

# Prevalence of Postpartum Depression and Related Factors among Mothers of Low Birth Weight Infants

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**Background:** Postpartum depression (PPD) is a common psychological disorder associated with childbirth. Over time, it can cause stress and mental problems, leading to a low quality of life and risk of malnutrition in their babies. Nonetheless, limited data are available on the prevalence and related factors of PPD among mothers of low birth weight (LBW) infants.

**Objective:** To study the prevalence of PPD and related factors in mothers of infants with LBW.

**Materials and Methods:** The present study was a descriptive cross-sectional design. It was conducted at Bhumibol Adulyadej Hospital (BAH) between June 2019 and September 2020. Participants were the immediate parturients admitted and delivering LBW babies. Demographic data were collected before the participants were discharged from the hospital. At four to eight weeks after delivery, participants were interviewed to complete three self-reported questionnaires, including the parenting data, the Thai version of Edinburgh Postpartum Depression Scale (Thai-EPDS), and the Revised-Thai version of the Multi-dimensional Scale of Perceived Social Support (r-T-MSPSS). The infants' data were collected from the medical records by the researcher.

**Results:** Two hundred sixty-seven from 398 participants were enrolled into the present study. The average age of participants, infants' gestational age, and birth weight in the present study were 27.8 years, 36<sup>+5</sup> weeks, and 2,281 grams, respectively. The prevalence of PPD among mothers of LBW infants in the present study was 22.5%. The factors significantly associated with PPD included both maternal factors such as educational level less than bachelor's degree, marital conflict, history of depression, unplanned pregnancy, non-breastfeeding, and low social support, and infant factors such as hospital stay more than three days, admission to the neonatal intensive care unit (NICU), and neonatal health problems.

**Conclusion:** The prevalence of PPD among mothers of LBW infants was 22.5%. Educational level less than bachelor's degree, marital conflict, history of depression, unplanned pregnancy, non-breastfeeding, low social support, hospital stay of infant more than three days, NICU admission, and neonatal health problems were associated factors of PPD.

**Keywords:** Thai version of Edinburgh Postnatal Depression Scale; Low birth weight infants; Postpartum depression

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Postpartum depression (PPD) is a common mental problem during the first year after childbirth. It is defined as a psychological and emotional disorder occurring four weeks after childbirth and symptoms are present for more than two weeks. PPD diagnostic criteria of the American Psychiatric Association are defined by the Diagnostic and Statistical Manual of Mental Disorders V (DSM-V)<sup>(1)</sup>. PPD is more severe than postpartum blue, but less than postpartum

psychosis. Symptoms of PPD are similar to general depression, namely sadness, insomnia, irritability, lack of self-interest, environment, fatigue, and loss of body weight. These symptoms impact maternal moods after childbirth and interfere with the mother's well-being. Quality of parenting after childbirth and the mother's relationships within the family are also affected, leading to unpleasant outcome such as divorce, suicidal thoughts, self-harm, or hurting baby in some severe cases<sup>(2)</sup>. Currently, the American Academy of Pediatrics (AAP) recommends the screening of maternal PPD within six months of childbirth, using the Edinburgh Postpartum Depression Scale (EPDS), in which postpartum mothers themselves respond to self-reported questionnaires<sup>(3)</sup>.

It is believed that factors related to PPD involve 1) variation of hormone levels after childbirth, especially estrogen, progesterone, prolactin, luteinizing hormone (LH), follicle stimulating hormone (FSH), and thyroid hormone, 2) psychological, emotional, anxiety changes, maternal attitudes towards having a

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child and childcare, and 3) social factors such as age, marital status, and family support<sup>(4)</sup>.

The prevalence of PPD ranges between 13% and 19%. The variation of prevalence is due to different methods, diagnostic criteria, usage of different questionnaires, and various postpartum periods defined in each investigation<sup>(4)</sup>. In 2015, the World Health Organization (WHO) reported 20% incidence of PPD among mothers after childbirth in developing countries<sup>(5)</sup>. In Thailand, a study by Limlomwongse et al (2006) showed 16.8% overall incidence of PPD<sup>(6)</sup>. The prevalence was higher in some groups of Thai postpartum mothers. Adolescent mothers as well as those with low economic status and infants admitted to the neonatal intensive care unit revealed 48%, 38%, and 28% to 70% prevalence of PPD, respectively.

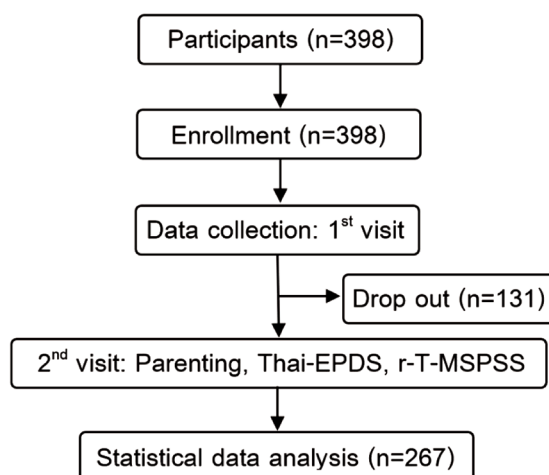
There are previous reports on the increasing prevalence of PPD in mothers of infants with extremely low birth weight (ELBW) as birth weight of less than 1,000 grams, very low birth weight (VLBW) as birth weight of less than 1,500 grams, and admission to neonatal intensive care unit (NICU)<sup>(7,8)</sup>. However, there is limited data currently available regarding PPD in mothers of infants with low birth weight (LBW) or birth weight of 1,500 to 2,499 grams with illnesses or complications after their birth. To fill the present study gap, the authors examined the prevalence and related factors of PPD among mothers of LBW infants.

## Materials and Methods

The present study protocol was approved by the Bhumibol Adulyadaj Hospital (BAH) Ethics Committee (IRB No.38/62). All participants received written information of the study and thoroughly understood. Then, the written consents were obtained.

A descriptive cross-sectional study was conducted between June 2019 and September 2020 at the inpatient and outpatient departments of BAH. Mothers of infants with LBW or birth weight between 1,500 and 2,499 grams who were able to read Thai language were recruited. Postpartum mothers under current pharmacological or non-pharmacological treatment of depression disorders, such as psychotherapy, electroconvulsive therapy (ECT), and transcranial magnetic stimulation (TMS), were excluded.

Since the estimated PPD prevalence among Thai population was between 5.7% and 25%, the sample size was based on PPD prevalence of 16.8% in Limlomwongse et al<sup>(6)</sup>, which was calculated by



**Figure 1.** Flow diagram of participants through the phases of present study.

Participants: postpartum mothers of low-birth-weight infants, Thai-EPDS: Thai version Edinburgh Postnatal Depression Scale, r-T-MSPSS: Revised-Thai version of the Multi-dimensional Scale of Perceived Social Support

Cochran 1977. Thus, this present study needed a sample size of 320 women, with 20% additional as compensation for uncompleted data.

All parturients with immediate admission and delivery of LBW babies were included in the present study. Demographic data were collected before hospital discharge (Figure 1).

At four to eight weeks after delivery, the enrolled postpartum mothers completed three self-reported questionnaires, the parenting data, the Thai version of EPDS (Thai-EPDS), and the Revised-Thai version of the Multi-dimensional Scale of Perceived Social Support (r-T-MSPSS). Data collection was performed at the outpatient department during routine infant follow-up visit and the inpatient department in case of hospital admission.

The Thai-EPDS was used to assess maternal PPD. Those who scored 11 or above were considered to have PPD, with Cronbach's alpha coefficient of 0.80 to 0.87<sup>(9,10)</sup>. The r-T-MSPSS was applied to evaluate the perceived social support, with Cronbach's alpha coefficient of 0.92<sup>(11)</sup>.

Infants' data, including gestational age, birth weight, health problems, and duration of nursery and NICU admission, were also collected from medical records by the researchers.

Data were analyzed by using the IBM SPSS Statistics, version 27 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to present the general characteristics of sample groups as frequency,

**Table 1.** Characteristics and factors related to PPD of depressed (n=60) and non-depressed mothers (n=207) of LBW infants

	Depressed; n (%)	Non-depressed; n (%)	p-value
<b>Mother</b>			
Age (years); mean±SD	26.1±7.6	28.3±6.4	0.030
< bachelor's degree	49 (81.7)	120 (58.0)	0.001
Marital conflict	18 (30.0)	6 (2.9)	<0.001
Previous depression	3 (5.0)	0 (0.0)	0.011
Unplanned pregnancy	39 (65.0)	43 (20.8)	<0.001
Unfulfilled gender	5 (8.3)	18 (8.7)	0.930
<b>Parenting</b>			
• Breastfeeding	20 (33.3)	24 (11.6)	<0.001
• Child rearing assistance	6 (10.0)	31 (15.0)	0.326
<b>Infant</b>			
Gestational age (weeks); mean±SD	36.2±2.2	36.9±1.7	0.010
Admission>3 days	27 (45.0)	36 (17.4)	<0.001
Birth weight (gram); mean±SD	2169.5±277.2	2312.7±175.3	<0.001
NICU admission >3 days	28 (46.7)	30 (14.5)	<0.001
Infant illness	39 (65.0)	82 (39.6)	0.001
• Neonatal jaundice	56 (21.0)	18 (6.7)	
• EOS	6 (2.2)	11 (4.1)	
• TTN	6 (2.2)	6 (2.2)	

SD=standard deviation; NICU=neonatal intensive care unit; EOS=early onset neonatal sepsis; TTN=transient tachypnea of the newborn

mean, standard deviation (SD), and percentage. Univariate analysis was performed to demonstrate various possible associated factors among patients by using chi-square test, t-test, and Pearson's correlation coefficient. Logistic regression analysis was used to identify significant risk factors for depression during 4 to 8 weeks of postpartum as adjust odds ratio (OR) with 95% confidence interval (CI).

## Results

Of the 398 participants, 267 (67%) postpartum mothers completed all questionnaires. One hundred thirty-one postpartum mothers did not come to hospital for infant follow-up visit. Of the 267 participants, there were 60 (22.5%) and 207 (77.5%) cases of depressed and non-depressed mothers, respectively, as identified by the Thai-EPDS during the four to eight weeks of postpartum.

Mean maternal and gestational ages of both groups were 26.1±7.6 and 36.2±2.2 for depressed mothers, while 28.3±6.4 and 36.9±1.7 for non-depressed mothers (p=0.030 and 0.010), respectively. Mean infant' birth weights in the depressed mother group and the non-depressed mother group were 2169.5±277.2 grams and 2312.7±175.3 grams (p<0.001), respectively.

The prevalence of PPD among mothers of LBW infants was 22.5%. Maternal and infant factors related to PPD in the two groups included educational level less than bachelor's degree, marital conflict, history of depression, unplanned pregnancy, non-breastfeeding, low social support, hospital stay of infant more than three days, NICU admission, and neonatal health problems, as shown in Table 1.

The non-depressed mother group reported higher education level than the depressed mother group who mostly had less than bachelor's degree (p=0.001). Meanwhile, the depressed mother group had more frequent marital conflict, as well as higher incidence of previous diagnosis of depression and more unplanned pregnancy than the non-depressed group, with statistical difference. The unfulfilled gender was not different between the groups. Moreover, there was more breastfeeding in the non-depressed mother group than the depressed mother group at 33.3 and 11.6%, respectively, with statistical difference (p<0.001). Nonetheless, no difference of child rearing assistance was observed between the groups.

There was a higher incidence of infants with hospital stay longer than three days, admission in NICU, and health problems, such as neonatal jaundice, early onset neonatal sepsis (EOS), and

**Table 2.** Social support of depressed (n=60) and non-depressed mothers (n=207) of LBW infants

	Depressed; n (%)	Non-depressed; n (%)	p-value	OR (95%CI)
Social support*				
Low (12 to 36)	5 (62.5)	3 (37.5)	0.004	9.1 (2.1 to 39.9)
Medium (37 to 60)	25 (37.9)	41 (62.1)	<0.001	3.3 (1.8 to 6.2)
High (61 to 84)	30 (15.5)	163 (84.5)	-	Reference

OR=odds ratio; CI=confidence interval

\* Revised-Thai version of the Multi-dimensional Scale of Perceived Social Support (r-T-MSPSS)

**Table 3.** Comparison of PPD prevalence and related factors in previous studies

	Present study	Helle, et al. <sup>(7)</sup>	Vigod, et al. <sup>(12)</sup>	Limlomwongse, et al. <sup>(6)</sup>	Roomruangwong, et al. <sup>(8)</sup>
Year	2020	2015	2010	2006	2006
Country	Thailand	Germany	-	Thailand	Thailand
Number	267 mothers	230 families	26 articles	610 mothers	97 mothers
Population	Fourth week postpartum mothers with LBW infants	230 mothers and 173 fathers at one month postpartum	Mothers from delivery to 52 weeks of postpartum and mothers with preterm infants	Pregnant women of 36 to 40 weeks and mothers of 6 to 8 weeks postpartum	Mothers of 4 to 6 weeks postpartum and mothers of infants in NICU
Study design	Descriptive cross-sectional study	Cross-sectional study	Systematic review	Cohort study	Descriptive cross-sectional study
Prevalence (%)	22.5	5.1 to 18.4 times higher risk	40.0	16.8	34
Related factors	Marital conflict, previous depression, unplanned pregnancy, no breastfeeding, low social support, admit >3 days, NICU admission, and infant illness	VLBW infant, female sex, lifetime psychiatric disorder, and low social support	Earlier gestational age, lower birth weight, ongoing infant illness/disability, and perceived lack of social support	Religion, evidence of irritable moods before menstruation, perception of pregnancy complications, and attitudes towards this pregnancy	Unfulfilled expectation of infant gender, poor personal resources, and history of depression in 1st week postpartum

LBW=low birth weight; NICU=neonatal intensive care unit; VLBW=very low birth weight

transient tachypnea of the newborn (TTN), in the depressed mother group than the non-depressed mother group.

The logistic regression analysis yielded that low social support was a statistically significant risk factor for maternal depression, as shown in Table 2.

## Discussion

The present study showed that 22.5% of the participants had depression during the four to eight weeks of postpartum. Maternal factors significantly associated with PPD were educational level less than bachelor's degree, marital conflict, history of depression, unplanned pregnancy, non-breastfeeding, and low social support. Whereas, hospital stay of more than three days, admission at NICU, and health problems, were infant factors significantly related to PPD, as shown in Table 3.

The prevalence of PPD in the present study was higher than other studies conducted in mothers of healthy infants in both U.S. and Thailand<sup>(6,13)</sup>.

Moreover, mothers of LBW infants were more likely to develop PPD than those with normal birth weight infants or birth weight of 2,500 grams or more.

Limlomwongse et al (2006) reported a PPD incidence of 16.8% in 610 Thai pregnant women of 36 to 40 weeks and mothers at six to eight weeks postpartum, using the EPDS. It was found that religion, evidence of irritable moods before menstruation, perception of pregnancy complications, and attitudes towards pregnancy were related factors of PPD in those women<sup>(6)</sup>.

Sheeder et al (2009) conducted a screening of PPD in mothers who brought their infants for follow-up at the well-child clinic during the six months after childbirth. The Colorado Adolescent Maternity Program (CAMP) was used as a comprehensive, prenatal, delivery, and postnatal care program in 204 mothers aged 12 to 21 years, who responded to the EPDS as a self-assessment, with EPDS score of 10 or more. It was revealed that the PPD screening at two weeks and two months after childbirth could

detect most mothers with later PPD during the first six months of their childbirth. The prevalence of PPD at two weeks and two months was 17 and 16.5%, respectively<sup>(13)</sup>.

In the present study, the prevalence of PPD among mothers of LBW infants without any illness was 10.9%, less than the Sheeder's study<sup>(13)</sup>. This was because the mean age of mother after childbirth in the present study was 27 years, which is more than the previous studies. It was reported that more mature mothers seemed to cope with life situations better than young mothers in Sheeder's study.

Roomruangwong et al (2006) showed that 34% of mother with infants admitted to NICU had PPD at four to six weeks after childbirth. The main correlated risk factors included anxiety during the first few weeks after childbirth, low social support, unaccepted gender of infant, history of underlying diseases, and PPD during the first week of childbirth. Those factors were associated with maternal PPD at four to six weeks of childbirth, with statistical significance<sup>(8)</sup>.

The present study was conducted in mothers of LBW infants admitted at both NICU and nursery. The numbers of infants in NICU were less than the Roomruangwong's study, which probably led to lower prevalence of PPD<sup>(8)</sup>. It was also explainable that mothers of NICU infants had more PPD due to the more extreme conditions of their babies compared to the present study.

Helle et al (2015) revealed that risk factors associated with PPD were weight of infants less than 1,500 grams, history of psychiatric disorders, and lack of support from the society<sup>(7)</sup>. The present study reported LBW mothers and low society support with high incidence of PPD were similar to Helle's findings. Mothers of LBW infants suffering from medical illnesses caused negative emotions in postpartum women, leading to self-blaming attitudes when the infants had to stay in the hospital longer than three days, with admission to NICU and health problems.

Vigod et al (2010) conducted a systematic review of 26 articles on mothers from delivery to 52 weeks of postpartum and mothers with preterm infants. The PPD prevalence of 40% was reported with related factors including earlier gestational age, lower birth weight, ongoing infant illness/disability, and perceived lack of social support<sup>(12)</sup>.

Lastly, the present study showed that the expected gender of the infants might be more related to cultural attitudes and expectations towards infant gender, amidst the advanced medical technology to perceive

the gender of infants before birth. Thus, mothers should be able to accept the unaccepted baby's gender. Particularly, this era of small single families and less social dependence led to the need to help one another within the family. Hence, the lack of assistance for caring for low-weight babies after birth should not affect maternal PPD.

## Conclusion

In the present study, PPD among mothers of LBW infants is 22.5%. Educational level less than bachelor's degree, marital conflict, history of depression, unplanned pregnancy, non-breastfeeding, low social support, hospital stay of infants more than three days, NICU admission, and neonatal health problems are associated factors of PPD. Nonetheless, PPD screening should be recommended to mothers with LBW at the four-to-eight-week postpartum period.

In the meantime, it is advisable for nursery or NICU healthcare providers to make an assessment on educational level, previous diagnosis of depression, planning for pregnancy, breastfeeding practice, and perceived social support in a bid to detect the greatest risk for PPD in mothers.

Thus, it is crucial for early detection of these risk factors in postpartum women, which may be helpful for obstetricians, pediatricians, and other medical personnel to render early detection and prompt intervention. Whilst, providing psychoeducation for new mother's family and friends is also helpful in increasing awareness of this illness and creating positive attitudes towards patients, leading to supportive manners in the care of these patients.

## Limitation

The loss follow-up rate in the present study was rather high. Because of the hospital's policy adaptation and the patient cancellation during the COVID-19 pandemic, the numbers of follow-up visits at BAH between March and September 2020 were markedly decreased. One-third of participants did not come to the infants' follow-up visit and not complete the self-reported questionnaires. So, those participants were excluded from the study due to incomplete data collection.

The high rate of loss follow-up in the present study may lead to an inconsistent prevalence and inaccurate risk factors of PPD. As a result, postpartum mothers with suspected PPD could not be truly evaluated and received no comprehensive and appropriate treatment. Nonetheless, the results in the



present study should be applicable in other groups of postpartum mothers despite the limitations. Whilst, further study with a larger population of PPD mothers is recommended to elucidate and ratify the outcomes, especially after the COVID-pandemic.

### What is already known on this topic?

There have been an increasingly prevalence of PPD in mothers of infants with extremely low birth weight and admission to NICU, as well as some of the Thai postpartum groups such as adolescents and low economic status mothers.

The AAP recommends the screening of maternal PPD within six months of childbirth, using the EPDS, in which postpartum mothers themselves respond to self-reported questionnaires.

### What this study adds?

Limited data is currently available on the studies of PPD in mothers of LBW infants, in which infants may have illnesses or complications after their birth and can result in PPD after childbirth. The present study fills this research gap with a purpose to examine the prevalence and related factors of PPD among mothers of LBW infants.

The present study yielded the PPD prevalence of 22.5% among mothers of LBW infants, higher than the overall prevalence of depression in postpartum mothers. Educational level less than bachelor's degree, marital conflict, history of depression, unplanned pregnancy, non-breastfeeding, low social support, hospital stay of infants more than three days, NICU admission, and neonatal health problems were associated factors of PPD.

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### Conflicts of interest

The authors declare no conflict of interest.

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