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# Postnatal Depression: Associated Factors and Its Relationship with Maternal Bonding among Malay Women in Malaysia

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**Abstract**— Postnatal depression is the commonest postpartum mood disorders, and is associated with significant morbidities and mortalities. The prevalence varies with geographical regions, but observed to be highest during the early weeks after childbirth. Studies have observed the negative effect of postnatal depression on postpartum bonding. The aim of the study is to determine the prevalence of postnatal depression among Malay women in Kota Bharu and its associated factors as well as to investigate the relationship between postnatal depression and postpartum bonding. A cross-sectional study was conducted among 276 mothers attending their first postnatal check-up at 6 health clinics in Kota Bharu. Participants were given questionnaires of sociodemographic profile, the Malay version Edinburgh Postnatal Depression Scale (EPDS) and the Malay version of Postpartum Bonding Questionnaire (PBQ). Data was analysed using correlation and multiple regression analysis. The prevalence of postnatal depression is 5.1 percent. The study also found positive correlation between postnatal depression and postpartum bonding ($r=0.364$, $p$-value$<0.001$). Multiple regression analysis showed that mode of delivery (Caesarean section) and perceived stress as predictors for postnatal depression.This study confirmed the result of previous studies on the inverse relationship between postnatal depression and postpartum bonding. Realizing how detrimental the effect of impaired bonding can be, mothers with the risks of developing postnatal depression should be screened and managed appropriately, at the earliest time possible.

**Keywords:** Bonding, depression, mother, postnatal, postpartum

## 1. Introduction

Depression is a severe public health issue that affects around 260 million people worldwide[1]. It has been identified as a leading cause of disability worldwide, contributing significantly to the global illness burden. The postnatal period in women is widely recognised as a time when they are more likely to develop depression[2]. The World Health Organization (WHO) defines postnatal depression (PND) as an episode of non-psychotic depression that begins within one year following childbirth, according to standardised diagnostic criteria[2]. A recent meta-analysis found a wide prevalence of PND, ranging from 3.5% to 58.8%, with higher prevalence observed in low income countries[3]. This disparity in prevalence could be attributed to variances in health-care systems, as well as socioeconomic and geographical differences[4]. Longitudinal study has reported that incidence rate of PND peaks over the first few weeks after childbirth and subsequently decrease

throughout the remaining postpartum period[5].

PND is proposed to be multifaceted, although studies have found a number of causes, including poor social support, marital conflict, a history of depression, the absence of breastfeeding, and recent stressful life events[4]. Unemployment, low education level, an unwanted pregnancy, and a caesarean delivery were also mentioned as variables linked to a higher risk of having PND[4,6].

PND can have catastrophic consequences, including maternal suicide, child abuse, and neglect[7]. It has also been negatively associated with emotional, behavioural, cognitive, as well as interpersonal development of young children[8]. Depressed women are more likely than non-depressed mothers to exhibit negative feelings about their children, and depressed mothers are frequently regarded as passive, withdrawn, unresponsive, or obtrusive toward their children[9,10]. In addition, as many studies have shown in the past, PND is associated with impaired bonding. In his study of mothers diagnosed with PND, Brockington discovered a rate of bonding impairment up to 29 percent[11].

The term "bonding" refers to the relationship between the caregiver and the infant, and it is defined as "a unique and special relationship between the two persons"[12]. The development of this relationship is observed to be the most significant process after birth. It involves both the mother behavioural system for providing care and the infant's behavioural system for eliciting parental attention[13]. In their attempt to further understand the concept of bonding, Klaus and Kennell observed a cohort of infants who suffered from birth complications and neonatal illnesses requiring them to be separated from their mothers[14]. Many of these infants developed failure to thrive which they suggested was due to the lack of bonding between the infants and their mothers resulting from the separation. As a result, they believed that having intimate sensory touch with the mother's body as soon as possible after delivery could foster the emotional link needed for the mother's satisfaction and care of the newborn, as well as the infant's ideal growth. Carter and Keverne endorsed this viewpoint, claiming that mother attachment serves to assure the child's caring, protection, and thus survival[15].

Impaired bonding is characterised by deficit or absence of "maternal feeling," plus anger, aggression, violent impulses, or rejection toward the infant[11] and this may cause long-term detrimental effects on children's development. Teicher found that children who were neglected had an increased risk of psychiatric disorders such as depression, anxiety disorders, and learning and memory impairment[16]. He also stated that decreased maternal attention is linked to a lifelong decrease in the production of the hormone oxytocin, which is essential for affiliative love and the maintenance of monogamous relationships. Similarly, an insecure attachment to a primary caregiver can significantly impair a child's ability to form and maintain healthy relationships throughout life[17]. A few case studies involving 'feral' children, who had survived with minimal human contact, showed that they have a severe lack of language and emotional development in the absence of love, language and attention among them[18].

Puerperium is recognised as a particularly vulnerable period for women, during which many

experience emotional distress. As puerperium was also suggested to be the 'critical period' during which contact with the baby might enhance a mother's relationship and bond with her baby[12, 14], any disturbances that resulted in the emotional perturbation and renders the mothers to be 'emotionally absent' during this period will therefore greatly affect this bonding process[14]. One of the examples is PND, which is known to negatively influence mother–infant interactions.

A number of international studies have demonstrated that postpartum depression has a significant impact on postpartum bonding. However, as to date there were no local studies investigating the link between these two variables. As many of the causative factors that can contribute to impaired postpartum bonding such as maternal health are reversible, studying the link between these variables will help us to better understand the association and give us insight on how to plan for any interventions in the future.

## 2. Methods

### *2.1 Study Design and Participants*

This is a cross-sectional study among 276 postpartum Malay women attending six Health Clinics in Kota Bharu, Kelantan, Malaysia from April until October 2020. Convenient sampling method was used with recruitment done among mothers who attended their first postpartum check-up scheduled between 28-42 days of postpartum. Ethical approval was obtained from Human Research Ethics Committee (HREC) Universiti Sains Malaysia (USM) with JEPem Code: USM/JEPeM/19090551

### *2.2 Questionnaires*

The self-administered questionnaires include questions on sociodemographic characteristics, the Malay version of Edinburgh Postnatal Depression Scale (EPDS) and the Malay version of Postpartum Bonding Questionnaire (PBQ) used to measure depression and maternal bonding respectively. For some of the sociodemographic variables such as husband's support, conflict with husband, family and in-law as well as stress, there were no objective measurements used and were only based on participants' personal perception.

#### 2.2.1 The Edinburgh Postnatal Depression (EPDS) Scale

This is a 10-item simple, short and practical screening tool to detect postnatal depression. It uses a Likert-type format for responses. The respondent needs to underline the possible response closest to how she has been feeling for the past one week. Each question has a scale from 0-3 reflecting the severity of the symptoms. Possible scores on the EPDS range from 0-30; with higher score indicates higher risk of having depressive illness. EPDS has been validated to multiple languages including Malay, with good internal consistency (Cronbach's alpha: 0.77). Azidah et al found that, at cut off score of 11.5, Malay version of EPDS has sensitivity of 72.7% and specificity of 95.1%[19].

#### 2.2.2 The Postpartum Bonding Questionnaire (PBQ)

This questionnaire has been used widely in a number of countries to identify problems in the mother-infant relationship during the postpartum period[20]. This self-administered questionnaires consists of 25 items categorised under 4 subscales or factors; General Factor, Rejection and

Pathological Anger, Anxiety about the Infant, and Incipient Abuse. These items are rated on a 6-point Likert scale with score ranging from 0 to 125, with high scores reflect a problematic mother-to-infant bond. PBQ has been observed to have good sensitivity and specificity. A validated Malay version is available and used in this study. In terms of scoring, Brockington has suggested different cut off scores for different subscales in order to diagnose mothers with impaired mother-infant relationship. The cut off score for 4 subscales are as listed below[21]:

1) General Factor: cut-off scores indicating impairment: ≥ 11, sensitivity: 0.87, specificity: 0.65
2) Rejection & Pathological Anger: cut-off scores indicating impairment: ≥ 13, sensitivity: 0.94, specificity: 0.86
3) Anxiety about the Infant: cut-off scores indicating impairment: ≥ 10, sensitivity: 0.61, specificity: 0.64
4) Incipient Abuse: cut-off scores indicating impairment: ≥ 2, sensitivity: 0.47, specificity: 0.95

*2.3 Data Analysis*

Descriptive analysis was carried out for the sociodemographic variables which included maternal age, level of education, employment status, household income and number of children. Multiple logistic regression was used to determine the factors associated with postnatal depression while Pearson's product moment correlation were used to determine the relationship between the postnatal depression and postpartum bonding. Data entry and analysis was done with SPSS version 26.0. Both univariate and multivariate analyses were performed. Independent variables that have p-value of <0.25 in single logistic regression or those judged to be clinically important would be entered in multivariate analysis.

## 3. Results

*3.1 Characteristics of the study participants*

The mean age of the participants was 30.4 (SD 5.17) years. About one third of the participants received education up to upper secondary (37.3%), while 29.3% were certificate and diploma holder and 27.9% held degree qualification. More than half of the participants (58.3%) were employed and about two third of them (64.9%) had household income below the state median income (RM 3563 monthly). Two hundred eighteen or 79% of them had three children or less (Table 1).

In terms of clinical demographics, majority of the participants (93.1%) had no medical illness prior to their last pregnancy. 76.8% of them had no history of miscarriage and 82.2% had no history of Caesarean surgery in the past. One hundred and sixty-five or 59.8% stated that their last pregnancies were unplanned. Only one participant (0.4%) had multiple (twin) babies while the rest of them had singleton. More than two thirds of the participants (70.3%) had no medical illness during this pregnancy and 92.4% of them had no issue during the delivery process. In terms of mode of delivery, two hundred eighteen or 79% had normal vertex delivery while 21% had Caesarean delivery. Two hundred fifty-seven or 93.1% of the participants' babies were born term

and 97.5% of them were breastfeed.

Majority of the participants (97.5%) claimed that their husbands were supportive throughout their confinement period. In terms of interpersonal conflict, three of the participants (1.1%) had conflict with husband, five of them (1.8%) with family members and only one (0.4%) with their in-laws. Forty-two (15.2%) admitted having stress during their confinement period. The characteristics of the participants are summarized in Table 1.

Table 1: Socio-demographic and clinical characteristics of the participants. (n=276)

| Variables | Frequency, n (%) | Mean (SD) |
|---|---|---|
| **Baby Days of Life** | | 33.52 (4.15) |
| **Age** | | 30.41 (5.17) |
| **Level of Education** | | |
| Secondary School | 113 (40.9) | |
| Certificate and Diploma | 81 (29.3) | |
| Degree and Above | 82 (29.7) | |
| **Employment** | | |
| Employed | 161 (58.3) | |
| Unemployed | 115 (41.7) | |
| **Income (RM/USD)** | | |
| 0-3562/842 | 179 (64.9) | |
| >3562/842 | 972 (35.1) | |
| **Number of Children** | | |
| 3 Or Less | 218 (79) | |
| More Than 3 | 58 (21) | |
| **Medical Illness Before Pregnancy** | | |
| Yes | 19 (6.9) | |
| No | 257 (93.1) | |
| **History of Miscarriage** | | |
| Yes | 64 (23.2) | |
| No | 212 (76.8) | |
| **History of Caesarean** | | |
| Yes | 49 (17.8) | |
| No | 227 (82.2) | |
| **Planned Pregnancy** | | |
| Yes | 111 (40.2) | |
| No | 165 (59.8) | |
| **No of Babies** | | |
| Singleton | 275 (99.6) | |
| Multiple | 1 (0.4) | |
| **Medical Illness This Pregnancy** | | |
| Yes | 82 (29.7) | |
| No | 194 (70.3) | |

| | |
|---|---|
| **Type Of Delivery** | |
| Normal Vertex | 218 (79) |
| Caesarean | 58 (21) |
| **Maturity** | |
| Term | 257 (93.1) |
| Preterm | 19 (6.9) |
| **Problem This Delivery** | |
| Yes | 21 (7.6) |
| No | 255 (92.4) |
| **Breastfeeding** | |
| Yes | 269 (97.5) |
| No | 7 (2.5) |
| **Support From Husband** | |
| Yes | 269 (97.5) |
| No | 7 (2.5) |
| **Conflict With Husband** | |
| Yes | 3 (1.1) |
| No | 272 (98.9) |
| **Conflict With Family** | |
| Yes | 5 (1.8) |
| No | 271 (98.2) |
| **Conflict With In-Law** | |
| Yes | 1 (0.4) |
| No | 275 (99.6) |
| **Stress** | |
| Yes | 42 (15.2) |
| No | 234 (84.8) |

*3.2 The Prevalence of Postnatal Depression*

The mean score for the EPDS was 4.19 (SD=4.05). Based on the cut off score used by Azidah et al, fourteen (5.1%) of the participants were depressed. The mean score for PBQ was 7.65 (SD=4.96). Seven (2.5%) of the participants had impaired bonding based on general subscale, eight of them (2.9%) had impaired bonding based on anxiety about the infant subscale and none had impaired bonding based on rejection and pathological anger as well based on incipient abuse subscale. The result is summarized in Table 2.

Table 2: Postnatal depression and mother-infant bonding. (n=276)

| Variables | Frequency, n (%) | Mean (SD) |
|---|---|---|
| **Total EPDS** | | 4.19 (4.05) |
| Not depressed | 262 (94.9) | |
| Depressed | 14 (5.1) | |
| **Total PBQ** | | 7.65 (4.96) |

| | |
|---|---|
| General | |
| Impaired | 7 (2.5) |
| Not impaired | 269 (97.5) |
| Anxiety | |
| Impaired | 8 (2.9) |
| Not impaired | 268 (97.1) |
| Rejection | |
| Impaired | 0 |
| Not impaired | 276 (100) |
| Abuse | |
| Impaired | 0 |
| Not impaired | 276 (100) |

*3.3 Factors associated with Postnatal Depression*

To identify factors associated with postnatal depression, Simple Logistic Regression Analyses were first used for regressing the categories of depression (depressed/not depressed) onto each of the demographic, clinical and social variables. Table 3 shows Simple Logistic Regression for initial model and the variables that met the initial screening criterion of $p<0.25$ were then regressed using Multiple Logistic Regression using automatic methods, which is presented in Table 4.

Two variables were found to be significantly associated with depression ($p<0.05$): mode of delivery and stress. Mothers who underwent caesarean delivery has more than four times risk of developing postnatal depression compared to those who underwent normal vaginal delivery. Also, those with perceived stress has more than 6 times risk of having postnatal depression compared to those without perceived stress.

Table 3: Predictors for postnatal depression using simple logistic regression analysis

| Variables | Crude b | Crude OR (95% CI) | Wald | p-value |
|---|---|---|---|---|
| **Age (years)** | -0.02 | 0.98 (0.88, 1.09) | 0.13 | 0.722 |
| **Education** | | | | |
| Secondary | 0 | 1 | | |
| Cert/Diploma | 0.12 | 1.12 (0.29, 4.32) | 0.03 | 0.867 |
| Degree & higher | 0.34 | 1.40 (0.39, 5.01) | 0.27 | 0.603 |
| **Employment** | | | | |
| Unemployed | 0 | 1 | | |
| Employed | 1.01 | 2.74 (0.75, 10.04) | 2.31 | 0.129 |
| **Income (RM)** | | | | |
| ≥4850 | 0 | 1 | | |
| 2500-4849 | 0.57 | 1.77 (0.35, 9.01) | 0.47 | 0.493 |
| 0-2499 | 0.86 | 2.36 (0.46, 12.06) | 1.06 | 0.303 |
| **Median Income (RM)** | | | | |
| >3562 | 0 | 1 | | |

| | | | | |
|---|---|---|---|---|
| 0-3562 | 0.72 | 2.05 (0.56, 7.54) | 1.17 | 0.279 |
| **No of children** | | | | |
| ≤ 3 | 0 | 1 | | |
| > 3 | 0.03 | 1.03 (0.28, 3.81) | 0.002 | 0.969 |
| **Comorbidities** | | | | |
| No | 0 | 1 | | |
| Yes | 0.04 | 1.04 (0.13, 8.43) | 0.002 | 0.969 |
| **Hx of Miscarriage** | | | | |
| Yes | 0 | 1 | | |
| No | 0.62 | 1.86 (0.41, 8.54) | 0.64 | 0.425 |
| **Hx of C-section** | | | | |
| No | 0 | 1 | | |
| Yes | 0.25 | 1.28 (0.34, 4.77) | 0.14 | 0.713 |
| **Planned pregnancy** | | | | |
| Yes | 0 | 1 | | |
| No | 0.20 | 1.22 (0.40, 3.75) | 0.12 | 0.725 |
| **Comorbidities during pregnancy** | | | | |
| Yes | 0 | 1 | | |
| No | 0.06 | 1.06 (0.32, 3.48) | 0.01 | 0.924 |
| **Mode of Delivery** | | | | |
| Normal | 0 | 1 | | |
| C-section | 1.11 | 3.03 (1.01, 9.11) | 3.89 | 0.049 |
| **Maturity** | | | | |
| Term | 0 | 1 | | |
| Preterm | 0.88 | 2.40 (0.50, 11.61) | 1.19 | 0.276 |
| **Complication during delivery** | | | | |
| No | 0 | 1 | | |
| Yes | 0.76 | 2.13 (0.44, 10.23) | 0.90 | 0.344 |
| **Breastfeeding** | | | | |
| Yes | 0 | 1 | | |
| No | 1.19 | 3.28 (0.37, 29.30) | 1.13 | 0.287 |
| **Support from husband** | 0 | 1 | | |
| Yes | 1.19 | 3.28 (0.37, 29.3) | 1.13 | 0.287 |
| No | | | | |
| **Conflict with husband** | | | | |
| No | 1 | 1 | | |
| Yes | -18.29 | <0.01 | <0.01 | 0.999 |
| **Conflict with in laws** | | | | |
| No | 1 | 1 | | |
| Yes | -18.27 | <0.01 | <0.01 | 1.000 |

| | | | | |
|---|---|---|---|---|
| **Conflict with family** | | | | |
| No | 1 | 1 | | |
| Yes | -18.29 | <0.01 | <0.01 | 0.999 |
| **Stress** | | | | |
| No | 0 | 1 | | |
| Yes | 1.55 | 4.71 (1.54, 14.36) | 7.41 | 0.006 |

Table 4: Multiple logistic regression analysis to determine factors associated with postnatal depression

| Variables | Adjusted b | Adjusted OR (95% CI) | Wald | P-value |
|---|---|---|---|---|
| **Mode of delivery** | 0 | 1 | | |
| Normal | 1.52 | 4.55 (1.36, 15.22) | 6.05 | 0.014 |
| Caesarean | | | | |
| **Stress** | | | | |
| No | 0 | 1 | | |
| Yes | 1.91 | 6.72 (2.00, 22.63) | 9.47 | 0.002 |

*Forward LR method applied. Classification table=94.9%, Hosmer –Lemeshow test p-value=0.707, Area under ROC curve=74.9%. No influential outlier, no interaction, and no multicollinearity detected

*3.4 Relationship of postnatal depression and postpartum bonding*

Pearson's correlation coefficients measured the linear relationship between postnatal depression and postpartum bonding among the mothers. There is positive correlation between PND and PBQ (r=0.364, p-value= <0.001) (Figure 1). Likewise, there is positive correlation between PND and 3 of the PBQ subscales namely General Factor subscale (r=0.377, p value <0.001), Anxiety about the Infant subscale (r=0.205, p value=0.001) and Rejection and Pathological Anger subscale (r=0.211, p value=<0.001).

Table 5: Correlation table of postnatal depression, self-esteem and postpartum bonding

| | Total Postpartum Bonding Score | Total Rosenberg Self Esteem Score | Total Postnatal Depression Score |
|---|---|---|---|
| **Total Postpartum Bonding Score** | 1 | -.063 | .364** |
| **Total Rosenberg Self Esteem Score** | -.063 | 1 | .080 |
| **Total Postnatal Depression Score** | .364** | .080 | 1 |

**p<0.001

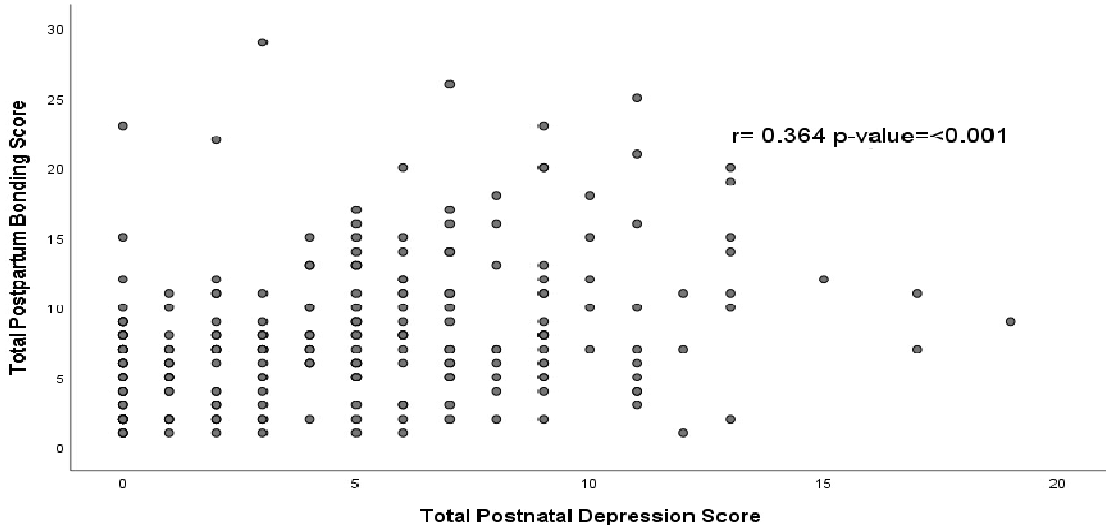


Fig. 1: Scatter plot of postpartum bonding vs postnatal depression

**4. Discussion**

The prevalence of PND among Malay women in this study is 5.1%, much lower if compared to the recent systematic review finding at 17%[22] and another local study with similar setting and screening tools with same cut-off score in 2006[23]. Nevertheless our prevalence is observed to be almost similar to a more recent Malaysia nationwide study in 2017 (4.4%)[7] as well as with the latest report of household survey on maternal and child health (2.3%)[24]. Generally we found that prevalence of PND vary widely; studies with better designs such as prospective cohort and structured interview tend to report prevalence of less than 10%, whereas studies of cross-sectional design or those that use lower cut-off point in screening tools often result in higher prevalence between 20-50%[25].

In this study, we explored the factors associated with postnatal depression and identified caesarean section as well as stress are significantly associated with PND. These findings are in accordance with the results of two recent meta-analyses on association of PND and caesarean section (CS). The first meta-analysis, conducted by Moameri et al, concluded that all types of CS (elective or emergency) increased the odds of PND by 1.15[26]. The second meta-analyses done by Xu et al also observed similar findings. Both emergency and elective CS increased the odds of PND with higher odds in emergency CS as compared to elective CS[27]. However, in this study we did not explore the type and indication for the CS.

Caesarean delivery can cause PND through at least four different pathways. The discrepancies in the oxytocin release, which is known to be crucial in promoting mother-baby interaction as well as in decreasing fear and stress level[28], during CS is one of the proposed mechanisms leading to PND. It was observed that those underwent prelabour, elective CS has reduced level of Oxytocin, compared to those who experienced labour but later proceed with emergency CS. The 'stress response' following surgery can also result in hormonal and metabolic change, including release of immunosuppressive hormones such as cortisol, as well as delaying wound healing[29]. Aside from that, the numerous complications that can arise as a result of CS, such as chronic pelvic pain,

infection, ureter and bladder injury, uterine rupture, and gastrointestinal dysfunction, can all induce and exacerbate stress, increasing the risk of PND[27]. It is also worth to note that studies have also observed perinatal complications such as passing out meconium, prolapsed umbilical cord, and haemorrhages are at high risk for developing postpartum depression[30]. These are among the obstetric complications that could be linked to CS.

Another factor found in this study to be associated with PND is perceived stress. Previous research has found that high levels of maternal stress during the postpartum period are associated with depressive symptoms[4,31, 32] Scheyer proposed, in particular, that women whose postpartum stress levels remain similar to those observed during the third trimester of pregnancy are more likely to experience symptoms of postpartum depression than women whose stress levels decrease after childbirth[31]. The local study by Azidah et al did not explore on stress, however they viewed the practice of taking traditional medicine during confinement period as a cultural factor that may be linked to stress and hence may cause or contribute to PND[23].

This study found positive correlation between PND and postpartum bonding (PPB). Several studies have reported the same result, though the cut-off point used in these studies was up to 12 weeks after child birth[33, 34]. Many of the researchers even extent their observation of depression to antenatal period, and expectedly depression was also associated with low maternal-fetal attachment[35]. Different mechanisms on how depression cause impaired bonding have been suggested, but they are mainly through defective interaction between the mother and her child. A relatively old study proposed that depressed mother can be hostile and intrusive, or withdrawn and disengage from her child[36]. Another study discovered that depressed women were less sensitive to their infants, and responded more negating and less affirming to the infant's experience[37].

In this study, there are several limitations identified. As we could not get a proper Malay validation paper on the Postpartum Bonding Questionnaire scale, the validity and reliability scores of the Malay version of the scale cannot be ascertained. In addition, with regards to the associated factors to postnatal depression, we are unable to measure other main predictors such as late trimester depression due to the cross-sectional nature of the study. Further recommendation for future research includes conducting study with better designs such as prospective cohort or clinical interview that complement the screening tools. Probability sampling can also be considered to improve the methodology. Finally modifying the inclusion criteria to include other ethnic groups is also suggested.

## 5. Conclusion

This study found that mode of delivery (caesarean section) and perceived stress are predictors for postnatal depression. It also confirmed the previous study findings on the association between postnatal depression and postpartum bonding. Realizing how damaging the effect of depression on bonding can be, early identification and intervention is important. Mothers with high risk for PND should be screened early and managed appropriately.

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