Post-Partum Depression Effect on Child Health and Development

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Abstract- While studies have shown the disastrous effects of post-partum depression (PPD) on children's behaviors, there is relatively lack of reliable data in Asian countries. This study examined the relative significance of maternal PPD in children's developmental disabilities at age four. In a longitudinal study design (2009), 1801 pregnant women attending in primary health centers of Mazandaran province in the north of Iran provided self-reports of depression from two to twelve postpartum weeks using Edinburgh Postnatal Depression Scale (EPDS). Approximately four years later, the women experiencing PPD and twice as the ones who did not experience this disorder were considered as case (N=204) and control (N=467) groups. The association between maternal depression at different times and childhood developmental disabilities based on Ages and Stages Questionnaire (ASQ) and other health problems reported by the child were analyzed using two-sample t-test, chi-square test, and logistic regression models. The presence of PPD only was not a predictor of child's developmental disabilities at age four. Childhood developmental disabilities in communication, gross motor and personal-social domains of ASQ were associated with the current and concurrent maternal depressive symptoms (OR=2.59, 95% CI=1.16-5.78; OR=4.34, 95% CI=2.10-8.96; OR=5.66, 95% CI=1.94-16.54 and OR=3.35, 95% CI=1.31-8.58; OR=4.15, 95% CI=2.72-13.87; OR=6.17, 95% CI=1.95-19.53 respectively). PPD, the current depressive symptoms, and depression at both occasions were associated with more health problems in children. Childhood developmental disabilities in some domains of ASQ were significantly related to the maternal depression chronicity or recurrence. Also, child's difficulties were more prevalent in association with maternal depression regardless of onset time.

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Introduction

Epidemiological studies have revealed high rates of post-partum depression (PPD) in different cultures worldwide (1,2). PPD affects women from personal adjustment and relationship with partner to their child development (3,4).

The first six months after childbirth is a critical time for a child's physical and psychological development (5). The children of depressed women probably suffer from uncertain affection and diminished psychomotor and cognitive development (6,7). The above effects will impair the infant's development, especially in terms of their intelligence and language (8). Also, a cohort study extracted finding showed a relationship between child's behavioral problems such as aggression, depressed mood, hyperactivity and maternal depression in the first year after childbirth (9). Some women with PPD tend to engage in child abuse and negligence (10). It was found that depressed mothers' children's behavioral problems along with depression continuation were more compared with those of healthy mothers (11). In severe cases, this condition can have a long term effect on children's growth and development and their attachment to the mother, even if the mother has been depression-free (12). In spite of a great number of studies documenting PPD adverse effects on child's development, a European study among the two-year children failed to show this association (13).

While there is considerable evidence from developed countries about the harmful effects of PPD on child's development, there is no long-term follow-up study in

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developing nations. As Grace *et al*., (2003) reviewed the literature and displayed that severe behavioral impact of PPD on children is at about age five (8); this study aims to investigate the developmental disabilities of 4-year-old children born from post-partum depressed women.

Materials and Methods

In a longitudinal cohort study in 2009, 1, 801 non-depressed pregnant women attending primary health centers (PHCs) in Mazaddaran province in the north of Iran were assessed for depression from two to twelve post-partum weeks using Edinburgh Postnatal Depression Scale (EPDS>12) (14). When their children were 4-year-old, those women's PHCs charts were reviewed in order to identify the qualified cases for the present study. Among them, the women with depressive symptoms during this time period were considered as the case group (N=216), and twice as many non-depressive symptoms women based on the EPDS were randomly selected from the control group (N=475) after individual matching based on the children's gender and age.

The eligible children's mothers who attended PHCs for child care were requested to participate in this study and to complete their consent form. When the women did not come over to the PHCs, a call was made as a reminder or appointment for home visit. Data on the socioeconomic background, pregnancy course, medical history, birth weight, the infant characteristics at delivery time and breastfeeding duration were recorded at recruitment time in the original study (15). Women under pharmacological treatment for their psychiatric disorders were excluded from the original study. Prior to this study period, the women who were recognized to have the likelihood of EPDS-based depression and agreed to refer to a physician for treatment (25 cases), the ones with chronic diseases (such as heart diseases, diabetes mellitus etc.) and who became pregnant during these four years were excluded from the study. Preterm birth and low birth weight infants and also infants with congenital abnormalities or other difficulties at the time of delivery were excluded from this study, too.

At the time of visit four years after delivery, the researchers and educated health care practitioners distributed the questionnaires among the eligible women and asked them to complete the 48-month adapted Ages and Stages Questionnaire (ASQ) version (16) and EPDS. The children's weight and height obtained at the study entry time and BMI values (body weight (kg) divided by the squared height (m)) were calculated based on these measurements. We also added a short questionnaire asking about the child's ongoing illness (such as severe anemia, malnutrition, allergy, respiratory infections etc.) and pharmacological medications.

EPDS

EPDS is the most common screening instrument for measuring PPD (17). It is a 10-item Likert scale. The mother selects one of four possible responses ("no, not at all" to "yes, quite often") according to her feeling within the past seven days. The score of all questions is computed, and seven of the 10 items scored in reverse (18,19). Different cut-off scores may be applied to diverse cultural populations(communities) (20). The reliability of this instrument has been verified in Iran, and the score of 12 has been established as a cut-off point (21). In this study, the patient was considered to have probable depression if EPDS score is >12.

ASQ

ASQ is a child developmental screening instrument (16). This questionnaire encompasses six items in five developmental domains: fine motor, problem-solving, communication, gross motor, and personal-social. This self-report tool designed to be completed by 4-60-month-old children's parents and caregivers, and take the least amount of time. The parent should have at least a fourth to sixth-grade reading level to be able to answer this questionnaire.

The parents are asked to answer "yes, sometimes, or not yet " to the item according to their every day observing their child's performance. Cutoff points establish ASQ scores based on which the children are identified as below the ''typically developing'' range and recommended for more intensive follow-up assessment. A score 2 SD below the mean is recommended (assigned) as the main cutoff point for identifying the possible developmental delays (16,22). ASQ national version was implemented on a population of 10522 children in different cities of Iran and confirmed ASQ as a valid and reliable screening instrument (23). In this study, the cut-off point at 30 to 39.1 was considered in five domains of ASQ to distinguish the children with and without behavioral problems.

Both medical problems and child developmental ASQ-based scores (categorized as normal development and abnormal development using cut-off 30 to 39.1 for different domains) were considered as dependent variables. Maternal depression was categorized into four groups: 'no depression,' 'PPD only,' 'current depression

only,' 'both current depression and PPD,' and viewed as an independent variable.

Descriptive analysis was used to describe the mother-child characteristics. Chi-square and independent two sample t-test were used to determine group differences (proportions and mean values) on categorical and continuous variables, respectively.

These analyses were performed to assess the relationships between child outcomes and maternal depressive symptom. The five domains of ASQ and the medical problems of the children whose mothers reported PPD, current depression and both PPD and current depression were compared with those from non-depressive mothers.

The significant variables were then tested in multiple logistic regression models to find out which variables remained significant. The women's age, general health status based on General Health questionnaire (GHQ-28) (24), ongoing illness and also the child's gender were taken as covariates in the model. In the regression analyses, the covariates were entered as block A in the first step, and maternal depressive symptoms were then entered in the second step as block B.

All the analyses were done using MBI-SPSS program ver. 20 and all the tests were considered at the significant level of 0.05 and confidence interval%95.

The study was approved by the ethics committees of Mazandaran University of Medical Sciences.

Results

Out of 691 women agreeing to took part in this study, 671 (98.82%) completed the data (204 on the post-partum depressed group and 467 on non-post-partum depressed group) and followed up the study. Twelve women (5.55%) with PPD history did not follow up the study. Eight (1.68%) non-depressed women were excluded from the analysis because they had not completed the final questionnaires (Figure 1).

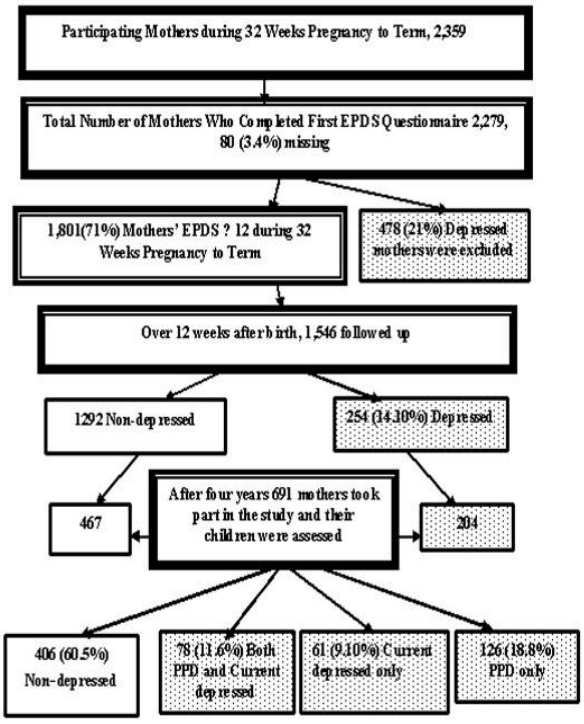

Figure 1. The women who followed the study from pregnancy to four years after birth

There was no significant difference between the baseline characteristics of post-partum depressed and non-depressed women (Table 1). The women with PPD only or both PPD and four years after delivery depression were less likely breastfeed their baby compared with the ones without depression (18.79±6.99, 18.01±7.75 and 19.66±5.64, 19.58±5.82 months, respectively) (Table 1).

The women with PPD only and current depression, as well as both PPD and current depression, were more likely to have a child with acute and chronic diseases and their child used more daily medication four years after birth than the baby of depression free women. These complications rate was highly significant in the

children whose mothers have experienced both PPD and current depression (P<0.05) (Table 2).

Table 1. The participants' background data

Variables	Post-partum depression (204)	Non-post-partum depression (467)	*P*.value*
Women' age (yrs)(SD)	30.10 (5.13)	30.14 (5.25)	0.42
Women' education (upper secondary level)	114 (55.9%)	226 (48.4%)	0.13
Primiparous	121 (59.3%)	297 (63.6%)	0.54
Infant's age (month)(SD)	47.87 (0.73)	47.89 (0.79)	0.05
Female child gender	103 (50.5%)	241 (51.6%)	0.42

*Two sample t-test for quantitative variables and *chi*-square test for qualitative variables

Table 2. Post-partum depression, current depression and both post-partum depression and current depression related to the distributed child health problems

Variables		Non-depression N (%)	PPD* N (%)	Current depression N (%)	Both PPD and current depression N (%)	*P*.value
Chronic diseases	**No**	339 (98.3)	105 (83.3)	59 (96.7)	60 (76.9)	<0.001
	Yes	7 (14.6)	21 (16.7)	2 (3.3)	18 (23.1)	
Acute diseases	**No**	395 (97.3)	112 (18.8)	44 (7.4)	44 (7.4)	<0.001
	Yes	11 (2.7)	14 (18.4)	17 (22.4)	34 (44.7)	
Daily medication	**No**	389 (64)	109 (17.9)	56 (9.2)	54 (8.9)	<0.001
	Yes	17 (27)	17 (27)	5 (7.9)	24 (38.1)	
Child's gender	**Girl**	201 (49.5)	66 (52.4)	25 (41)	35 (44.9)	>0.05
	Boy	205 (50.5)	60 (47.6)	36 (59)	43 (55.1)	

*PPD: post-partum depression

Using chi-square test, the women with PPD only significantly had more children suffering from developmental disabilities in two domain of ASQ including gross motor and personal-social domain, while the mothers experiencing current depression or both PPD and current depression were more likely to have a child with developmental disabilities in most domains of ASQ (fine motor, communication, gross motor and personal-social) after four years of birth.

After considering the co-factors, multiple logistic regressions showed that current depression and both PPD and current depression influenced the child's developmental disabilities in most domains of ASQ after four years of birth. The women with current depression and those with both PPD and current depression were significantly more likely to have a child with developmental disabilities in communication, gross motor and personal-social domains of ASQ [(OR=2.59, 95% CI=1.16-5.78; OR=4.34, 95% CI=2.10-8.96 and OR=5.66, 95% CI=1.94-16.54, respectively) and (OR=3.35, 95% CI=1.31-8.58; OR=4.15, 95% CI=2.72-13.87 and OR=6.17, 95% CI=1.95-19.53, respectively)]. While the women with PPD only were not more likely to have developmental disabilities affected child according to ASQ after four years of birth in multiple logistic regressions after being adjusted for covariates.

Discussion

The present study evaluated the impact of postpartum and current depression on 4-year-old children's developmental disabilities. This study's derived results may be summarized in four main findings.

First, although PPD could predict the child developmental disabilities according to ASQ at age four in simple logistic regression, in multiple regression models, PPD was a predictive factor for some domains of child developmental disabilities if the women experienced depression on both occasions of the assessment. This finding was consistent with the previous study finding (11,25) but it appears to be partly compatible with the findings of other studies reporting PPD with an independent adverse effect on child's development disabilities (8,9), indicating that this group of women not only should be recognized as soon as possible during post-partum period and considered as a high-risk group in clinical practices but also prospective evaluation of maternal and child health is also required.

Second, some adverse effects were found in communication, gross motor and personal-social domains of ASQ in children born of current depressed women, in line with the previous studies (11,25,26). This could be

explained by this fact that depressed women may have low maternal confidence in child care thus they play a poor role model (25,27). The other explanation is that the data about children's behavior were based on maternal self-estimation and no observation was done directly. The previous studies reported that the depressed women might perceive their children more negatively than non-depressed women (25,28).

Third, we found that the women displaying depressive symptoms at each occasion, i.e., during post-partum period, the time when the child was four years old and at both post-partum period and four years later appeared to have a child with acute and chronic diseases to a greater extent than the healthy group. Besides, their children also used more daily medication at age four. A study among Pakistani children also confirmed that maternal depression may be a risk factor for malnutrition and illness in the children living in a low-income country (29). These results highlight this fact that early and late exposure to maternal depression regardless of being a significant factor for child developmental disabilities led to children with more difficulties.

Four, in comparison with our study findings, a gender-link difference in the children has been discussed in the previous studies which found maternal depression exerting greater impact on the boys than the girls ,i.e. the finding not achieved in this study (11,30). Even in some domains of ASQ, the female children were more affected by maternal depression. These results are similar to those of the Swedish study among the 12-year-old children (25) and Pakistani study among one-year-old kids (29). It seems that other variables such as socio-demographic factors should be considered for further evaluation and may be added to the model, since the child's gender is not enough to judge and the environmental effects are also significant.

Some limitations in this study should be mentioned, too. This study did not examine ongoing exposure to depression during the four-year follow-up. Other factors that could affect the infant's health and development such as lack of healthy lifestyle, psychosocial conflicts due to lack of family support and financial problems influencing child care have not been explored in this study. Moreover, all information in this study has been gathered from self-reported questionnaires (EPDS and ASQ); however, most researches indicate a high sensitivity and specificity of these questionnaires (23,31).

The current study makes a unique contribution to the research cases by highlighting the importance of current depression. Despite low frequencies of child developmental disabilities in this study, the findings of elevated child health difficulties and the association between some domains of ASQ and maternal depression are significant. Lack of association between PPD and increased risk of child developmental disabilities in the absence of later maternal depression is the opposing evidence for the early PPD effects on child disturbances. Total exposure to maternal depression in comparison with a control group is needed to examine this association in a long follow-up study in a larger sample. The women who experienced depression at both post-partum periods and four years later appeared to rate their child behavior as problematic to a greater extent. Maternal depression may have a greater impact on child's behavioral disabilities when it appears early in life.

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