je upitnik konstruisan za potrebe istraživanja, kao i Pitsburški indeks kvaliteta spavanja (engl. *Pittsburgh sleep quality index* – PSQI). Četiri nedelje nakon porođaja, učesnice su popunile Edinburšku skalu postnatalne depresije (engl. *Edinburgh postnatal depression scale* – EPDS), a dijagnoza je postavljena primenom strukturisanog intervjua.

Rezultati. Visok rizik od nastanka NPPD-a (skor na EPDS-u ≥ 13) nađen je kod 21 učesnice istraživanja (9,63%). Visok skor na EPDS-u uočen je kod žena bez partnera, nezaposlenih i domaćica, žena sa niskim nivoom socijalne podrške, žena nezadovoljnih godišnjim prihodom u domaćinstvu i kod žena prilikom neželjene trudnoće (p < 0,05). Socijalna podrška i kvalitet spavanja bili su u pozitivnoj korelaciji, a godišnji prihod domaćinstva i zadovoljstvo partnerskim odnosom u negativnoj korelaciji sa nepsihotičnom postporođajnom depresijom. Kvalitet spavanja u trećem tromesečju povezan je sa simptomima nepsihotične postporođajne depresije, a korelacija je statistički značajna (p < 0,05).

Zaključak. Loš kvalitet spavanja predstavlja faktor rizika za nastanak nepsihotične postporođajne depresije.

Ključne reči: kvalitet spavanja, nepsihotična postporođajna depresija, faktori rizika