

Risk factors for postpartum depressive symptoms

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Research Article

Keywords: postpartum depressive symptoms, preterm birth, Edinburgh Postnatal Depression Scale

Posted Date: April 6th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1509248/v1>

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Abstract

Purpose:

The purpose of the present study is to clarify predictors of postpartum depressive symptoms. The study focuses on the relationship between preterm birth and postpartum depressive symptoms in primary medical facilities among mothers who visited one clinic for a medical checkup at 1 month postpartum.

Methods:

The following data were retrospectively collected from medical records: total Edinburgh Postnatal Depression Scale (EPDS) score, maternal age at birth, parity, history of psychiatric disease, pre-pregnancy body mass index (BMI), gestational age, infant's sex and maternal nationality. We analyzed the risk factors for postpartum depressive symptoms as measured by the Japanese version of the EPDS.

Results:

Of 727 subjects, the mean EPDS score at 1 month postpartum was 4.14 and 76 of the 727 subjects (10.5%) had an EPDS score of 9 points or more. After multivariate analysis, "preterm birth" showed an odds ratio [OR] of 4.14 [95% confidence interval [CI], 1.48-11.57; p=0.007], "primipara" an OR of 3.16 [95%CI, 1.81-5.53; p<0.001], "a history of psychiatric disease" an OR of 2.53 [95%CI, 1.23-5.23]; p=0.012] and "male infant" an OR of 1.70 [95%CI, 1.02-2.81; p=0.041] were associated with postpartum depressive symptoms.

Conclusions:

In total, 76 (10.5%) of the 727 subjects (10.5%) had an EPDS score of 9 points or more at 1 month postpartum. Mothers of late premature infants, primipara, mothers with a history of psychiatric disorders, and mothers of boys were more likely to have depressive symptoms in the first month postpartum in low-risk births in Japan. Mothers with these factors in their background might need to be carefully monitored during pregnancy and after delivery.

Background

Postpartum depression is one of the psychiatric disorders that occur during the postpartum period, and the prevalence of postpartum depression in Japan has been shown to be as high as 6.3–15.2% at 1 month postpartum [1, 2]. It was revealed that postpartum depression was associated with decreased quality of life [3]. It was also reported that women with postpartum depressive symptoms were at risk of suicide [4–6], and that postpartum depression influenced unintended injury and accidental fall in infants [7], attachment disorder in the relationship between mother and child [8, 9], health seeking behavior and breast-feeding in infancy [10], and consequently child neglect and its related effects on child development. Since postpartum depression influences not only the mother herself, but also the persons around her including her child as described above, it is considered necessary to conduct screening and

intervention as early as possible. By identifying the risk factors associated with postpartum depression, women who are prone to such risk factors can be detected early, enabling the women most in need to receive effective support [11]. Postpartum care, including postpartum depression has been reported to reduce the number of postpartum suicides[12].

It was previously reported that the most important risk factors for postpartum depression were high life stress, insufficient social support, experience of abuse, history of depression before and during pregnancy, worries about infant care and dissatisfaction with married life or partner, or preterm birth [13–15]. Although the relationship between preterm birth and postpartum depression has been investigated in many studies and some studies showed a significant relationship [16, 17], others did not [18, 19]. A recent review by Zhao et al. concluded that preterm birth was associated with postpartum depression [16]. In Japan, Tamaki et al. showed that high scores in the Edinburgh Postnatal Depression Scale (EPDS) test and the State-Trait Anxiety Inventory State (STAIS) test were correlated with preterm birth at 3 months postpartum, but not at 1 month and 4 months postpartum, using a chi-square test [15]. The relationship between preterm birth and postpartum depression is thus still somewhat controversial. It was reported that preterm birth is responsible for deaths of children aged under 5 years [20]. Premature infants account for 30% of infants admitted to the Neonatal Intensive Care (NICU), indicating that premature infants have more respiratory distress syndrome than term infants [21]. It has been reported that mothers of preterm infants have a different experience from what the mothers envisioned for pregnancy, childbirth, and childcare, with more emotional distress, higher depression score and higher traumatization [22–24]. This is suggestive of a relationship between preterm birth and postpartum depression. While studies in Japan have examined postpartum depression and psychosocial factors [1, 18, 25], few studies have examined other relevant factors.

The purpose of the present study was to extract the risk factors for postpartum depressive symptoms in primary medical facilities that seem to treat relatively low-risk groups in Japan and to analyze the relationship between preterm birth and postpartum depressive symptoms at 1 month postpartum.

Methods

Participants

The participants of the present study were women living in Saitama City (an ordinance-designated city with a population of approximately 1,320,000) who gave birth at an obstetrics and gynecology clinic in Saitama City from September 2017 to December 2018. Women who visited the clinic for a medical checkup at 1 month postpartum were requested to answer the EPDS questionnaire (Japanese version). Of the 1466 women who gave birth between January 1, 2017 and December 31, 2018, 733 women answered the EPDS questionnaire were included in the study. Excluding three women with duplicated information and three women with missing data from among these 733, a final total of 727 women were included in the analysis of the present study.

An information disclosure document stating the purpose and content of the present study and that it had been approved by an ethics committee was posted in the waiting room of the obstetrician's office. Pregnant women who wished to refuse participation in the present study could contact the researcher at any time to inform her that they would like to withdraw. The need for informed consent was waived in line with ethical guidelines in medical and health research involving human subjects in Japan [26].

The present study was approved by the medical ethics committee of Juntendo University (approval number: 2019166).

Data collection method

The following data were retrospectively collected from medical records: total EPDS score, maternal age at birth, parity, history of psychiatric disease, pre-pregnancy body mass index (BMI), gestational age, infant's sex and maternal nationality.

Method of assessing postpartum depressive symptoms

We assessed postpartum depressive symptoms using the Japanese version of the EPDS. The EPDS is a self-administered instrument developed for screening of postnatal depression by Cox et al. in 1987 [27]. The Japanese version of the EPDS was developed by Okano et al. in 1996 and is a 10-item self-reporting scale [28]. Each item is scored on a scale ranging from 0 to 3 and the lowest and highest possible total scores are 0 and 30, respectively [28]. Its reliability and validity have been validated [28]. Women with total EPDS scores of 9 points or higher are considered to have suspected postpartum depression [28]. All analyses were conducted using IBM SPSS Statistics for Windows (version 25.0; IBM Corp, Armonk, NY, USA).

Statistical analysis

The subjects analyzed were categorized into two groups by the median pre-pregnancy BMI and the median maternal age at birth, respectively. Multivariate logistic regression analyses were performed with total EPDS score (≤ 8 vs ≥ 9) as the dependent variable, gestational age (gestational age: <37 weeks vs ≥ 37 weeks) as the independent variable, and pre-pregnancy BMI ($\leq 19 \text{ kg/m}^2$ vs $\geq 20 \text{ kg/m}^2$), maternal age at birth (≤ 31 vs ≥ 32), parity (yes vs no), history of psychiatric disease (yes vs no), maternal nationality (Japanese vs non-Japanese), and infant's sex (male vs female) as covariates.

Results

Out of 727 subjects in the present study, 22 subjects (3.0%) had a preterm birth (birth before 37 weeks of gestation) and a total of 76 of 727 subjects (10.5%) had an EPDS score of 9 points or more (suspected postpartum depression). The mean maternal age (and standard deviation [SD]) at birth was 31.67 years old (range: 17–43, SD: ± 4.601), the mean EPDS score was 4.14 points (range: 0–23, SD: ± 3.552), the mean week of delivery was 38.83 weeks (range: 35–41, SD: ± 1.214), and the mean pre-pregnancy BMI

was 20.67 kg/m² (range: 14–32, SD: ±2.911). The median pre-pregnancy BMI was 20 kg/m² and the median maternal age at birth was 32 years.

A chi-square test revealed that the proportion of women with an EPDS score of 9 points or more (suspected postpartum depression) was significantly higher in women who gave birth before 37 weeks of gestation (27.3%) compared to women who gave birth after 37 weeks of gestation (9.9%; p < 0.01) (Table 1).

Table 1
Basic characteristics of the subjects (n = 727)

Variables	Categories (n)	EPDS		Risk (%)	p-value
		(≤ 8) (n = 651)	(≥ 9) (n = 76)		
Age at birth	≤ 31 years (n = 357)	311 (47.8)	46 (60.5)	12.9	0.035
	≥ 32 years (n = 370)	340 (52.2)	30 (39.5)	8.1	
Parity	Multipara (n = 384)	363 (55.8)	21 (27.6)	5.5	< 0.001
	Primipara (n = 343)	288 (44.2)	55 (72.4)	16.0	
Race	Japanese (n = 703)	629 (96.6)	74 (97.4)	10.5	1.000
	Non-Japanese (n = 24)	22 (3.4)	2 (2.6)	8.3	
History of psychiatric disease	No (n = 674)	610 (93.7)	64 (84.2)	9.5	0.003
	Yes (n = 53)	41 (6.3)	12 (15.8)	22.6	
BMI before pregnancy	≤ 19 (n = 287)	259 (39.8)	28 (36.8)	9.8	0.619
	≥ 20 (n = 440)	392 (60.2)	48 (63.2)	10.9	
Infant's sex	Female (n = 351)	322 (49.5)	29 (38.2)	8.3	0.062
	Male (n = 376)	329 (50.5)	47 (61.8)	12.5	
Gestational age	≥ 37 weeks (n = 705)	635 (97.5)	70 (92.1)	9.9	0.009
	< 37 weeks (n = 22)	16 (2.5)	6 (7.9)	27.3	

EPDS, Edinburgh Postnatal Depression Scale; BMI, body mass index

Regarding the risk factors for postpartum depressive symptoms, the results from the multivariate logistic regression analyses are shown in Table 2. Multivariate logistic regression analysis also showed that “preterm birth” (odds ratio [OR], 4.14; 95% confidence interval [95%CI], 1.48–11.57; p = 0.007), “primipara” (OR, 3.16; 95%CI, 1.81–5.53; p = 0.000), “a history of psychiatric disease” (OR, 2.53; 95%CI, 1.23–5.23), p

= 0.012) and “male infant” (OR, 1.70; 95%CI, 1.02–2.81; p = 0.041) were associated with postpartum depressive symptoms.

Table 2
Multivariate logistic regression analysis (n = 727)

Variables	Categories (n)	Multivariate OR (95%CI)	p-value
Age at birth	≤ 31 years (n = 357)	1 (ref)	0.380
	≥ 32 years (n = 370)	0.79 (0.47–1.34)	
Parity	Multipara (n = 384)	1 (ref)	< 0.001
	Primipara (n = 343)	3.16 (1.81–5.53)	
Race	Japanese (n = 703)	1 (ref)	0.456
	Non-Japanese (n = 24)	0.57 (0.13–2.54)	
History of psychiatric disease	No (n = 674)	1 (ref)	0.012
	Yes (n = 53)	2.53 (1.23–5.23)	
BMI before pregnancy	≤ 19 (n = 287)	1 (ref)	0.849
	≥ 20 (n = 440)	1.05 (0.63–1.75)	
Gestational age	≥ 37 weeks (n = 705)	1 (ref)	0.007
	< 37 weeks (n = 22)	4.14 (1.48–11.57)	
Infant’s sex	Female (n = 351)	1 (ref)	0.041
	Male (n = 376)	1.70 (1.02–2.81)	

95%CI, 95% confidence interval; OR, odds ratio; BMI, body mass index

The percentage of women with postpartum depressive symptoms was 20.0% at 35 weeks of gestation, and 29.4%, 10.7%, 10.4%, 9.0%, 9.9%, and 11.9% at 36 to 41 weeks of gestation, respectively (Fig. 1).

Discussion

We investigated the risk factors (especially preterm birth) for postpartum depressive symptoms in mothers who visited the clinic for medical checkup at 1 month postpartum using EPDS. Consequently, the chi-square test and multivariate logistic regression analyses revealed that “preterm birth” was associated with postpartum depressive symptoms in the first postpartum month in Japan.

In the present study, preterm births occurred at 35 to 36 weeks of gestation and the results supported a previous study showing that late preterm birth was a risk factor for postpartum depressive symptoms at 1 month postpartum [23]. The National Center for Child Health and Development stated that “late preterm

birth is defined as birth between 34 and 36 weeks of gestation, and late preterm infants are said to have many health issues” [29]. Late preterm infants were revealed to be physiologically and metabolically immature and often to have breast-feeding problems [30–32]. Many mothers of preterm infants have been found to have high anxiety about the health of their children, and post-traumatic symptoms due to shock from unexpected preterm birth, inadequate psychological preparation for motherhood, inadequate preparation of the home and other environments, and experiences different from those expected or anticipated for birth [23, 24]. These findings suggest that mothers of late preterm infants are routinely in a state of stress. It is believed that routine stress is one of the risk factors for postpartum depression and that the association between preterm birth and postpartum depressive symptoms is related to early stress of parents and problems with the interaction between mother and child [17, 22]. In addition, from the observation in the present study, it is believed that the association between late preterm birth and postpartum depressive symptoms depend on routine stress and negative feelings of mothers toward children. In contrast, some studies showed no association between preterm birth and postpartum depressive symptoms. De Paula Eduardo et al. [31] concluded that the reasons for varying results might include differences in the confounding variables used, in the tools used for screening and evaluating depression, and in the study subjects [33]. Further studies are needed to gain a better understanding of the association between late preterm birth and postpartum depressive symptoms.

The present study showed that “primipara”, “history of psychiatric disease” and “male infant” were significantly associated with postpartum depressive symptoms at the medical checkup at 1 month postpartum. Regarding parity, primipara were found to be more prone to postpartum depressive symptoms when compared to multipara. Previous studies on the relationship between the birth experience and postpartum depression reported that primipara had higher EPDS scores and were more prone to postpartum depression when compared to multipara [1, 18, 34–36]. The results from the present study supported those from the previous studies. It has been reported that a greater proportion of primipara had suspected postpartum depression compared to multipara, primipara were under high stress particularly in the early postpartum period according to the Parental Stress Scale, and that primipara had higher anxiety and depression scores on the Hospital Anxiety and Depression Scale compared to multipara [35–38]. Nakano et al. considered that women who experienced depression after the first childbirth had low motivation for a second childbirth and did not want a further pregnancy, resulting in a higher frequency of postpartum depression in primipara compared to multipara [18]. We believe that these reasons also explain the results of the present study showing higher frequency of postpartum depressive symptoms in primipara compared to multipara. Conversely, Dietz et al. reported that there was no significant difference in the frequency of postpartum depression between primipara and multipara [39]. Their results contradict the results obtained in the present study. We believed that the reasons for this difference might include differences in methods, and the timing of and tools for evaluating postpartum depressive symptoms. Furthermore, as Takegata et al. have shown, varying results may also be due to differences in the environment, such as differences in societies and cultures [25].

The present study also showed that women with a history of psychiatric disease were more likely to have postpartum depressive symptoms than women without a history of psychiatric disease. Previous studies have revealed that a history of psychiatric disease was one of the risk factors for postpartum depression [8, 13, 16, 40]. The greatest risk factor for postpartum depression was shown to be symptoms of depression during pregnancy, and a risk factor for depression during pregnancy was shown to be a prior history of major depressive disorder [8]. A prior history of major depressive disorder is thus considered to be a risk factor for postpartum depressive symptoms. In addition, it was demonstrated that a greater proportion of women with postpartum depression had a family history of postpartum depression than those without postpartum depression, and the predictive factors for recurrent depression in elderly people included a high level of neuroticism and a low level of mastery [41, 42]. Therefore, we believed that in the present study, women with a history of psychiatric disease were more likely to have symptoms of postpartum depressive due to susceptibilities related to genetic factors and personality traits.

In addition, the present study showed that mothers with male infants were more prone to postpartum depressive symptoms than mothers with female infants. A study by Mori et al. in Japan and other studies in other countries also showed that the infant's expected sex was associated with postpartum depression at 1 month postpartum [1, 25, 43]. On the other hand, it was reported that in India, Nigeria and China, the birth of female infants was associated with postpartum depression because the husbands and family members believed that male infants were needed to continue the family line and develop the family business leading to a strong desire for the birth of male infants, and hence the birth of female infants might negatively affect the marital relationship [25, 43, 44]. Takegata et al. reported that currently, parents in Japan have a preference for female infants because parents' expectations of better relationships with biological daughters and of biological daughters caring for them in old age outweigh their desires for a family heir or for future financial support [25]. In addition, it was reported that sex preference could cause postpartum depression when there was a disagreement between the mother and her mother-in-law in that regard [45]. In the present study, the birth of male infants might have been associated with postpartum depressive symptoms due to a similar cause.

There are several limitations to the present study. First of all, in general, it has been shown that people underreport undesirable behaviors. The present study used a self-administered questionnaire, the subjects' responses of which might have been influenced by their perceptions of the social desirability of their responses [46]. Secondly, the results of the present study are difficult to generalize, since the target population consisted of the patients of a single hospital. Finally, since the hospitals covered by the present study were practitioners, high-risk pregnant women were transferred to larger hospitals. As a result, the number of subjects with factors affecting the EPDS might have been reduced. In the future, it will be necessary to increase the number of hospitals included and conduct longitudinal research.

Conclusions

In total, 10.5% of the subjects of the present study had depressive symptoms at 1 month postpartum. Mothers of late premature infants, primipara, mothers with a history of psychiatric disorders, and mothers

of boys were more likely to have depressive symptoms in the first month postpartum in low-risk births in Japan. As such, mothers with these factors in their background might need to be carefully monitored during pregnancy and after delivery.

Abbreviations

EPDS: Edinburgh Postnatal Depression Scale

BMI, body mass index

95%CI, 95% confidence interval

OR, odds ratio

NICU, Neonatal Intensive Care

Declarations

Ethics approval

This study was approved by Juntendo University Medical Ethics Committee (approval number: 2019166).

In accordance with the national guideline "Ethical Guidelines for Medical and Medical Research Involving Human Subjects," the need to obtain consent was waived because the subject's records were reviewed retrospectively [26].

Consent for publication

Not applicable.

Acknowledgements

Not applicable.

Availability of data and material

It is not possible for the authors to share data from the present study publicly, as the data sets analyzed are not publicly available.

Competing interests

The authors declare that they have no conflicts of interest.

Funding

Not applicable.

Authors' contributions

KM contributed to the study conception, acquired the data, data analysis, and drafting of the manuscript. ME and AK designed the research, drafted the manuscript, and critically revised the text. HK, YM, MT, JT, EN, YU critically reviewed the manuscript. All authors have read and approved the final manuscript for submission and attest to the validity and legitimacy of the data and their interpretation.

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Figures

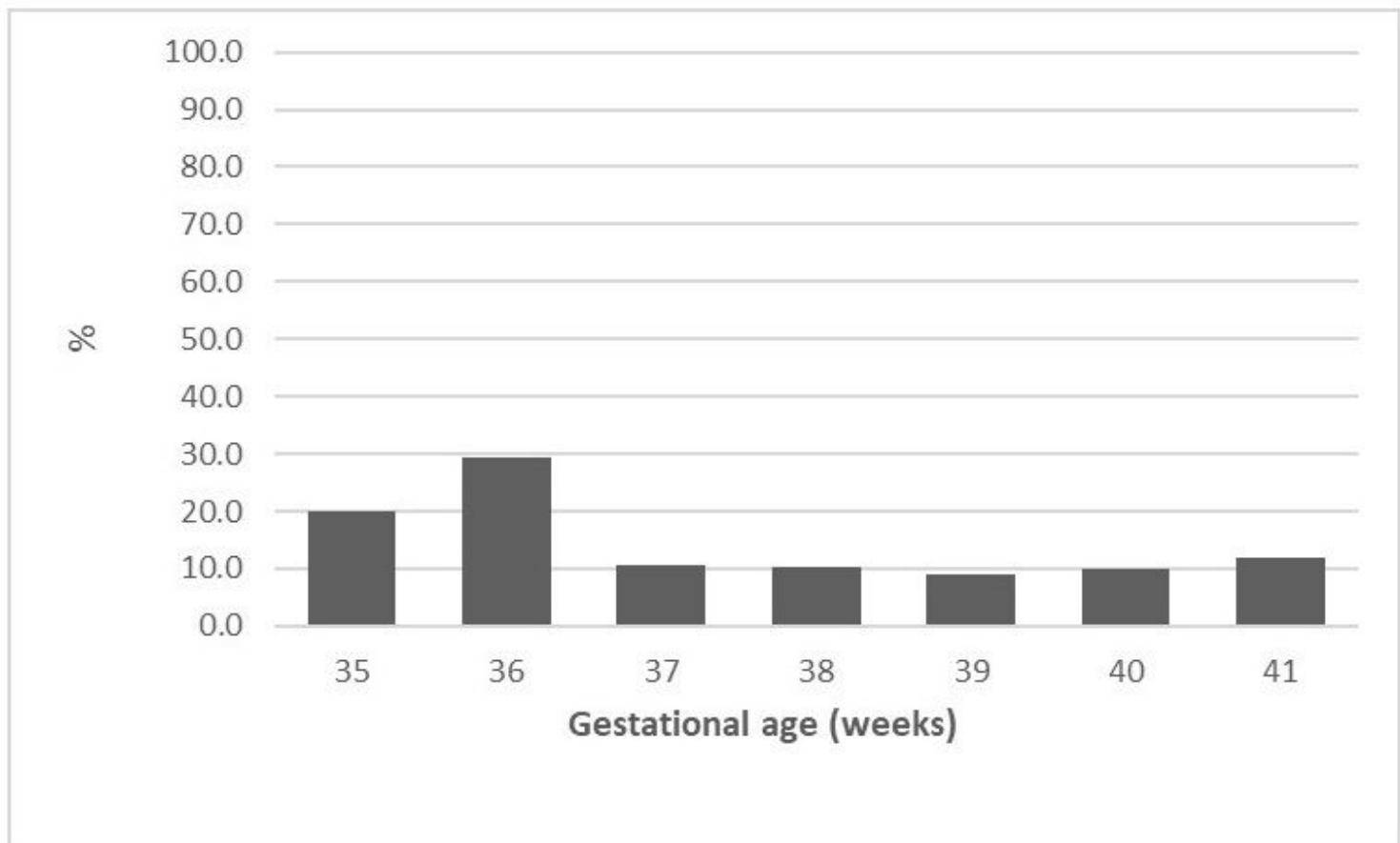


Figure 1

Association between gestational age and percentage of EPDS score above 9