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The level of anxiety and its relationship with metacognitive beliefs in asthma patients during the COVID-19 pandemic

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Abstract

Asthma is a disease characterized by the narrowing of the airways and resulting shortness of breath. Anxiety is a condition that is frequently observed in patients with asthma and causes worsening of symptoms. Coronavirus disease-2019 (COVID-19) has influenced the mental health of many individuals. 'The aim of this study is to determine the anxiety levels of asthma patients during the pandemic period and to reveal the contribution of these patients' metacognition to anxiety'. This study was planned retrospectively Twenty-eight asthma patients were evaluated for asthmatic symptoms and anxiety levels. before the COVID-19 pandemic and 28 healthy controls were included. During the COVID-19 pandemic, patients were re-evaluated for asthmatic symptoms and anxiety levels. The Asthma Control Test (ACT), Beck Anxiety Inventory (BAI) and Metacognition Scale-30 (MCS) were applied to all participants to evaluate levels of asthmatic symptoms, anxiety and metacognitive beliefs. During the pandemic, while patients' ACT scores increased significantly (p=0.011), the BAI score decreased significantly (p=0.039), compared to the pre-pandemic values. BAI score was negatively correlated with pre- and post-pandemic ACT scores (p=0.029, p=0.006, respectively). During the pandemic, patients' BAI score and "need to control thoughts" subscale score of MCS-30 were found significantly higher than those of controls (p=0.003). Additionally, patients' anxiety levels during the pandemic were correlated with the metacognitive scale score (p=0.036). Asthma symptoms were observed to remit, and anxiety levels to decrease during the pandemic in asthma patients, compared to the pre-pandemic values. Patients' anxiety levels during the pandemic were found higher than those of controls. Therefore, we consider that current anxiety is related to metacognitive beliefs, and our study findings are important in terms of understanding anxiety developing in asthma patients during the pandemic and reflecting the findings to psychotherapeutic modalities.

Keywords: Anxiety, asthma, belief, covid-19, metacognition

Introduction

Asthma is the most common chronic airway disease (1-18%) and manifests itself with such symptoms as cough, shortness of breath, and chest tightness [1]. The most common psychiatric challenge accompanying asthma is anxiety, and while the level of anxiety is found higher in 90% of asthma patients, one-third of the patients are stated to have an anxiety disorder [2]. It is reported that anxiety not only facilitates the emergence of asthma symptoms but increases their severity as well [3].

The first cases of coronavirus disease-2019 (COVID-19) due to severe acute respiratorysyndrome coronavirus-2 (SARS-CoV-2) occurred in Wuhan, China, in December 2019.

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The fact that COVID-19 has made a big impact and turned into a pandemic has led to anxiety and fear around the world. Uncertainties regarding the COVID-19 pandemic have negatively affected the mental health of individuals, and increased anxiety, depression, and sleep disorders have become the most common psychiatric problems [4].

In a study conducted with approximately 7.000 people in China during the COVID-19 pandemic, the prevalence of generalized anxiety disorder was determined to be 35.1%, while in another study performed with 343 participants in Türkiye, the anxiety level was found higher in 45.1% of the participants [5,6]. The concept of metacognition can be defined as high-level cognitive structures and processes controlling, regulating, and evaluating thoughts [7] . Under the cognitive behavioral approach, individuals may experience various positive and negative beliefs (metacognition) about their thoughts (cognitions) affecting their approaches to events. Dysfunctional metacognitions are important factors in the continuation of mental disorders and cause an individual to develop non-adaptive reaction styles, leading to mental disorders [8].

The relationship of metacognition with anxiety in chronic diseases such as fibromyalgia and irritable bowel syndrome has been previously investigated [9]. It has been previously shown that there is an increase in the anxiety level of asthma patients [2]. The main target of our study is comparing the pre-pandemic anxiety levels of asthmatic patients without any psychiatric disorders with the levels detected in the course of COVID-19. Besides, our study also aimed to compare the anxiety levels and metacognitive beliefs during the COVID-19 pandemic with those of the controls and examine the relationship between the patient's current anxiety and metacognitive beliefs. We hypothesize that COVID-19 has increased the anxiety level of asthma patients, so the anxiety level during the COVID-19 pandemic has been higher than that of the healthy controls, and the current anxiety in asthma patients is associated with dysfunctional metacognitions.

Material and Methods

The hospital records of those diagnosed with asthma in the chest diseases outpatient clinic and referred to the department of psychiatry due to anxiety symptoms between January 2019 and January 2020 were mounted and retrospectively investigated in Konya Practice and Research Hospital of Baskent University. After recording the data of asthmatic patients revealing no psychopathology following psychiatric examination, the patients were re-assessed by chest diseases and psychiatry specialists after May 2020. Approval was obtained from the Ethics Committee of the medical school of Baskent University (project number: KA20/210- 01.12.2020). Written and informed consent was obtained from each participant about the design.

In terms of inclusion criteria, those <18 years of age, literate, and diagnosed with asthma under the criteria of the Global Initiative for Asthma (GINA) were included [10]. Patients with uncontrolled asthma and those with additional chronic diseases, having any previous psychiatric diagnosis, and using psychiatric drugs were excluded from the study.

The scores of the Asthma Control Test (ACT) and Beck Anxiety Inventory (BAI), and other features related to the patient's sociodemographic data and history of additional diseases detected in the pre-pandemic period in 31 patients previously evaluated in the chest diseases outpatient clinic and diagnosed with asthma and seen not to have active psychopathology during the psychiatric examination were recorded. Two and one patients due to comorbidity and uncontrolled diagnosis of asthma were not included in the criteria, respectively. Therefore, 28 patients with no past or present psychiatric diseases and 28 healthy control subjects were matched concerning age and sex and constituted our study participants. The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) was conducted by a psychiatrist to all participants included in the study [11].

Assessment Tools

The Sociodemographic Data Form: The form including questions was created by the researchers to investigate such demographic features of the patients as age, sex, level of education, employment, and marital status.

The Asthma Control Test (ACT): Calculated as the highest (25 points) and the lowest (5 points), good control (>19), partial control (15-19), and uncontrolled (<15), ACT is a test consisting of five titles questioning the symptoms of asthma during the sleep and wake cycle, using rescue medication and rating patients' exposure to asthma-related daily activities [12].

The Beck Anxiety Inventory (BAI): Having a total of 21 items (each has 4 grading options), developed by Beck et al., BAI is a self-assessment scale and detects the risk in terms of anxiety level in adults by measuring the symptoms of anxiety; the validity and reliability of BAI in Turkiye was researched by Ulusoy et al. [13].

The Metacognition Scale-30 (MCS-30): Developed by Cartwringht-Hatton and Wells to evaluate metacognitive beliefs, MCS-30 is a 30-item scale consisting of five subscales: positive beliefs", "need to control thoughts", "cognitive awareness", "uncontrollability and danger", and "cognitive confidence". In MCS-30, each item is scored from 1 to 4 points, meaning 1 (I do not agree at all) and 4 (I completely agree). The lowest score that can be obtained from the scale is 30, and the highest score is 120. The higher the score is, the higher the pathological and dysfunctional metacognitive activities are [14].

Statistical Analysis

The Statistical Package for Social Sciences for Windows, version 15.0 package program was utilized to analyze the statistics (SPSS Inc., Chicago, IL, USA). Since the variables evaluated by the Kolmogorov-Smirnov test showed normal distribution, the student's t-test was used to compare the variables. The findings were reported as mean±standard deviation (SD). The

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chi-square test was used to compare the categorical data, and the relationships between parametric numerical variables were investigated with the Pearson's correlation test. All tests used are two-tailed. In all analyzes, a p-value of <0.05 was assessed to be significant.

Results

The patients' average mean age included in the study was 43.57±15.14 years. Of the patients, 67.9% (n=19) were women; 53.6% (n=15) were found university graduates; 60.7% (n=17) were employed, and 64.3% (n=18) were married. Even so, there was no statistically significant difference between both groups concerning age, sex, level of education, employment, and marital status. The findings related to the sociodemographic data are presented in Table 1.

When the patients' pre-pandemic ACT and BAI scores were compared with those after the COVID-19 pandemic, a significant increase was seen in the scores of ACT (p=0.011) while a significant decrease was detected in the BAI scores (p=0.039) (Table 2). Given the association between the patients' ACT scores and BAI scores evaluated pre- and during the COVID-19 pandemic via the Pearson's correlation analysis, a negative correlation was determined (r=-0.413 and p=0.029; r=-0.530 and p=0.006, respectively).

When both groups were compared concerning the BAI and MCI-30 scores during the COVID-19 pandemic, the BAI score (p=0.034) and the subscale of "need to control thoughts" (p=0.003), one of the subscale scores of MCI-30, were found to be significantly higher (Table 1). When the correlation between the scores of MCI-30 and BAI determined during the COVID-19 pandemic was evaluated through the Pearson's correlation analysis, there was a positive correlation between the averages of the total MCI-30 score and the BAI score (p=0.036).

Table 1. Comparison of the sociodemographic and clinical characteristics of the patient and control groups during the Covid-19 pandemic

	Patient (n=28)	Control (n=28)	P
Age	43.6±15.14	44.5±14.83	0.824
Gender (Female/Male)	19/9	17/11	0.577
Education Status (Primary/Secondary/High/University)	7/2/4/15	5/4/6/13	0.672
Marital Status (Married/Single/Divorced/Widow)	18/5/1/4	20/4/2/2	0.749
Employment Status (Employed/Unemployed)	17/11	20/8	0.397
Beck Anxiety Inventory (BAI)	12.95±10.96	8.05±3.47	**0.034**
Positive Belief	11.75 3.38	11.25 3.86	0.637
Need to control thoughts	14.29 3.54	11.20 3.05	**0.003**
Cognitive awareness	16.21 2.92	15.05 3.12	0.218
Uncontrollability and danger	13.75 3.28	14.15 2.96	0.667
Cognitive confidence	14.32 4.38	13.80 4.13	0.680
Total Metacognition Scale-30 (MCS-30)	70.32 12.36	64.45 7.42	0.065

BAI: Beck Anxiety Inventory, MC S-30: Metacognition Scale-30
T-test was used for the evaluation of non-categorical data and Chi-square comparison of categorical data. p<0.05
*Independent samples t-test was used for comparison the evaluation of continuous data and Chi- square for comparison of categorical data

Table 2. Comparison of the patients' ACT and BAI scores before the Covid-19 pandemic with the ACT and BAI scores during the pandemic period (n:28)

	Pre-Pandemic Mean±SD	During Pandemic Mean±SD	p
Asthma Control Test (ACT)	15.75±5.10	18.50±5.07	**0.011**
Beck Anxiety Inventory (BAI)	17.70±10.89	12.95±10.96	**0.039**

Independent samples t-test was used for comparison BAI: Beck Anxiety Inventory, ACT: Asthma Control Test
The t-test was used to compare the pre-pandemic data with the data during the pandemic. p <0.05

Among the subscales, especially the subscale scores of "uncontrollability and danger" (p=0.027) and "need to control thoughts" (p=0.006) were observed to be positively correlated with the BAI score (Table 3).

Compared to the patients by the sociodemographic data such as sex, education, employment, and marital status, no significant difference was found between the scale scores of pre- and post-pandemic periods. When the patients' age was compared with the scale scores, it was seen that there was no significant relationship between the pre- and post-COVID-19 pandemic.

Table 3. Relationship between Metacognition Scale-30 (MCI-30) and Beck Anxiety Inventory (BAI) score of patients during the Covid-19 pandemic (n:24)

	Pearson correlation coefficient	p
Positive Belief	0.351 ()	0.093
Need to control thoughts	0.540 ()	**0.006**
Cognitive awareness	0.332 ()	0.113
Uncontrollability and danger	0.451 ()	**0.027**
Cognitive confidence	-0.051 ()	0.815
Total MCS-30	0.430 ()	**0.036**

BAI: Beck Anxiety Inventory, MCS-30: Metacognition Scale-30
The relationship between variables was examined using the Pearson correlation test. p <0.05

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Discussion

All governments in the world, all health professionals of these governments, and the World Health Organization (WHO) have so far fought and made a vigorous effort against COVID-19 which has become the biggest threat to humanity in the 21st century, and the victory has yet to be won. Lack of definitive responses to the questions about the pandemic such as the end of the pandemic and what the treatment modalities are requires maintaining the measures taken to reduce the spread of SARS-CoV-2. Among the main measures are vaccination, social distance, quarantine, and social isolation, and such measures force people to stay at home as much as possible and negatively affect individuals' mental health [2]. The psychological consequences of such a serious life event may be more serious, especially for asthma patients, one of the high-risk groups. It is important to investigate the anxiety level of asthma patients during the pandemic process and to examine the relationship between existing anxiety and metacognitive beliefs to control the psychological consequences of the pandemic in these patients.

Our study revealed that asthmatic symptoms and anxiety levels were reduced during the COVID-19 pandemic when compared to those within the pre-pandemic period. Additionally, as asthmatic symptoms increased during both pre- and post-pandemic periods, the anxiety level was also detected to increase. Compared the patients with the healthy controls concerning the anxiety level and metacognitive beliefs during the COVID-19 pandemic, the patients were observed to have higher anxiety levels and to use the "need to control thoughts" metacognition at a higher rate. Also, a positive relationship was found between the patient's anxiety level during the pandemic and the metacognitions of "need to control thoughts" and "uncontrollability and danger".

The surge of COVID-19 and its rapid global spread have caused higher mortality and uncertainties about the virus, increased individuals' anxiety levels, and so paved the way for mental illnesses [15]. In recent studies, it has been shown that mental illnesses, such as anxiety disorders, depression, post-traumatic stress disorder and sleep disorders, have increased after the COVID-19 pandemic [16]. In a meta-analysis where the mental impacts of the COVID-19 outbreak on the general population were evaluated, the anxiety level was observed to increase by 31.9% [17]. Quarantine and social isolation lead to a significant increase in anxiety levels [18]. In a study investigating the effects of COVID-19 in terms of sociodemographic factors, it was stated that psychiatric symptoms were more common in women, and among those between 21-40 years of age, those with a history of medical treatment or chronic disease, and those whose family members or relatives contracted COVID-19 [17]. In another study investigating mental health status in those with chronic diseases during the quarantine period due to COVID-19, chronic diseases were grouped, and the levels of somatization and distress were detected to be higher in those with respiratory system diseases than the controls [19]. In the studies conducted on children with asthma during the COVID-19 pandemic, asthma was concluded not to be a serious risk factor for COVID-19 infection; however, it was emphasized that keeping the psychological status of the patients stable along with the medical condition was important to minimize the effects of the pandemic [20]. Based on these findings, it was not an expected result that the patient's anxiety level decreased during the COVID-19 pandemic in our study. However, both the anxiety level of the patients and the asthma-related symptoms assessed by ACT were observed to decrease in our study. During the COVID-19 pandemic, one of the most common measures taken to decrease the spread rate of the virus is social isolation, and the increase in social isolation may have reduced exposure to environmental allergens. Therefore, asthma-related symptoms can be considered to decrease thanks to the increased isolation, and the clinical improvement may have been related to the decrease in anxiety level. The correlation between the decreases in asthma symptoms and anxiety levels during both pre and post-pandemic periods supports such a relationship.

During the pandemic, the anxiety level was revealed to be significantly higher among the patients than that of the healthy control group. In a study conducted in our country, it was concluded that psychiatric symptoms, such as anxiety and depression, increased during the pandemic, and women and those with previous psychiatric diseases and additional chronic diseases were affected most by increased psychiatric symptoms [6]. However increased anxiety level was found in the general population during the pandemic in previous studies, the level of anxiety was determined to be higher within asthma patients than the controls, as compatible with the findings in the literature. Given that asthma is a chronic disease, such clinical findings as cough and shortness of breath detected due to COVID-19 are primarily related to the respiratory system, and those factors may have led to the increase in the anxiety levels of asthma patients. Supporting this relationship, a study conducted in Greece during the quarantine due to COVID-19 revealed that those with any respiratory system disease experienced higher distress, compared to those with other chronic diseases and the healthy control group [19]. Various studies were carried out on patients with chronic diseases during the pandemic, and it was revealed that COVID-19-induced stress triggers acute heart attacks in patients with cardiac disease, and those patients have postponed hospital admission due to concerns of COVID-19 infection [21]. It has been reported that anxiety induced by COVID-19 may exacerbate disease attacks in those with multiple sclerosis (MS); 20% of epilepsy patients have difficulty accessing routine medical treatments, and the rate of rejection of surgical operations of breast cancer patients has increased [22]. The fact that the anxiety level of asthma patients is higher than the healthy controls during the pandemic is important in terms of triggering anxiety- related attacks, as in cardiac patients and those with MS. In addition, the correlation between the anxiety level and asthmatic symptoms during pre- and pandemic periods, and the lower rate of asthma symptoms in patients during the pandemic than the pre-pandemic suggest that less exposure to environmental allergens due to social

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isolation as a secondary factor has decreased the level of anxiety in COVID-19 sufferers. During the pandemic, increasing social isolation and unwillingness to leave home have been important factors causing the sufferers to delay their access to treatment.

Metacognition is a term used to define that individuals are aware of the events in their minds and whether they can manage the events [23]. The metacognitive system is of vital importance in adapting our thoughts to the environment. Therefore, when dysfunctional metacognitions are used, various psychopathologies occur. In various studies investigating the relationship between metacognition, and anxiety, chronic conditions such as infertility, irritable bowel syndrome, fibromyalgia and psychiatric diseases, it was reported that there were significant differences between the patient and the control groups [24]. In our study, it was found that patients with asthma had more metacognitions of "need to control thoughts" than the healthy controls, and as the anxiety level increased, the metacognitions of "need to control thoughts" and "uncontrollability and danger" were stated at a higher rate. Subscale of "need to control thoughts" is a belief indicating that if individuals cannot control their thoughts, they will be responsible for the damaging consequences. As another subscale, "uncontrollability and danger" is the notion where anxiety cannot be taken under control in dangerous situations. In previous studies carried out with panic disorder patients, it was found that both metacognitive parameters were used higher by panic disorder patients [25]. When panic disorder patients use these dysfunctional metacognitive parameters, the situation has been interpreted as a case where the patients' anxiety needs to be controlled, and the patients wish to be safe and should not blame themselves because of not controlling the anxiety [26]. The same may be the case for asthma patients. These results are important in terms of bringing a different perspective to the anxiety of asthma patients during the pandemic within the framework of the metacognitive model. Our study is the first to evaluate asthma patients' anxiety levels comparing the findings during the pre-pandemic and pandemic periods, and investigating the relationship between the anxiety level and metacognitive beliefs in asthma patients. Although our study findings are surprising that asthma patients had lower anxiety levels during the pandemic than in the pre-pandemic period, it was determined that the current anxiety during the pandemic was higher among the patients than the control group. Given the relationship between the patient's current anxiety and metacognitive beliefs, the patients were observed to make an excessive effort to control their thoughts. The fact that the study participants consisted of only those admitted to a single university hospital, and the small number of participants are the most important limitations of this study. However, the data being collected via face-to-face interviews with the patients rather than the Internet or by phone calls makes our study different from others regarding the psychological consequences of the COVID-19 pandemic. Other trials carried out during the troublesome process have also shown that metacognitions are effective on COVID-19 induced anxiety [27,28].

Conclusion

As a result, it was determined that the anxiety level in asthma patients during the pandemic was higher than that of the healthy controls, and the increased anxiety level during the pandemic was associated with metacognitive beliefs. We consider that the obtained data can be used in psychotherapy-focused modalities for the anxiety of asthma patients, as well as contributions to the understanding of anxiety and the management of such patients' treatments during the pandemic. We also consider that other factors affecting the anxiety level of patients during the pandemic may be the subject of future studies, and further comprehensive studies in which the data on the treatment of asthma patients are discussed are required.

Conflict of interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
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Ethical approval
Our study approval was obtained from the Ethics Committee of the medical school of Baskent University (project number: KA20/210).

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