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Investigating the relationship between maternal mental health and the rate of anxiety disorders in asthmatic children

Firouzeh Derakhshanpoor¹; Nima Faraji²; *Arash Askari³

¹Associate professor of child and adolescent psychiatry, Golestan Research Center of Psychiatry, Golestan University of Medical Sciences, Gorgan, Iran.

²Physician, Golestan University of Medical Sciences, Gorgan, Iran.

³Assistant professor of psychiatry, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

Abstract

Introduction: Asthma is a chronic inflammatory disease and can put children at risk of psychiatric disorders such as anxiety and depression. Moreover, maternal depression has a significant influence on children's health and well-being. This study aimed to investigate the effect of maternal mental health on the rate of anxiety disorders in children with asthma.

Materials and Methods: In a cross-sectional study, 163 dyads of asthmatic children, and their mothers referred to the Asthma and Allergy Clinic of the Taleghani Hospital in Gorgan in 2021, were enrolled. The Spence questionnaire was used to assess the degree of anxiety disorders in children. The mothers completed General Health Questionnaire-28. Data were analyzed using SPSS software version 26.

Results: Physical symptoms, anxiety and insomnia, and social dysfunction were diagnosed in 86 (52.8%), 79 (48.5%), and 90 (55.2%) mothers, respectively. In term of depression, 90 mothers (73%) had no depression. Anxiety disorders and obsession were observed in 95 (58.3%) and 70 (42.9%) children, respectively. However, 135 children (82.8%) indicated no social phobia. The frequency distribution of asthma severity was significantly different in anxiety symptoms, mental health, and maternal depression. However, there was no significant difference in gender and age group in children ($P > 0.05$). The frequency distribution of maternal mental health was significantly different from the rate of a childhood anxiety disorder ($P < 0.001$).

Conclusion: The rate of anxiety disorders in children with asthma and mental disorders in their mothers was high. Findings indicated that maternal mental health could affect the rate of anxiety disorders in children with asthma.

Keywords: Anxiety disorders, Asthma, Mental health

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*Corresponding Author:

Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
askarina@mums.ac.ir

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Introduction

Asthma is a heterogeneous disease characterized by chronic airways inflammation and respiratory manifestations of cough, wheezing, shortness of breath, and chest tightness. Asthma is one of the most common chronic lung disorders in children, which has a diverse prevalence in different countries, from 1 to 18% (1-3).

Factors that aggravate asthma symptoms include exercise, exposure to allergens and irritants, climate change, stress, mental excitement, and viral respiratory infections (1). This disease, which affects children of all ages, hurts their quality of life and academic performance (4). In addition, there is some evidence indicating that children with asthma are at risk for psychiatric disorders such as anxiety and depression (5).

The prevalence of anxiety disorders in asthmatic children is three times bigger than that of the healthy group.

Asthmatic children with anxiety disorder experience increased asthma symptoms, decreased physical and emotional function, more needing for health services, and a higher risk of smoking as a teenager than asthmatic children without anxiety disorder (6,7). Also, anxiety and depression are common in parents of asthmatic children (8).

The chronic nature of pediatric asthma may cause to hospitalize children several times. Furthermore, the unclear prognosis and quality of life, lack of awareness about the origin of disease and medical treatment procedures, economic burden, and experiences of child's pain during illness cause anxiety and depression in their parents. On the other hand, emotional problems such as depression or anxiety in parents are associated with asthma outcomes in children (9-11).

Based on the evidence, the depression and anxiety in mothers with asthmatic children impact mother-child relationships and increase the emergency department visits due to disease exacerbation (12).

Various studies have been conducted on the quality of life of asthmatic children and their mothers. However, the effect of maternal mental health on asthmatic children's anxiety disorders has not been studied. Therefore, this study aimed

to investigate the impact of maternal mental health on anxiety disorders in children with asthma.

Materials and Methods

In this cross-sectional study, the statistical community consisted of all children with a net diagnosis of asthma, and their mothers were referred to the Asthma and Allergy Clinic of the Taleghani Hospital in Gorgan city in 2021. Based on Deraz et al. study (13) and the formula, the sample size estimated 151 dyads of children and their mothers. Due to the drop rate, we selected 163 dyads through the convenient sampling method.

Inclusion criteria included net asthma diagnosis by pediatric asthma and allergy specialist, at least three months after the onset of pediatric asthma, aged 6 to 15 years, and the mother's ability to answer the questionnaire correctly. Exclusion criteria included children with disabilities, chronic illnesses other than asthma and other psychiatric disorders other than anxiety disorders, those with severe events such as the death of first-degree relatives over the past year, and unwillingness to participate were excluded from the study.

The study was conducted after obtaining permission from the Ethics Committee of Gorgan University of Medical Sciences, and all participants signed a written consent form.

Research instruments

A) *The Spence Children's Anxiety Scale*: It has been designed to measure anxiety in children based on the DSM-IV. The initial form of the scale in Australia in 1997 and 1998 was proven in two major national studies (14).

The syndrome factors are separation anxiety, social phobia, obsessive-compulsive disorder, asymmetry-market phobia, generalized anxiety disorder, and fear of bodily harm. This scale contains 38 questions to reflect the symptoms. Six questions are positive, and the negative answers are designed to reduce bias. There are no these questions in the parent version of the Spence Questionnaire.

This questionnaire was standardized by Mousavi et al. on 450 male and female students, and its validity was confirmed, and its reliability was reported to be 0.89 (15). In each question,

option a (never) has zero points, option b (sometimes) one point, option c (often) two points, option d (always) three points. The minimum score is 0, and the maximum is 114. The information obtained from the questionnaire in each subgroup of anxiety disorders is placed in four tables related to the sex and age of the child.

These four tables are for girls 7 to 9 years old, girls 10 to 13 years old, boys 7 to 9 years old, and boys 10 to 13 years old. Then, the total score of the questionnaire and each subgroup of anxiety disorders are placed in the table, and their severity is evaluated.

B) General Health Questionnaire-28 (GHQ-28): It is a 28-item Mental Health Scale Questionnaire (GHQ-28). The first part of the questionnaire includes demographic information, and the second part includes questions about mental health, which were first designed by Goldberg and Hiller (1972), and its reliability was confirmed by Taghavi (16) and Nazifi (17). The scale consists of 4 subtests, each of which has seven questions.

Questions 1 to 7 are related to the physical symptoms subtest, questions 8 to 14 are related to the anxiety and insomnia subtest, questions 15 to 21 are related to the social dysfunction subtest, and questions 22 to 28 are related to the depression subtest. The correlation coefficient of the two tests was 55, and the correlation coefficients between the subtests of this questionnaire with a total score were between 0.72 and 0.87, which indicates its high validity. Also, this test has high reliability, and the calculated alpha value for all items is 0.9. All items of the Mental Health Questionnaire have four options, and there are two types of scoring methods for these options.

One is the traditional method, where the items are scored as (0-0-1-1), and the maximum score of the person will be 28. Another scoring method is the Likert method, in which the options are scored as (0-1-2-3), and the maximum score will be 84. The Likert method is usually used in most studies, including this one. A score higher than or equal to 24 or a score higher than 6 in each of the subtests indicates a lack of mental health.

The data of this study were analyzed in SPSS software version 26. Descriptive results were reported using central indices and dispersion

(mean, standard deviation, number, and percentage). A one-way analysis of variance (ANOVA) independent t-test was used to compare the means of quantitative variables. The Chi-square test or Fisher's exact test compared qualitative variables. Spearman test was used to examine the relationship between variables. The significance level was considered 0.05 for all tests.

Results

The study population characteristics have been summarized in Table 1. 163 mothers and 163 children were included in the study. The mean age of mothers was 35.33 ± 5.34 years (mean age= 35, between 23 and 48 years).

Sixty-six mothers (30.5%) had an academic degree, and 58 mothers (36.5%) were employed. In addition, 86 mothers (47.2%) represented mental health; however, physical disorders, anxiety, and depression were identified in 77, 84, and 43 mothers.

Most children (43.6%) were in the age group of 6-8 years, and 68 (41.7%) and 93 (58.1%) children had different levels of anxiety disorders and obsessive-compulsive disorder, respectively. Also, 135 children (82.8%) represented no social phobia. Agoraphobia panic, separation anxiety, fear of physical harm, and generalized anxiety were observed in 68, 65, 87, and 72 children (Table 1).

The frequency distribution of the severity of maternal mental health disorders was significantly different according to the level of education ($P < 0.05$). However, the frequency distribution of the severity of maternal health disorders did not significantly differ between maternal employment statuses ($P > 0.05$) (Table 2).

Table 1. The characteristics of the study population

Characteristics		Number (%)	
Mothers	Age (Year)	<30	20 (12.3)
		30-35	55 (33.7)
		35-40	51 (31.3)
		≥40	37 (22.7)
	Education	Under diploma	26 (16.0)
		Diploma	71 (43.5)
		Higher degree	66 (30.5)
	Occupation	Employed	58 (35.6)
		Unemployed	105 (64.4)
	Severity of health disorder	None	77 (47.2)
		Slight	65 (39.9)
		Intermediate and severe	21 (12.9)
	Physical symptoms	None	86 (52.8)
		Slight	48 (29.4)
		Intermediate	18 (11.0)
		Severe	11 (6.7)
	Anxiety and insomnia	None	79 (48.5)
		Slight	52 (31.9)
Intermediate		25 (15.3)	
Severe		7 (4.3)	
Social performance	None	90 (55.2)	
	Slight	64 (39.3)	
	Intermediate	9 (5.5)	
Depression	None	120 (73.6)	
	Slight	31 (19.0)	
	Intermediate	6 (3.7)	
	Severe	6 (3.7)	
Children	Age (Year)	6-8	71 (43.6)
		8-10	28 (17.2)
		10-12	40 (24.5)
		12-15	24 (14.7)
	Anxiety disorders	None	95 (58.3)
		Slight	37 (22.7)
		Intermediate	14 (8.6)
		Severe	17 (10.4)
	Obsession	None	70 (42.9)
		Slight	46 (28.2)
		Intermediate	32 (19.6)
	Social phobia	Severe	15 (9.2)
		None	135 (82.8)
		Slight	21 (12.9)
	Agoraphobia panic	Intermediate	4 (2.5)
		Severe	3 (1.8)
		None	95 (58.3)
		Slight	39 (23.9)
	Separation anxiety	Intermediate	13 (8.0)
		Severe	16 (9.8)
None		98 (60.1)	
Slight		15 (9.2)	
Fear of physical harm	Intermediate	28 (17.2)	
	Severe	22 (13.5)	
	None	76 (46.6)	
	Slight	36 (22.1)	
Disseminated anxiety	Intermediate	31 (19.0)	
	Severe	20 (12.3)	
	None	91 (55.8)	
	Slight	35 (21.5)	
	Intermediate	24 (14.7)	
	Severe	13 (8.0)	

The frequency distribution of the severity of maternal mental health disorders was significantly different according to the level of education ($P < 0.05$).

However, the frequency distribution of the severity of maternal health disorders did not significantly differ between maternal employment statuses ($P > 0.05$) (Table 2).

Table 2. The distribution of the severity of maternal health disorders in terms of education and occupation

Characteristics		Severity of health disorder (No %)			P
		None	Slight	Intermediate and severe	
Education	Under diploma	6 (23.1)	16 (61.5)	4 (15.4)	0.008
	Diploma	44 (62)	20 (28.2)	7 (9.1)	
	Higher degree	27 (40.9)	29 (43.9)	10 (15.2)	
Occupation	Employed	30 (51.7)	24 (41.4)	4 (6.9)	0.230
	Unemployed	47 (44.8)	41 (39)	17 (16.2)	

There was a direct relationship between the total score of the general health questionnaire with physical symptoms, depression, anxiety, and social dysfunction ($P < 0.05$). Also, there was a direct correlation between anxiety, social dysfunction, physical symptoms, and depression. A significant correlation was also found between social dysfunction and physical symptoms—moreover, depression correlated with physical symptoms and social dysfunction ($P < 0.05$). However, there was no significant relationship between age and the total health score ($P > 0.05$).

There was no significant relationship between maternal age and child age with the Spence Pearson questionnaire ($P > 0.05$).

A positive and significant relationship was identified between the total score of the GHQ-28 questionnaire and the Spence Pearson questionnaire ($P < 0.05$) as the higher overall score of the GHQ-28 questionnaire (maternal mental health disorder increases) was related to the higher total score of Spence questionnaire (the child's anxiety disorder increases) (Table 3).

Table 3. The correlation between GHQ-28 and maternal parameters and the Spence Pearson questionnaire

Parameters	Spearman correlation coefficient	P
Total GHQ-28 score and maternal physical symptoms	0.780	0.001
Total GHQ-28 score and maternal depression	0.731	0.001
Total GHQ-28 score and maternal age	0.033	0.675
Total GHQ-28 score and maternal anxiety	0.869	0.001
Total GHQ-28 score and maternal social dysfunction	-0.687	0.001
Physical symptoms and maternal anxiety	0.601	0.001
Maternal depression and maternal anxiety	0.550	0.001
Maternal depression and maternal physical symptoms	-0.367	0.001
Maternal depression and maternal social dysfunction	0.464	0.001
Maternal social dysfunction and maternal physical symptoms	-0.361	0.001
Maternal social dysfunction and maternal anxiety	0.549	0.001
Total score of GHQ-28 questionnaire and Spence Pearson questionnaire	0.295	0.001
Spence Pearson questionnaire score and maternal age	-0.055	0.485
Spence Pearson questionnaire score and child age	-0.008	0.920

There was no significant difference in the frequency distribution of asthma severity according to gender and age group ($P > 0.05$). However, a significant difference was observed in the distribution of asthma severity in terms of

anxiety symptoms ($P < 0.05$). Also, the severity of pediatric asthma was significantly associated with the rate of maternal depression and the severity of their mental health disorders ($P < 0.05$) (Table 4).

Table 4. The severity of pediatric asthma, child's anxiety symptoms, and maternal mental health

Characteristics		The severity of asthma (No %)			P
		Slight	Intermediate	Severe	
Sex	Male	41 (53.2)	28 (36.4)	8 (10.4)	0.439
	Female	54 (62.8)	26 (30.2)	6 (7.0)	
Age	6-10	51 (53.7)	37 (37.7)	10 (10.3)	0.137
	10-14	44 (67.6)	17 (26.1)	4 (6.1)	
The severity of the child's anxiety symptoms	None	63 (66.3)	28 (29.5)	4 (4.2)	0.015
	Slight	18 (48.6)	13 (35.1)	6 (16.2)	
	Intermediate	9 (64.3)	5 (35.7)	0 (0.0)	
	Severe	5 (29.4)	8 (47.1)	4 (23.5)	
The severity of maternal depression	None	90 (75.0)	29 (24.2)	1 (0.8)	0.001
	Slight	3 (9.7)	20 (64.5)	8 (25.8)	
	Intermediate	2 (33.3)	3 (50.0)	1 (16.7)	
	Severe	0 (0.0)	2 (33.3)	4 (66.7)	
Severity of maternal mental disorder	None	56 (72.7)	19 (24.7)	2 (2.6)	0.001
	Slight	37 (56.9)	25 (38.5)	3 (4.6)	
	Intermediate	2 (11.7)	8 (47.1)	7 (41.2)	
	Severe	0 (0.0)	2 (50.0)	2 (50.0)	

No significant difference was identified in the distribution of children's anxiety severity according to their age and gender and the mother's employment ($P > 0.05$). However, the distribution of anxiety disorders in children was significantly different between the mother's education, as the higher level of education was associated with the lower level of children's anxiety ($P < 0.05$). The frequency of children with anxiety disorders was also associated significantly with the mothers' age. The older the

mother had more anxious children ($P < 0.05$). Also, the distribution of maternal mental health was significantly associated with the rate of childhood anxiety disorder.

The maternal mental disorder was directly related to the rate of anxiety disorders in their children ($P < 0.05$). The distribution of the severity of anxiety disorders in the child was also significantly associated with the severity of insomnia and anxiety in the mother ($P < 0.05$) (Table 5).

Table 5. The distribution of the severity of anxiety disorders

Characteristics			Severity of anxiety				P
			None	Slight	Intermediate	Severe	
Children	Age (Year)	6-10	58 (59.2)	19 (19.4)	8 (8.2)	13 (13.3)	0.366
		10-14	37 (56.9)	18 (27.7)	6 (9.2)	4 (6.2)	
	Sex	Male	44 (57.1)	22 (28.6)	6 (7.8)	5 (6.5)	0.210
		Female	51 (59.3)	15 (17.4)	8 (9.3)	12 (14.0)	
Mothers	Education	Under diploma	6 (23.1)	8 (30.8)	4 (15.4)	8 (30.8)	0.001
		diploma	43 (60.6)	15 (21.1)	6 (8.5)	7 (9.9)	
		Academic degree	46 (69.7)	14 (21.2)	4 (6.1)	2 (3.0)	
	Occupation	Employed	38 (65.5)	10 (17.2)	4 (6.9)	6 (10.3)	0.514
		Unemployed	57 (54.3)	27 (25.7)	10 (9.5)	11 (10.5)	
	Age (Year)	<30	10 (50.0)	9 (45.0)	0 (0.0)	1 (5.0)	0.020
		30-35	31 (56.4)	11 (20.0)	3 (5.5)	10 (18.2)	
		35-40	31 (60.8)	7 (13.7)	9 (17.7)	4 (7.8)	
		≥40	23 (62.2)	10 (27.0)	2 (5.4)	2 (5.4)	0.070
		<35	41 (54.7)	20 (26.7)	3 (4.0)	11 (14.7)	
		≥35	54 (61.4)	17 (19.3)	11 (12.5)	6 (6.8)	
	Mental health	Healthy	39 (45.3)	26 (30.2)	8 (9.3)	13 (15.1)	0.003
		No healthy	56 (72.7)	11 (14.3)	6 (7.8)	4 (5.2)	
	Severity of anxiety		61 (77.3)	10 (12.7)	5 (6.3)	3 (3.7)	0.001

Discussion

The present study indicated that the severity distribution of maternal mental health disorder was significantly associated with the level of education but not with the employment status. In line with this finding, it had been shown that mothers with lower education levels have insufficient and incorrect information about the diseases and necessary care of their children. Therefore, they experience more anxiety, worry, and psychological distress, which lead to maternal mental health disorders (18).

There is some evidence indicating a lack of focus on improving life and the children's disorders by parents, especially mothers. Consequently, they may confront various physical and psychological complaints, especially mental disorders (19).

In a study conducted by Birgül Batmaz et al. in 2021, 168 children aged 8-18 years with diagnosed allergic diseases and 61 healthy children participated. The children fulfilled pediatric quality of life, trait anxiety inventory for children, and depression inventory, while their mothers fulfilled the General Anxiety Disorder-7 (GAD-7) scale and the Patient Health Questionnaire-9 (PHQ-9). The results indicated that children with allergic diseases had lower quality of life. Remarkably, the quality of life in these children is not associated with the severity of disease but is associated with depression and anxiety in these patients and their mothers' depression (20). These findings are consistent with the present study, which suggests the significant relationships between maternal mental health and severity of asthma as an allergic disease and children's anxiety, although we did not compare healthy children as the control group.

We identified no significant difference in the distribution of asthma severity by sex. However, severe asthma was associated with the highest anxiety symptoms. Previously, it has been reported that the rate of anxiety disorders in asthmatic children was 39%, which was very close to the present study (41.7%). Moreover, consistent with our results, a significant association was seen between anxiety and asthma severity (13).

In another study, Costa et al. evaluated 189 dyads of children with asthma and their mothers

to investigate the association between uncontrolled asthma in children and maternal common mental disorder, social support, and stressful events. The findings indicated a positive association between uncontrolled asthma and mental disorders in mothers. Also, poor social support and stressful events in mothers can negatively impact controlling asthma and moderate the relationship between a child's asthma and maternal mental disorder (21). These results support our findings.

In a study by Ghaempanah et al. in 2013, they assessed 80 mothers with asthmatic children aged 7-12 years. The mothers completed the General Health Questionnaire (GHQ-28). The findings revealed that the depression scores in mothers were higher significantly than cut-off points in the community, but the GHQ scores were not associated with three levels of asthma control (well controlled, partly controlled, and uncontrolled) in children (22). These findings support the present findings regarding maternal depression, but they were inconsistent in terms of the severity of asthma and maternal mental health.

Another study conducted on 208 asthmatic children and their caregivers in Spain during 2010-2016 concluded that depression, anxiety, psychological disorders, and poor quality of life were more common in caregivers, which increased the risk of uncontrolled asthma in children significantly (23).

The present study had limitations such as limited geographical area and lack of assessment type of occupation and socio-economical status of mothers. Therefore, it is recommended that future studies be conducted in the case-control design and different geographical areas.

Conclusion

The present study indicated that the rates of anxiety disorders in asthmatic children and maternal mental disorders are high, which is recommended to prevent and control these cases. Furthermore, parents and children with chronic illnesses should be educated and provided with mental health care. Therefore, not only asthmatic children experience a better quality of life, but their anxiety does not exacerbate their asthma symptoms, and consequently, financial resources do not waste.

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