



## Research paper

## Prevalence trends of pre- and postnatal depression in Japanese women: A population-based longitudinal study



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## ABSTRACT

**Background:** This study aimed to describe the prevalence trends of pre- and postnatal depression, via measures of the Edinburgh Postnatal Depression Scale (EPDS) total and factor scores, from 20 weeks' gestation to 3 months postpartum, stratified by parity, in a Japanese female population.

**Methods:** A longitudinal, population-based study was conducted among perinatal women giving birth at maternity facilities in Setagaya area of Tokyo, Japan. Of the 1775 women who participated, 1311 women met the inclusion criteria of this analysis. All data, including EPDS, were collected via self-administrated questionnaires at 20 weeks' gestation and at 5 time points postpartum, from the first few days to 3 months postpartum. We divided EPDS items into three factors: "anxiety," "anhedonia," and "depression," according to factor analysis.

**Results:** The prevalence of individuals exhibiting depressive symptoms, EPDS total score, and each factor score peaked at two weeks postpartum in primiparas (EPDS total = 5.58, anhedonia = 0.47, anxiety = 2.64, and depression = 1.23). In contrast, the EPDS total score and factor scores for "anxiety" and "depression" gradually decreased for multiparas, from the prenatal to postpartum period (EPDS total 3.33, 3.03, 3.03, 2.72, 2.76, and 2.37).

**Limitations:** Each factor score was not weighted; instead, we simply added up the item scores ranging from 0 to 3 for each question. Additionally, the population representativeness of Japanese women was not high, although the sample was population-based and had a high follow-up rate.

**Conclusions:** This study shows that the trends of EPDS total and factor scores differ by parity throughout the pre- and postnatal periods among a Japanese female population.

## 1. Introduction

Depression is a common psychiatric manifestation in women during the pre- and postnatal periods. In support of this, previous studies have shown that 12.8% of women were assessed as being at risk of depression, both during the second trimester and postpartum period (Bennett et al., 2004b; O'hara and Swain, 1996). The negative effects of prenatal and postnatal depression on maternal and child health are widely known, and include suicidality among mothers, inappropriate child behaviors, delayed child development, undesirable parenting behavior, and fewer positive parent-infant interactions (Bennett et al., 2004a; Grigoriadis et al., 2013; Lindahl et al., 2005; Narayanan and Naerde, 2016; Paulson et al., 2006, 2009).

To provide appropriate and sufficient care to women, it is important to understand the pathology of psychiatric manifestation during the pre- and postnatal periods by parity, as well as the optimal timing to conduct mental health assessments. Many studies have aimed to reveal the high-risk period for prenatal and postnatal depression to track women's mental health status over long periods of time (Banti et al., 2011; Davé et al., 2010; Ishikawa et al., 2011; Iwata et al., 2016; Munk-Olsen et al., 2006; Skipstein et al., 2010). The evidence regarding the highest-risk period for postnatal depression is not conclusive however, and suggests a period between two weeks and one month postpartum. For instance, while most studies have concluded that the risk for postnatal depression is the highest one month postpartum, Munk-Olsen et al. reported that individuals who became parents for the first time,

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demonstrated the highest risk of postnatal depression two weeks postpartum (Munk-Olsen et al., 2016). Yet, this assertion was made without comparing the risk at two weeks and one month. Therefore, a comparison of risk at these time points is important to better understand optimal timing for screening and support provision.

Several previous studies have shown that it is useful for healthcare providers to calculate the Edinburgh Postnatal Depression Scale (EPDS) subscales, in addition to the EPDS total score, to understand women's mental health condition in greater detail (Jomeen and Martin, 2005; Matthey et al., 2013; Tuohy and McVey, 2008). The factor structure of the EPDS has been gradually revealed through various studies. These studies have shown that the EPDS is composed of not only the “depression” factor, but also “anxiety” and “anhedonia” factors (King, 2012; Kubota et al., 2014; Swalm et al., 2010; Tuohy and McVey, 2008; Coates et al., 2016). However, very few studies (Petrozzi and Gagliardi, 2013) have compared the scores of each EPDS factor at more than one time point. Additionally, no evidence exists to describe the trends of these scores during the pre- and postnatal periods, stratified by parity, using a population-based sample.

The current study aimed to address these gaps regarding the highest risk period for postpartum depression, as well as the trends of EPDS total and factor scores across time. In this study, we describe the prevalence of risk for pre- and postnatal depression, as well as the EPDS total and factor scores by parity, from 20 weeks' gestation until three months following delivery in a population-based sample of Japanese women. Specifically, the current study hypothesized that the prevalence of postnatal depression would be greater at two weeks following birth than at one month.

## 2. Methods

### 2.1. Study design and participants

The current study was a population-based, longitudinal study of women who gave birth at any of the maternity hospitals in the Setagaya area of Tokyo, Japan. All pregnant women who were scheduled to give birth at any of the participating maternity hospitals were candidates for this study. Participants were recruited from December 2012 to May 2013. Women who gave written informed consent to participate in this study were included, and those who were not able to complete the questionnaire due to limited Japanese language ability were excluded. Data were collected, via a self-administered paper questionnaire or an iPad2 questionnaire application, at 20 weeks' gestation (T1) and at five separate time points during the postnatal period; specifically, the first few days (T2), 2 weeks (T3), 1 month (T4), 2 months (T5), and 3 months postpartum (T6).

Data for T1, T2, and T4 were collected via self-administered paper questionnaires or electronically via MOMONGA (Xware Corp, Tokyo, Japan), an iPad2 questionnaire application, at pre- and postnatal check-ups and after delivery. T2 and T3 questionnaires were administered by care providers during the postpartum hospital stay. T3 questionnaires were later returned to their care providers, either directly by the participants at health check-ups two weeks postpartum, or by mail. T4 questionnaires were distributed by care providers and returned directly at the health facility. T5 and T6 data were sent to participants and returned by mail.

In total 1717 women provided informed consent and answered the baseline questionnaire at 20 weeks' gestation (T1). Of these, 411 were excluded from analyses because of miscarriage, relocation, referral to a different hospital due to a maternal and/or neonatal health condition, or other medical reasons. Five women were also excluded due to a missing parity value. This resulted in a total of 1306 women who answered the questionnaire during the first few days following delivery (T2), and were thus included in the analyses.

### 2.2. Measures

We collected basic characteristics such as maternal age, parity, educational level, employment status, economic status, family support, and past or present psychiatric visit during pregnancy. Family support was assessed using a single question, “Do you have an individual other than a husband to provide support?” with answer options of “Yes” or “No”. We also collected peri- and neonatal outcomes, such as gestational age, delivery mode, pain due to episiotomy or perinatal tear, childbirth satisfaction, epidural anesthesia, and admission to neonatal intensive care unit in addition to postnatal depression at T2. To assess pre- and postnatal depression, we used the EPDS at each time point (T1 to T6). The EPDS is a 10 item screening tool for postnatal depression. Recently, the EPDS has been used to assess prenatal depression (Bennett et al., 2004b). The score of each item and the total score ranges from 0 to 3, and 0 to 30, respectively. EPDS items 1, 2, and 4 were reverse-coded and the score for all items were summed. Okano et al. conducted a validation study for a Japanese version of the EPDS (Okano et al., 1996). This study showed that the Japanese version of the EPDS has good internal consistency and test-retest reliability. The study also revealed that the cut-off score of 8/9 is the most appropriate among Japanese population (sensitivity 75%; specificity 93%). We defined women whose score was more than nine points as being at high risk for depression. This cut-off score has been widely used to assess the risk for postpartum depression among Japanese mothers in various other studies (Iwata et al., 2016; Kubota et al., 2014; Shimizu et al., 2015).

### 2.3. Data analysis

We conducted chi-square and Student's t-tests to determine differences in basic characteristics of participants by parity, and factor analysis to examine the factor structure of the EPDS at each time point. Kubota et al. (2014) conducted explanatory and confirmatory factor analyses of the EPDS among Japanese mothers, including both primiparas and multiparas. According to the results, the Japanese version of EPDS consists of three factors: “anhedonia” (EPDS items 1 and 2), “anxiety” (EPDS items 3, 4, and 5), and “depression” (EPDS items 7, 8, and 9). This factor structure is almost identical to the EPDS structure found in western countries. Therefore, the number of factors in the current study was set as 3, based upon these findings. Maximum-likelihood extraction was carried out on all EPDS items. Additionally, promax rotation was adopted, as these factors would likely be correlated. Significant item factor loadings of 0.40 or above were chosen to interpret the factors.

To understand the trends of each EPDS factor, the item scores are simply summed, resulting in factor and total scores. The mean and standard deviation (SD) of factor and total scores at each time point are described by parity. All of the descriptive and factor analyses were performed using the maximum samples, while excluding missing values.

A mixed effect model for repeated measurements was conducted to evaluate the differences in EPDS factor and total scores at two time points by parity. Data analyses were performed using IBM SPSS Statistics, version 19 (IBM, Armonk, NY) and STATA/IC 12.0 (Stata Corporation, College Station, Texas, USA).

### 2.4. Ethical considerations

All participants received an explanation of the study prior to providing written, informed, individual consent. This study was approved by the Ethical Committee of the National Center for Child Health and Development (Approval Number 627) on 1 November 2012.

## 3. Results

Of the 1306 included participants, 721 women (55.2%) were primiparas with a mean age of 33.7 years (SD 4.7), while 585 (44.8%)

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