

Relationship between Child Development and Maternal Postpartum Depression: A Cross-Sectional Study

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ABSTRACT

Background: The first two years of life is of paramount importance for child development, and the acquired skills during this period will be the basis for success in the future. Postpartum depression as one of the common mental health issues in mothers may be associated with child development.

Methods: This cross-sectional study was conducted on 366 women (aged 18-45 years) referred to health care centers. Demographic characteristics form, Edinburg postnatal depression scale, as well as ages and stages questionnaires, were used for data collection. The collected data were analyzed in SPSS software (version 18) at a significant level of less than 0.05.

Results: The mean maternal depression score in an abnormal state was higher, compared to that in the normal state, requiring the follow-up situations in communication, fine motor, and personal-social domains. Moreover, the ANOVA test demonstrated a statistically significant difference between the maternal depression score in various situations of mentioned domains ($P=0.03$, $P=0.016$, and $P=0.018$). There was no statistically significant difference between maternal depression scores in various situations of gross motor and problem-solving domains ($P=0.503$ and $P=0.145$). Furthermore, Pearson test results pointed to a significant relationship between depression scores and the state of development in communication, fine motor, and personal-social domains.

Conclusion: As evidenced by the obtained results, health care providers should consider postpartum depression in order to maintain and improve children's development. The provision of adequate information regarding child development can improve the quality of care for the children whose mothers suffer from postpartum depression.

Keywords: Child, Development, Depression, Maternal, Postpartum

Introduction

The development of the brain structure and function is very rapid in the first two years of life (1) when an opportunity is provided for children to acquire various skills. The acquired skills will be the basis for success in the future; therefore, any defect can lead to an irreversible loss for the child (2, 3, 4). Development is a process in which the child's brain and the nervous system undergo a multifaceted change so that the child gradually acquires new capabilities and skills (5, 6). The development includes some domains, such as physical, cognitive, and psychosocial development (7).

Based on previously conducted studies, child

development is affected by genetics, environmental, psychological, and socioeconomic factors (8). Developmental disorders were reported in 39% of children under 5 years in low-income countries, and their distribution in different regions of Iran was demonstrated to range from 18.7%-22.5% (9). The main cause of developmental disorders has remained unknown. Despite biological and nutritional factors affecting the development of children, recent research has pointed to a significant relationship between children's development and social determinants of maternal health (10). Moreover, the quality of mother-child

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interaction can affect child development (11) and help brain development (12). Several studies revealed the role of mothers in the facilitation of children's social-emotional development (13), language and literacy skills (14), as well as cognitive development (15).

Maternal health, especially mental health, is considered a basis for children's health (16). In this regard, one of the most common problems that can involve maternal health is postpartum depression with incidence rates of 13% and 34% in developed and developing countries, respectively (17, 18). The data indicated that the postpartum depression is 25%-39% in Iran; moreover, severe cases of this disease may persist until two years after childbirth (19).

Postpartum depression reduces a mother's ability to support child (20), mother-child involvement, sensitivity, and conditional responsiveness (21). Depressed mothers are incapable of appropriate interaction with their children. They show less affection and spend less time to play with their children (22, 23). Mothers with postpartum depression do not have a good mother-child bonding and respond less to child signals (24). Therefore, the children of depressed mothers have lower stimuli and experience improper interaction which can have a negative impact on their development (22, 25).

Ali et al. in Pakistan claimed that postpartum anxiety and depression influenced mental, social, emotional, linguistic, cognitive, and motor development (26). Nonetheless, other studies revealed that postpartum depression had no effect on the cognitive, psychological, and motor development of the child (27, 28).

It should be considered that providing adequate information regarding children's development can improve the health care of the children whose mothers suffer from such problems as postpartum depression. According to research conducted in this regard, as well as the importance of maintaining and promoting the physical and mental health of mothers and children (19), the researchers in the present study strived to carry out research in this field. Therefore, this research aimed to investigate the relationship between postpartum depression and child development in the first two years of life.

Methods

Study design and population

Isfahan is divided into four areas: west, east, north, and south. The health care centers which

are located in all areas provide such care practices as monitoring growth and child development to mothers and children. It has been reported that 11.8% of children had developmental disorders in the city (9, 29). This cross-sectional study was conducted on 366 mothers who were referred to health care centers. The study population included all mothers (aged 18-45 years) whose children were maintained in health care centers.

Inclusion and exclusion criteria

The inclusion criteria for the mothers were no history of infertility, addiction, chronic diseases, and experience of severe stress during the past six months. Mothers' stress was assessed using the Holmes-Rahe scale, and a score of less than 150 was regarded (30) as the inclusion for the study. Moreover, in this study, term and single delivery, birth weight of 2500-4000 g, lack of intrauterine growth restriction (IUGR), not being a step-child, and lack of specific disease history were considered the inclusion criteria of the study for children.

The sample size was calculated at 366 subjects based on the following equation:

$$N = (Z_1 + Z_2)^2 (1 - r^2) / r^2 + 2$$

We considered Z_1 value for a confidence interval of 99%=2.58 and $P=0.5$. When we assumed power of test=90 %, Z_2 was determined to be equal to 1.87. The Correlation coefficient (r) was considered at least 0.2.

Methods

The health centers were randomly selected from all health centers in different areas of Isfahan using the lottery method. Therefore, each health center was assigned a number; thereafter, numbers were randomly drawn from the box. The samples were mothers who were referred to health centers in order to receive care for themselves and their children.

Instruments

In this study, three questionnaires of socio-demographic characteristics of the mothers, the Edinburg postnatal depression scale (EPDS), as well as the ages and stages questionnaire (ASQ), were used. The Edinburg postnatal depression scale contains 10 items which are rated on a four-point Likert scale, ranging from 0 to 3(0= not at all, 1= not very often, 2= most of the time, and 3= all the time). The items 3 and 5 to 10 are reversely scored. The total score is calculated by the addition of all scores. A score of more than 12 indicates postnatal depression (27).

On the other hand, ASQ was used to assess the development of children. This questionnaire is relatively simple and completed by parents or caregivers. The ASQ contains 19 questionnaires for 19 different age groups. Each questionnaire consists of 30 items arranged from easier activities to more difficult ones (7). Five domains of development are assessed by ASQ (communication, gross motor, fine motor, personal-social, and problem-solving), along with a public or general section (21). There is a set of 6 items for each domain. The mothers are asked to respond to the items by considering their child's performance. The responses to the items are included yes, sometimes, and not yet with point values of 10, 5, and 0, respectively. Cut-off points determine whether children are at risk and should be referred for more follow-up and evaluation or children are recognized within a normal developmental (7, 27).

Measuring tools: validity and reliability

In total, the Iranian version of the Edinburgh questionnaire was investigated by researchers. The validity and reliability of EPDS in Iran were acceptable. The assessment of validity using known groups revealed reasonable results. The Cronbach's alpha and intraclass correlation coefficients in test-retest were reported as 0.83 and 0.80, respectively (31).

The ASQ national version was standardized and confirmed as a valid and reliable tool. The sensitivity and specificity of ASQ were obtained at 72% and 86% (27). To determine the content validity of the socio-demographic questionnaire after studying the related books and papers, the questionnaire was evaluated and confirmed by 15 faculty members of Isfahan University of Medical Sciences.

Ethical consideration

The present article was extracted from a research project approved by the Research Deputy and Ethics Committee of Isfahan University of Medical science (code: 291179). The participation of mothers was voluntary and based on informed consent.

Data Analyses

We used descriptive statistical analysis (mean, standard division, and frequency distribution) and other statistical methods (ANOVA test and Pearson's correlation). Ultimately, the collected data were analyzed in SPSS software (version 18). A p-value less than 0.05 was considered

statistically significant.

Results

In terms of socio-demographic characteristics, the results showed that the mean age of mothers was 27.67 years, and the majority of them (49.2%) had a diploma. Furthermore, 93.2% of subjects were housewives. The delivery mode was a cesarean section in 66% of mothers and most mothers had one child (Table 1).

Table 1. Frequency distribution of socio-demographic characteristics

| Characteristics | Number | Percent (%) |
|-------------------------|--------|-------------|
| Child age (month) | | |
| 6-4 | 86 | 23.4 |
| 12-76 | 118 | 32.2 |
| 18-13 | 96 | 26.2 |
| 24-19 | 66 | 18.2 |
| Maternal age (year) | | |
| 25-18 | 120 | 32.8 |
| 35-26 | 219 | 59.8 |
| 45-36 | 27 | 7.4 |
| Maternal employment | | |
| Housewife | 341 | 93.2 |
| Employed | 25 | 6.8 |
| Maternal education | | |
| High school | 89 | 24.3 |
| Diploma | 180 | 49.2 |
| University | 97 | 26.5 |
| Father education | | |
| High school | 57 | 15.6 |
| Diploma | 195 | 53.3 |
| University | 114 | 31.1 |
| Number of children | | |
| 1 | 230 | 62.8 |
| 2 | 109 | 29.8 |
| 3 | 23 | 6.3 |
| 4-5 | 4 | 1.1 |
| Mode of delivery | | |
| Normal vaginal delivery | 124 | 34 |
| Cesarean section | 242 | 66 |

The mean depression score in this study was 7.06 ± 5.06 . In the studied population, 19.4% of women were found to be depressed with a score of above 12. The highest frequency distribution of personal-social, communication, gross motor, fine motor, and problem-solving was in the normal state (95.9%, 94%, 94%, 92.9%, and 90.2%, respectively). Although the mean scores of maternal depression were different in normal, abnormal, and follow-up situations of gross motor and problem-solving domains, there was no statistically significant difference between maternal depression in various situations of gross motor and problem-solving domains ($P=0.503$ and $P=0.145$).

The mean depression score of mothers in an abnormal state was higher, as compared to that in the normal state, requiring the follow-up

Table 2. Maternal depression score according to dimension and situation of child development

| Dimension of child development | Situation | Mean and standard deviation of maternal depression score | ANOVA test | P-value |
|--------------------------------|-----------|--|------------|---------|
| Communication | Abnormal | 10.66 ± 3.21 | 3.85 | 0.03 |
| | Follow-up | 9.21±6.5 | | |
| | Normal | 7.63±4.96 | | |
| Gross motor | Abnormal | 5±1 | 6.87 | 0.503 |
| | Follow-up | 8.57±4.8 | | |
| | Normal | 7.77±5.09 | | |
| Fine motor | Abnormal | 10.75±4.99 | 4.15 | 0.016 |
| | Follow-up | 9.54±5.28 | | |
| | Normal | 7.64±5.03 | | |
| Problem solving | Abnormal | 8.45±6.33 | 1.94 | 0.145 |
| | Follow-up | 9.64±4.9 | | |
| | Normal | 7.62±5.09 | | |
| Personal-social | Abnormal | 13±3.82 | 4.07 | 0.018 |
| | Follow-up | 10.63±6.96 | | |
| | Normal | 7.64±4.96 | | |

Table 3. Pearson's correlation between maternal depression score and dimension of child development

| Dimension of child development | Maternal depression score | |
|--------------------------------|---------------------------|-----------------|
| | Pearson correlation | Sig. (2-tailed) |
| Communication | -0.177 | 0.001 |
| Gross motor | -0.065 | 0.216 |
| Fine motor | -0.182 | 0.001 |
| Problem solving | -0.109 | 0.037 |
| Personal-social | -0.189 | 0.001 |

situations in communication, fine motor, and personal-social domains. Moreover, the ANOVA test showed a statistically significant difference between the maternal depression score in normal and abnormal states, as well as a need for follow-up conditions in the three domains ($P=0.03$, $P=0.016$, and $P=0.018$) (Table 2). Furthermore, Pearson test results demonstrated a significant relationship between the depression score and the state of development in communication, fine motor, and personal-social domains (-177, -182, -189) (Table 3).

Discussion

In general, the results of the current research pointed out that maternal postpartum depression was not related to the domains of gross motor and child problem-solving; nonetheless, maternal depression was associated with the domains of communication, fine motor, and personal-social.

The mother's sensitivity to child behavior is the center of communication and interaction between mother and child, as well as the development of the emotional and social dimensions of the child. The inability to control maternal emotions and insensitivity of mothers can increase the crying of the child, reduce maternal duties, and consequently, weaken the regulation of emotions, reduce motivation,

destroy the learning of social behavior, and impair child development. Furthermore, depressed mothers revealed slower responses to child vocalizations, as compared to non-depressed ones (32). In addition, the establishment of communication, telling stories, and playing with the child were less frequently observed in depressed mothers (33).

In a review study, Porto et al. (2016) assessed mechanisms through which depression affects child development during the first year of life. They showed that maternal depression was related to atypical emotions (34). The researchers have pointed to the effect of maternal depression on the social development of the child (33). Stein et al. (2014) conducted a study to investigate the correlation between perinatal mental disorders and the development of children. The findings of the stated study pointed out that the children of depressed mothers obtained the lowest score in cognitive and social domains, as compared to the control group (35).

In the same context, Besse et al. (2021) pointed out that the children of depressed mothers had poorer communication and social development, in comparison with those with non-depressed mothers (36). Liu et al. (2017) also demonstrated that mothers' depression symptoms were associated with lower cognitive

scores in children aged 56 months and less. In the current study, by controlling confounding variables, it was indicated that the mean cognitive score was lower in children 6-8 weeks postpartum whose mothers obtained a high score of postpartum depression, as compared to that in children with non-depressed mothers (17).

The results of some studies on the direct effect of postpartum depression on all children are different and even controversial. Vameghi et al. (2015) suggested that apart from maternal depression, the socioeconomic status of the family is effective in the development of children aged 6-18 months (37). The findings of another study on one-year-old children in Iran indicated no significant relationship between maternal depression and the range of the gross motor. In the referred study, the socioeconomic status of the family was shown as the effective factor so that the prevalence of the disorder in the gross motor was higher in families with lower socioeconomic status (38).

Furthermore, according to some researchers, prenatal depression is more prevalent in mothers and the most predictor of postpartum depression. Therefore, what we regard as the negative impacts of postpartum depression on the development of children are in fact the additional effects resulting from previous or chronic depression in mothers, and postpartum depression does not affect the cognitive, motion, and psychological development of children (27), or its undesirable effect is negligible (28, 39).

Moreover, researchers mentioned that postpartum depression is not a direct and significant factor in the developmental disorders of children. Nevertheless, the following mediating variables can be also effective: maternal, genetic, and hereditary factors, physical problems of the child (27), child's gender, interactions, and communication between mother and child (28, 40), quality of the family atmosphere and health, social and economic support, as well as the presence of chronic prenatal depression or repeated recurrence (41,42). It should be noted that the relationship between maternal depression and the development of the child may be a two-way relationship. Therefore, an integrated approach to improving the development of children may include programs considering the parent-child relationship, maternal depression, as well as child's health and nutrition (43). Tsivos (2015) believes that intervention in postpartum depression, apart from enhancing the quality of

the mother-infant relationship, can improve the development of babies (44).

Limitations

Although the relationship between depression and some domains of development of children was indicated in this research, the limitations of this study should be also considered. Among the notable limitations, we can refer to the following: the information from mothers for the diagnosis of depression or developmental disorders of children was obtained using a self-reporting method and not based on a clinical evaluation. In this respect, Corastein mentioned that depressed women may have a more negative perception of their children's behavior and report more problems with their children (27). Secondly, a cross-sectional study design was used in this study. Therefore, the lack of evaluation of changes in depression scores in different periods and lack of control over confounding variables, such as economic and maternal social support, are other limitations of this study that would require further research.

Conclusion

It seems that health care providers should consider the postpartum depression of mothers in order to maintain and improve child development. The provision of adequate information regarding children's development can improve the quality of care for the children whose mothers suffer from postpartum depression. Consequently, it is recommended to assess the development of children with depressed mothers.

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Conflicts of interest

There are no conflicts of interest.

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