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Frequency and correlates of mother-infant bonding disorders among postpartum women in India

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ABSTRACT

Purpose: Disorders of mother-infant bonding have been described since early 20th Century. Previous studies have looked at the prevalence of bonding disorders among mothers with postpartum psychiatric disorders. However, its frequency among healthy postpartum mothers is less studied.
Methods: Two hundred and fifty mother-infant dyads were studied using the Mini International Neuropsychiatric Interview (MINI), the Stafford Interview, Bangalore Maternal Behaviour Scale (BMBS) and Tamil versions of the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Bonding Questionnaire (PBQ). The mothers were interviewed between 4 weeks to six months postpartum. In addition, thirty one mothers with a lifetime history of psychiatric disorders were interviewed using the above scales.
Results: The frequency of bonding disorders was found to be 24% among healthy postpartum mothers as against 45.2% in mothers with psychiatric disorder. However, the frequency of mild disorders of bonding was relatively lower at 5.6% among healthy mothers and 6.5% among mothers with psychiatric disorders. We found that mothers in India had a clinging / over-involved subtype of anxiety that prevented them from leaving their baby under care of another competent adult. While infant-related anxiety was seen in 10% of healthy mothers, about 20% of mothers with psychiatric diagnoses had anxiety. The presence of bonding disorders was not correlated with any maternal or infant related factors except difficulty in breastfeeding.
Conclusions: Disorders of mother infant bonding are seen in healthy postpartum mothers. The frequency of mild disorders of bonding appears to be similar across countries and this condition warrants further attention.

1. Introduction

Mother-infant bonding disorders are a set of disorders characterised by a lack of maternal emotional response towards her infant. This refers particularly to the mother's feelings towards her infant as opposed to the infant's emotional response to the mother (attachment) (Brockington, 1998). These disorders have been described since at least the early 20th Century by Oppenheim who described it as 'hatred of the infant' and later by Luft in 1964 who recognised the difficulty faced by some mothers in the natural bonding for their infants. A more detailed description of the disorder was later given by Brockington in 1984 (Brockington, 1998).

In 2006 operational definitions for the bonding disorders were given by Brockington (Brockington et al., 2006). *Mild disorders* of bonding refers to a lack of positive emotional feelings towards the infant. This may be either a distressing delay in development of positive feelings for the infant, the presence of ambivalent feelings or in some mothers a loss of the bond that was felt initially. *Infant-focused anxiety* has been described as a sense of anxiety that is felt by the mothers when they are near their infant. The anxiety reduces when the mother is away from her infant. *Pathological anger* has been described where the mother feels intense anger towards the baby. Mild anger is restricted to verbal abuses or shouting at the baby. In severe cases, neglect of care of baby or frank abuse is seen. Finally, in *rejection* the mother does not want to continue rearing her child and considers temporary (*threatened rejection*) or permanent (*established rejection*) transfer of care to someone.

These disorders have been reported from several countries among mothers with and without postpartum psychiatric disorders. Among

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mothers with postpartum depression 23% (Garcia-Esteve et al., 2016) to 70% (Siu et al., 2010) have disorders of mother-infant bonding. Thus, not all mothers who suffer from postpartum depression have difficulty in emotional bonding. The prevalence estimates of bonding disorders among healthy postpartum mothers have varied from about 3% (Garcia-Esteve et al., 2016) to 6% (Reck et al., 2006). This indicates that mother-infant bonding disorders are distinct and independent of maternal psychiatric morbidity. A recent report from a mother-baby unit in India reported a frequency of 42% among in-patients treated in a mother-baby unit (Chandra et al., 2015). However, the frequency and correlates of bonding disorders among healthy Indian mothers is unknown.

The diagnosis is made clinically based on detailed clinical interview, the Stafford Interview (Brockington et al., 2017) and with the use of operational definitions. Other methods of diagnosis involve a direct observation of the mother-infant interaction. These methods are however more tedious and involve significant discomfort to the mother and baby. In the presence of mother-infant bonding disorders, the emotional development of the baby is affected. Therefore, there is a need to routinely screen and diagnose bonding disorders to ensure early intervention (Brockington, 1997; Reck et al., 2004). To enable screening, instruments such as the Postpartum Bonding Questionnaire (PBQ) have been developed (Brockington et al., 2001). We translated the PBQ into Tamil for this study. The validation and factor structure of the scale have been described in a previous paper (Vengadavaradan et al., 2019).

The objectives of this study were to assess the frequency of mother-infant bonding disorders among healthy postpartum women attending a postpartum obstetric clinic and to find the clinical correlates of bonding disorders among the healthy postpartum women.

2. Materials and methods

2.1. Study design and details

A cross-sectional observational study was conducted in the postpartum clinic of the department of Obstetrics and Gynaecology and Peripartum Psychiatry Clinic of the department of Psychiatry of a tertiary care hospital, which is a public sector medical institution located in India. The study was conducted between November 2016 and February 2018. The study was approved by institutional review board and ethics committee. All participants provided written informed consent prior to recruitment in the study.

2.2. Subgroups

Two hundred and fifty mother-infant dyads (two hundred and forty two mothers and eight pairs of twins) were recruited from the department of Obstetrics and Gynaecology into group 1 which consisted of healthy postpartum (HP) mothers without any lifetime diagnosis of psychiatric disorders. Mothers with a lifetime history of psychiatric disorders (n = 31) were recruited in group 2 (PP group). They were recruited from the departments of Obstetrics and Gynaecology and Psychiatry.

2.3. Inclusion and exclusion criteria

Mothers who were above 18 years of age and had recently delivered a baby within the last 4 weeks to 6 months and had at least one living issue from the current pregnancy were recruited after taking written informed consent. Mothers with acute medical illnesses were excluded. The Mini International Neuropsychiatric Interview (MINI screen 6.0) (Sheehan et al., 1997) was applied to rule out psychiatric disorders in HP group and to determine the psychiatric diagnosis in the PP group.

2.4. Sample size

Since the primary objective of the research project was to validate the Tamil version of the PBQ (PBQ-T), we planned to recruit 250 mothers in the HP group. This was based on the suggested sample size for validation of scales which recommends ten times the number of responders as the number of items of the scale (Hinkin et al., 1997). Patients who presented with postpartum psychiatric illness were recruited in the PP group if they were willing to participate in the study.

2.5. Study procedure

The mother and an adult caregiver were interviewed using a semi-structured proformafor sociodemographic and clinical details of the pregnancy and postpartum period from the available case records and interview. The mother-infant bonding section of the Stafford Interview was applied and the responses were recorded in a written form by First Author. The verbatim responses were then reviewed by two psychiatrists independently (Second and Third Authors)as per the methodology used by Brockington et al (Brockington et al., 2001).The two authors who diagnosed bonding disorder were blinded to the entries made by each other till the exercise of consensus diagnosis was undertaken.

2.6. Measures used

2.6.1. Stafford clinical interview

The Stafford Interview is a structured clinical interview used in women with perinatal psychiatric conditions (Brockington et al., 2017). It is a comprehensive interview that explores not only symptoms faced by mothers but also the contextual factors. The section on Mother-Infant Bonding of the Stafford Interview was used to diagnose bonding disorders. The interview is a gold standard tool for diagnosis of postpartum bonding disorders and has been found useful in clinical and research settings.The section includes specific questions about the mother's feelings towards the baby, anxiety in caring for the baby and also incidents of anger and abuse towards the baby.

2.6.2. Edinburgh Postnatal Depression Scale (EPDS)

The Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987) was used to score the depressive symptoms. In the absence of clinical depression in group 1, which was ruled out using the MINI screening instrument, the EPDS scores represented psychological distress or depressive symptoms. This was done to ensure discriminant validity and to distinguish bonding disorders from depression. A validated Tamil version of the EPDS scale was used in the study (Benjamin et al., 2005).

2.6.3. Bangalore Maternal Behaviour Scale (BMBS)

The Bangalore Maternal Behaviour Scale (BMBS) (Ganjekar et al., 2018) was applied to get the caregiver's report of the mother's behaviour towards the infant. This was done to establish concurrent validity as the presence of bonding disorders may result in observable changes in the mother's behaviour.

2.6.4. Postpartum Bonding Questionnaire (Tamil)

This study was conducted for the purpose of validation of this scale. The 25-item Tamil version of the scale (Vengadavaradan et al., 2019) was used in this study.

2.7. Definition of bonding disorders – widening the definition of infant-focused anxiety

The operational criteria for disorders of mother-infant bonding was as defined by Brockginton et al (2006) (Brockington et al., 2006). However, analysis of the patient's responses on the Stafford Interview revealed that there were several instances of patients who felt anxious when they were away from their baby. They were anxious about the

safety of their baby and could not trust other competent adults, sometimes their own mother or mother-in-law with the care of the baby. In severe cases, they even let go of their own essential needs to be with their baby at all times. This "over-involved / clinging subtype" of infant-focused anxiety was recognised and diagnosed among mothers in addition to the previously described "avoidant subtype" of infant focused anxiety.

Mild Infant focused Anxiety:

"The mother reports feeling anxious, particularly when alone with her infant"

(existing criterion)

OR

Mother has significant anxiety when away from infant (separation anxiety) and is consistently reluctant to transfer care of infant to other competent adults

(added criterion)

Severe infant focused Anxiety:

"This anxiety leads to reduced contact"

(existing criterion)

OR

Mother has significant separation anxiety to the extent of giving up her own essential needs to care for the baby

(added criterion)

2.8. Data entry and statistical analysis

The interviews were conducted by the first author and data entered into a centralised data repository, Research Electronic Data Capture (REDCap) (Harris et al., 2009). Statistical analysis was done using Statistical Software for Social Sciences (SPSS) version 17.0. The data are represented using mean and standard deviations for continuous variables and frequencies and percentages for categorical variables. The association between the sociodemographic and clinical variables were done using Chi square test.

3. Results

3.1. Characteristics of the participants

The HP group consisted of 250 mother-infant dyads (242 mothers and 8 pairs of infants). The mean age of the mothers was 25.95 years (SD-3.99). More than 95% of mothers were educated upto secondary school level and about 50% were graduate or postgraduate. Nearly 60% belonged to lower socio-economic status. About 60% of the mothers were primiparous. Anaemia was the most common medical condition seen in about one-third of mothers. Hypertension was seen in 15% and diabetes in 8% of mothers during their pregnancy as recorded in their case notes. One-third of mothers (n = 83) required Caesarean section for delivery, 59 of whom required emergency Caesarean section.

The mothers were interviewed an average of 58 days after childbirth. The mean birth weight of the infants was 2.53 kg (SD-0.75). About 60% were having a normal birth weight and nearly 28% were having low birth weight defined as birth weight between 2–2.5 kg. Twelve percent of infants weighed less than 2 kg at birth. About 20% infants had neonatal jaundice.

The 31 mothers in group 2 (PP) had a lifetime history of psychiatric disorders. There were four mothers with Acute and transient psychotic disorders (F23), one with psychosis not otherwise specified (F29), two mothers with Bipolar Affective Disorder (F31), two with first episode of mania(F30), nine mothers with depressive disorder (F32), eight mothers with adjustment disorders (F43) and five with anxiety disorders including two with obsessive compulsive disorder. Out of the thirty one mothers, - had their illness episode in the current postpartum period and the rest were in remission throughout the current pregnancy and postpartum. The mothers had a mean age of 25.35 years (SD-3.55). The education level of this group was lower with only about 70% having secondary school education or more. Anaemia was seen in about 45% of the mothers, diabetes in 13% and hypertension in 20%. Only one-fourth of them delivered by Caesarean section. The mothers in this group were interviewed at a mean of about 10 weeks after childbirth. The mean birth weight of infants in this group was 2.62 kg (SD-0.68).

Table 1
Demographic details of the postpartum mothers and the infants.

Variable	Group 1 (OG) – n = 250		Group 2 (Peripartum psychiatry) – n = 31	
	Mean/ Frequency	SD/percentage	Mean/ Frequency	SD/ percentage
Age	25.95	3.991	25.35	3.55
No of years of education	12.92	3.761	12.97	3.799
MBRS score	4.64	3.3	6.1	5.924
EPDS score	2.67	3.386	9.35	8.151
PBQ-T score	6.72	5.421	9.19	7.569
Education				
-Illiterate				
-primary	4	1.6	2	6.5
-secondary	5	2	4	12.9
-higher secondary	74	29.6	3	9.7
-graduate	41	16.4	7	22.6
-postgraduate				
	91	36.4	10	32.3
	35	14	5	16.1
Religion				
Hindu	223	89.2	28	90.3
Christian	10	4	2	6.5
Muslim	17	6.8	1	3.2
Others	0	0	0	0
SES				
Low	147	58.8	15	48.4
Middle	67	26.8	10	32.3
High	36	14.4	6	19.4
Gender of baby				
Male	124	49.6	13	41.9
Female	126	50.4	18	58.1
Para				
P1	147	58.8	18	58.1
P2	93	37.2	11	35.5
P3	7	2.8	1	3.2
> P3	3	1.2	1	3.2
No of live children				
LI				
L2	148	59.2	18	58.1
L3	94	37.6	11	35.5
> L3	8	3.2	2	6.5
	0	0	0	0
No of abortions				
A1	33	13.2	7	22.6
A2	11	4.4	0	0
A3	5	2	0	0
> A3	1	0.4	0	0
No of IUD				
1 IUD	10	4	1	3.2
2 IUD	2	0.8	0	0
3/ > 3 IUD	0	0	0	0
IVF pregnancy	2	0.8	0	0
Twin pregnancy	8	3.2	0	0

The Table 1 gives the sociodemographic and clinical characteristics of the mothers and infants of the two groups in further detail.

3.2. Frequency of bonding disorders

In the HP group of mothers, we noted that 60/250 (24%) mothers had diagnosis of any bonding disorder, some mothers had more than one bonding disorder. Mild disorders of bonding were seen in 14/250 (5.6%), infant-focused anxiety 25/250 mothers (10%). Twenty-eight mothers (11.2%) had pathological anger towards their infant. One

Table 2
Pregnancy and delivery complications.

Variable	Group 1 (OG) – n = 250		Group 2 (Peripartum psychiatry) – n = 31	
	Mean/ Frequency	SD/percentage	Mean/ Frequency	SD/ percentage
Pregnancy complications				
Hypertension				
-no hypertension				
-gestational hypertension	212	84.8	25	80.6
-preeclampsia	14	5.6	4	12.9
-eclampsia				
	21	8.4	1	3.2
Diabetes	3	1.2	1	3.2
Anaemia				
Jaundice	20	8	4	12.9
Constipation	80	32	14	45.2
Fever	3	1.2	0	0
Others	0	0	0	0
	18	7.2	0	0
	0	0	0	0
Delivery complications				
Preterm rupture of membranes (PROM)	20	8	2	6.5
Non progression of labour	9	3.6	0	0
Need for Episiotomy	155	62	20	64.5
Need for Assisted delivery				
-nil	223	89.2	30	96.8
-vacuum	21	8.4	1	3.2
Forceps	6	2.4	0	0
Need for Caeserean section	83	33.2	8	25.8
Caesereansection type				
-elective	23	28.05	5	16.1
-emergency	59	71.95	3	9.7

mother had threatened rejection of the infant.

In the PP group of mothers, 14/31 (45.2%) were diagnosed with some form of bonding disorder. Mild disorders were noted in 2/31 (6.5%) of mothers. Infant-focused anxiety in six (19.4%) and pathological anger in eight (25.8%). One mother had threatened rejection of the infant.

3.3. Association of bonding disorders with maternal and infant clinical factors

None of the clinical factors among the mothers showed an association with the presence or absence of bonding disorders, except that only 5% of mothers with diabetes mellitus in the HP group had bonding disorders against the expected rate of 24% (Chi-square = 4.303; p = 0.038). In the PP group, none of the clinical factors had significant association with bonding disorders. The associations are listed in Table 2.

In the HP group, we noted that the presence of feeding difficulties in the infant were significantly associated with the presence of a bonding disorder (Chi-square = 5.353, p = 0.021). However none of the infant related factors were associated with the presence of bonding disorder in the PP group.

Table 3
Infant characteristics.

Variable	Group 1 (OG) – n = 250		Group 2 (Peripartum psychiatry) – n = 31	
	Mean/ Frequency	SD/percentage	Mean/ Frequency	SD/ percentage
Infant age (days)	58.78	25.573	68.81	32.629
Infant birth weight	2.53	0.75	2.62	0.68
Infant birth weight				
-ELBW	4	1.6	0	0
-VLBW	26	10.4	3	9.7
-LBW	69	27.6	4	12.9
-normal	151	60.4	24	77.4
Poor cry at birth	37	14.8	2	6.5
APGAR 1				
< 8	58	23.2	2	6.5
8/ > 8	192	76.8	29	93.5
APGAR 5				
< 9	28	11.2	2	6.5
9/ > 9	222	88.8	29	93.5
Difficulty in feeding	67	26.8	6	19.4
Jaundice in the neonate				
-nil	198	79.2	25	80.6
-needed sunlight	11	4.4	1	3.2
-needed phototherapy	41	16.4	5	16.1
Failure to thrive	38	15.2	3	9.7
Other medical illness in the neonate				
- preterm	16	6.4	3	9.7
- external malformations	1	0.4	0	0
- neonatal infections	14	5.6	1	3.2
- neonatal seizures	2	0.8	0	0
- neurological	5	2	1	3.2
- genitourinary	4	1.6	1	3.2
- hematological	7	2.8	0	0
- respiratory	22	8.8	1	3.2
- retinopathy of prematurity	4	1.6	0	0
- cardiovascular	7	2.8	1	3.2
- metabolic	10	4	1	3.2
- endocrine	2	0.8	0	0
- bone and muscular	2	0.8	0	0
- gastrointestinal	3	1.2	0	0

4. Discussion

4.1. Frequency of bonding disorders

The frequency of bonding disorders was 24% in healthy postpartum women and 45.2% in postpartum women with psychiatric illness. Mild disorders of bonding, which can be construed as the core concept of a disordered mother-infant bond, involves a lack of positive emotional feelings for the infant. A new mother as well as the family and society around her expects that this bonding occurs automatically and naturally, but about 1 in 20 mothers seem to have difficulty in formation of this emotional bond. Other studies done in healthy postpartum mothers have found a similar rate of mild disorders of bonding in Germany (Reck et al., 2006), Spain (Garcia-Esteve et al., 2016) and England (Brockington et al., 2006) of around 5%. This indicates a certain universality in this phenomenon which cuts across societies and deserves due attention to aid early intervention and prevent adverse consequences in the long term (Tables 3–6).

The frequency of other forms of bonding disorders have been more varied across studies. The expression of infant-focused anxiety was distinctly different in our study. We found that all mothers exclusively had the over-involvement/ clinging subtype of anxiety. Rejection of infant was also rare in our study. The reason for these two observations could be that in India, motherhood is a sacred role and babies are

Table 4
Categories of bonding disorders and their distribution.

	Group 1 (OG) – n = 250		Group 2 (Peripartum psychiatry) – n = 31	
Diagnosis	Number	Percentage	Number	Percentage
Any Bonding Disorder	60	24	14	45.2
Mild disorders of bonding	14	5.6	2	6.5
Delay	5	2	0	0
Ambivalence	8	3.2	1	3.2
Loss of initial response	1	0.4	1	3.2
Infant-related Anxiety	25	10	6	19.4
Mild	22	8.%	3	9.7
Severe	3	1.2	3	9.7
Pathological Anger	28	11.2	8	25.8
Mild	15	6	5	16.1
Moderate	4	1.6	1	3.2
Severe	9	3.6	2	6.5
Rejection (Threatened)	1	0.4	1	3.2

considered a gift from God. Mothers therefore accept motherhood as a duty even if the bond may not have formed yet. This was reflected in the responses of some of the mothers who said that they could never get angry at their babies as 'babies were a gift from God'. Similarly, the frequency of pathological anger was about 11% in the HP group and most often it was mild and involved instances of screaming at the baby. The expression of anger is often seen as a cry for help and the other family members come in to help the mother with the care of the baby.

There is sparse literature available on the prevalence of disorders of mother-infant bonding, with most data from Western countries. The data from South Asian countries is even sparse, with the only other data from India reporting that 42% of mothers admitted to an in-patient mother-baby unit had bonding disorders(6).

4.2. Over-involved/ clinging subtype of infant-focused anxiety

The previous descriptions of infant-focused anxiety have described an avoidant subtype of anxiety. The mothers felt anxious when they were with their baby. This was associated with pathological anger and/ or rejection of the baby. However, we noted that anxious mothers (25 in the HP group and six in PP group) reported feeling anxious when they had to leave their infants alone or under the care of some other competent adult. We did not find any mother with avoidant subtype of anxiety.

While a worry about infant and tendency to think about the infant was almost universal when the mother is away, some mothers felt it difficult to focus on their work, or often hurried back early because of the anxiety. They could not easily trust another competent adult, such as their own mothers with the care of the baby. This was diagnosed as mild anxiety. In severe anxiety the mother was always with her baby and would give up her own essential needs such as going for her food or other personal needs even when another competent adult was available to care for the baby.

We noticed that some mothers were anxious to leave a sleeping baby alone. They feared that the baby may start crying and others cannot console it, feared insect bites or even feared that there may be apnoea or sudden infant death. Other mothers were anxious in leaving an awake baby alone. They feared the baby may crawl away and injure oneself or that the baby may cry inconsolably.

We did not find any significant association between maternal and infant clinical factors and the presence of bonding disorders. The association of feeding difficulties with the presence of bonding disorders could be explained by the fact that poor bonding may be associated with lower oxytocin levels and poor milk let-down reflex. Such association of oxytocin with mother-infant bonding has been reviewed previously (Galbally et al., 2011).

There is increasing awareness of the consequences of perinatal depression on birth outcomes and infant development. There has been a recent call for early intervention to prevent as well as treat perinatal depression using medications as well as psychotherapeutic approaches delivered at individual and community levels (Tareen and Tandon, 2018; Gajaria and Ravindran, 2018). This study highlights the fact that bonding disorders, which can occur in the absence of even perinatal depression also need to be recognised urgently because they are also likely to have an adverse impact on the emotional development of the infant. Therefore, future studies should concentrate on the exploration of epidemiology, biological correlates and methods of prevention or developing brief interventions for bonding disorders.

4.3. Strengths & limitations

The strengths of this study include a moderately large sample size of 250 healthy postpartum mothers who were diagnosed using a gold standard structured interview for the diagnosis of bonding disorders. Structured clinical interview (MINI screen) was used to rule out a lifetime history of psychiatric disorders. The diagnosis of bonding disorders was done by two independent psychiatrists who were blinded to each other's ratings and also to the scores on PBQ-T.

However, a single interviewer had administered the Stafford Interview as well as the other rating scales such as BMBS and PBQ-T, hence bias at that level could not be eliminated. The PP group had only 31 patients and the findings pertaining to this group may require further confirmation in a larger sample of patients. Psycho-social factors like social support for the mother, relationship with their own parents significant life events, quality of marital relationship and intimate partner violence could have been assessed as additional factors which could contribute to bonding difficulties, since literature pinpoints the association between the above factors and the other common perinatal disorders (Mbawa et al., 2018). We have however, not studied these aspects systematically in our study. Recent evidence has suggested that immune dysregulation may be involved in postpartum psychosis (Sathyanarayanan et al., 2019). Since postpartum psychosis is also associated with poor infant care and impaired mother-infant bonding, future studies in the field of mother-infant bonding must look at possible immune mechanisms.

4.4. Conclusions

Mild disorders of the mother-infant bonding are seen in about one in twenty mothers. This seems to be uniform across cultures. Other disorders of mother-infant bonding such as pathological anger and infant-focused anxiety may be more common among mothers with mental illnesses. An over-involved/ clinging subtype of infant-focused anxiety may require recognition in addition to the previously described avoidant subtype. Apart from being associated with difficulty in breast-feeding, there were no significant associations between maternal and infant clinical aspects and bonding disorders.

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None. It is a non-funded study.

Research involving human participants

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/ or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study

Table 5
Association between maternal correlates and bonding disorder.

Maternal correlates	Group 1 (OG)			Group 2 (peripartum psychiatry)		
	% of bonding disorder absent	% of Bonding disorder present	Chi square (p value)	% of bonding disorder absent	% of Bonding disorder present	Chi square (p value)
Maternal age			1.815 (0.612)			7.618 (0.055)
- 18 to 20 years	82.6	17.4		100	0	
- 21 to 25 years	77.1	22.9		47.1	52.9	
- 26 to 30 years	71.9	28.1		77.8	22.2	
- > 30 years	80	20		0	100	
Educational status			7.387 (0.287)			3.562 (0.614)
- Illiterate	100	0		0	0	
- less than primary	100	0		100	0	
- primary	78.1	21.9		50	50	
- high school	74.4	25.6		33.3	66.7	
- higher secondary	85.7	14.3		71.4	28.6	
- graduate	71.3	28.7		50	50	
- postgraduate	69.4	30.6		40	60	
Occupation of patient			8.920 (0.349)			2.735 (0.255)
- housewife	76	24		50	50	
- teacher	33.3	66.7		100	0	
- self employed	100	0		0	0	
- medical	80	20		0	0	
- helper	100	0		0	0	
- agriculture	75	25		0	0	
- student	100	0		0	0	
- operator	100	0		0	0	
- engineer	100	0		0	0	
- supervisor	0	0		100	0	
Religion – Hindu	75.8	24.2	0.095 (0.953)	50	50	2.735 (0.255)
- Christian	80	20		100	0	
- Muslim	76.5	23.5		100	0	
SES – Low	79.6	20.4	2.586 (0.274)	53.3	46.7	0.178 (0.915)
- Middle	71.6	28.4		60	40	
- High	69.4	30.6		50	50	
Para – P1	74.8	25.2	1.426 (0.699)	50	50	4.020 (0.259)
- P2	76.3	23.7		72.7	27.3	
- P3	85.7	14.3		0	100	
- P4	100	0		0	100	
Primipara	75	25	0.199 (0.656)	50	50	0.406 (0.524)
Multipara	77.5	22.5		61.5	38.5	
Live no of children			0.227 (0.892)			4.020 (0.134)
-1	75	25		50	50	
-2	77.7	22.3		72.7	27.3	
-3	75	25		0	100	
No of abortions			2.885 (0.577)			0.524 (0.469)
- none	74.5	25.5		58.3	41.7	
-1	84.8	15.2		42.9	57.1	
-2	81.8	18.2		0	0	
-3	60	40		0	0	
- > 3	100	0		0	0	
No of IUD			1.834 (0.400)			1.255 (0.263)
- none	75.6	24.4		56.7	43.3	
-1	90	10		0	100	
-2	50	50		0	0	
Presence of IVF pregnancy	50	50	0.747 (0.387)	0	0	
Anaemia	78.8	21.2	0.488 (0.485)	57.1	42.9	0.055 (0.815)
Hypertension			2.441 (0.486)			2.776 (0.428)
- Gestational HTN	92.9	7.1		75	25	
- Preeclampsia	76.2	23.8		100	0	
- Eclampsia	66.7	33.3		0	100	
Diabetes	95	5	4.303 **(0.038)***	50	50	0.043 (0.835)
IUGR	0	0		0	0	
Heart disease	50	50	1.507 (0.22)	100	0	0.851 (0.356)
Epilepsy	0	0		100	0	0.851 (0.356)
Hypothyroidism	69.4	30.6	0.991 (0.320)	100	0	1.761 (0.185)
Hyperthyroidism	0	0		100	0	0.851 (0.356)
Jaundice	100	0	0.959 (0.327)	0	0	
Fever	77.8	22.2	0.034 (0.855)	0	0	
PROM	65	35	1.442 (0.230)	50	50	0.020 (0.887)
Non progression of labour	88.9	11.1	0.850 (0.356)	0	0	
Episiotomy	74.8	25.2	0.302 (0.583)	55	45	0.001 (0.981)
Assisted delivery			0.584 (0.747)			0.851 (0.356)
- Nil	76.7	23.3		53.3	46.7	
- Vacuum	71.4	28.6		100	0	
- Forceps	66.7	33.3		0	0	

(*continued on next page*)

Table 5 (*continued*)

Maternal correlates	Group 1 (OG)			Group 2 (peripartum psychiatry)		
	% of bonding disorder absent	% of Bonding disorder present	Chi square (p value)	% of bonding disorder absent	% of Bonding disorder present	Chi square (p value)
LSCS	80.7	19.3	1.519 (0.218)	50	50	0.102 (0.750)
- Elective	78.3	21.7	0.101 (0.751)	60	40	0.533 (0.465)
- Emergency	72.7	68.8		33.3	66.7	

* $p < 0.05$.

Table 6
Association between infant correlates and bonding disorder.

Infant correlates	Group 1 (OG)			Group 2 (Peripartum psychiatry)		
	% of bonding disorder absent	% of Bonding disorder present	Chi square (p value)	% of bonding disorder absent	% of Bonding disorder present	Chi square (p value)
Infant age			0.751 (0.386)			0.313 (0.576)
- 30 to 60 days	74.7	25.3		50	50	
- > 60 days	80.4	19.6		60	40	
Infant gender			0.135 (0.713)			0.406 (0.524)
- male	75	25		61.5	38.5	
- female	77	23		50	50	
Birth weight			6.358 (0.095)			1.726 (0.422)
- ELBW	75	25		0	0	
- VLBW	57.7	42.3		66.7	33.3	
- LBW	73.9	26.1		25	75	
- NBW	80.1	19.9		58.3	41.7	
Poor cry at birth	78.4	21.6	0.135 (0.714)	50	50	0.020 (0.887)
Feeding difficulties	65.7	34.3	5.353 **(0.021)***	66.7	33.3	0.420 (0.517)
Neonatal jaundice			1.024 (0.599)			1.282 (0.527)
- none	76.3	23.7		56	44	
- needed sunlight	63.6	36.4		0	100	
- needed phototherapy	78	22		60	40	
Failure to thrive	65.8	34.2	2.561 (0.110)	66.7	33.3	0.188 (0.665)
Other illnesses						
- preterm	56.2	43.8	3.656 (0.056)	33.3	66.7	0.620 (0.431)
- external malformations	0	100	3.179 (0.075)	0	0	
- neonatal infections	78.6	21.4	0.054 (0.817)	100	0	0.851 (0.356)
- neonatal seizures	100	0	0.637 (0.425)	0	0	
- neurological	80	20	0.045 (0.832)	0	100	1.255 (0.263)
- genitourinary	75	25	0.002 (0.962)	100	0	0.851 (0.356)
- hematological	85.7	14.3	0.373 (0.542)	0	0	
- respiratory	63.6	36.4	2.022 (0.155)	100	0	0.851 (0.356)
- retinopathy of prematurity	50	50	1.507 (0.220)	0	0	
- cardiovascular	71.4	28.6	0.083 (0.774)	100	0	0.851 (0.356)
- metabolic	80	20	0.091 (0.762)	100	0	0.851 (0.356)
- endocrine	100	0	0.637 (0.425)	0	0	
- bone and muscular	50	50	0.747 (0.387)	0	0	
- gastrointestinal	100	0	0.959 (0.327)	0	0	

* $p < 0.05$.

was approved by the Institute Ethics Committee of our University prior to its initiation.

Informed consent

All the participants in the study provided written informed consent prior to their recruitment into the study.

Data repository

The data of this study have not been included in any data repository online.

Declaration of Competing Interest

None of the authors have any conflict of interest to declare.

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