THE JOURNAL OF
Obstetrics and Gynaecology Research

doi:10.1111/jog.14776 J. Obstet. Gynaecol. Res. Vol. 47, No. 6: 2126–2130, June 2021

Psychological stress associated with the COVID-19 pandemic in postpartum women in Yokohama, Japan

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Abstract

Aim: This study aimed to clarify how the COVID-19 pandemic impacts psychological stress levels in postpartum women in Yokohama, Japan.

Methods: We retrospectively compared the rates of positive screening tests for postpartum depression (Edinburgh Postnatal Depression Scale score of 9 or more or self-injury factors) and liaison/psychiatric intervention rates between pre-pandemic and pandemic groups of postpartum women who delivered a live birth at our tertiary perinatal center in Yokohama, Japan between January 2019 and May 2020. Those whose postpartum health screening was performed in 2019 (March–June 2019) were considered the pre-pandemic group, and those whose screening was performed between March and June 2020 were considered the pandemic group. Adjustments were made for maternal background, pregnancy, and delivery outcomes, including a history of psychiatric disorders, complications, preterm delivery, NICU admission, and maternal postpartum complications, and the data were analyzed using a logistic regression analysis.

Results: Postpartum health screenings were performed on 339 women before the pandemic and 279 women during the pandemic. Positive screening rates for postpartum depression did not change before and during the pandemic (adjusted odds ratio 1.48, 95% confidence interval 0.885–2.46).

Conclusions: There was no apparent increase in maternal psychological stress due to the COVID-19 pandemic in Yokohama, Japan. Postpartum women responded differently in settings with varied levels of disease severity and social restrictions.

Key words: postpartum care, psychiatric.

Introduction

Pregnancy and childbirth are risk factors for depression.[1] Appropriate interventions may, however, assist both mothers and their babies during the postpartum period.[1, 2] Stressful life events are also known to be risk factors for postpartum depression.[3] In January 2020, the new coronavirus, COVID-19, was transmitted between human beings in China, and in March 2020, the WHO declared COVID-19 a pandemic.[4] In February 2020, many COVID-19 cases related to the cruise ship Diamond Princess were reported in Yokohama.[5] In March 2020, the number of COVID-19 cases significantly increased, from 224 on March 1, to 1887 on March 31, which was an eight-fold increase. The Japanese government announced a state of emergency in the Tokyo metropolitan area, including Yokohama, on April 7, 2020. Even though the announcement encouraged people to stay home and discouraged travel between cities, it was not a legally binding mandate.

Received: November 29 2020.
Accepted: March 13 2021.
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Reports of worsening psychological stress in pregnant and postpartum women emerged from other countries due to the COVID-19 pandemic.[6, 7] However, in Japan, the social background was different and the spread of COVID-19 was not severe[8]; there was not even an urban lockdown.[9] However, it is necessary to analyze how the COVID-19 pandemic impacts psychological stress levels in pregnant and postpartum women in Japan. This has not been sufficiently studied. Therefore, the present study aimed to clarify the impact of the COVID-19 pandemic on psychological stress in postpartum women in Japan.

Methods

The subjects of the study were mothers who had experienced a live birth at Yokohama City University Medical Center, a Japanese tertiary perinatal facility. Participants were divided into two groups: a pre-pandemic and pandemic group. The mothers who visited our hospital 1 month into postpartum between March 2019 and June 2019 were included in the pre-pandemic group. Those who visited between March 2020 and June 2020 were included in the pandemic group. The postpartum visits took place between 28 and 35 days after delivery.

The mental stress of participants was assessed using the Edinburgh Postnatal Depression Scale (EPDS), which is a questionnaire used internationally as a screening tool for perinatal mental health difficulties, such as postpartum depression.[10] The EPDS is a self-rating scale comprised of 10 subscales, including a questionnaire investigating the existence of self-injurious behavior.[11] Each item on the subscales is rated from zero to three points. The maximum EPDS score is 30 points. In Japan, nine or more points indicate a likelihood of postpartum depression.[12] The data were obtained retrospectively for all cases available from medical records and perinatal databases in our hospital.

We compared the two groups according to the date of the postpartum visit. The primary goal was to determine the rate of the EPDS-positive cases, which were those with an EPDS score of 9 or more, and/or those with the self-injury items selected. The secondary goal was to determine the rate of high EPDS scores (9 or more), EPDS score values, rate of self-injury items selected, and rate of those who required liaison psychiatric interventions after hospital discharge.

We adjusted for confounding factors[1, 13, 14] such as maternal background and pregnancy outcomes, including age at delivery, nullipara, multiple pregnancy, pre-pregnancy BMI, history of psychiatric disorders (previous psychiatric visits, psychiatric disorders, and psychiatric visits during pregnancy), complications (diabetes mellitus, gestational diabetes mellitus with insulin use, hypertension, and gestational hypertension), preterm delivery at <37 weeks of gestation, Neonatal Intensive Care Unit (NICU) admission, coverage under public assistance at the time of delivery (a state-based livelihood protection system), absence of partner (not referring to those cohabiting outside of marriage), lack of regular prenatal checkups, and maternal postpartum complications requiring additional treatment, and carried out a logistic regression analysis. There were no cases of pregnancy with COVID-19 positivity in our hospital.

In addition, the following measures were taken to prevent infections: prolonging the interval between prenatal checkups by 1–2 weeks, restricting visits to women by family members and friends during hospitalization, restrictions on accompanying family members and friends to prenatal checkups, and terminating partner attendance at delivery.

Gestational diabetes mellitus was diagnosed if one or more of the following criteria were met: fasting plasma glucose ≥92 mg/dL, 1-h value ≥180 mg/dL, or 2-h value ≥153 mg/dL on the 75-g oral glucose tolerance test. Therapeutic interventions after a diagnosis of gestational diabetes mellitus were carried out as follows: First, nutritional counseling and dietary therapy were provided. Next, if the target blood glucose levels (before meals, <100 mg/dL; 2 h after meals, <120 mg/dL) were not achieved, insulin therapy was initiated. Hypertension was defined as hypertension before pregnancy or the 20th week of gestation. Gestational hypertension was defined as the incidence of hypertension during pregnancy (blood pressure ≥140/90 mmHg after the 20th week of gestation) with the normalization of blood pressure after delivery.

Statistical analysis was performed using Fisher's exact test for categorical variables and the Wilcoxon test for continuous variables. Odds ratios (ORs) and 95% confidence intervals (CIs) were also calculated. A logistic regression analysis was carried out, and the 95% CI was obtained for the adjusted regression coefficient and adjusted odds ratio (aOR). P values <0.05 were considered significant. The data were analyzed using JMP Pro 15 (version 15.0.0, SAS Institute Inc.,

Cary, NC, USA). Since this was an exploratory study, we did not calculate the sample size.

The study protocol was approved by the Ethics Committee of Yokohama City University Medical Center (Ethics Committee Number; B2000600116). Because the present study was a retrospective study, we use the opt-out method instead of obtaining informed consent from individuals. The included women's anonymity was preserved.

Results

There were 685 women who attended the hospital for a postpartum visit during the study period, and 618 of these were included in the study. About 6 women had insufficient data, and 61 women could not attend between 28 and 35 days postpartum. The pre-pandemic and pandemic groups included 339 and 279 women, respectively. A comparison of women's backgrounds in the two groups is shown in Table 1. The backgrounds of the 61 women who did not attend the hospital for a postpartum visit between 28 and 35 days postpartum are shown in the Supplementary File. There were no statistically significant differences in maternal backgrounds between the two groups.

Table 2 shows the results of the comparative analysis of the following measures: rate of EPDS positive screening, rate of high EPDS score (≥9 points), rate of self-injury items checked on the questionnaire, EPDS score values, and the rate of post-discharge liaison psychiatric interventions.

In the present study, there were no significant differences in the EPDS score and rate of behavioral changes, such as increased self-harm intentions, between the pre-pandemic and pandemic groups. Because of the small number of interventions, it was not possible to perform a multivariate analysis of differences in the rate of women requiring liaison psychiatric intervention. Hence, there was no significant change in the psychological stress of postpartum women associated with the COVID-19 pandemic in Yokohama, Japan.

Discussion

There was no difference in the EPDS score and behavioral changes, such as increased self-harm intentions, before and during the COVID-19 pandemic in contrast to other countries that reported increased mental stress during the pandemic. Zanardo et al.[7] compared the EPDS scores of puerperal women in Northeast Italy during the period of government restrictions on

TABLE 1 Participant characteristics

	Pre-pandemic (n = 339) n (%)	Pandemic (n = 279) n (%)	P-value
Age, median (IQR)	33 (29–37)	33 (29–37)	0.93
<19	3 (0.9)	1 (0.4)	0.63
≦35	135 (40)	105 (38)	0.62
≦40	34 (10)	27 (9.7)	1
BMI, median (IQR)	20.7 (19.2–22.7)	20.3 (18.9–22.6)	0.1
Nullipara	182 (54)	150 (54)	1
Multiple pregnancy	10 (3.0)	10 (3.6)	0.66
Coverage under public assistance	5 (1.5)	2 (0.7)	0.47
Absence of partner	8 (2.4)	3 (1.0)	0.36
Not receiving regular prenatal checkups	2 (0.6)	3 (1.0)	0.66
History of psychiatric disorders	6 (1.8)	11 (4.0)	0.14
Complications			
Psychiatric disorders	24 (7.1)	20 (7.2)	1
DM or GDM	12 (1.2)	19 (6.8)	0.094
Hypertension or GH	33 (9.7)	25 (9.0)	0.78
Preterm delivery	31 (9.1)	30 (11)	0.59
NICU admission	55 (16)	62 (22)	0.064
Maternal postpartum complications	15 (4.4)	5 (1.8)	0.72
Day of postpartum visit, median (IQR)	31 (29–33)	31 (29–33)	0.35

Abbreviations: DM, diabetes mellitus; GDM, gestational diabetes mellitus with insulin use; GH, gestational hypertension; IQR, interquartile range.

TABLE 2 The results of EPDS screening and the rate of post-discharge liaison psychiatric interventions for pre-pandemic and pandemic groups

	Pre-pandemic (n = 339)	Pandemic (n = 279)	OR (95% CI)	P-value	aOR[a] (95% CI)	P-value
Positive, n (%)	38 (11)	41 (15)	1.26 (0.850–2.19)	0.23	1.48 (0.885–2.46)	0.14
EPDS ≧ 9, n (%)	34 (10)	38 (14)	1.41 (0.864–2.31)	0.17	1.55 (0.910–2.64)	0.11
Self-injury, n (%)	17 (5.0)	16 (5.7)	1.15 (0.571–2.32)	0.72	1.09 (0.501–2.37)	0.83
EPDS score value, median (IQR)	3 (1–5)	3 (1–6)		0.24		
Liaison psychiatric intervention, n (%)	1 (0.3)	1 (0.4)	1.22 (0.0757–19.5)	1	NA	NA

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; EPDS; Edinburgh Postnatal Depression Scale; IQR, interquartile range; OR, odds ratio; NA, not applicable. and [a]Adjusted confounding factors: age at delivery, nullipara, multiple pregnancy, pre-pregnancy BMI, history of psychiatric disorders, complications, preterm delivery, NICU admission, coverage under public assistance, absence of partner, not attending regular prenatal checkups, history of domestic violence, and maternal postpartum complications.

movement and the same period in the previous year and reported a significantly higher total score of 2.16 points. Research from China[6] regarding mental health during pregnancy and a comparison of thoughts of self-harm from before and after the report of COVID-19 human-to-human transmission showed a 2.85-fold increase in the risk of self-harm. In contrast to such reports, our results indicated that the median EPDS score was unchanged from pre-pandemic to pandemic, the rate of high EPDS score and the self-injury factor were also unchanged. The most likely reason for the difference in maternal psychological stress caused by the COVID-19 pandemic between Japan and other countries is that the number of COVID-19 patients in Japan and the extent of their illness was less than that of other countries.[15] In addition, there were no administrative lockdowns and only a few restrictions in Japan. In previous reports from China and Italy,[6, 7] moving between cities and going out were severely restricted. In contrast, in Japan, people could go out freely and without penalty. For preventative measures against infection at our hospital, we did not allow partners to attend deliveries, restricted visits to women by family members and friends during hospitalization, and placed restrictions on accompanying family members or friends for prenatal checkups. However, these factors did not appear to have affected the EPDS score.

There was also no increase in women requiring liaison psychiatric intervention during the pandemic in univariate analysis. The EPDS is only a screening tool and cannot be used for diagnosis. In Japan, an EPDS score of nine or more points is considered positive with a sensitivity of 75% and specificity of 93%.[12] The high false-positive rate may be the reason why no difference was observed. However, there was no difference in liaison psychiatric intervention rates in univariate analysis, which may indicate that the COVID-19 pandemic did not worsen psychological stress significantly enough to require intervention.

This study has several limitations. First, the research was based on a single center, and it was a retrospective study. This means that it is difficult to confirm that it represents the impact on pregnant and puerperal women in different parts of Japan. Second, we administered the EPDS in the postpartum period and were neither able to consider all possible stressors experienced during pregnancy nor assess pregnant women who required intervention during pregnancy. Moreover, because of the small number of interventions, it was not possible to perform the multivariate analysis of the rate of liaison psychiatric interventions. Finally, when the infection persists or additional administrative measures are taken, the psychological stress of these factors is expected to be worsened as compared to the results of this study. In other words, there may still be room for prevention in Japan. Therefore, it is necessary to further improve mental healthcare measures under the current situation where the pandemic is still widespread.

Despite these limitations, Yokohama, where this study was conducted, is a city with many COVID-19 cases related to the Diamond Princess cruise ship.[5] In addition, our hospital is a tertiary perinatal center, and low-risk cases and cases at risk of various complications were included in the study. Therefore, the

external validity of the results of the present study is high.

In conclusion, there was no apparent increase in maternal stress due to the COVID-19 pandemic. This study is significant because it found that pregnant and puerperal women responded differently in settings before and during the pandemic with different severities and social restrictions. It is necessary to conduct further studies in a large scale, multicenter setting based on statistical case number design.

Author Contributions

Kazuya Hiiragi wrote the initial draft of the manuscript as first author; Soichiro Obata and Shigeru Aoki assisted in writing the manuscript; Kazuya Hiiragi and Toshihiro Misumi contributed to the analysis and interpretation of data; Etsuko Miyagi contributed to review and final approval of the manuscript, and all other authors contributed to data interpretation and critical revision of the manuscript; and all authors approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1: Supporting Information