Correlation Between Anxiety Disorders and Asthma Severity Indices in Asthmatic Children

Mahsa Rekabi¹, Parisa Honarpisheh², Mahboobeh Karimi-Galougahi³, Vahab Rekabi⁴, Maryam Vasheghani⁵, Narges Eslami⁶, Samin Sharafian⁶, Hooman Sharifi⁷, Alireza Mahdaviani⁸, Mahboubeh Mansouri⁹, Sasan Vaseghⁱ⁰, Armin Shirvani⁵ and Paniz Pourpashang⁶*

¹Department of Pediatric Immunology and Allergy, Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases, Masih Daneshvari Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
²Pediatric Respiratory Disease Research Center, National Research Institute of Tuberculosis and Lung Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran
³Department of Otorhinolaryngology, Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases, Masih Daneshvari Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
⁴Shiraz University of Medical Sciences, Shiraz, Iran
⁵Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases, Masih Daneshvari Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
⁶Department of Pediatrics, Mofid Children’s Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
⁷Department of Pediatrics, Mofid Children’s Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
⁸Department of Tobacco Prevention and Control Research Center, National Research Institute of Tuberculosis and Lung Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran
⁹Department of Pediatric Immunology and Allergy, Pediatric Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases, Masih Daneshvari Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
¹⁰Department of Pediatric Immunology and Allergy, Mofid Children’s Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
¹¹Department of Psychiatry, Imam Hossein Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
¹²Faculty of Medical Education, Shahid Beheshty University of Medical Sciences, Tehran, Iran
¹³Mofid Children’s Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding author: Mofid Children’s Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Email: punez_p@yahoo.com

Received 2022 July 25; Revised 2023 May 31; Accepted 2023 June 14.

Abstract

Background: Anxiety and depression in patients with asthma have been linked to frequent exacerbations, increased use of healthcare resources, and poor asthma control.

Objectives: In the current study, we examined the correlations between asthma and symptoms of depression/anxiety in adolescents with asthma referred to Masih Daneshvari and Mofid hospitals during 2020 - 2021.

Methods: The current observational, cross-sectional study was conducted by administering the Spence Children Anxiety Scale and a demographic information checklist among 105 subjects. Asthma severity was measured using forced expiratory volume in 1 second (FEV1), FEV1/forced vital capacity (FVC), the number of short-acting β-2 agonists used per week or month, the number of night awakenings per week or month, having asthma symptoms in daily activities, the number of asthma attacks needing oral corticosteroids per year, and the number of disease exacerbations per week or month. Data were analyzed, and the correlation between the variables was investigated through linear regression and ordinal logistic regression.

Results: Patients with a mean age of 11.3 ± 2.5 years showed a mean overall anxiety score of 14 ± 9 out of 114. There was a significant negative correlation between the overall score of anxiety disorders and FEV1 and FEV1/FVC (P < 0.001). There was also a direct correlation between the overall score of anxiety disorders and the frequency of using β-2 agonists, the number of night awakenings, interference with normal functions, and exacerbation frequency (P < 0.001).

Conclusions: Our findings indicated a significant association between anxiety disorders and asthma in children. Considering the high prevalence of asthma in Iran than the global average, studying the underlying mechanisms of anxiety and psychological and environmental variables in children with asthma can aid in developing effective psychological therapies.

Keywords: Asthma, Psychiatric Morbidity, Depression, Anxiety, Adolescent

1. Background

Asthma is the most common respiratory disorder. The prevalence, severity, and duration of hospitalization in patients with asthma have increased in recent years (1). Asthma is often characterized by limitations in physical activity, negative impacts on social life and relationships, challenges in finding and maintaining...
employment, and a decreased quality of life (2). More than 80% of asthma-related deaths occur in low and middle-income countries, and almost 25,000 children die yearly (3). In Iran, asthma affects 13.14% of people under 18 and 7.48% of people of all ages, which is higher than the global average (4).

Asthma is one of the most common chronic inflammatory disorders in adolescence, with various consequences, including poor school performance and social work disorders. Thus, it can be a serious health issue (5-7). The prevalence of asthma in children is currently increasing. In 2001, 8.7% of children had asthma, and by 2009, this number had risen to 9.6%. This upward trend is expected to continue, with the CDC predicting that by 2025, more than 400 million people will have asthma (8). Its prevalence and severity are linked to factors such as exposure to allergic materials and lifestyle changes, particularly regarding physical activity. There is a correlation between asthma prevalence and reaction to allergenic materials, especially air dust particles (9).

Anxiety and depression are up to six times more common in people with asthma than in the general population (10). Also, 16% of people with asthma in the UK have panic disorder (11), compared to 1% in the general population (12). In patients with psychiatric or behavioral disorders, abnormal breathing patterns can cause asthma-like symptoms (13). Several studies have discovered a link between asthma and anxiety disorders among young people and adults (14, 15). One study found a close association between anxiety, depression, and poor asthma control. Another study revealed that children with well-controlled asthma were not at an elevated risk of anxiety, depression, or low self-esteem (16). Prior research has shown a high prevalence of asthma and mood disorders in adolescents (17).

2. Objectives

Because the association between anxiety disorders and asthma severity indicators has not been extensively investigated in Iran, we herein investigated this association in children with asthma who were referred to Masih-Daneshvari and Mofid hospitals during 2020-2021.

3. Methods

3.1. Subjects

The sample size was calculated based on the formula provided for regression analysis by Tabachnick and Fidell: Sample size = $50 + 8^*$(number of independent variables) (18). As the number of independent variables was 9, the minimum sample required was 122. Considering the conditions of the coronavirus pandemic, lockdowns, and the need to refer patients, finally, 105 patients completed the study, and the rest refused to continue. Hence, about 13% of the patients lost the follow-up, but since Tabachnick and Fidell recommended a sample size of at least 80 for regression analysis, the statistical power of this study was appropriate (19).

The study group consisted of 105 children with asthma (31 males and 74 females) aged between 6 and 18 years (mean ± SD: 11.3 ± 2.5) who were followed up in the Pediatric Allergy and Immunology Departments of Masih-Daneshvari and Mofid hospitals, Shahid Beheshti University of Medical Sciences during 2020-2021. In this study, 6-18-year-old children who had asthma symptoms (chronic cough, tightness in the chest, wheezing, and shortness of breath) were evaluated. After performing a complete physical examination, if they had inclusion criteria, they entered the study with their parent’s written informed consent. For inclusion in the study, the person would have asthma confirmed by spirometry, no heart disease (heart failure, heart valve failure, severe heart valve stenosis, and heart attack), lack of severe lung disease (cystic fibrosis, chronic obstructive pulmonary disease, and chronic and severe pulmonary bronchitis), and no history of chronic disease. This study was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences (IR.SBMU.MSP.REC.1400.223).

3.2. Study Design

Diagnosis and severity of asthma were described prospectively based on the global initiative for asthma guideline (20). The children were administered Spence Children’s Anxiety Scale (SCAS) (parent report). Besides an overall anxiety score, six areas, including separation anxiety, social anxiety, panic, generalized anxiety, social phobia, and obsessive-compulsive disorder (OCD), were also evaluated based on the questionnaire utilized in this study. Duration of asthma, asthma symptoms, and the number of emergency department visits were also recorded for asthmatic children. The sociodemographic characteristics of patients were recorded in a separate questionnaire.

The SCAS consists of 44 items, of which 6 are filler items. Only 38 anxiety items are scored. The 6 filler items are not scored. The responses are scored on a 4-point scale ranging from 0 to 3 (never = 0, sometimes = 1, often = 2, always = 3). This yields a maximum possible score of 114. The total score is the sum of items: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 12 + 13 + 14 + 15 + 16 + 18 + 19 + 20 + 21 + 22 + 23 + 24 + 25 + 27 + 28 + 29 + 30 + 32 + 33 + 34 + 35 + 36 + 37 + 39 + 40 + 41 + 42 + 44. Alternatively, the
The study included 105 subjects, including 31 (29.5%) males and 74 (70.5%) females. The mean age was 11.3 ± 4.4 years, ranging from 7 to 16.

Patients’ mean total anxiety score was 14 ± 9 out of 14, with a median of 13 (2,49). A total score of less than 60 is in the normal range. We examined the correlation between FEV1 and the squared total score using linear regression. There was a statistically significant inverse correlation between FEV1 and the overall score, so by one unit increase in FEV1, the overall score decreased by 0.029 (P < 0.001).

Likewise, we examined the correlation between FEV1/FVC and the overall score, showing a statistically significant negative correlation with a coefficient of 0.057 (P < 0.001). Examination of the correlation between the total score and the frequency of using short-acting β-2 agonists showed a statistically significant direct correlation with a coefficient of 0.9 (P < 0.001). Additionally, a significant correlation with a coefficient of 0.92 was found between the number of night awakenings per month and the total score (P < 0.001). Likewise, we assessed the correlation between symptom interference in routine activities and the total score and found a statistically significant positive correlation with a coefficient of 1.56 (P < 0.001). However, linear regression analysis found no correlation between the yearly number of asthma exacerbations requiring treatment with oral corticosteroids and the total score of the questionnaire (P = 0.184).

In the next step, we evaluated the patients’ various areas of anxiety, including separation anxiety, social anxiety, panic, generalized anxiety, social phobia, and OCD (Table 1).

Table 1. Patients’ Scores on Various Types of Anxiety

<table>
<thead>
<tr>
<th>Type of Anxiety</th>
<th>Mean ± SD</th>
<th>Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation anxiety</td>
<td>3 ± 3</td>
<td>3 (0-10)</td>
</tr>
<tr>
<td>Social anxiety</td>
<td>3 ± 2</td>
<td>3 (0-12)</td>
</tr>
<tr>
<td>Obsessive compulsive disorder</td>
<td>0 ± 1</td>
<td>0 (0-6)</td>
</tr>
<tr>
<td>Panic</td>
<td>1 ± 1</td>
<td>1 (0-6)</td>
</tr>
<tr>
<td>Generalized anxiety</td>
<td>2 ± 2</td>
<td>2 (0-9)</td>
</tr>
<tr>
<td>Social phobia</td>
<td>3 ± 3</td>
<td>2 (0-15)</td>
</tr>
</tbody>
</table>

Ordinal logistic regression analysis investigated the correlation between separation anxiety scores and other variables. The results of the correlation between asthma-related variables and separation anxiety scores are seen in Table 2 and described as follows. A regression coefficient of 0.028 showed a statistically significant association between separation anxiety score and FEV1. The separation anxiety score decreased by 0.028 when the FEV1 variable increased by one unit (P = 0.001). The separation anxiety score had a negative association with FEV1/FVC, with a regression coefficient of 0.056 (P = 0.001). Furthermore, the separation anxiety score increased by 0.808 (P = 0.001) for a single unit increase in the frequency of using short-acting β-2 agonists during the week. Similarly, there was a statistically significant association between the separation anxiety score and the frequency of night awakenings per month (regression coefficient of 0.62, P = 0.001) and the interference of symptoms in routine activities (regression coefficient of 1.25, P = 0.001). In addition, the separation anxiety score had a significant association with the number of pulmonary exacerbations needing corticosteroid medication and the frequency of...
Using linear regression after controlling for age and gender, we observed a significant negative association between social anxiety disorder (SAD) score and FEV1/FVC. Accordingly, the SAD score decreased by 0.029 units (P = 0.003) for every unit increase in FEV1/FVC. There was also a statistically significant association between the SAD score and the frequency of using short-acting β-2 agonists over the week (regression coefficient of 0.43 and P < 0.001). Furthermore, the SAD score had a statistically significant direct correlation with the frequency of waking up at night during the month, interference of symptoms in normal activities, and the frequency of symptoms during the week (regression coefficients of 0.41, 0.74, and 0.43, respectively; P = 0.001). According to ordinal logistic regression analysis, the OCD score had no statistically significant correlation with other asthma-related variables. Although the OCD score decreased by 0.001 per unit increase in FEV1, the association was insignificant (P = 0.872).

Likewise, we examined the correlation between variables and panic scores. As observed, FEV1 and FEV1/FVC variables had no significant correlation with panic scores. In contrast, for one unit increase in using short-acting β-2 agonists, the panic score increased by 0.67 (P = 0.001). Also, for a one-time increase in the number of night awakenings, the panic score increased by 0.39 (P = 0.066), which was significant in the borderline range. Hence, it can be claimed that the panic score significantly correlated with the number of night awakenings. Further studies with a higher sample size are needed to validate these results.

There was also a direct correlation between the panic score and the number of symptom exacerbations during the week (regression coefficient of 0.67, P = 0.001). We also discovered a significant correlation between the FEV1 and FEV1/FVC variables and the generalized anxiety score (regression coefficients of 0.048 and 0.12, respectively; P = 0.001). Moreover, the frequency of using short-acting β-2 agonist, frequency of night awakenings, interference of symptoms with routine activities, number of pulmonary exacerbations requiring corticosteroids, and frequency of symptom exacerbations had a significant direct correlation with the generalized anxiety score (regression coefficients of 1.45, 1.6, 2.3, 1.8, and 1.45, respectively; P = 0.05). Finally, the social phobia score had a significant negative association with FEV1 (regression coefficient of 0.04, P = 0.001). Also, the frequency of using short-acting β-2 agonists during the week, frequency of night awakenings during a month, interference of symptoms with routine activities, and frequency of symptom exacerbations during the week were directly related to the social phobia score (regression coefficients of 1.16, 1.05, 1.69, and 1.16, respectively; P < 0.001) (Table 2).

5. Discussion

In this study, we examined 105 asthmatic patients aged 6 to 18, referred to Mofid and Masih Daneshvari hospitals in Tehran between 2020 and 2021 to investigate the correlation between asthma-related variables and anxiety scores. Our results show a negative correlation between the overall score of anxiety disorders and FEV1 and FEV1/FVC. There was also a direct correlation between the overall score of anxiety disorders and the frequency of using short-acting β-2 agonists, the number of night awakenings, interference with daily tasks, and the frequency of symptom exacerbations. In detail, separation anxiety, social anxiety, OCD, panic, generalized anxiety score, and SAD had a substantial association with asthma-related symptoms.

Asthma is one of the most frequent chronic childhood disorders, affecting 9.5% of the world's under-18 population and 13% in Iran (22). This chronic inflammatory disease of the airways causes frequent pulmonary exacerbations, which can result in panic in children. Therefore, anxiety in children with asthma should be considered (23). Previous studies in patients with asthma have reported that experiencing greater levels of negative emotion leads to decreased lung function (24). Anxiety disorders, particularly panic disorders, are prevalent in children with asthma, with a reported frequency of 33% (25). While anxiety affects 7% of children in the general population, it affects four to five times more children with asthma (26). Anxiety disorders in childhood can reflect adolescent anxiety and other mental disorders, and they can continue to adulthood (27).

Evidence suggests that anxiety disorders in children are linked to adulthood disorders, including depression, panic, agoraphobia, and physical illness (28). Prolonged respiratory problems can lead to catastrophic beliefs about the symptoms of respiratory disease, which can lead to panic attacks, and children who experience more negative emotions are more likely to have asthma attacks (29). Our findings revealed a negative correlation between FEV1 and FEV1/FVC and separation anxiety, SAD, and generalized anxiety. Only FEV1 revealed a negative correlation with the OCD and social phobia scores. Anxiety in asthmatics exposes them to a variety of behavioral and social disorders (30). Previous research has also discovered a link between asthma and anxiety or depression, leading to recommendations in national and international guidelines to evaluate comorbid mental...
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Coefficient</th>
<th>Std. Err.</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Based on Ordinal Logistic Regression (Separation Anxiety Score)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1</td>
<td>-0.028</td>
<td>-0.263</td>
<td>0.089</td>
<td>0.001</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>-0.056</td>
<td>-0.335</td>
<td>0.034</td>
<td>0.001</td>
</tr>
<tr>
<td>Use of short-acting β-2 agonists</td>
<td>0.808</td>
<td>0.564</td>
<td>0.237</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of night awakenings per month</td>
<td>0.62</td>
<td>0.447</td>
<td>0.333</td>
<td>0.001</td>
</tr>
<tr>
<td>Symptom interference in routine activities</td>
<td>1.25</td>
<td>0.419</td>
<td>0.667</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of pulmonary exacerbations needing corticosteroid medication</td>
<td>0.75</td>
<td>0.154</td>
<td>1.386</td>
<td>0.001</td>
</tr>
<tr>
<td>Frequency of symptom exacerbations</td>
<td>0.808</td>
<td>0.546</td>
<td>0.237</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Based on Linear Regression (Total Score)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1</td>
<td>-0.029</td>
<td>-0.347</td>
<td>0.06</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>-0.057</td>
<td>-0.373</td>
<td>0.111</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Number of asthma exacerbations</td>
<td>4.601</td>
<td>0.184</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Requiring treatment with oral corticosteroids during the year</td>
<td>0.184</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of short-acting β-2 agonists</td>
<td>0.9</td>
<td>0.706</td>
<td>0.682</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Number of night awakenings per month</td>
<td>0.92</td>
<td>0.609</td>
<td>0.993</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Symptom interference in routine activities</td>
<td>1.56</td>
<td>0.544</td>
<td>2.071</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>SAD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>-0.029</td>
<td>-0.333</td>
<td>0.031</td>
<td>0.003</td>
</tr>
<tr>
<td>Frequency of using short-acting β-2 agonists over the week</td>
<td>0.43</td>
<td>0.569</td>
<td>0.216</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Frequency of night awakenings during the month</td>
<td>0.41</td>
<td>0.437</td>
<td>0.305</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Interference of symptoms in normal activities</td>
<td>0.74</td>
<td>0.452</td>
<td>0.603</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Frequency of symptoms during the week</td>
<td>0.43</td>
<td>0.569</td>
<td>0.216</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>Panic Scores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-acting β-2 agonists</td>
<td>0.67</td>
<td>0.342</td>
<td>0.128</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of night awakenings</td>
<td>0.39</td>
<td>0.312</td>
<td>0.16</td>
<td>0.066</td>
</tr>
<tr>
<td>Number of symptom exacerbations during the week</td>
<td>0.67</td>
<td>0.342</td>
<td>0.128</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Social Phobia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1</td>
<td>0.04</td>
<td>0.323</td>
<td>0.02</td>
<td>0.001</td>
</tr>
<tr>
<td>Using short-acting β-2 agonists during the week</td>
<td>1.16</td>
<td>0.489</td>
<td>0.269</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Frequency of night awakenings during a month</td>
<td>1.05</td>
<td>0.446</td>
<td>0.352</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Interference of symptoms with routine activities</td>
<td>1.69</td>
<td>0.333</td>
<td>0.747</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Frequency of symptom exacerbations during the week</td>
<td>1.16</td>
<td>0.489</td>
<td>0.269</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td><strong>Generalized Anxiety Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1</td>
<td>0.048</td>
<td>0.357</td>
<td>0.084</td>
<td>0.001</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>0.12</td>
<td>0.479</td>
<td>0.026</td>
<td>0.001</td>
</tr>
<tr>
<td>Short-acting β-2 agonists</td>
<td>1.45</td>
<td>0.622</td>
<td>0.181</td>
<td>0.05</td>
</tr>
<tr>
<td>Frequency of night awakenings</td>
<td>1.6</td>
<td>0.641</td>
<td>0.239</td>
<td>0.05</td>
</tr>
<tr>
<td>Interference of symptoms with routine activities</td>
<td>2.3</td>
<td>0.479</td>
<td>0.52</td>
<td>0.05</td>
</tr>
<tr>
<td>Number of pulmonary exacerbations requiring corticosteroid medication</td>
<td>1.8</td>
<td>0.193</td>
<td>1.098</td>
<td>0.05</td>
</tr>
<tr>
<td>Frequency of symptom exacerbations</td>
<td>1.45</td>
<td>0.622</td>
<td>0.381</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Abbreviations: FEV1, forced expiratory volume in 1 second; FVC, forced vital capacity; SAD, social anxiety disorder.
health impairment in patients with severe asthma (31, 32). Although the underlying mechanisms of anxiety and asthma have not been precisely identified, studies have shown that anxiety and depression may worsen with the disease's severity (33). According to a recent study by Montalbano et al., the quality of life impairment and internalizing behavioral problems, particularly the subscale including anxiety and depressive symptoms, are more common in children with severe asthma than in non-severe asthma, and no sex differences were identified (34).

In two meta-analysis studies, reviewing 901 studies, children with chronic diseases were found to be more anxious than the average level (35, 36). Due to the prevalence of psychological and behavioral problems in children with asthma, they are at higher risk for developing and worsening anxiety disorders (26). In a cohort study, Goodwin et al. discovered that severe and persistent asthma among 5-year-old children significantly increased the risk of mental problems between the ages of 5 and 17, while the risk of mental disorders in children with mild and improved asthma did not increase (37). The inability to perform the desired physical function causes a person to suffer from anxiety and depression (38). In asthma, chronic inflammation and high levels of proinflammatory cytokines affect glucocorticoid and corticosteroid-releasing hormone receptors and alter the hypothalamic-pituitary-adrenal (HPA) axis, impairing neurotrophic factor secretion. These reactions eventually cause damage to the hippocampus and decrease monoamine content in the brain (39, 40). Panek et al. also discovered that glucocorticoid receptor gene (NR3C1) haplotypes (ER22/23EK, N363S, BclI) were linked to mood and anxiety issues in asthma patients (40).

On the other hand, more anxiety leads to weaker control over the disease (41). Studies have shown that anxiety in children with asthma can affect self-care behaviors (42) and treatment adherence (42). Hospitalization (43), medical expenses (44), and parental anxiety (45) are among the problems caused by the disease that can harm the quality of life of children with the disease (46). According to the current study, asthma negatively impacts mental health, particularly anxiety disorders. The frequency of short-acting β-2 agonists consumption, the number of night awakenings, interference of symptoms in daily tasks, frequency of pulmonary exacerbations requiring oral corticosteroid therapy, and frequency of symptoms flare-ups were all found to be positively correlated with separation anxiety and generalized anxiety scores. There was also a positive link between social anxiety and short-acting β-2 agonist use, the frequency of waking up at night, the interference of symptoms with routine tasks, and the frequency of symptom exacerbation. The number of short-acting β-2 agonists administered and the number of symptom exacerbations are directly connected to the panic score. These results align with research conducted by Kullowatz et al. on 90 asthmatic patients. Their findings revealed that the incidence of anxiety and depression in asthma patients has a major impact on patients’ quality of life (47).

Similarly, Mancuso et al. found that 45% of patients with asthma were positive for depressive symptoms, and depression was significantly associated with a lower quality of life score (48). In this regard, de Miguel Diez et al.’s research, which used two SF-36 questionnaire indicators and interviewed adults with asthma and bronchitis, found that healthy people had higher mental health scores than asthmatics (49). According to Ahmadiafshar et al.’s research, students with asthma symptoms had a higher level of anxiety. They also reported higher rates of depression among students with asthma in a parallel study (50). This correlation has been validated in other research (51, 52). However, previous research has found conflicting results and reported no link between mental disorders and asthma (16, 53). In one study, adolescents with asthma had a higher frequency of anxiety and depression, but this correlation was insignificant regarding age, gender, and asthma severity (54).

Concomitant stress caused by respiratory disorders can be a factor in developing anxiety disorders or depression. Consistent with this notion, some studies have found a link between anxiety and poorly controlled asthma (41, 55). According to Garg and Silverberg, children with allergy disorders are likelier to have at least one psychological and behavioral issue (56). In the study by Kohlbueck et al., children with asthma were nearly three times more likely than children without asthma to have emotional symptoms, and asthma was not linked to emotional symptoms (57). These differences may be the result of different measuring tools or sampling methods. In addition, some contributing factors, such as the ethnic, environmental, and cultural background of the study population, may explain these diverse outcomes. However, further studies with a larger sample size are needed to evaluate the associations of demographic variables, particularly gender, with mental health in patients with asthma.

5.1. Conclusions

Asthma has various negative physical, psychological, social, and economic effects. Asthma prevalence in Iran is higher than the global average, causing a severe public health hazard. The current research found
significant associations of separation anxiety, social anxiety, OCD, panic, generalized anxiety score, and SAD with asthma-related symptoms in children aged 6 - 18. Therefore, it is necessary to consider asthma’s psychological and environmental aspects, which may worsen the disease and its consequences. However, further research with a larger sample size is needed to identify the underlying mechanisms of anxiety in children with asthma, which can lead to successful psychological therapies.

Footnotes

Authors’ Contribution: M. R., P. P., V. R., and P. H. conceived and designed the evaluation and drafted the manuscript. P. P., M. KG., M. V., N. E., S. S., and H. S. participated in designing the evaluation, performed parts of the statistical analysis, and helped to draft the manuscript. P. P., A. M., M. M., and S. V. re-evaluated the clinical data, revised the manuscript, performed the statistical analysis, and revised the manuscript. A.S. re-analyzed the clinical and statistical data and revised the manuscript. All authors read and approved the final manuscript.

Conflict of Interests: The authors declare no conflict of interest.

Funding/Support: The author(s) received no financial support for the research, authorship, and/or publication of this article.

Informed Consent: Written informed consent was obtained from the parents.

References


