

Original Article

The Association between Maternal Depression and Anxiety on Nutritional Problems in Children Aged 6 to 36 Months

Mohammad Effatpanah¹ Reza Rezaee-Taheri² Saeedreza Jamali Moghadam Siyahkali³ **Omid Dadras***⁴ Elahe Abedi-Taleb⁵ Rezvan Hashemi⁶ Reza Tavakolizadeh⁷ Yousef Mojtahedi⁸ Elnaz Asadollahi⁹ Seyedahmad Seyedalinaghi¹⁰

1. Associate Professor, Department of Psychiatry, Ziaieian Hospital, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Assistant Professor, Department of Pediatrics, School of Medicine, Ziaieian Hospital, Tehran University of Medical Sciences, Tehran, Iran
3. Assistant Professor, Ziaieian Hospital, Tehran University of Medical Sciences, Tehran, Iran
4. PhD candidate, Department of Health Informatics, School of Public Health, Kyoto University, Japan
5. MSc candidate, Ziaieian Hospital, Tehran University of Medical Sciences, Tehran, Iran
6. Assistant Professor, Department of Geriatric Medicine, Ziaieian Hospital, Tehran University of Medical Sciences, Tehran, Iran
7. Assistant Professor, Department of Pediatrics, Tehran University of Medical Sciences, Tehran, Iran
8. Assistant Professor, Department of Pediatrics, Ziaieian Hospital, Tehran University of Medical Sciences, Tehran, Iran
9. MSc candidate, Department of Health Services Management, Ziaieian Hospital, Tehran University of Medical Sciences, Tehran, Iran
10. Assistant professor, Iranian Research Center for HIV/AIDS, Iranian Institute for Reduction of High-Risk Behaviors, Tehran University of Medical Sciences, Tehran, Iran

*Correspondence to: Omid Dadras
omiddadras@yahoo.com.

(Received: 27 Jan. 2020; Revised: 9 Apr. 2020; Accepted: 23 May. 2020)

Abstract

Background and Purpose: Maternal depression and anxiety can cause nutritional problems in offspring. Despite the numerous literature, the knowledge regarding the impact of maternal mental health on child's eating disorder is still limited. This study explored the impact of maternal depression and anxiety on eating disorders among children aged 6 to 36 months in Tehran, Iran.

Material and Methods: A total number of 320 children aged 6 to 36 months old and their mothers were enrolled at a teaching university hospital in Tehran (Ziaieian Hospital). To collect the data, the inventory of problematic eating behaviors for 36-month old children, Beck Depression Inventory (BDI-II) questionnaire, Beck Anxiety Inventory (BAI) questionnaire, and demographic information questionnaire were used. To examine the relationship between maternal depression and anxiety with childhood feeding problems, bivariate (Chi-square) and multivariate (logistic regression) analyses were employed.

Results: The mean mothers' depression and anxiety scores were found to be 15.97 (SD=12.08) and 14.26 (SD=11.87), respectively. An estimated 23.8 % of children were suffering from eating disorders. There was a significant association between the mother's severe depression and child's eating disorder [OR = 5.7; CI (95%) = 2.92-11.43]. Although this association attenuated for the moderate level of depression in mothers, it was still statistically significant [OR= 2.25; CI (95%) = 1.05-4.8]. There was also a significant association between the moderate level of anxiety in mother and child's eating disorder [OR = 2.17; CI (95%) = 1.15-4.10].

Conclusion: It appeared that the children of mothers with higher levels of depression experienced more eating disorders during childhood. Furthermore, middle maternal anxiety level was associated with more feeding abnormalities in children. Therefore, screening and addressing the mental health issues in mothers at the early stages could prevent from future eating disorders in offspring.

Keywords: Maternal; Depression; Anxiety; Children; Nutritional Problems

Citation: Effatpanah M. Rezaee-Taheri R, Jamali Moghadam Siyahkali S, **Dadras O***, Abedi-Taleb E, Hashemi R, Tavakolizadeh R, Mojtahedi Y, Asadollahi E, Seyedalinaghi S. The Association between Maternal Depression and Anxiety on Nutritional Problems in Children Aged 6 to 36 Months. Iran J Health Sci. 2020; 8 (2): 1-8.

1. Introduction

Nutritional problems in children defined as food refusal, selectivity, and erratic meal patterns which usually exacerbate in 3-year-old children (1). In USA, an estimated 45% of children are affected by such problems, and the incidence is increasing worldwide (2). The most important concerns in such children are food refusal and late diagnosis of selectivity (3), which usually obstacles complementary nutrition (4, 5). The child is often underweight or obese, which could raise the parent's concern (1, 6). Growth chart deviation during infancy could impose irreparable consequences on mental and physical health. Malnutrition may lead to subsequent growth retardation in childhood and eventually disability in school-age and adolescence (7). Obesity may also culminate to adulthood problems (8).

These issues raise the questions about pathophysiology and treatment of such problems. Maternal depression and anxiety are known to cause nutritional and behavioral problems in offspring (9). However, there is little known about the impact of maternal mental health on child's erroneous eating habits.

The etiologies of feeding troubles at an early age in children are not completely specified. Although recent studies suggest that parental mental health could impact the childhood growth and physical health, and children of such parents may suffer more from feeding problems in childhood (10-12), there is limited knowledge about specific mental illnesses that could cause such problems. Therefore, in this study, we aimed to explore the impact of maternal depression and anxiety on eating disorders among children aged 6 to 36 months in Tehran, Iran.

2. Materials and Methods

We conducted a cross-sectional study between June 2017 and April 2018 to explore the association of maternal depression and anxiety on nutritional problems of children aged 6 to 36 months old referred to the pediatric clinic of Ziaei Hospital. A total number of 320 children were selected randomly from amongst the children, aged 3-36 months, who visited the outpatient clinic in the morning time. The prevalence of eating disorders was measured using the "the inventory of problematic eating behaviors for 36-month old children" questionnaire. The "Beck Anxiety Inventory (BAI) questionnaire" and "Beck Depression Inventory (BDI-II) questionnaire" were also used to measure the prevalence of depression and anxiety among mothers. The mothers were included in the study according to the eligibility criteria and informed consent.

The exclusion criteria included; illiteracy and twin pregnancy or more for mother and inappropriate birth weight, history of asthma, hypothyroidism, Down syndrome, Cushing, and Prader Willi for the child. Four questionnaires, namely, the inventory of problematic eating behaviors for 36-month old children, Beck Depression Inventory (BDI-II) questionnaire, Beck Anxiety Inventory (BAI) questionnaire, and demographics information questionnaire were used in this study to collect the data. Demographics information questionnaire collects data on parental age, smoking, weight and children's age, weight and Percentile. The inventory of problematic eating behaviors for 36-month old children questionnaire is specifically designed to evaluate and characterize the maternal concerns regarding feeding problems in children aged 6-36 months old,

and it is completed by parents or caregiver(2). Questionnaire validity was examined based on the model proposed by Lewinsohn et al. and it proved as a valid instrument to be used in Iranian population. In the present study, the existence of at least one feeding problem at any domain was considered as feeding disorder in the child. Beck Depression Inventory (BDI-II) questionnaire is developed by Beck et al. in 1961, and is one of the most valid and precise scales to assess the depression (13). It measures the depression severity and scores from zero to 66 on Likert scale (14). The standard cut-off scores were as follows: minimal depression (0–9), mild depression (10–18), moderate depression (19–29), severe depression (30–63). Previous studies proved the validity and reliability of the Persian version (15). Beck Anxiety Inventory (BAI) questionnaire determines the severity of anxiety in youths and adults. It contains 21 questions scored from zero to 3 on Likert scale and measures the common signs of anxiety (somatic, subjective, mental and fear). The total score ranged from zero to 63 (16). Higher total scores indicate more severe anxiety symptoms. The cutoffs and anxiety levels were as follows: mild anxiety (0-15), moderate anxiety (16-25), and severe anxiety (26-63). Validity and reliability of the scale have been assessed in

the Iranian population and proved to be trustworthy (17). Descriptive analysis was used to describe the mother and child characteristics and the mean scores for depression and anxiety among mothers. To examine and determine the relationship between maternal depression and anxiety with childhood feeding problems, and to take into account the confounding effect, bivariate (Chi-square) and multivariate analyses (logistic regression) were employed. The significance level of p value was considered to be 0.05.

Ethical Considerations

The protocol of this study was reviewed and approved by Tehran Medical University Ethical Committee (Ethics code: IR.TUMS.VCR.REC.1396.2800).

Informed written consent was obtained from all participants and participants' autonomy and confidentiality concerns were explained and addressed by researchers.

3. Results

In this study, a random sample of 320 children aged 6-36 months old and their mothers were recruited. The mothers, the majority of whom (97.2%) were housewives, aged 17 to 44 years old. Almost half of the mothers had a diploma degree and the mean BMI score for them was 26.05 (*SD*: 4.30) (Table 1).

Table 1. Demographic characteristics of mothers, mean (SD) and frequency (%)

Age, mean (SD) year	29.76 (5.4)
Depression score, mean (SD)	15.97 (12.08)
Anxiety score, mean (SD)	14.26 (11.87)
BMI, mean (SD)	26.05 (4.30)
Occupation, n(%)	
Housewife	311 (97.2)
Employed	9 (2.8)
SES [†] , n(%)	
<1 million Toman	71 (22.2)
1 to 2 Million Toman	221 (69.1)
>2 million Toman	27 (8.4)
Education, n(%)	
Illiterate	5 (1.6)
Under diploma	81 (25.3)
Diploma	163 (50.9)
University education	71 (22.2)

[†]SES: socioeconomic status

Half of the children (160) were male. The minimum and maximum of children's weight (kg) were 11.55-25.00 (mean:11.55) with the mean percentile of 66.90. The

children's BMI ranged from 16.65 to 42.46 (mean: 26.05) (Table 2). An estimated 23.8 % of children were suffering from eating disorders.

Table 2. Demographic characteristics of children aged 6-36 months, mean (SD) and frequency (%)

	Mean (SD)
Age (month)	19.92 (9.16)
Weight (kg)	11.55 (2.65)
Weight Percentile	66.90(29.48)
Gender (%)	
Male	160 (50%)
Female	160 (50%)

Table 3. The relationship between mother's characteristics, depression, and anxiety level with children eating disorders

	OR (95%CI)	P-value
Age (mother)	0.98 (0.93 to 1.03)	0.49
Gender	0.75 (0.45 to 1.27)	0.29
Depression grade		
Minor	Ref	
Mild	1.84 (0.80 to 4.22)	0.14
Moderate	2.43 (1.14 to 5.17)	0.02*
Severe	5.67 (2.89 to 11.11)	<0.001*
Anxiety grade		
Minor	Ref	
Moderate	2.09 (1.11 to 3.92)	0.02*
Severe	2.12 (0.85 to 2.29)	0.10
BMI	0.93 (0.87 to 0.99)	0.02*
Parity (continuous)	0.68 (0.45 to 1.04)	0.07
Employed	0.39 (0.04 to 3.19)	0.38
Education	1.02 (0.72 to 1.45)	0.89

Table 3 illustrates the association between mother's characteristics, depression, and anxiety level with children eating disorder. As is shown in the table, the mother's BMI ($OR = 0.93$; $CI (95\%) = 0.87$ to 0.993) was associated with child's eating disorder. The mean mothers' depression and anxiety scores were 15.97 ($SD = 12.08$) and 14.26 ($SD = 11.87$), respectively.

There was a significant association between the mother's severe depression and child's eating disorder [$OR = 5.7$; $CI (95\%) = 2.92$ - 11.43]. Although this association

attenuated for the moderate level of depression in mothers, it was still statistically significant [$OR = 2.25$; $CI (95\%) = 1.05$ - 4.8]. On the other hand, at the mild and minimal levels of depression, there was no significant association between eating disorders in child and depression in mother (p -value>0.05). In terms of the mother's anxiety impact on child's eating disorder, there was only a significant association between the moderate level of anxiety in mother and child's eating disorder [$OR = 2.17$; $CI (95\%) = 1.15$ - 4.10] (Table 4, 5).

Table 4. Odds ratio and confidence interval (95%) for the association between maternal depression and children eating disorder

	OR (95% CI) [†]	P-value
Depression		
Minimal	Reference	
Mild	1.65 (0.71-3.83)	0.241
Moderate	2.25 (1.05-4.83)	0.036*
Severe	5.77 (2.92-11.43)	<0.001*

[†]Odds ratio adjusted for age mother, mother's BMI, gender of children, SES, mother occupation, education, and parity

Table 5. Odds ratio and confidence interval (95%) for the association between maternal anxiety and children eating disorder

	OR (95% CI) †	P-value
Anxiety		
Mild	Reference	
Moderate	2.17 (1.15-4.10)	0.01*
Severe	2.05 (0.81-5.18)	0.12

†Odds ratio adjusted for age mother, mother's BMI, gender of children, SES, mother occupation, education, and parity

4. Discussion

To the best of the knowledge of researchers, in Iran, this is the first study in which the impacts of maternal depression and anxiety on children feeding disorders were evaluated. 320 mothers and their children aged 3-36 months were assessed. It appeared that the children of mothers with higher levels of depression experienced more eating disorders during their childhood. Furthermore, middle maternal anxiety level was associated with more feeding abnormalities in children. Unexpectedly, this association disappeared at the high level of anxiety.

The family environment was found to be among the causative factors of obesity. In an observational study; maternal psychological disorders, family practice during emotional situation, and coping skills were compared between the families of two groups of obese and normal-weight children. Higher rates of anxiety, depression, overprotection, and failure to cope were observed in the mothers of obese group (18). In a case-control study, the results showed less happiness, positive energy, and flexibility in family of anorectic children (anorexia is defined as food refusal for at least a month in a child who has no interest in eating) (19). A number of studies have shown that the parents' psychological behavioral disorders, such as anxiety, depression, bipolar and personality disorders, and eating disorders

could affect the children feeding habits negatively, and increase the risk of developing early-life nutritional disorders in offspring (12, 20, 21).

A study in Netherland assessed the impact of parental anxiety and nutritional problems on the nutritional problems of 3-year-old children using the Brief Symptoms Inventory and Childhood Eating Behavior questionnaires. The results showed significant association only between the children nutritional problems and maternal anxiety, and not of the fathers (22). Another study in Australia assessed the relationship between family and maternal factors and incidence of nutritional problems in children aged 8-13 years old. The study evaluated the children and their mothers at the beginning, first- and second-year of the study. After adjusting for confounding factors, the maternal anxiety about her child weight, levels of family stress, and maternal education were the significant predictors of children nutritional problems (23). Similar studies showed that maternal psychological disorders particularly depression and anxiety could affect the eating habits and practices in children and the genetic is not the dominant factor in eating disorders, anymore (18, 24, 25).

Although, consistent with previous literature, we found that the higher level of depression is associated with higher eating disorders in children, the association between children eating disorder and

maternal anxiety was found only significant at the middle level of anxiety. This was against the findings of previous studies and our expectation; current literatures showed that the higher level of anxiety causes more feeding problems in offspring (20, 21). We believed that there might be some unpredicted confounding effects in our analysis that attenuate the impact of high maternal anxiety on child's eating disorders.

The findings of current study suggested the immense impact of maternal depression and anxiety on child's eating disorders. Therefore, it is recommended to develop and implement screening programs to identify and address the mental illness of mothers at early stages to prevent from future eating disorder in offspring.

Limitation

There were some pitfalls in the present study. First, the chronicity and time of the mother's mental illness onset could not be precisely estimated. The studies showed that the onset of mother's mental illness in the first year of child's life represents a sensitive period for incidence of child's eating disorder (26). Second, the mother's eating behaviors have been shown to influence the child's eating habits (27), which was not considered in our study; however, we adjusted for the mother's body mass index (BMI), which is an indicator of eating habits and disorders in mother (27).

Acknowledgments

The authors thank the staff in Ziaieian Hospital for their help.

Conflicts of Interest

The authors have no conflict of interest.

References

1. Arikpo D, Edet E, Chibuzor M, Odey F, Caldwell D. Educational interventions for improving primary caregiver

complementary feeding practices for children aged 24 months and under. The Cochrane Database of Systematic Reviews. 2018.

2. Lewinsohn P, Holm- Denoma J, Gau J, Joiner T, Striegel- Moore R, Bear P, et al. Problematic eating and feeding behaviors of 36- month- old children. *International Journal of Eating Disorders*. 2005;38(3):208-19.
3. Sanders M, Patel R, Le Grice B, Shepherd R. Children with persistent feeding difficulties: an observational analysis of the feeding interactions of problem and non-problem eaters. *Health Psychology*. 1993;12(1):64.
4. Dovey T, Staples P, Gibson E, Halford J. Food neophobia and 'picky/fussy' eating in children: a review. *Appetite*. 2008;50(2):181-93.
5. Northstone K, Emmett P. The associations between feeding difficulties and behaviours and dietary patterns at 2 years of age: the ALSPAC cohort. *Maternal & child nutrition*. 2013;9(4):533-42.
6. Chan L, Magarey A, Daniels L. Maternal feeding practices and feeding behaviors of Australian children aged 12–36 months. *Maternal and child health journal*. 2011;15(8):1363-71.
7. Walker S, Wachs T, Gardner J, Lozoff B, Wasserman G, Pollitt E, et al. Child development: risk factors for adverse outcomes in developing countries. *The lancet*. 2007;369(9556):145-57.
8. Baird J, Fisher D, Lucas P, Kleijnen J, Roberts H, Law C. Being big or growing fast: systematic review of size and growth in infancy and later obesity. *Bmj*. 2005;331(7522):929.
9. Rahman A, Iqbal Z, Bunn J, Lovel H, Harrington R. Maternal depression and child severe acute malnutrition: a case-control study from Kenya. *BMC Pediatrics*. 2018;3(18):289.
10. Hope S, Micali N, Deighton J, Law C. Maternal mental health at 5 years and childhood overweight or obesity at 11 years: evidence from the UK Millennium Cohort Study. *International Journal Obesity*. 2019;43(1):43-52.
11. Jani Mehta R, Mallan K, Mihrshahi S, Mandalika S, Daniels L. An exploratory study of associations between Australian-Indian mothers' use of controlling feeding

- practices, concerns and perceptions of children's weight and children's picky eating. *Nutrition & Dietetics*. 2014;71(1):28-34.
12. Golik T, Avni H, Nehama H, Greenfeld M, Sivan Y, Tauman R. Maternal cognitions and depression in childhood behavioral insomnia and feeding disturbances. *Sleep medicine*. 2013;14(3):261-5.
 13. Beck A, Ward C, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Archives of general psychiatry*. 1961;4:561-71.
 14. Dozois D, Dobson K, Ahnberg J. A psychometric evaluation of the Beck Depression Inventory-II. *Psychological assessment*. 1998;10(2):83.
 15. Ghassemzadeh H, Mojtabei R, Karamghadiri N, Ebrahimkhani N. Psychometric properties of a Persian-language version of the Beck Depression Inventory- Second edition: BDI- II-PERSIAN. *Depression and anxiety*. 2005;21(4):185-92.
 16. Beck A, Epstein N, Brown G, Steer R. An inventory for measuring clinical anxiety: psychometric properties. *Journal of consulting and clinical psychology*. 1988;56(6):893.
 17. Kaviani H, Mousavi A. Psychometric properties of the Persian version of Beck Anxiety Inventory (BAI). *Tehran University Medical Journal TUMS Publications*. 2008;66(2):136-40.
 18. Blanco M, Sepulveda A, Lacruz T, Parks M, Real B, Martin- Peinador Y, et al. Examining Maternal Psychopathology, Family Functioning and Coping Skills in Childhood Obesity: A Case-Control Study. *European Eating Disorders Review*. 2017;25(5):359-65.
 19. Lucarelli L, Ammaniti M, Porreca A, Simonelli A. Infantile anorexia and co-parenting: a pilot study on mother-father-child triadic interactions during feeding and play. *Frontiers in psychology*. 2017;8:376.
 20. Bould H, Sovio U, Koupil I, Dalman C, Micali N, Lewis G, et al. Do eating disorders in parents predict eating disorders in children? Evidence from a Swedish cohort. *Acta Psychiatrica Scandinavica*. 2015;132(1):51-9.
 21. Bould H, Koupil I, Dalman C, DeStavola B, Lewis G, Magnusson C. Parental mental illness and eating disorders in offspring. *International Journal of Eating Disorders*. 2015;48(4):383-91.
 22. De Barse L, ardonna Cano S, Jansen P, addoe V, Verhulst F, Franco O, et al. Are parents' anxiety and depression related to child fussy eating? . *Archives of disease in childhood*. 2016;10(6):53-538.
 23. Allen K, Gibson L, McLean N, Davis E, Byrne S. Maternal and family factors and child eating pathology: risk and protective relationships. *Journal of Eating Disorders*. 2014;2(11).
 24. Petzoldt J, Wittchen H, Einsle F, Martini J. Maternal anxiety versus depressive disorders: specific relations to infants' crying, feeding and sleeping problems. *Child: Care, Health and Development*. 2016;42(2):231-45.
 25. Martini J, Petzoldt J, Knappe S, Garthus-Niegel S, Asselmann E, Wittchen H. Infant, maternal, and familial predictors and correlates of regulatory problems in early infancy: The differential role of infant temperament and maternal anxiety and depression. *Early Human Development*. 2017:23-31.
 26. Takács L, Smolík F, Putnam S. Assessing longitudinal pathways between maternal depressive symptoms, parenting self-esteem and infant temperament. *PLoS One*. 2019;18(8):699-707.
 27. Watson H, O'Brien A, Sadeh-Sharvit S. Children of parents with eating disorders. *Current Psychiatry Reports*. 2018; 20(11): 101.