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Evaluation of anxiety and depression in asthma patients during the COVID-19 pandemic

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ABSTRACT

Aim: To determine the frequency of the development of anxiety and depression in asthma patients who attended an outpatient clinic during the COVID-19 pandemic, whether these rates were higher than those of the healthy population, and whether there is a possible relationship between asthma control levels, anxiety, and depression.

Method: A total of 112 patients with asthma and 81controls, whose mean ages and genders were matched, were included in the study. Demographic data of the two groups and general information about their asthmatic conditions were recorded. Asthma control tests (ACTs) were performed to determine the level of asthma control. The Beck Depression Inventory and Beck Anxiety Inventory were administered to the asthma patients and controls. The groups were compared in terms of their Beck depression and anxiety scores and asthma control. We investigated whether there is a relationship between asthma control level and anxiety and depression scores.

Results: Of the asthma patients, 78.6% were found to have anxiety, and 48.2% reported depression, while 32.1% anxiety and 12.3% depression were found in the control group. Depression and anxiety scores were significantly higher in asthma patients than in the control group. It was observed that 59% of the patients had very poorly controlled asthma, and as the ACT levels of the patients worsened, depression and anxiety scores increased.

Conclusions: To reduce the frequency of anxiety and depression in asthma patients, it is essential to provide accurate information about COVID-19 and to effectively control asthma. Therefore, asthma patients should be informed about COVID-19 and advised to engage in regular outpatient examinations.

Key words: COVID-19, asthma, pandemic, depression, anxiety.

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Introduction

The Coronavirus disease 2019 (COVID-19) pandemic has been responsible for the deaths of millions of people and has deeply affected many individuals' physical and mental health. The incidence of other diseases, such as post-traumatic stress disorder, generalised anxiety disorder, and depression, has increased significantly since the pandemic [1-3]. In a comprehensive meta-analysis conducted during

the COVID-19, the prevalence of depression, anxiety, stress, and insomnia was 31.4%, 31.9%, 41.1%, and 37.9%, respectively [4].

In pre-COVID-19 pandemic studies, the frequency of anxiety and depression was reported to be higher in asthma patients than in the average population [5-7]. In the pandemic period, the prevalence of depression and anxiety in asthma patients and whether such rates are higher than in the healthy population remain unknown. Although some studies have found that people with asthma and chronic diseases had more anxiety and were more likely to experience depression during the pandemic, the data on this subject are limited [8,9].

The aim of the present study was to assess the prevalence of depression and anxiety in asthma patients during the COVID-19 pandemic, and to determine whether there is any possible relationship between the asthma control level and the incidence of anxiety and depression.

Materials and methods

This study was designed as a prospective survey. The study protocol was approved by the hospital's local ethics committee (2022/234) and was performed in accordance with the principles of the Declaration of Helsinki. Signed informed consent was collected from all the patients and members of the control group. Between January 10 and March 10, 2022, 112 asthmatic patients and 81 controls were included in the study. The control group consisted of patients who presented to the outpatient clinic with similar complaints and did not meet the exclusion criteria. The mean age and gender of the asthma patients and the controls were matched. Demographic data, educational status, marital status, co-morbidities, drug use, previous COVID-19 test results, and emergency service admissions and/or hospitalizations due to asthma in the last year were recorded. Thus, the general characteristics of the asthma patients who presented to the outpatient clinic during the pandemic were assessed.

Asthma control tests (ACTs) were performed, and it was determined whether the disease was under control. If the total score on the ACT was 20–25, it is considered well controlled, 16–19 as not well controlled, and 5–15 as very poorly controlled [10]. Then, the Beck Depression Inventory and Anxiety Inventory were administered to the asthma patients. These two scales consist of 21 questions with four score options ranging from 0 to 3, with a total score of up to 63 [11]. The validity and reliability of the Beck Depression Inventory were examined in the Turkish population. The cut-off value for the diagnosis of depression according to the Beck Depression Scale has been calculated as 17 [12]. In our study, a score above 16 was accepted as clinical depression, 10–16 points was classified as mild or minimal mood disturbance, 17–20 points as mild clinical depression, 21–30 points as moderate depression, 31–40 points as severe depression, and >40 points as very severe depression. The Beck Anxiety Inventory is a survey conducted to determine the frequency of anxiety symptoms experienced by individuals. Our study classified a score of<10 points as normal, 10–18 points as indicative of mild anxiety, 19–29 points as moderate anxiety, and 30–63 points as severe anxiety. The validity and reliability study of the Beck Anxiety Inventory was performed in Turkey by Ulusoy et al. [13].

The frequency of clinical depression and anxiety was determined in the asthma group using these questionnaires. These groups were classified as mild, moderate, or severe according to their anxiety and depression scores. A healthy control group matched for age and gender was formed, and the same questionnaires were administered. The prevalence of depression and anxiety was assessed in both groups, and it was determined

whether there was a difference in depression and anxiety scores and a higher prevalence in the asthma group compared to the control group. Then, we investigated whether there was a relationship between ACT scores and Beck anxiety and depression scores in asthma patients.

Inclusion criteria

- Asthma patients followed up in the chest medicine and asthma polyclinic.
- Patients aged between 16–65 years.
- Patients who agreed to participate in the study.

Exclusion criteria

- Patients who had any additional diseases other than hypertension, diabetes, hyperlipidemia, heart rhythm disorders, and chronic ischemic heart disease.
- Patients who smoked more than 10 packs/year.

Statistical analysis

The SPSS 25.0 package programme was used for the data analysis. Descriptive data on the sociodemographic information of the participants were presented in the form of frequency tables (n and %), and numerical variables were given as medians (min–max). When the study data were analyzed in terms of normality assumptions, Kolmogorov–Smirnov values were computed as $p<0.05$. A Spearman correlation analysis, a nonparametric test, was performed to determine the relationship between the continuous variables (ACT, Beck Depression Inventory, and Beck Anxiety Inventory scores) in the patient group. Another nonparametric test, the Mann–Whitney U test, was used to compare the continuous variables (Beck depression and anxiety scores) between the patient and control groups. The chi-square test was used to compare the categorical variables. $P<0.05$ was considered statistically significant in all analyses.

Results

The mean age of the asthma and control groups was 42 years, with 74.1% (n= 83) having asthma, and 74.1% (n=60) of the control group being female. A total of 57.1% (n=64) of the asthmatic patient group and 59.2% (n=48) of the control group had a previous COVID-19 infection. Of the asthma group, 74.1% (n=83) had allergic rhinitis accompanying asthma. Although asthma was very poorly controlled in 59% (n=66) of the patients, asthma emergency admissions were reported by 32.1% (n=36) and hospitalizations by 4.5% (n=5) in the last year. A total of 24.1% of the patients used a short-acting beta-2 agonist (SABA) alone or did not use inhalers at all. Other sociodemographic characteristics of the patients are summarized in Table 1.

A statistically significant difference was found between the asthma and control groups with respect to the prevalence of depression ($p<0.001$), the prevalence of anxiety ($p<0.001$), depression levels ($p<0.001$), and anxiety levels ($p<0.001$; Table 2). The prevalence of depression and anxiety in asthma patients was higher than in the control group. When asthma patients were evaluated in terms of anxiety and depression, depression was found in 48% (n=54) and anxiety in 78.6% (n=88; Table 2). When asthma patients with depression and anxiety were classified according to the severity of the disease, moderate depression was found in 17.9% (n=20), severe depression in 8.9% (n=10), moderate anxiety in 28.6% (n=32), and severe anxiety in 21.4% (n=24). When evaluated according to the severity of the disease, mild, moderate, and severe depression and mild, moderate, and severe anxiety were found to be higher in the asthma group than in the control group (Table 2).

When the depression and anxiety scores of the asthma and control groups were compared, the depression and anxiety scores of the asthma group were found to be significantly higher than those of the control group, respectively ($p<0.001$; Table 3).

Table 1. Sociodemographic characteristics of asthma patients.

Parameters		**Values**
Age (mean ± SD)		41,82±11,65
Asthma Control Test (mean ± SD)		14,61±4,83
Cigarette pack/year (mean ± SD)		6,78±2,87
Number of emergency service admissions (ort± SD)		1,25±2,97
Sex N (%)	Female	83 (74,1)
	Male	29 (25,9)
Smoking N (%)	No	82 (73,2)
	Yes	30 (26,8)
Allergy N (%)	No	29 (25,9)
	Yes	83 (74,1)
Have you had COVID-19? N (%)	No	48 (42,9)
	Yes	64 (57,1)
Educational status N (%)	Secondary school and below	58 (51,8)
	High school	28 (25,0)
	University	26 (23,2)
Marital status N (%)	Single	33 (29,5)
	Married	79 (70,5)
Hospitalization in the last year N (%)	No	107 (95,5)
	Yes	5 (4,5)
Emergency service admissions in the last year N (%)	No	76 (67,9)
	Yes	36 (32,1)
Asthma Control Test N (%)	Well controlled	23 (20,5)
	Not-well controlled	23 (20,5)
	Very poorly controlled	66 (59)
Medicine use status N (%)	No /SABA	27 (24,1)
	MTL+ AH	7 (6,3)
	LABA+ICS	25 (22,3)
	LABA+ICS+MTL	19 (16,9)
	LABA+ICS+MTL+AH	31 (27,7)
	ICS+MTL+AH	3 (2,7)
Comorbidities N (%)	Hypertension	18 (16,1)
	Diabetes	8 (7,1)
	Hyperlipidemia	8 (7,1)
	Cardiac arrhythmia	5 (4,5)
	Chronic ischemic heart disease	5 (4,5)

SABA: short-acting beta 2- agonist, LABA: long-acting beta-2 agonist, ICS: Inhaled corticosteroid, MTL: montelukast, AH: antihistaminic

Table 2. Comparison of asthma patients and control group in terms of anxiety and depression.

Parameters		**Asthma group N (%)**	**Control group N (%)**	***p***
Depression N (%)	No	58 (51,8)	71 (87,7)	***<0.001***
	Yes	54 (48,2)	10 (12,3)	
Anxiety N (%)	No	24 (21,4)	55 (67,9)	***<0.001***
	Yes	88 (78,6)	26 (32,1)	
Depression levels	Normal	30 (26,8)	43 (53,1)	***<0.001***
	Mild mood disturbance	28 (25,0)	28 (34,6)	
	Mild depression	24 (21,4)	7 (8,6)	
	Moderate depression	20 (17,9)	2 (2,5)	
	Severe depression	10 (8,9)	1 (1,2)	
Anxiety levels	Normal	24 (21,4)	55 (67,9)	***<0.001***
	Mild anxiety	32 (28,6)	22 (27,2)	
	Moderate anxiety	32 (28,6)	4 (4,9)	
	Severe anxiety	24 (21,4)	0 (0,0)	

Chi Square test, p<0.05 significant.

Table 3. Comparison of the relationship between the anxiety and depression levels and the study groups.

Parameters	**Groups**	**Median (min-max)**	***P* value**
Beck depression	Case	15,5 (0,0-41,0)	***<0.001***
	Control	10,0 (0,0-32,0)	
Beck anxiety	Case	18,5 (0,0-55,0)	***<0.001***
	Control	5,0 (0,0-28,0)	

Mann Whitney U test, p<0.05 significant.

Table 4. Correlation results of ACT with depression and anxiety scores in the case group.

Parameters	**Asthma control test**	
	r	***p* value**
Beck depression	-0,380**	***<0,001***
Beck anxiety	-0,390**	***<0,001***

**The correlation is significant at the 0.05 level (Spearman correlation test),*

*** The correlation is significant at the 0.01 level (Spearman correlation test).*

When we analysed the correlation relationships between the ACT and Beck depression and anxiety scores in the asthma group, a significant negative correlation was found between ACT scores and the Beck depression and anxiety scores. Specifically, as the ACT scores decreased, the Beck depression and anxiety

scores increased (r=-0.380, p<0.001; r=-0.390, p<0.001, respectively; Table 4).

Discussion

To the best of our knowledge, this is the first study in our country to evaluate anxiety and depression in adult asthmatic patients during the COVID-19 pandemic. In our study, it was observed that the anxiety and depression scores of asthma patients who presented to the outpatient clinic during the pandemic period were significantly higher than those of the control group. It was found that a great majority of the asthma patients did not have their disease under control. It was also shown that as the ACT levels of the patients worsened, the Beck anxiety and depression scores increased. It was observed that 78.6% of the asthma patients had anxiety, and 48% had depression. In terms of degree, during the pandemic period, 26.8% of asthma patients had moderate and severe depression, while 50% had moderate and severe anxiety symptoms.

In the present study, the Beck depression and anxiety scores of asthma patients who presented to the outpatient clinic during the pandemic period were significantly higher than those of the control group (p<0.001). In a study based on a nationwide internet-based survey in Bangladesh, the average depression and anxiety scores of the participants who reported asthma, Chronic Obstructive Pulmonary Disease (COPD), hypertension, obesity, heart disease, and cancer were significantly higher than those of the general population [14]. In the study by Boer et al., it was shown that asthma patients experienced more anxiety than the healthy control group during the pandemic period [9]. In another study, Sayeed et al. found that the mean stress, anxiety, and depression scores of individuals with chronic diseases, including asthma, were significantly higher than those of the control group without chronic diseases [15]. All these results are consistent with those of our study.

In the present study, it was observed that as ACT scores decreased, depression and anxiety scores increased. In other words, as the control that the patients had over their asthma worsened, the incidence of depression and anxiety increased. In most studies conducted before the pandemic, it was found that the incidence of depression and anxiety increased as the level of asthma control worsened [16,17]. Another study conducted before the pandemic reported that depressive disorder adversely affected asthma control, while anxiety disorder did not [18]. A study that included patients with asthma during the pandemic showed that anxiety was related to the level of asthma control and actually worsened it [19]. In the study by Sheha et al. that took place during the pandemic, it was determined that the incidence of depression and anxiety increased as the patients' asthma control worsened [8]. In a similar vein, Gunaydın et al. found that among asthmatic adolescents aged between 12–18 years, the state anxiety scores of patients with poor asthma control were higher than those of controlled patients [20]. While patients' asthma control rates during the pandemic differ according to country, it has been observed that a great majority of asthma patients have uncontrolled cases of the disease [9,21]. Accordingly, this rate was quite high in our study. This suggests that, although we are currently in the later pandemic stages, patients with asthma are hesitant to come to the hospital and/or use their medications. The fact that only 35% of the patients reported to the emergency department throughout one year, even though they had uncontrolled cases of the disease, supports this hypothesis. Moreover, it was observed in our study that approximately 24.1% of the patients who came to the outpatient clinic

either used SABA alone or did not use inhalers. The frequent use of masks and disinfectants due to the pandemic may also be a factor contributing to the deterioration of disease control.

While depression was found in 48.2% of asthma patients in this study who presented at the outpatient clinic during the pandemic, it was reported by only 12.3% of the healthy control group. It was further observed that 26.8% of asthma patients had moderate to severe depression. In studies conducted before the pandemic, the prevalence of depression in asthma patients was significantly higher than in the healthy group [7,17,22,23]. In fact, the prevalence of depression we found in asthma patients during the pandemic was considerably higher than in studies conducted before the pandemic. In a study conducted during the COVID-19 pandemic with patients having chronic diseases, including asthma, it was found that 71.6% of the patients had mild to severe depressive symptoms, while only 31.1% of those without chronic diseases had depressive symptoms [24]. In another study that included adults and children during the pandemic, the prevalence of depression in adult asthma patients was significantly higher than in the control group [25]. Elsewhere, borderline depression was also reported at a rate of 30% in patients with severe asthma, and significant clinical depression was found in 29.5% [8]. In our study, although no classification was made according to the severity of asthma, the asthma of most of the patients (59%) was very poorly controlled. Others have reported that depression was twice as common in patients with asthma during the pandemic than in the period prior to its advent [9].

We found anxiety in 78.6% of asthma patients who reported to the outpatient clinic during the pandemic, and in 32% of the control group. It was also observed that 50% of asthma patients had moderate and severe anxiety. In a study conducted on patients with asthma before the pandemic, anxiety was found at a rate of 36.9% [16]. In a related vein, Nascimento et al. reported generalized anxiety disorder at a rate of 24.4% in their study of 86 patients with asthma [19]. According to Urritia et al., the frequency of anxiety was 31% in asthma patients in a comprehensive study conducted before the pandemic [21]. In our study, the anxiety rates detected in patients with asthma were considerably higher than those found before the pandemic.

A study conducted during the pandemic found borderline anxiety in 16.9% of patients with severe asthma, and clinical anxiety was found in 44.3% [8]. In another study investigating the probability of experiencing mental health symptoms in the past seven days during the pandemic in groups with and without chronic respiratory diseases, stress and anxiety symptoms were found to be significantly higher in the past week in asthmatic patients [26]. Others reported that 59% of patients with chronic diseases, including asthma, showed mild or higher levels of anxiety, while 25.6% of those without chronic diseases showed the same symptoms [15].

In our study, the prevalence of anxiety was very high in asthma patients who presented at the outpatient clinic. In addition to the psychological effects of the pandemic on asthma patients, this may be due to the significant majority of them not having their disease under control.

One limitation of this research is that it was a single-center study with a limited number of patients. It is thought that prospective studies with a more significant number of patients are needed on this subject. Another limitation is that asthma patients could not be evaluated in terms of the correct usage of inhaler medications. Moreover, a power analysis regarding the sample size could not be performed in our study.

Conclusion

We observed that the frequency of anxiety and depression was significantly higher in asthma patients who reported to the outpatient clinic during the pandemic period. Moderate and severe anxiety was detected in a great majority of patients with anxiety. In addition, it was determined that the frequency of anxiety and depression increased as the control level of the disease worsened in asthma patients. To reduce the frequency of anxiety and depression in asthma patients during a pandemic, it is thought that their diseases should be controlled first. Therefore, asthma patients should have been informed about COVID-19, advised to use their medications regularly, and have regular outpatient examinations.

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Open Access Statement

References

[1]Huang Y, Zhaoa N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. Psychiatry Res. 2020; 288: 112954.

[2]Gasteiger N, Vedhara K, Massey A, et al. Depression, anxiety and stres during the COVID-19 pandemic: results from a New Zealand cohort study on mental well-being. BMJ Open. 2021; 11(5):e045325.

[3]Qiu J, Shen B, Zhao M, et al. A nation wide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. Gen Psychiatr. 2020;33(2):e100213.

[4]Wu T, Jia X, Shi H, et al. Prevalence of mental health problems during the COVID-19 pandemic: A systematic review and meta-analysis. J Affect Disord. 2021; 281:91-8.

[5]Oğuztürk Ö, Ekici A, Güliter S, et al. Bronşial Astımlı Hastalarda Depresyon. J ClinPsy. 2000; 3(2):99-101.

[6]Aydın N, Gürel D, Vural A, et al. The Presence of Depression and Anxiety in Patients with Bronchial Asthma. T Klin J Allergy-Asthma. 2002;4(3):119-24.

[7]Cooper CL, Parry GD, Saul C, et al. Anxiety and panic fear in adults with asthma: prevalence in primary care. BMC Fam Pract. 2007; 8:62.

[8]Sheha DS, Abdel-Rehim AS, Abdel-Latif OM, et al. Asthma control and mental health level of asthma patients during COVID-19 quarantine: a cross-sectional survey. Egypt J Bronchol. 2021;15(1):12.

[9]Boer GM, Houweling L, Hendriks RW, et al. Asthma patients experience increased symptoms of anxiety, depression, and fear during the COVID-19 outbreak. Chron Respir. Dis 2021;18:14799731211029658.

[10] Global Strategy for Asthma Management and Prevention, 2022 (updated). https://ginasthma. org/wp-content/uploads/2022/07/GINA-Main-Report-2022-FINAL-22-07-01-WMS.pdf
[11] Sorias O. Psikiyatrik derecelendirme ölçekleri. Güleç C, Köroğlu E, ed. Psikiyatri Temel Kitabı. 1. Cilt. Ankara. 1998:81-93.
[12] Hisli N. Beck Depresyon Envanteri'nin geçerliliği üzerine bir çalışma. Psikoloji Dergisi 1988;6:118-22.
[13] Ulusoy M, Sahin, N, Erkmen H. Turkish version of the Bec kAnxiety Inventory; Psychometric Properties. J Cognitive Psychother. 1998;12:163-72.
[14] Tasnim R, Sujan SH, Islam S, et al. Depression and anxiety among individuals with medical conditions during the COVID-19 pandemic: Findings from a nationwide survey in Bangladesh. Acta Psychol (Amst). 2021;220:103426.
[15] Sayeed A, Kundu S, Banna HA, et al. Mental Health Outcomes of Adults with Comorbidity and Chronic Diseases during the COVID-19 Pandemic: A Matched Case-Control Study. Psychiatr Danub. 2020;32(3-4):491-8.
[16] Ciprandi G, Schiavetti I, Rindone E, et al. The impact of anxiety and depression on outpatients with asthma. Ann Allergy Asthma Immunol. 2015;115(5):408-14.
[17] Lavoie KL, Bacon SL, Baron S, et al. Which is worse for asthma control and quality of life: depressive disorders, anxiety disorders, or both? Chest. 2006;130(4):1039-47.
[18] Trzcińska H, Przybylski G, Kozłowski B, et al. Analysis of the relation between level of asthma control and depression and anxiety. Med Sci Monit. 2012; 18(3): CR190–CR194.
[19] Nascimento I, Nardi AE, Valença AM, et al. Psychiatric disorders in ambulatory asthma patients. Psychiatry Research. 2002;15:110(1):73-80.
[20] Gunaydın NC, Baykal S. COVID-19 Pandemi Döneminde Astım Tanılı Ergenlerde Anksiyete Düzeyinin Değerlendirilmesi. Namık Kemal Tıp Dergisi. 2020;8(3):288-94
[21] Urrutia I, Aguirre U, Pascual S, et al. Impact of Anxiety and Depression on Disease Control and Quality of Life in Asthma Patients. J Asthma. 2012;49: 201–8.
[22] Mangold R, Salzman GA, Williams KB, et al. Factors Associated with Depressive Symptoms in Uncontrolled Asthmatics. Asthma. 2018;55(5):555–60.
[23] Yonas MA, Marsland AL, Emeremni CA, et al. Depressive Symptomatology, Quality of Life, and Disease Control in Individuals with Well-Defined Severe Asthma. Asthma. October 2013; 50(8): 884-90
[24] Ettman, CK., Abdalla SM., Cohen GH, et al. Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. JAMA Netw Open. 2020;3(9):e2019686.
[25] Higbee DH, Nava GW, Kwong ASF, et al. The impact of asthma on mental health andwell-being during COVID-19 quarantine. Eur Respir J. 2021;58(1):2004497.
[26] Wei L, Islam JY, Mascareno EA, et al. Physical and Mental Health Impacts of the COVID-19 Pandemic among US Adults with Chronic Respiratory Conditions. J ClinMed. 2021;10(17):3981.