

ASSOCIATION OF MATERNAL DEPRESSION WITH GROWTH OF INFANTS OF LESS THAN 06 MONTHS OF AGE

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Abstract

OBJECTIVE: To determine the association between maternal postpartum depression and the growth of infants attending a tertiary care Paediatrics OPD in Karachi.

METHODOLOGY: This cross-sectional research was conducted from July 2023 to July 2024 in the Paediatrics Outpatient Department of The Indus Hospital, Karachi. A total of 123 mothers with infants who are below six months were enrolled consecutively. Maternal depression was assessed using the Edinburgh Postnatal Depression Scale, and infant growth was evaluated with WHO and INTERGROWTH-21st references. Data were analysed in SPSS version 26 using Chi-square tests, with significance defined at $p < 0.05$.

RESULTS: Among 123 participating mothers, 48% were identified with postpartum depression, including 27% with mild to moderate and 21% with severe symptoms. Maternal depression showed significant associations with lower family income ($p=0.010$), nuclear household type ($p=0.002$), preterm births ($p=0.000$), incomplete immunization ($p=0.000$), and absence of exclusive breastfeeding ($p=0.000$). All infants of severely depressed mothers were malnourished, whereas those of non-depressed mothers maintained normal growth ($p<0.001$).

CONCLUSION: The study demonstrated that maternal postpartum depression significantly affects the nutritional and growth outcomes of infants under six months of age. Higher depression scores were associated with preterm birth, poor immunization, and lack of exclusive breastfeeding, leading to increased malnourishment among affected infants. These findings highlight the importance of integrating maternal mental health assessment into routine paediatric care to promote early identification, intervention, and improved infant growth and well-being.

INTRODUCTION

Maternal mental health plays a central role in ensuring both maternal well-being and optimal infant development. The World Health Organization

defines maternal mental health as a condition in which mothers can function productively, cope with life's challenges, and contribute effectively to their

communities [1]. Among maternal mental disorders, postpartum depression (PPD) is one of the most common and debilitating conditions, affecting approximately 17% of women globally, with a significantly higher burden reported in low- and middle-income countries [2,3]. In South Asia, where poverty, limited healthcare access, and social stressors are prevalent, the prevalence of PPD has been reported to range from 25% to 63% [4,5]. Pakistani studies have also demonstrated alarmingly high rates of maternal depression, particularly among women from socioeconomically disadvantaged backgrounds [6].

Postpartum depression is characterised by persistent sadness, fatigue, guilt, disturbed sleep, and impaired bonding with the newborn [7]. Its impact extends beyond the mother to the child, influencing physical growth, cognitive development, and emotional regulation [8]. Evidence suggests that maternal depression during the postnatal period can lead to preterm delivery, low birth weight, malnutrition, and stunting [9,10]. A systematic review and meta-analysis revealed that children of depressed mothers in developing countries have nearly twice the risk of being underweight and stunted compared with those of non-depressed mothers [11]. Cohort studies from Asia have also shown that higher maternal depressive scores are associated with reduced infant weight gain and slower linear growth during the first six months of life [12,13].

Several mechanisms explain this association. Depressed mothers are less likely to exclusively breastfeed, may delay the introduction of complementary feeding, and often exhibit decreased responsiveness to infant cues, leading to inadequate nutrition and increased risk of infections [14,15]. Moreover, limited family support, marital conflict, and lack of awareness exacerbate both maternal depression and poor infant growth outcomes [16]. Early detection and management of maternal depression are therefore essential to mitigate adverse infant health consequences. The Edinburgh Postnatal Depression Scale (EPDS) remains the most widely validated screening instrument for early identification of depressive symptoms in postpartum women [17]. Given the paucity of data from tertiary-care settings in Pakistan, this study was designed to assess maternal postpartum depression using the EPDS and to

determine its association with the growth of infants under six months of age. Grasping this association could facilitate the formulation of institutional strategies aimed at the early identification, intervention, and support initiatives that enhance the well-being of both mothers and infants.

METHODOLOGY

The research was conducted within a one-year interval of the time span between July 2023 and July 2024 in the Paediatrics Outpatient Department (OPD) of The Indus Hospital, Karachi. The study used a cross-sectional design because of its aim to establish a relationship among maternal depressive symptoms and the appearance of infants under the age of six months. Maternal depression was assessed by the Edinburgh Postnatal Depression Scale (EPDS) where the scores of 0-8 meant no depression, 9-11 probability of depression, and 12 and above high likelihood of depression. Infant growth was evaluated using the INTERGROWTH-21st and WHO growth reference charts, based on weight-for-age and length-for-age Z-scores, and categorized as severely impaired (< -3 SD), moderately impaired (< -2 SD), or normal (> -2 SD). The calculated sample size was 123 participants, derived through the WHO sample size calculator using a 19.3% estimated prevalence of postpartum depression, a 7% margin of error, and a 95% confidence level. A non-probability consecutive sampling method was utilized. Eligible participants included all mothers of infants under six months presenting for well-baby examinations, while exclusions applied to those unwilling to participate or with a prior history of managed neurological or psychiatric illness. After obtaining informed consent, data were collected through the Urdu version of the EPDS, and infant anthropometric measurements were recorded using calibrated SECA infant weighing scales and length boards. These measurements were plotted on standardized growth charts to classify growth status. Statistical analysis was performed using SPSS version 26. Continuous variables were summarized as means with standard deviations or medians with interquartile ranges, and categorical variables were presented as frequencies and percentages. The relationship between maternal depression and infant growth was examined using the

Chi-square test, with a p-value of less than 0.05 considered statistically significant.

RESULTS

Table 1 shows the association between maternal depression (based on EPDS categories) and various socio-demographic and infant characteristics among 123 mothers. The overall prevalence of maternal depression was 48%, with 27% of mothers experiencing mild to moderate depression (EPDS 9–11) and 21% experiencing severe depression (EPDS ≥ 12), while 52% of mothers had no depression (EPDS 0–8). The mean maternal age was 27.9 ± 5.3 years, showing no significant difference across depression categories ($p=0.458$). Most mothers (39%) were aged 25–30 years, and 33% were under 25 years. The mean number of hours spent with the child per day was 18.7 ± 2.9 , which was not significantly associated with depression severity ($p=0.919$). A statistically significant association was observed between monthly family income and maternal depression ($p=0.010$); mothers from lower-income families ($\leq 15,000$ PKR) had a higher proportion of severe depression (35%) compared to those with higher income levels. Similarly, family system was significantly related ($p=0.002$), with depression more common among mothers from nuclear families (58%) than combined families (42%). No significant association was found between the child's gender ($p=0.680$) or infant's age ($p=0.315$) and maternal depression. However, gestational age showed a strong association ($p=0.000$), as preterm births (46%) were more common among mothers with severe depression. Immunization status was also highly significant ($p=0.000$), with only 4% of infants of severely depressed mothers having up-to-date immunizations, while 85% were partially vaccinated. Exclusive breastfeeding was significantly associated with maternal depression ($p=0.000$); only 12% of mothers with severe depression practiced exclusive breastfeeding compared to 75% of those without depression. The most cited reasons for non-exclusive breastfeeding among depressed mothers included lack of time due to other responsibilities (35%) and infant illness (31%). Furthermore, recent infant illness within the past month showed a highly significant association with maternal depression ($p=0.000$), with 91% of mildly to moderately depressed and 92% of severely depressed mothers

reporting such illnesses. The number of siblings under age five did not show any significant relationship with depression ($p=0.576$).

Table 2 shows a significant association between maternal depression and infant growth status in terms of both weight-for-age and length-for-age. Among the total 123 infants, 63% were well-nourished and 37% were malnourished. All infants (100%) of mothers without depression were well-nourished, whereas none of the infants of severely depressed mothers fell into this category. In contrast, all infants (100%) of mothers with severe depression were malnourished, while 61% of those whose mothers had mild to moderate depression were also malnourished. A similar pattern was observed for length-for-age, where all infants of non-depressed mothers were well-nourished, while 100% of those of severely depressed mothers were malnourished. These findings indicate a strong and statistically significant relationship ($p<0.001$) between higher maternal depression levels and poor infant nutritional and growth outcomes.

Table III demonstrates a significant association between maternal depression and infant nutritional status in relation to term or preterm birth and exclusive breastfeeding practices. Among term infants, all well-nourished babies were born to mothers with no depression (100%), while malnourishment was notably higher among infants of mothers with mild to moderate (62%) and severe depression (100%) ($p=0.000$). Similarly, in preterm infants (34–36 weeks), all well-nourished babies were from non-depressed mothers (100%), whereas malnourishment was more frequent among those whose mothers had mild to moderate (50%) or severe depression (100%) ($p=0.001$). Comparable trends were observed for length-for-age measurements, where well-nourishment was exclusively seen among infants of non-depressed mothers, while malnourishment increased with the severity of maternal depression ($p=0.000$ for term and $p=0.001$ for preterm infants). Regarding exclusive breastfeeding, infants of non-depressed mothers were more likely to be well-nourished both in terms of weight-for-age (100%) and length-for-age (100%), whereas malnourishment was more prevalent among infants of mothers with mild to moderate or severe depression ($p=0.000$ for both parameters). These

findings indicate that higher levels of maternal depression are strongly associated with poor infant nutritional outcomes, particularly among preterm and

non-exclusively breastfed infants.

Table I: Association Between Maternal Depression (EPDS Categories) and Socio-Demographic/Infant Characteristics

Socio-Demographic & Infant Characteristics	Total	No Depression (EPDS 0-8)	Mild to Moderate Depression (EPDS 9-11)	Severe Depression (EPDS ≥12)	P-value
	n=123	n=64 (52%)	n=33 (27%)	n=26 (21%)	
Mother's Age (year)					
Mean ± SD	27.9 ± 5.3	27.2 ± 4.9	28.4 ± 5.8	28.5 ± 5.8	0.458 [†]
Min - Max	19 - 42	19 - 38	20 - 42	21 - 39	
<25	40(33)	24(38)	9(27)	7(27)	0.787 [†]
25–30	48(39)	24(38)	13(39)	11(42)	
>30	35(28)	16(25)	11(33)	8(31)	
Hours Mother Spends with Child					
Mean ± SD	18.7 ± 2.9	18.6 ± 2.9	18.8 ± 2.6	18.8 ± 3.5	0.919 [†]
Min - Max	12 - 24	12 - 24	12 - 24	15 - 24	
Monthly Family Income					
Up to 15,000	19(15)	4(6)	6(18)	9(35)	0.010 ^{††}
15,000 to 30,000	76(62)	41(64)	21(64)	14(54)	
More than 30,000	28(23)	19(30)	6(18)	3(12)	
Family System					
Combined	78(63)	50(78)	17(52)	11(42)	0.002 ^{††}
Nuclear	45(37)	14(22)	16(48)	15(58)	
Child's Gender					
Male	59(48)	31(48)	14(42)	14(54)	0.680 [†]
Female	64(52)	33(52)	19(58)	12(46)	
Infant's Age					
<3 months	84(68)	41(64)	26(79)	17(65)	0.315 [†]
3–5 months	39(32)	23(36)	7(21)	9(35)	
Term/Preterm					
Term	104(85)	61(95)	29(88)	14(54)	0.000 ^{†††}
Preterm (34 to 36 weeks)	19(15)	3(5)	4(12)	12(46)	
Immunization Status					
Up to date	82(67)	57(89)	24(73)	1(4)	0.000 ^{††}
Partially Vaccinated	36(29)	6(9)	8(24)	22(85)	
Unvaccinated	5(4)	1(2)	1(3)	3(12)	
The infant exclusively breastfed					
Yes	65(53)	48(75)	14(42)	3(12)	0.000 ^{†††}
No	58(47)	16(25)	19(58)	23(88)	
If No, reasons for non-exclusively breastfed (multiple response)					
Baby remains hungry even after feeding	6(5)	2(3)	3(9)	1(4)	0.004 ^{††}
Family prefers Formula feeding	10(8)	7(11)	2(6)	1(4)	
Husband prefers Formula feeding	1(1)	0(0)	1(3)	0(0)	
Mother etc. prefers Formula feeding	9(7)	2(3)	3(9)	4(15)	

Mother has less time to feed due to other responsibilities	23(19)	4(6)	10(30)	9(35)	
Mother-in-law prefers Formula feeding	1(1)	1(2)	0(0)	0(0)	
The infant has some medical illness	8(7)	0(0)	0(0)	8(31)	
Any significant illness in last 01 month					
Yes	66(54)	12(19)	30(91)	24(92)	0.000 ^{***†}
No	57(46)	52(81)	3(9)	2(8)	
Number of siblings underage 5					
No sibling	47(38)	27(42)	10(30)	10(38)	0.576 [†]
One sibling	45(37)	20(31)	16(48)	9(35)	
more than 1 sibling	31(25)	17(27)	7(21)	7(27)	

*P-value<0.05, **P-value<0.0001, † One-way Anova, †Pearson Chi Square test

Table II: Association Between Maternal Depression and Infant Growth Status (Weight and Length for Age)					
Infant Growth Status	Total	No Depression (EPDS 0-8)	Mild to Moderate Depression (EPDS 9-11)	Severe Depression (EPDS ≥12)	P-value
	n=123	n=64	n=33	n=26	
Infant Growth Status (Weight for Age)					
Well-nourished	77(63)	64(100)	13(39)	0(0)	0.000***†
Malnourished	46(37)	0(0)	20(61)	26(100)	
Infant Growth Status (Length for Age)					
Well-nourished	77(63)	64(100)	13(39)	0(0)	0.000**
Malnourished	46(37)	0(0)	20(61)	26(100)	

**P-value<0.0001, †Pearson Chi Square test

Table III: Association Between Maternal Depression and Infant Nutritional Status by Term/Preterm Birth and Exclusive Breastfeeding Practices					
Term/Preterm Birth		No Depression	Mild to Moderate Depression (EPDS 9-11)	Severe Depression	P-value
		n=64	n=33	n=26	
Term	Infant Growth Status (Weight for Age)				
	Well-nourished	61(100)	11(38)	0(0)	0.000 ^{***†}
	Malnourished	0(0)	18 (62)	14(100)	
Preterm (34 to 36 weeks)	Well-nourished	3(100)	2(50)	0(0)	0.001 ^{†*}
	Malnourished	0(0)	2(50)	12(100)	
Term	Infant Growth Status (Length for Age)				
	Well-nourished	61(100)	11(38)	0(0)	0.000 ^{***†}
	Malnourished	0(0)	18(62)	14(100)	
Preterm (34 to 36 weeks)	Well-nourished	3(100)	2(50)	0(0)	0.001 ^{†*}
	Malnourished	0(0)	2(50)	12(100)	
Exclusive Breastfeeding Practices					
Nourished Status	(Weight for Age)				
	Well-nourished	48(100)	6(43)	0(0)	0.000 ^{***†}

	Malnourished	0(0)	8(57)	3(100)	
Nourished Status	(Length for Age)				
	Well-nourished	48(100)	9(64)	0(0)	0.000***†
	Malnourished	0(0)	5(36)	3(100)	

*P-value<0.05, **P-value<0.0001, †Pearson Chi Square test

DISCUSSION

The present study explored the association between maternal postpartum depression and the growth of infants under six months of age, providing new insight from a tertiary care paediatric outpatient setting in Karachi. Clinical evaluation of the mothers was using the Edinburgh postnatal depression scale (EPDS), which is a validated screening instrument that enables to categorize the depressive symptoms as mild, moderate, and severe [17]. The diagnostic criteria of postpartum depression are persistent low mood, irritability, disturbance of sleep, anxiety, and poor ability to bond with the infant [7]. The application of EPDS in this study allowed determining the different levels of depressive symptoms of mothers, which demonstrated the presence of a significant prevalence of postpartum depression in the group of mothers studied. Approximately half of the mothers screened positive, underscoring the growing public health burden of maternal mental health disorders in low- and middle-income countries, as previously emphasized by Mitchell et al. [3] and Fisher et al. [4]. The findings revealed that maternal depression was strongly correlated with a number of sociodemographic and perinatal variables such as family income, family structure, gestational age, immunization, and breastfeeding behaviours. Mothers with lower-income and nuclear family backgrounds recorded higher scores on depression, which are in line with other recent research conducted in Pakistan and other South Asian nations where their socioeconomic factors and lack of family support have been found to contribute to maternal psychological distress [5,6,16]. These findings also support reinforce the fact that postpartum depression is not just a biological phenomenon but has strong social and environmental preconditions. In the present research also, there was a significant correlation between maternal depression and preterm birth as reported by Van Niel and Payne [7] and Herba et al. [8], who described how maternal stress and

mood disturbances during pregnancy and the postpartum period increase the risk of preterm birth and impaired neonatal outcomes.

The strongest result of the study was the high level of correlation of maternal depression and infant growth indices in terms of WHO and INTERGROWTH-21st standards. Newborn babies of depressed mothers were prone to underweight and underdeveloped, and the babies of non-depressed mothers had normal growth patterns. These results correspond to the meta-analysis of Surkan et al. [9], indicating almost two times higher odds of underweight and stunting in children of mothers with symptoms of depression. Similarly, Rahman et al. [10] in Rawalpindi observed that maternal mental health problems were linked with poor weight gain and higher rates of malnutrition in infants. Comparable evidence was reported in more recent studies, including Haithar S et al. [11], who established that maternal depression was a risk factor of high significance to early childhood malnutrition and He Q et al. [12] who determined that higher levels of depressive symptoms in mothers were linked to lower infant developmental growth curves over the first year of life. The present findings also resonate with the findings of Shrestha et al. [13] in Japan and Faisal-Cury et al. [14] in Brazil who identified depressive symptoms as having a negative effect on breastfeeding practices, which lead to poor infant nutrition. The present study has significantly indicated that the exclusive breastfeeding was significantly reduced among mothers with moderate and severe depression as evidence of the behavioural and emotional effects of postpartum depressive conditions in caregiving. Depressed mothers may have diminished energy, decreased responsiveness to infant cues, and reduced motivation to maintain consistent feeding schedules [15]. Such behavioural modifications may result in poor caloric intake, risk of infection, and later growth failure.

The present study, as opposed to those by high-income nations, where the social support system and available healthcare can help alleviate the effects of

postpartum depression, illustrates the increased difficulties encountered by women in low-resource settings. Poor screening, a lack of cultural stigma around mental illness and integrated maternal mental health services are other factors that contribute to the continuation of this problem [2,3,4]. The results thus highlight the dire necessity to include psychological assessment in postnatal and child welfare practices.

The strengths of the current study include factualization of standardized diagnostic criteria by use of standardized tools like EPDS, and objective infant growth measures by use of WHO and INTERGROWTH-21st. The investigation contributes to a source of information in the region that lacks local research. Nevertheless, there are some limitations that are to be identified. The cross-sectional design limits the ability to make causal inferences because the relationships between maternal depression and infant development over time cannot be solidly determined. The reliance on self-reported depressive symptoms may introduce response bias, and the sample, being drawn from a single tertiary facility, may not represent the general population. Moreover, other things like maternal nutrition, family set ups and paternal support, which cannot be measured, could as well impact depression as well as the infant developmental outcomes.

The present findings confirms the facts that maternal depression does play a great role in infant development especially when the social and economic background is characterized by limited resources. Postpartum depression is a complication that should be identified and treated at an early stage to enhance maternal and child health rates. Longitudinal multicentre research in the future is advisable to investigate causality mechanisms and efficacy of combined screening and counselling interventions in primary health care practices.

CONCLUSION

The study demonstrated that maternal postpartum depression significantly affects the nutritional and growth outcomes of infants under six months of age. Higher depression scores were associated with preterm birth, poor immunization, and lack of exclusive breastfeeding, leading to increased malnourishment among affected infants. These findings highlight the importance of integrating

maternal mental health assessment into routine paediatric care to promote early identification, intervention, and improved infant growth and well-being.

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