

Quality of life in pediatric with asthma during the COVID-19 pandemic: Moderating role of coronavirus-related anxiety in children and mothers

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ABSTRACT

Coronavirus SARS-CoV-2 disease (COVID-19) has affected the quality of life of children and parents. Furthermore, the mental health of children with asthma and their care givers may be affected by the anxious conditions of the coronavirus. In this study, the moderating role of coronavirus anxiety in the associations between psychiatric symptoms and quality of life (QL) in children with asthma was investigated. The present study is a cross-sectional study. The sample includes 118 children (53% boys) aged 7 to 14 years with asthma and their mothers (n =118). Also, 56% of the samples had mild asthma, 38% moderate, and 24% severe asthma. The results showed that after adjusting for the role of severity and control of asthma, child and mother psychiatric symptoms predicted 17% ($\Delta R^2=.17$) of the variance in QL in children. Coronavirus anxiety in children and mothers as moderating variable explained 15% of the variance QL in children with asthma. Overall, psychiatric symptoms and coronavirus anxiety in mothers and children predicted 27% of the poor QL in children with asthma. In this study, a high correlation was observed between maternal psychiatric symptoms and child psychiatric symptoms. Psychiatric symptoms and coronavirus anxiety in mothers and children play a significant role in the QL of children, especially during the coronavirus pandemic. Therefore, paying more attention to these symptoms can help improve the QL of children with asthma. Also, investigating the long-term effects of these symptoms can be of interest to researchers.

Keywords: Quality of Life; COVID-19; Pediatric Asthma; Depression; Anxiety

1. INTRODUCTION

Asthma is a common chronic respiratory disease in children that can be particularly affected by conditions caused by the COVID-19 pandemic (Oreskovic et al., 2020). Some studies have reported asthma as a potential risk



factor for developing COVID-19 (Castro-Rodriguez and Forno, 2020), while others have reported a lower risk of developing COVID-19 in asthmatic patients (Green et al., 2021). Nevertheless, limited reports are available and accurate information on the danger of mortality from coronavirus in children with asthma is not yet available (Abrams and Szeffler, 2020; Castro-Rodriguez and Forno, 2020). Lifestyle changes and stress caused by the COVID-19 pandemic (Extensive closure of schools and some businesses, social distance, economic effects on families, news of the mortality rate, and severe decline in social activities) have had negative effects on the mental health and well-being of children and their families (de Figueiredo et al., 2021; Patrick et al., 2020). Furthermore, in these conditions, decreased physical function, weight gain, changes in the functioning of the treatment system, and access to the treatment system can have significant effects on the lives of children with asthma and their families (Clawson et al., 2021; Oreskovic et al., 2020; Kramarov et al. 2021). The results of a study showed that patients with asthma at quarantine significantly reported uncontrolled asthma and symptoms of anxiety and depression (Sheha et al., 2021). In another study, mothers of pediatrics with food allergies reported more anxiety and a lower QL compared with controls (Protudjer et al., 2021). Studies on the specific effects of coronavirus-related anxiety in children and mothers on QL are very limited.

Children with asthma are at greater risk for behavioral problems, which requires further psychological assessments (Montalbano et al., 2020). A meta-analysis showed that the prevalence of anxiety in youth people with asthma was three times more than in healthy peers (Dudeney et al., 2017). The combination of anxiety and depression symptoms seems to be more common in children with asthma than anxiety or depression alone (Saragondlu Lakshminarasappa et al., 2021). In a recent study, symptoms of anxiety and depression indicated 37% of the variance of outcomes of asthma in children (especially asthma control and health-related QL) (Kulikova et al., 2021). In addition, anxiety and depression in mothers of asthmatic children were more than in the healthy group, and psychological trauma of parents and children affects their quality of life (Easter et al., 2015; Vila et al., 2003). In a Structural Equation Modeling design (SEM), maternal depression was, directly and indirectly, related to the psychological disorders of asthmatic children and indirectly related to the child's physical function through negative parenting (Lim et al., 2008). In a recent study, there was a direct relationship between psychological symptoms of parents and adolescents with asthma, while there was no significant relationship in the control group (Dut et al., 2021). However, research on the relationship between maternal and child psychological symptoms and quality of life in Iran is limited.

In a systematic review study, a strong relationship was shown between asthma severity and QL in children (Everhart and Fiese, 2009). Severe and uncontrolled asthma significantly affects the QL of children (Banjari et al., 2018; Montalbano et al., 2020). In a cohort study in Iran, the severity of asthma in children was significantly associated with the impaired QL of children and their parents (Zieh et al., 2006). A review of the research literature shows that the effects of coronavirus anxiety on the QL of asthmatic children have not been studied so far. Given the chronicity of asthma in children and the effects of psychological variables on the performance of children and their families, the current study investigates the role of psychiatric symptoms and coronavirus anxiety in children and mothers on the OL of children. In this study, to evaluate the specific role of psychiatric symptoms and coronavirus anxiety on children's OL, the variable related to the severity of asthma was controlled. The principal aim of this study was to investigate the moderating role of coronavirus anxiety in the associations between psychiatric symptoms and OL in pediatrics asthma.

2. MATERIALS AND METHODS

Participants

The sample included 118 children (Boys = 53%) with asthma aged 14-17 years ($M = 10.7$, $SD = 1.8$), and 118 mothers 50-28 years old, who were referred to asthma and allergy clinics in Tehran. Also, 56% of the subjects had mild asthma, 38% moderate, and 24% severe asthma. Regarding mothers' educational level: 24% had elementary or middle school education, 45% had a diploma, 27% had an associate or bachelor's degree, and 4% had a degree above a bachelor's degree.

Procedure

The present study is a cross-sectional study. After diagnosing asthma and determining its severity following the criteria of the GINA, the Subjects were referred by asthma and allergy physician, the process and general content of the research for mother and child were explained in person. Then, the participants based on the inclusion and exclusion criteria: diagnosis of asthma by a specialist, ability to read and write (the child and mother), the age of minimum 7 and maximum 17 years for the child, and no participation in psychiatric treatment and psychotherapy were examined. Prior to the study, the mother and child read and signed the ethical consent. Finally, all participants (children and mothers) answered all the questionnaires. According to the health

protocols in the pandemic, the questionnaires were prepared as an online link and provided to the participants. The data collection was conducted from October 3, 2020, to March 19, 2021.

Measures

Pediatric Asthma Quality of Life (PAQL)

The PAQL (7-17 years old) has 23 items, which was developed by Juniper (Juniper et al., 1996). This scale measures three dimensions, including symptoms, performance, and limitations of daily activities, and provides an overall score of quality of life. The items of this measure are designed on a Likert scale from 1 to 7. In the original version of this scale, high internal reliability and validity have been reported (Juniper et al., 1996). The psychometric properties of this scale have been reported as appropriate in Iran (Zieh et al., 2006). Cronbach's alpha coefficient of this scale in this study was 0.94.

Revised Child Anxiety and Depression Scale (RCADS)

This self-report scale contains 47 items and provides an overall score for symptoms of emotional disorders (anxiety and depression) (Chorpita et al., 2005). Questions of this measure are scored on a Likert scale from 0 (never) to 3 (always). The validity of this scale has been reported acceptable in clinical and non-clinical samples (Chorpita et al., 2005). Internal consistency and validity of this scale have been reported as satisfactory in Iran (Mohammadi et al., 2019). Cronbach's alpha coefficient of this scale in this study was 0.95.

Asthma Control Test (ACT)

This 7-item scale consists of two parts: the first part (4 items) is completed by the child (4-11 years old), and the second part (3 items) is completed by the parent. A score below 19 indicates uncontrolled asthma. A score of 19 or higher means that asthma is under control. The validity and reliability of this acceptable scale have been reported (Liu et al., 2007).

Depression Anxiety Stress Scales (DASS)

This 21-item self-report scale measures the symptoms of depression, anxiety, and stress in adults. Each item on this scale is given a score from 0 to 3. The reliability and validity of this satisfactory scale have been reported (Antony et al., 1998). Cronbach's alpha coefficient of this scale in this study was 0.93.

Coronavirus Anxiety Scale (CAS)

This scale has 5 items and its items are scored from 0 (not at all) to 4 (almost every day). The cut-off score for this scale is ≥ 9 . High scores on this scale indicate coronavirus-related anxiety, dysfunction in performance, and frustration. In the original version of this scale, good validity and reliability have been reported (Lee, 2020). The Iranian version of the scale has been reported with acceptable validity and reliability (Mohammadpour et al., 2020).

Pediatric Coronavirus Anxiety Scale (PCAS)

Because no measurement tool is available to assess coronavirus-related anxiety in children, six clinical psychologists developed a 10-item scale based on existing coronavirus-related anxiety questionnaires, and 4 items finally agreed. Before administration of the questionnaire on the original sample, it was administered to 40 children and the results showed good initial validity and reliability ($\alpha = 0.78$). The items of this measure are designed on a Likert scale from 0 (never) to 5 (always). The content of the scale was as follows: 1. I get worried when I talk about the coronavirus or listen to its news. I cannot sleep when I think about or talk about the coronavirus 3. When I think about or talk about the coronavirus, I lose my interest (appetite) in eating, 4. I'm very scared of getting coronavirus. Cronbach's alpha of this scale was reported to be 0.81 in this study.

Statistical Analysis

IBM SPSS 26 software was used for analysis. Before analysis, outliers (4 items) were deleted, the normality of data was confirmed, and also multicollinearity was rejected. Data were analyzed using Cronbach's alpha, Pearson correlation, and Hierarchical Linear Regression.

3. RESULTS

According to Table 1, all research variables had a significant relationship with the QL of children with asthma. Coronavirus-related anxiety ($r = 0.68, p < 0.01$), and child psychiatric symptoms (Depression and Anxiety) ($r = 0.61, p < 0.01$), showed the highest relationship with impaired QL. Also, all research variables had a negative correlation with asthma control in children ($p < 0.01$). A high correlation between the psychiatric symptoms of the mother and the psychiatric symptoms of the child ($r = 0.78, p < 0.01$) was one of the most significant results.

Table 1 Means, Standard Deviations, Skewness, Kurtosis, and Inter-Correlations of Study Variables.

		<i>M</i>	<i>SD</i>	Skewness	Kurtosis	1	2	3	4	5	6
1	PAQL	78.8	26.4	.01	-1.01		-.53**	.61**	.47**	.55**	.68**
2	ACT	20.5	3.5	-.94	.95			-.43**	-.40**	-.56**	-.32**
3	RCAD	40.1	22.7	.41	-.24				.78**	.34**	.44**
4	DASS	21.6	10.9	-.10	-1.01					.48**	.27**
5	CAS(M)	2.8	2.3	.60	-.77						.41**
6	PCAS	9.5	3.5	.27	-.80						

Note: PAQL = Pediatric Asthma QL; ACT = Asthma Control Test; RCAD = Revised Children's Anxiety and Depression Scale; DASS = Depression Anxiety Stress Scales; CAS (M) = Coronavirus Anxiety Scale (Mother); PCAS = Pediatric Coronavirus Anxiety Scale. ** $p < .01$.

According to several previous studies on the significant and effective relationship between the severity and control of pediatric asthma on QL (Banjari et al., 2018; Everhart and Fiese, 2009; Zieh et al., 2006), in this study, in order to control the role of severity and control of asthma, Hierarchical linear regression analysis was used. Based on Table 2, asthma severity and control were entered into the model (control variable) in the first Block. In the second Block, the total score of psychiatric symptoms of the mother (Stress, Anxiety, and Depression) and children's symptoms (Anxiety and Depression) were entered. Finally, in the third Block, two variables of coronavirus-related anxiety in mothers and children were entered into the model for investigating the moderating role of coronary anxiety in the relationship between psychiatric symptoms and QL.

According to Table 2, psychiatric symptoms in mothers and children predicted 17% of impairment in QL in children with asthma ($\Delta R^2 = .17$). Coronavirus anxiety as moderating variable explained 15% of the variance QL in children with asthma. By adjusting for the effect of asthma severity and control, psychiatric symptoms and coronavirus-related anxiety in children and mothers predicted 27% of the variance in children's QL.

Table 2 Hierarchical Linear Regression Analysis

Predictor	B	SE B	β	t	R ²	ΔR^2	F	df1	df2
Model 1					.35	.35 **	31.08	2	115
(Constant)	102.11	19.7		5.18					
Severe Asthma	12.04	3.4	.35	3.35					
ACT	-2.15	.74	-.29	-2.9					
Model 2					.52	.17 **	30.37	2	113
(Constant)	64.35	18.22		3.53					
Severe Asthma	10.94	3.09	.32	3.53					
ACT	-1.04	.66	-.14	-1.57					
RCAD	.66	.12	.57	5.3					
DASS	-.44	.26	.18	1.67					
Model 3					.67	.15 **	37.69	2	111
(Constant)	48.45	15.44		3.13					

Severe Asthma	1.97	3.3	.06	.59
ACT	-.98	.55	-.13	-1.75
RCAD	.42	.11	.36	3.61
DASS	-.24	.23	.10	1.02
PCAS	3.08	.49	.41	6.23
CAS(M)	2.17	1.06	.19	2.04

Note: ACT = Asthma Control Test; RCAD = Revised Children's Anxiety and Depression Scale; DASS = Depression Anxiety Stress Scales; CAS (M) = Coronavirus Anxiety Scale (Mother); PCAS = Pediatric Coronavirus Anxiety Scale. **p <.01.

In general, research variables, including Asthma severity and control in children, psychiatric symptoms, and Coronavirus-related anxiety in children and their mothers predicted 67% of the variance of the impairment in QL in children with asthma ($R^2 = .67$). As shown in Figure 1, children (and their mothers) with severe and moderate asthma scored higher on psychiatric symptoms, coronavirus anxiety, and poor QL than mild asthma. Also, the mean scores of asthma control in these two groups were lower than mild asthma.

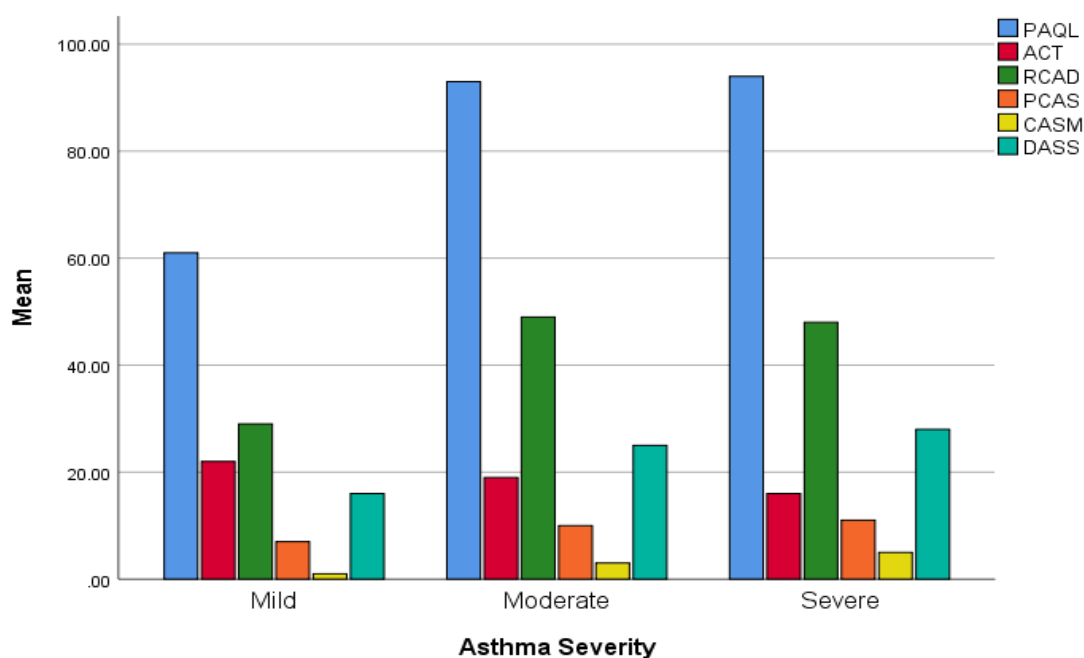


Figure 1 Bar chart of Mean Study Variables Based on Pediatric Asthma Severity.

4. DISCUSSION

Studies have shown that the QL of Asthmatic children is significantly lower than controls (Silva et al., 2015). Moreover, the condition caused by the COVID-19 pandemic has caused parents and children with asthma to experience more negative emotions (Clawson et al., 2021). Asthma control and severity have been considered by many researchers and have a significant relationship with the QL of children. Asthma attacks, hospitalization, impaired educational performance and other activities, fatigue, and sleep problems caused by asthma can greatly affect the QL (Banjari et al., 2018; Everhart and Fiese, 2009; Montalbano et al., 2020; Zieh et al., 2006). In this study, our main goal was to investigate the moderating role of coronavirus anxiety in the associations between psychiatric symptoms and QL in children with asthma.

Findings of this study showed that psychological symptoms of mothers and children predicted 17% of the QL disorders in children. This finding is in line with previous research indicating that psychiatric symptoms, especially anxiety and depression, affect children's QL (Dut et al., 2021; Kulikova et al., 2021; Lim et al., 2008). One notable finding in this study is the high correlation between maternal psychiatric symptoms and child psychiatric symptoms. Parental behaviors can affect the QL of children. Also, children's health status can also affect the QL of family members. Mothers of children with asthma face more challenges with their children and spend more time with their children (Marsac et al., 2007). In a study conducted by Lim et al., (2008), maternal

depression was directly related to internalizing symptoms (anxiety and depression) pediatrics with asthma. Additionally, the child's internalization symptoms were directly related to their physical function (Lim et al., 2008). Mothers' behaviors, such as severe reductions in autonomy, blame, catastrophic cognitive beliefs about problems, dysfunctional coping styles, and reduced emotional warmth toward children, can predispose children to psychopathology, including anxiety and depression (Nicol-Harper et al., 2007; Sohrabzadeh Fard et al., 2018; Whaley et al., 1999). Also, depression, and anxiety can affect the functioning of the immune system, problem-solving, memory, and attention, which can negatively affect the self-management and quality of life of people with asthma (Adams et al., 2004).

The main finding of this study was the moderating role of coronavirus-related anxiety in the associations between psychiatric symptoms and QL which led to the explanation of 27% of the impairment in QL in children with asthma. No similar research was found on this topic. However, in a study, it was reported that the rate of pediatric asthma control improved during quarantine compared with the same time before (Ferraro et al., 2021). However, Some factors, such as reduced treatment follow-up, weight gain, and parental anxiety, may affect children with asthma during the COVID-19 pandemic (Ding and Lu, 2020). One study found that children with asthma and their parents experienced more negative emotions than healthy children during the pandemic (Clawson et al., 2021).

Concerns of parents and children with asthma about the risk of developing COVID-19 on the one hand, and the lack of parental awareness and uncertainty of scientific data regarding the vulnerability of children with asthma to COVID-19, on the other hand, can lead to increased anxiety in parents and children. This extreme anxiety can lead to more severe restrictions and anxious behaviors of parents, which can affect the QL of children. One of the limitations of this study was the lack of assessment of other physical problems of children that may have affected the QL of children if any.

5. CONCLUSION

The severity and control of asthma play a significant role in the QL of children. Besides this, psychiatric symptoms and coronavirus-related anxiety in asthmatic children and their mothers can have a meaningful impact on children's QL. One of the points of strength in this research was its focus on the effect of mental health variables, other than the severity and control of pediatric asthma, on the QL of asthmatic children during the COVID-19 pandemic. It seems that clinicians' attention to psychiatric symptoms in asthmatic children and their mothers, especially during the COVID-19 pandemic, can help increase the effectiveness of treatment on children's QL. Given the finding of this article, investigating the long-term effects of psychological problems on the QL and performance of children with asthma can be of interest to researchers.

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Author Contributions

All authors contributed to the design of the research. Sohrabzadeh Fard, Bakhtiari, and Eslami collected and analyzed the data. Sohrabzadeh Fard, Bakhtiari, and Masjedi Arani drafted the manuscript. All authors contributed to editing the manuscript. The final version of the manuscript has been read and approved by all authors.

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Ethical approval

The study was approved by the Medical Ethics Committee of Shahid Beheshti University of Medical Sciences (ethical approval code: IR.SBMU.MSP.REC.1399.487).

Data and materials availability

All data associated with this study are present in the paper.

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