



Depression, Anxiety and Primiparity are Negatively Associated with Mother–Infant Bonding in Japanese Mothers

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Purpose: Postpartum depression is a well-known risk factor, and postpartum anxiety and parity are potential risk factors, for mother–infant bonding disorder. However, few studies have focused on the relationships among these factors and mother–infant bonding. This cross-sectional study explored the associations between depression, anxiety and parity, and mother–infant bonding.

Materials and Methods: Japanese mothers, both primiparas and multiparas, completed the Mother-to-Infant Bonding Scale (MIBS) and the Hospital Anxiety and Depression Scale (HADS) one month after childbirth. We performed a stepwise multiple regression analysis with the forward selection method to assess the effects of HADS anxiety and depression scores and parity as independent variables on mother–infant bonding as the dependent variable.

Results: A total of 2379 Japanese mothers (1116 primiparas and 1263 multiparas) took part in the study. MIBS score (2.89 ± 2.68 vs 1.60 ± 2.11 ; $p < 0.0001$) was significantly higher in primiparas than in multiparas. HADS anxiety (6.55 ± 4.06 vs 4.63 ± 3.41 ; $p < 0.0001$) and depression (6.56 ± 3.43 vs 5.98 ± 3.20 ; $p < 0.0001$) scores were also significantly higher in primiparas than in multiparas. A stepwise multiple regression analysis with the forward selection method revealed that HADS depression and anxiety scores and parity were significantly associated with MIBS score ($p = 0.003, 0.015$ and 0.023).

Conclusion: Depression, anxiety and primiparity were negatively associated with mother–infant bonding one month after childbirth.

Keywords: HADS, Japanese, MIBS, parity, postpartum

Introduction

Bonding disorder is a psychological state that leads to lack of affection and emotional bond with children. Parents with bonding disorder may have feelings of rejection or even hatred towards their children.¹ Early detection and prevention of signs of bonding failure are very important in preventing child abuse, improving relationships with children, and supporting childcare.²

Systematic reviews have demonstrated that peripartum depression is negatively associated with mother–infant bonding^{3,4} and that peripartum anxiety may also have negative effects on mother–infant bonding.³ These findings remain controversial,^{4,5} but identifying and intervening in both depression and anxiety during the peripartum period are considered critical to prevent bonding disorder. However, few studies have investigated the effects of peripartum anxiety and depression simultaneously on mother–infant bonding with small sample sizes.^{6–11}

One study found that 5.0% of 280 Japanese primiparas who were interviewed by trained midwives had experienced a major depressive episode within 3 months of childbirth.¹² A meta-analysis of self-report questionnaire surveys found that the prevalence of depression at one month after childbirth was 14.3% in 108,431 Japanese mothers.¹³ By contrast, the prevalence of postpartum anxiety has been poorly studied. A self-report questionnaire survey reported that 26.2% of 1348 Japanese mothers had experienced anxiety at 3–4 months after childbirth.¹⁴ In Japan, many studies have shown that postpartum depression is negatively associated with mother–infant bonding,^{6–8,15–19} but few studies have evaluated the effects of postpartum anxiety on mother–infant bonding.^{7,8} Recent large-scale Japanese studies have provided evidence for associations of primiparity with poor mother–infant bonding¹⁸ and postpartum depression.^{13,18} However, there is little research, with inconsistent findings, on the influence of parity in postpartum anxiety in either Japan⁸ or elsewhere.^{4,9,10,20} It is still unclear how depression, anxiety, parity and mother–infant bonding are related in Japanese mothers.

This study aimed to assess whether primiparas showed poorer mother–infant bonding and worse symptoms of anxiety and depression than multiparas, and whether depression, anxiety and primiparity were negatively associated with mother–infant bonding.

Materials and Methods

Ethics Statement

This study followed the principles of the Declaration of Helsinki and was approved by the Ethics Committee of Niigata University and the ethics committees of the participating obstetric institutions. Written informed consent was obtained from all participants.

All relevant data are within the paper. We are not able to make the underlying data available to readers, because we do not have the permission of the committees to do so.

Participants

This study is part of the Perinatal Mental Health Research Project, which has been in progress since March 2017.²¹ We recruited participants from 34 obstetric institutions in Niigata Prefecture, Japan, and included pregnant Japanese women aged 18 years or older. We excluded pregnant women with serious physical complications, serious

pregnancy complications, or severe psychiatric disorders (eg, severe schizophrenia or severe depression).

Measurements

The instruments were administered consecutively and self-completed at three time points: early pregnancy (approximately 12–15 weeks), late pregnancy (approximately 30–34 weeks) and postpartum (4 weeks after childbirth). This study is a sub-analysis of postpartum data up to December 2019.

The Mother-to-Infant Bonding Scale (MIBS) is a self-report questionnaire that evaluates the feelings of mothers towards their babies.²² This scale was originally developed as an eight-item questionnaire²² and was later modified to add two additional items.¹⁵ The MIBS contains 10 items that assess mother–infant bonding.¹⁵ Each item is graded on a four-point Likert-type scale (0–3). Higher MIBS scores indicate worse mother–infant bonding. The Japanese version of MIBS has been previously validated¹⁵ and is commonly used to assess mother–infant bonding in Japan.^{7,8,15,16,18,21}

The Edinburgh Postnatal Depression Scale (EPDS) is the most widely used self-report questionnaire for screening for peripartum depression.^{6,9–11,13,15–19,23–25} However, this scale is not suitable for detecting peripartum anxiety.²³ We therefore used the Hospital Anxiety and Depression Scale (HADS), which is a self-report questionnaire designed to identify anxiety and depression in non-psychiatric hospital outpatients.²⁶ It has also been used in pregnant women.^{6–8,14,27–37} The HADS includes 14 questions, of which seven assess anxiety (items 1, 3, 5, 7, 9, 11, and 13) and seven depression (items 2, 4, 6, 8, 10, 12, and 14).²⁶ Each item is graded on a four-point Likert-type scale (0–3). Higher HADS scores indicate more severe symptoms of anxiety and depression. The Japanese version of HADS³⁸ has been validated in a previous study.³⁹

Statistical Analysis

We compared the mean age, MIBS score, and HADS anxiety and depression scores for primiparas and multiparas using a *t*-test. To identify potential predictors of mother–infant bonding, we used simple regression analyses with HADS anxiety and depression scores, parity and age as independent variables and MIBS score as the dependent variable. We regarded variables with *p* values less than 0.1 as potential predictors. We then performed a stepwise multiple regression analysis with the forward selection method to assess the effects of potential

predictors on mother–infant bonding. We used the Statistical Package for the Social Sciences (SPSS) version 25 (IBM Japan, Tokyo, Japan) for the statistical analyses.

Results

The study participants were 2379 mothers (1116 primiparas and 1263 multiparas). These individuals included 1755 mothers (853 primiparas and 902 multiparas) from a previous study reporting the factor structure of MIBS.²¹ The age of participants ranged from 18–50 years. Primiparas were significantly younger than multiparas (mean age \pm SD: 31.0 ± 4.96 vs 33.0 ± 4.34 years; Table 1).

We assessed mother–infant bonding and symptoms of anxiety and depression using MIBS and HADS in 1116 primiparas and 1263 multiparas (Table 1). MIBS score (2.89 ± 2.68 vs 1.60 ± 2.11) was significantly higher in primiparas than in multiparas. HADS anxiety (6.55 ± 4.06 vs 4.63 ± 3.41) and depression (6.56 ± 3.43 vs 5.98 ± 3.20) scores were also significantly higher in primiparas than in multiparas. Cronbach's α values for overall MIBS and HADS, anxiety and depression were 0.885, 0.751, 0.778 and 0.806, respectively.

Using simple regression analysis, we identified HADS anxiety score ($r = 0.500$ and $p < 0.001$), HADS depression score ($r = 0.476$ and $p < 0.001$) and parity ($r = -0.264$ and $p < 0.001$), but not age ($r = 0.012$ and $p = 0.595$), as potential predictors of mother–infant bonding. A stepwise multiple regression analysis with the forward selection method found that HADS depression score (standardized regression coefficient [SRC] = 0.454), HADS anxiety score (SRC = 0.359) and parity (SRC = -0.252) were significantly associated with MIBS score (Table 2).

Discussion

In this study, 1116 primiparas had significantly higher MIBS and HADS scores than 1263 multiparas one

Table 2 Multiple Regression Analysis for the Effects of HADS Depression and Anxiety Scores and Parity on MIBS Score

Independent Variables	MIBS	SRC	p
	Adjusted R ²		
HADS depression	0.449	0.454	0.003
HADS anxiety	0.522	0.359	0.015
Parity	0.577	-0.252	0.023

Abbreviations: HADS, Hospital Anxiety and Depression Scale; MIBS, Mother-to-Infant Bonding Scale; SRC, standardized regression coefficient.

month after childbirth. The Japan Environment and Children's Study indicated that EPDS and MIBS scores one month after childbirth were significantly higher in 32,342 primiparas than in 44,031 multiparas.¹⁸ A meta-analysis showed that 35,023 Japanese primiparas had a significantly higher prevalence of postpartum depression measured using EPDS than 66,983 multiparas, with a relative risk of 1.76.¹³ Kita et al reported that primiparity was significantly correlated with HADS score one month after childbirth in 562 Japanese mothers.⁸ Taken together, these findings suggest that Japanese primiparas show poorer mother–infant bonding and worse symptoms of anxiety and depression than multiparas in the postpartum period. There may be some explanations for these differences. First, multiparas are likely to draw confidence from their previous experience, whereas childbirth and childcare are unknown events for primiparas.^{13,18,25} Second, women who suffered bonding failure, depression or anxiety during the peripartum period of their first birth may not want to give birth to a second child.¹³

Postpartum depression is a well-known risk factor for mother–infant bonding disorder.^{3,18} In our multiple regression analysis, depression had the most significant negative association with mother–infant bonding. At the second step of the multiple regression analysis, we observed a significant association between HADS anxiety score and MIBS score. Kita et al⁸ also reported that HADS anxiety score was significantly correlated with the scores of two MIBS subscales (lack of affection, and anger and rejection) one month after childbirth in 562 Japanese mothers. However, they used simple regression analysis. Using multiple regression analysis, Edhborg et al⁹ found that the score for the State-Trait Anxiety Inventory was inversely correlated with the score for the Postpartum Bonding Questionnaire (PBQ) at 2–3 months after childbirth in 674 Bangladeshi mothers. This suggests that there was a positive association between anxiety and mother–infant bonding. Tietz et al¹⁰ assessed depressive symptoms using EPDS, anxiety symptoms using the Anxiety

Table 1 MIBS and HADS Scores in Primiparas and Multiparas

Variables	Primiparas (n = 1116)	Multiparas (n = 1263)	p
Age	31.0 ± 4.96	33.0 ± 4.34	< 0.0001
MIBS	2.89 ± 2.68	1.60 ± 2.11	< 0.0001
HADS anxiety	6.55 ± 4.06	4.63 ± 3.41	< 0.0001
HADS depression	6.56 ± 3.43	5.98 ± 3.20	< 0.0001

Notes: Data are shown as the mean \pm SD.

Abbreviations: HADS, Hospital Anxiety and Depression Scale; MIBS, Mother-to-Infant Bonding Scale.

Cognitions Questionnaire and the Body Sensations Questionnaire, and mother–infant bonding using PBQ in 78 German mothers at 2–8 months after childbirth. In simple regression analyses, symptoms of both depression and anxiety were significantly correlated with mother–infant bonding. In a multiple regression analysis, however, the association between symptoms of anxiety and mother–infant bonding was not significant after controlling for the effect of depressive symptoms. Lutkiewicz et al¹¹ also reported similar results in 150 Polish mothers at 1–3 days after childbirth. These inconsistencies among studies may stem from differences in ethnicity, postpartum period, rating scale and statistical analysis. However, it is important to assess the impact of both postpartum depression and anxiety on mother–infant bonding. In our multiple regression analysis, we found the negative effect of primiparity on mother–infant bonding remained after controlling for depression and anxiety. This suggests that we should pay attention to symptoms of both depression and anxiety especially in primiparas, who are at higher risk of bonding disorders.

This study had some limitations. First, it was cross-sectional, and therefore able to show associations between HADS depression and anxiety scores and parity, and MIBS score. However, we could not determine causal relationships. Prospective studies will be needed to provide evidence for causation. Second, our 2379 participants may not be representative of the general population of postpartum Japanese women. However, they were recruited from 34 obstetric institutions in Niigata Prefecture. Our findings that primiparas show poorer mother–infant bonding and worse depressive symptoms than multiparas are consistent with those from earlier large-scale Japanese studies.^{13,18} We therefore speculate that our results are unlikely to be affected by sampling bias. Third, we did not adjust for potential confounders, such as employment, education, social support, partner relationship, attachment to own mother, and history of mental disorders,^{3,4,18,40–43} because these sociodemographic data were not available.

Conclusion

Depression, anxiety and primiparity were negatively associated with mother–infant bonding one month after childbirth.

Abbreviations

EPDS, Edinburgh Postnatal Depression Scale; HADS, Hospital Anxiety and Depression Scale; MIBS, Mother-

to-Infant Bonding Scale; PBQ, Postpartum Bonding Questionnaire; SRC, standardized regression coefficient.

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Disclosure

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