

Original Research



Neonatal sepsis for postpartum depression

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Abstract

Introduction: The postpartum period is generally a time of happiness and bonding between mother and the newborn, but complicated pregnancies can alter this. Postpartum depression (PPD) is a common complication of childbirth.

Objectives: To determine the effect of neonatal sepsis on PPD of mothers

Methods: This was a descriptive study conducted in secondary and tertiary care hospitals in the district of Gampaha. The study population comprised postpartum mothers of neonates who were diagnosed with sepsis (n=236) and those who were not (n=240). Neonatal sepsis was defined by the presence of one of the clinical signs according to the IMCI strategy or culture positive blood or cerebrospinal fluid. The validated Edinburgh Postpartum Depression Scale and an interviewer-administrated questionnaire were used. Multiple logistic regression was applied and adjusted odds ratios (aOR) and 95% confidence intervals (CI) were calculated.

Results: The study revealed that among the mothers of sepsis neonates, 185 (78.4%) were depressed. There were 51 (21.2%) mothers also depressed among the mother of non-sepsis babies. The association between PPD and neonatal sepsis was statistically significant (aOR=13.44; 95% CI=8.68, 20.83). The socio-demographic factors, obstetric and neonatal factors were not independently associated with PPD.

Conclusions: Postpartum depression among mothers of septic neonates was higher than in mothers of apparently healthy neonates. It is essential to arrange a screening programme and counselling sessions while in the hospital for all the mothers.

Key words: counselling, neonates, prevention, risk factors, sepsis

Introduction

Unpleasant psychological nature of the parents, especially of mothers having sick neonates is well documented in literature (1-2). Some authors have measured it as stressors (3-4), whereas others have measured it as depression (5-6). Identifying these psychological conditions is important to improve the ability of mothers to meet the needs of their babies and to develop the skills required to fulfil their role. Mothers in the postpartum period are a special group whose psychological changes are measured as postpartum depression (PPD).

The non-psychiatric depression that women experience during the first four weeks of the postpartum period is overall referred to as PPD (7). Risk factors for PPD have been examined indicating that the strongest predictors for PPD include depression or anxiety during pregnancy, personal and family history of depression, lack of social support and stressful life events (8-10). However, most women who were depressed did not necessarily have personal or family histories of depression. It is therefore important to consider causes that occur more commonly, such as stressful life events including sickness of the neonates.

The postpartum period is generally a time of happiness and bonding between the mother and the newborn, but complicated pregnancies can alter this. PPD is a common complication of childbirth. Studies carried out to find out the prevalence of depression among postpartum mothers in western countries have shown it to be 10% to 24% (11-13). Among the Asian countries, the prevalence was 23% in India (14) while it was 32.1% in Sri Lanka (9). The studies carried out to assess PPD of mothers whose neonates were in neonatal intensive care units (NNICU) found out that the rate of PPD increased by 70% in USA (15), 35.6% in California (16), 70% in Ghana (17) and 25% in Turkey (18).

Mothers' mental health is crucial when their neonates are sick because of the importance of attachment and bonding with the baby; their participation in care; and long-term infant development. The birth of a critically ill infant may cause a crisis for the family. Most of them have some difficulty in adapting to both the hospital environment and especially the NNICU environment. Both these environments are stressful for the parents. Therefore, it is important to find out

whether there is an association between neonatal sepsis and PPD of mothers. This would be useful to improve the management of neonatal sepsis and be proactive in identifying women at risk and provide appropriate counselling. The objective of this study was to determine the effect of neonatal sepsis on the PPD of mothers in secondary and tertiary care hospitals in the district of Gampaha.

Methods

This was a descriptive study conducted in secondary and tertiary care hospitals in Gampaha District in Sri Lanka. The study population for the exposure group was postpartum mothers with neonates who were diagnosed with sepsis. The non-exposure group was postpartum mothers with neonates who were not diagnosed with sepsis and who were born on the same date or within two days of birth of each case. Neonatal sepsis was defined by the presence of one of the clinical signs according to the World Health Organisation Integrated Management of Childhood Illness (IMCI) strategy (19) or culture positive of blood or cerebrospinal fluid. The exclusion criteria were neonates with congenital abnormalities and neonates whose mothers were not residing in Gampaha District. The study setting for the exposure group was four hospitals in this district, namely Colombo North Teaching Hospital, District General Hospital Gampaha, District General Hospital Negombo and Base Hospital Wathupitiwala. The study setting for the controls was from the administrative district of Gampaha.

The sample size was calculated considering an odds ratio (OR) of 1.7, type I error of 0.05, power of 0.8 and proportion of PPD among the controls of 0.32 (9). Accordingly, the final sample size was 240 in each exposure and non-exposure groups. The exposure group of mothers was recruited consecutively from the hospitals. The non-exposure group of postpartum mothers was selected from the community in relation to the medical officer of health (MOH) areas where the exposure mothers resided.

The data collection instruments were the Edinburgh postnatal depression scale (EPDS) and an interviewer-administered questionnaire (IAQ). The EPDS has been widely evaluated in many countries and cultures around the world. It has been validated in western countries such as Netherlands (20), USA (21)

and Sweden (22). It focuses on cognitive and affective symptoms, which avoid the inflation of prevalence confounded by the presence of physical symptoms (such as fatigue and physical discomfort) typical in normal pregnancy and the postpartum period (23). The EPDS consisted of 10 questions. Each question is scored from 0 to 3, making the overall range between 0 and 30. It is a self-administered questionnaire and validated for Sri Lankan context and recommended for use in Sri Lanka. A cut-off score of nine or more detects PPD with 89.9% sensitivity and 78.9% specificity (9, 24-25). It was concluded that the EPDS scale can be used in the first week of the postpartum period of mothers (26).

The IAQ was designed to assess the associated factors described in other studies (9, 14) in relation to PPD. The questionnaire was designed to cover factors of PPD in mothers, such as socio-demographic factors, maternal and neonatal related factors, social support received, major life events experienced and economic hardship. The questions were designed in a simple way and worded in simple language that could be understood easily by the participants. The face and content validity, appropriateness and the relevance in the local context of the IQA were assessed by experts. A pre-test of the IAQ was done to assess the acceptability, comprehension and ease of administration of the questionnaire.

Three pre-intern medical graduates were recruited and trained as research assistants to collect data. It is shown that it would take at least 72 hours to change the psychological status of the mother after sickness of the neonate (26). Owing to this fact, both IAQ and EPDS were administered five days after the diagnosis of neonatal sepsis. For the non-exposure group, it was assessed within two weeks of recruitment.

Support for day-to-day work was assessed by inquiring whether someone was helping in routine activities at home such as cooking, washing, and cleaning. Someone to look after other children was assessed by asking about the people caring for the other kids at home when she was attending on the newborn baby. The experience of abuse meant any kind of abuse including physical, mental, and sexual harassments, and verbal abuses either by the husband or any other family member. The suffering of major illnesses was assessed by asking anyone in the family about facing major accidents, recent stroke, fractured bones, underwent surgery or newly diagnosed cancer

or had handicapped children. An unexpected event was defined as death of a close family member. Major economic hardships were assessed based on the loss of occupation of husband or herself, loss of major property, major disasters during the last one year and difficulty in repayment of loans.

Data analysis

Statistical analysis was conducted employing the software package SPSS (version 16). Bivariate cross tabulations were done to identify the association of PPD with selected socio-demographic factors, maternal factors and neonatal factors. Odds Ratio (OR) and 95% confidence intervals (CI) were calculated. The factors that showed associations of probability value of <0.20 in the bivariate analysis were entered into the multivariate logistic regression model.

Results

Out of the 240 mothers, four mothers did not respond to the EPDS. Hence, the response rate was 99.2%. The mean age of the study participants was 28 years (SD=5 years). Of the total, 29 (6.0%) mothers were below 20 years and 46 (9.6%) more than 35 years of age. The majority of mothers (n=446; 93.1%) were Sinhalese and married 473 (98.6%). The highest proportion (n=384; 80%) of mothers were not on paid employment.

There were 185 (78.4%) depressed mothers among the exposure group and 51 (21.2%) among the controls (Figure 1). The association between PPD and neonatal sepsis was statistically significant (OR= 13.44; 95% CI=8.68, 20.83) (Table 1).

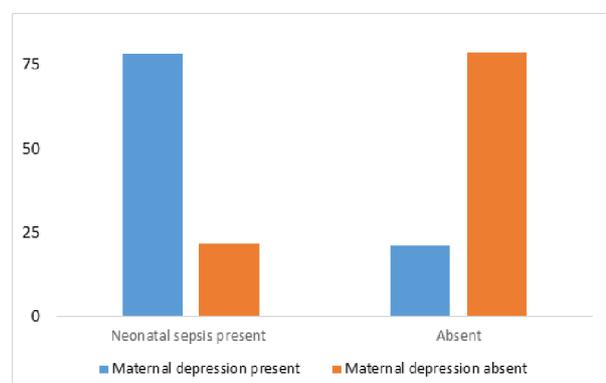


Figure 1. Association of postpartum depression with neonatal sepsis

All the socio-demographic factors were not significantly associated with the PPD (Table 1). Mothers of babies whose maturity was less than 36 weeks of gestation were significantly more depressed than mothers whose neonates were 36 weeks or more weeks of gestation. Mothers having neonates with a birth weight less than 2500g were two times more likely to be depressed than mothers with neonates of a birth weight of more than 2500g (Table 2).

There was no significant association of maternal

depression and factors such as social support, abuses, major life events, economic hardship and unexpected events in their life (Table 3).

Neonatal sepsis was significantly (OR=14.0; 95% CI=8.6, 22.8) associated with postpartum depression after controlling the confounding effects (Table 4). Therefore, neonatal sepsis was a major determinant for PPD. Other factors such as the birth weight of the neonate, the maturity of neonates, and bad obstetric history of the mothers were not found significant in multivariate logistic regression analysis.

Table 1. Association of postpartum depression with socio demographic factors of mothers

Characteristic	Maternal depression				OR (95% CI)	p value
	Present (n=236)		Absent (n=240)			
	No.	%	No.	%		
Age of mothers						
< 20 years	14	48.3	15	51.7	0.95	0.88
≥ 20 years	222	49.7	225	50.3	(0.45-2.01)	
Ethnicity						
Non-Sinhalese	15	45.5	18	54.5	0.84	0.62
Sinhalese	221	49.9	222	50.1	(0.41-1.70)	
Religion						
Non-Buddhist	44	42.3	60	57.7	0.69	0.09
Buddhist	192	51.6	180	48.4	(0.44-1.07)	
Educational level						
< O/L	36	55.4	29	44.6	1.31	0.31
≥ O/L	200	48.7	211	51.3	(0.77-2.22)	
Mother's occupation						
Housewife	186	48.9	194	51.1	0.88	0.58
Paid occupation	50	52.1	46	47.9	(0.56-1.38)	
Income (Rupees)						
≤ 10000	11	35.5	20	64.5	0.54	0.10
10,001 -	225	50.6	200	49.4	(0.25-1.15)	

Table 2. Association of postpartum depression and maternal and neonatal factors

Characteristic	Maternal depression				OR (95% CI)	p value ¹
	Present (n=236)		Absent (n=240)			
	No.	%	No.	%		
POA						
< 36 weeks	38	84.4	7	15.6	6.27	0.001
≥ 36 weeks	199	46.4	230	53.3	(2.74-14.36)	
Presence of bad obstetric history						
Present	42	62.5	25	37.3	1.86	0.01
Absent	194	47.4	215	52.6	(1.09-3.17)	
Gender of the neonates						
Male	129	52.0	119	48.0	1.23	0.27
Female	107	46.9	121	53.1	(0.85-1.76)	
First born or subsequent born						
Being a First born	128	53.3	111	46.4	1.38	0.08
Subsequent children	108	45.6	129	54.4	(0.96-1.98)	
Birth weight						
< 2500	62	64.6	34	35.4	2.61	0.001
≥ 2500	174	45.8	206	54.4	(1.36-3.44)	
Age of onset of sepsis						
≥ 72 hours	54	72.0	21	28.0	1.69	0.1
< 72 hours	131	81.4	30	18.6	(0.89-3.24)	
Type of the hospital						
Tertiary care hospital	136	49.3	140	50.7	1.05	0.79
Secondary care hospital	101	50.5	99	49.5	(0.73-1.51)	

¹ Significant at p<0.05 given in bold letters

Table 3. Association of postpartum depression and maternal and social support, major life events, economic hardship and abuse

Characteristic	Maternal depression				OR (95% CI)	p value ¹
	Present		Absent			
	No.	%	No.	%		
Social support						
Absent	3	60.0	2	40.0	1.51	0.65
Present	234	49.8	236	50.2	(0.25-9.14)	
Support during hospital stay						
Yes	3	60.0	2	40.0	1.51	0.65
No	234	49.8	236	50.2	(0.25-9.14)	
Abuse of mother						
Yes	3	100.0	0	0.0	0.49	0.08
No	234	49.5	239	50.5	(0.45-0.54)	
Major illness among family members						
Yes	2	50.0	2	50.0	1.01	0.99
No	235	49.8	237	50.2	(0.14-7.22)	
Having economic hardship						
Yes	6	100.0	0	0.0	0.49	0.01
No	230	49.0	239	51.0	(0.45-0.54)	
Experience of unexpected events						
Yes	5	71.4	2	28.6	2.57	0.25
No	231	49.4	237	50.6	(0.49-13.35)	

¹ Significant at p<0.05 given in bold letters

Table 4. Multivariate logistic regression model for maternal depression and factors

Variables	B	SE	Wald	OR	95% CI		p value ¹
Presence of neonatal sepsis	2.64	0.25	113.7	14.0	8.68	20.83	0.00
Birth weight <2500 g	-0.19	0.34	0.33	0.82	0.43	1.59	0.56
Maturity of neonate <36 weeks	0.75	0.51	2.16	2.12	0.78	5.70	0.14
Bad obstetric history (history of abortions, still birth, neonatal death)	-0.49	0.33	2.18	0.61	0.31	1.18	0.14
Constant	1.25	0.16	61.3	0.29			0.00

B-beta coefficient; SE-standard error; OR- odds ratio; CI-confidence interval

¹ Significant at p<0.05 given in bold letters

Discussion

In the present study, it was revealed that the presence of PPD among the mothers of neonatal sepsis neonates was 78.4%, whereas PPD among the control group was 21.6%. It was statistically significant. Another Sri Lankan study also reported that illness of the neonate was significantly associated with PPD (9).

One study carried out in Turkey revealed using the EPDS that 29.5% of NNICU group mothers were depressed whereas in the control group it was 13.6% ($p < 0.005$) (27). But in this study, the cutoff level for EPDS score was 13. The difference of PPD among the mothers observed could be due to different cutoff values used in EPDS in different studies (6, 28). Another study carried out at a California tertiary care NNICU found that 77.8% of mothers were positive for symptoms of depression and 35.6% of mothers were PPD (16). Using the Patient Health Questionnaire for assessing depression among the mothers of hospitalized infants in NNICU, it was found that 70% of mothers had PPD (17). Another study used the Beck Depression Inventory for assessing postpartum depression among mothers who delivered premature neonates in Nigeria found that 15.1% of mothers were depressed with preterm neonates in NNICU than the term neonates (3.7%) (29). The actual proportions of depressed mothers were difficult to compare in different studies due to the use of different scales and tools (17, 29).

According to the findings of the current study, there was no association between any of the socio-demographic factors and PPD. Similar findings were revealed by others (27-28, 30) that there was no significant association between socio-demographic factors namely maternal age, education level of mothers, and working status of mothers and PPD of mothers of neonates admitted to NNICU. However, one study reported that unemployment was associated with PPD (31).

According to the bivariate analysis, low birth weight and preterm birth were associated with PPD. Similar to our findings, another study reported that low birth weight was not independently associated with PPD (27) In contrast, two studies reported that low weight or preterm birth was independently associated with postpartum depression (32). We could not find any association between the experience of unexpected life events and PPD. In contrast to our findings, three studies reported that life events increased the risk of PPD (9, 31, 33). According to our study, there was no association between abuse of mother and PPD. In contrast, two studies reported that poorer relationships with husbands or parents (34), and unstable marital condition (35) were associated with postpartum depression.

The difference in findings may be due to the study settings in which they were carried out, the former

study was carried out among postpartum mothers in the community, whereas the present study was carried out in the hospitals and from controls in the community. Other main differences between the two studies were the time of administration of the EPDS questionnaire. The EPDS questionnaire was administered after six weeks of the postnatal period in the former study whereas current study EPDS administered within two weeks of delivery to postpartum mothers.

There are few limitations inherent to our study design. The sensitivity and specificity of the EPDS are not optimal (24). Therefore, the detection of postpartum depression was subjected to some misclassification. Further, diagnosis of neonatal sepsis was based on IMCI criteria which has a sensitivity of 85% and a specificity of 75% (19), in addition to considering the culture positive status. Still, there was a risk of false negative diagnosis which leads to misclassification bias. Third, the selection of the study population based on classification on the neonatal sepsis which leads to overestimating the association with PPD. To prevent this selection bias, we recommend consecutive sampling of postpartum mothers from hospitals and following them up for a reasonable period of time.

Conclusions & Recommendations

PPD among mothers with neonatal sepsis babies was 78% compared to 28% among mothers of non-sepsis babies in the district of Gampaha. It is timely to introduce a screening programme to detect postpartum depression among mothers whose neonates are at neonatal units. Thereafter, curative, supportive and counselling services for them can be arranged. Routine psychiatric support services should be improved for these mothers. Institutional staff in postnatal wards and NNICU need to be trained on managing PPD.

Public Health Implications

Neonatal sepsis is strongly associated with postpartum depression. Screening and management of postpartum depression is essential in clinical practice.

Author Declarations

Competing interests: The authors declare that they have no conflicts of interests' in this study.

Ethics approval and consent to participate: The ethics clearance was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya. Informed written consent was obtained from all the participants.

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Author contributions: CJ participated in the design of the study, coordinated data collection, performed the statistical analysis and drafted the first version of the manuscript. CA participated in the design of the study, performed the statistical analysis, interpreted the data and helped to draft the manuscript. Both authors read and approved the final manuscript.

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