



EPIDEMIOLOGICAL AND CLINICAL PARAMETERS IN PATIENTS WITH COVID-19 AND BRONCHIAL ASTHMA

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ABSTRACT:

Purpose: to analyze the epidemiological and clinical parameters of asthmatic patients with COVID-19 infection.

Materials and methods: a retrospective study was performed including data from an outpatient pulmonary practice in Pleven, Bulgaria, for the period 01.04. 2020 – 31.12. 2021. Sixty-five asthmatics were included and divided into two groups, referred to hospital due to COVID-19 infection (A) and outpatients (B), and their epidemiological and clinical data were compared.

Results: 65 patients were analyzed, 46 (71%) women and 19 (29%) men. Forty-four patients were confirmed with PCR and/or antigen test, and in 21, the diagnosis was based on clinical and X-ray data. Group A included 18 patients. It was found that patients over 65 years were significantly more in group A (44.4% vs 18.8%, $p < 0.05$). There were significant differences between the groups concerning ischemic heart disease (9%/3%, $p = 0.001$), arterial hypertension (10.6%/7.6%, $p = 0.007$), heart failure (3%/0%, $p = 0.01$), diabetes, but not in allergic rhinitis. We did not find a distinction regarding sex, adherence to inhalation therapy and usage of systemic corticosteroids ($p > 0.05$). None of the patients had an exacerbation during the treatment in the hospital and within a month after the hospital discharge.

Conclusion: According to the analyses of the study, COVID-19 infection is not a risk factor for asthma exacerbations. The leading causes for the severity of the coronavirus infection in asthmatics are the age and some concomitant diseases.

Keywords: asthma, COVID-19, outpatients, comorbidities.

INTRODUCTION:

Despite the remarkable advances in the knowledge of asthma and the modernization of asthma treatment in recent years, the disease remains a serious medical and social problem worldwide. It is the second most prevalent disease among chronic respiratory diseases, and it remains the leading cause of morbidity and mortality among them [1]. There is an increase in the prevalence of asthma in many countries [2]. Problems related to the disease include underestimation of the diagnosis (e.g., in Spain, up to 50%

of asthmatics are undiagnosed) and lack or insufficient control of the disease. Worsening of the disease can be due to many reasons – related to control, proper treatment and its adherence, as well as underlying risk factors, with viral infections being the predominant risk factor [3]. The rapidly progressing pandemic of COVID-19, which began in late 2019 and was caused by SARS-CoV-2, posed new challenges to medicine. Millions of people have been affected by the infection and its associated morbidity and mortality. Many studies have emerged in a relatively short time describing the clinical manifestations and severity of the infection, the change in laboratory parameters and the importance of specific biomarkers for the prognosis of the disease. It is already known that in patients with COVID-19 infection, the severity of the disease varies from asymptomatic to fatal. Different clinical phenotypes have been described based on clinical course and laboratory parameters [4, 5].

There are many reports looking for a relationship between underlying diseases and the severity of coronavirus infection. Among them, the most common are cardiovascular diseases, and diabetes. In this regard, the role of asthma in the course of new coronavirus infection, as well as the feedback – the impact of COVID-19 infection on the course of asthma, are less studied. COVID-19 infection in asthma patients has a complex impact and is modified by many interrelated factors – demographic, environmental [6]. At the beginning of the epidemic caused by COVID-19, asthma was identified by some authors as a risk factor for severe disease. This definition is logical and is in line with many publications since the 1970s, indicating the increased susceptibility of asthma patients to viral infections, including those caused by coronaviruses [4, 6, 7]. There is growing evidence in the literature to suggest that patients with mild to moderate asthma are not at risk for severe coronavirus infection, unlike those with severe asthma [2]. Many studies of COVID-19 focused on hospitalized patients, but it should be noted that many patients have been treated on an outpatient basis [8]. The follow-up, monitoring, and treatment of patients with bronchial asthma during the COVID-19 epidemic remained a major challenge.

The aim of our study was to analyze the epidemiological and clinical parameters of asthmatic patients with COVID-19 infection.

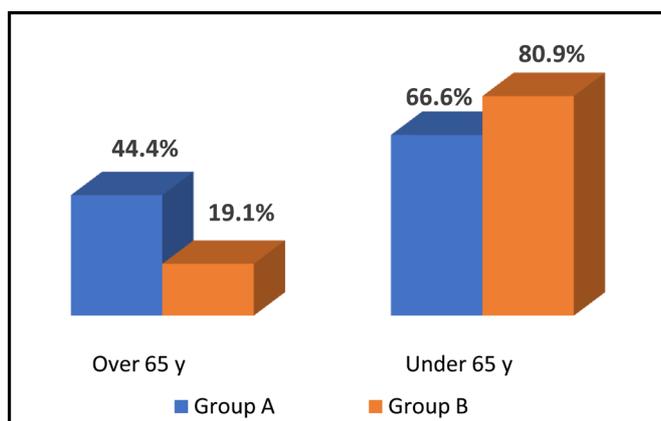
MATERIAL AND METHODS:

This was a non-interventional, retrospective study with elements of a prospective study, using data from electronic medical records from an outpatient pulmonary practice "Asthma center" in Pleven, Bulgaria. The data were collected for the period 01.04. 2020 – 31.12. 2021. Demographic characteristics (age and sex), history of concomitant diseases by number and type were described. Data concerning asthma severity, adherence to basic therapy and systemic corticosteroids use were included too. The asthmatics were divided into two groups: referred to hospital due to COVID-19 infection (A) and outpatients (B), and their epidemiological and clinical data were compared. The data from the survey were processed with software statistical packages STATGRAPHICS v. 19.0 and EXCEL for Windows. The Kolmogorov-Smirnov test was applied to verify the distribution of the variables. In the analysis of the results, the parametric tests were applied in: normal distribution for hypothesis testing: Student's t-test in dependent and independent samples; Analysis of Variance (ANOVA) – LSD, Tukey HSD, Duncan Scheffe, Bonferon; non-parametric test with a different than normal distribution to test hypotheses: Pearson test; Kruskal-Wallis test; Man Whitney (Wilcoxon) W test. The significance of the conclusions was determined at $p < 0.05$.

RESULTS;

Sixty-five patients were analyzed, 46 (71%) women and 19 (29%) men average age of 44.6 y (SD ± 14). 44 patients were confirmed with PCR and/or antigen test, and in 21, we put the diagnosis according to clinical and X-ray data. Group A included 18 patients and group B – 47 patients. The average age was comparable in both groups, but the patients over 65 years were significantly more in group A (44.4% vs 18.8%, $p < 0.05$) (Fig. 1). 7.6% of men and 19.7% of women were hospitalized. There were no significant differences in sex between the groups, $p > 0.05$.

Fig. 1. Distribution of the patients by age over and under 65 years in both groups



Regarding the severity of asthma, we found no differences in the compared patients (Table 1). None of the patients in this observational study had an exacerbation of asthma during the treatment in the hospital and within a month after the hospital discharge.

Table 1. Asthma severity – comparison between the groups.

Asthma severity	Group A	Group B	Row Total
1 Mild	8.93%	39.29%	48.21%
2 Moderate	17.86%	30.36%	48.21%
3 Severe	0.00%	3.57%	3.57%
Column Total	26.79%	73.21%	100.00%

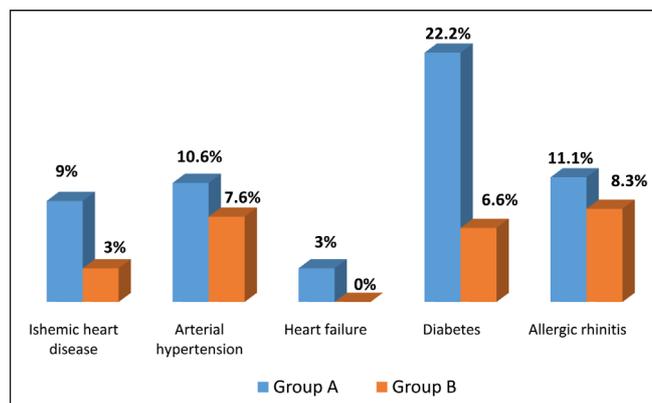
The large share of patients with concomitant diseases was impressive – 61.5% of all of them. The percentage of comorbidities was higher in the hospitalized asthmatics (A/B group – 83.3%/53.2%; $p = 0.038$). Some of the patients had one, and others had two, three or more than three comorbidities (Table 2). We found comorbidities such as arterial hypertension, ischemic heart disease, diabetes, heart failure, and allergic rhinitis.

Table 2. Comparative assessment of the number of concomitant diseases in both groups.

Concomitant diseases by number	1 Group A	2 Group B
1 disease	3 16.7%	21 44.7%
2 diseases	6 33.3%	5 10.7%
3 or more diseases	6 33.3%	6 12.8%
Without conc. diseases	3 16.7%	32 31.9%
Total	18 100.0%	47 100.0%

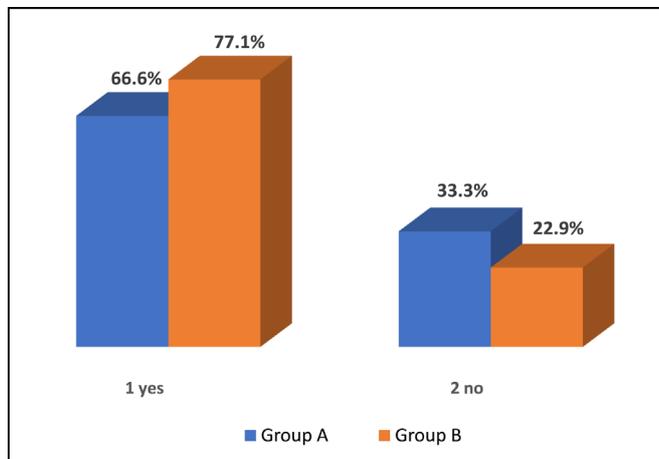
There were significant differences between the groups concerning ischemic heart disease (A/B group – 9%/3%, $p = 0.001$), arterial hypertension (10.6%/7.6%, $p = 0.007$), heart failure (3%/0%, $p = 0.01$), diabetes, but not in allergic rhinitis (Fig. 2).

Fig. 2. Comparative assessment of the types of concomitant diseases in both groups



The majority of patients were adhered to basic inhalation therapy with corticosteroids and beta 2 agonists. There was no significant difference in this indicator in the compared groups (Fig. 3). We did not find a distinction regarding the use of systemic corticosteroids ($p>0.05$).

Fig. 3. Adherence to therapy.



DISCUSSION:

Several aspects are considered in this study. The first concerns the role of coronavirus infection in the course of asthma, examining the likelihood for exacerbations in this chronic pulmonary disease. We found that there was no such dependence, which is in support of the data provided by some authors [9].

Davies et al. (2021) established in interesting large, population-based research in the United Kingdom that the lockdown was associated with a 36% pooled reduction in emergency admissions for asthma. There was no significant change in asthma deaths and reductions in severe asthma exacerbations. One of the explanations for this phenomenon was the role of environmental factors such as altered exposure to air pollution and road traffic, increased social distancing [10]. In contrast, Philip et al. (2022) concluded in their study that COVID-19 is associated with worsened asthma control. Moreover, follow-up of these patients showed that some of them developed “long COVID” with worsening of the symptoms in both diseases [6]. In our study, follow-up of hospitalized patients within one month after the discharge did not show worsening of asthma. It is interesting to clarify the overlap of the symptoms of asthma

and COVID-19 infection, emphasizing the need for differentiation in order to treat these patients successfully. For the time being, assumptions about the worsening of the course of asthma caused by Sars-CoV-2, similar to other viral infections, are not justified by most authors [11, 12].

Only 3.57% of the group of patients in our study had severe asthma. The data are confirmed by those of a large Italian study (2021), in which in 1504 patients with severe asthma was found a low incidence of infection – 1.73% [13].

The role of comorbidities as a risk factor for severe course of COVID-19 infection has been widely discussed in the literature. Many authors emphasize that older adults, as well as those with underlying chronic diseases, are at risk of more severe infection [14]. The importance of arterial hypertension, chronic cardiovascular diseases, diabetes and chronic obstructive pulmonary disease (COPD) for the negative course of the disease has already been proven [15, 16]. However, there are relatively few researchers who study the opposite effect – asthma on the manifestation of COVID-19 infection [6, 10]. We found that comorbidities were important in terms of the risk of hospitalization in the patients with asthma we studied. A significant part of the studied patients had concomitant diseases, of which 12.7% – with three or more comorbidities, more often affecting the group of hospitalized patients ($p<0.02$). Cardiovascular diseases and diabetes stand out among them. For example, patients with ischemic heart disease and diabetes are nearly three times more likely to be hospitalized than others.

In an attempt to explain reductions in severe asthma exacerbations, some authors note the possible correlation with adherence to inhalation therapy with inhaled corticosteroids [10, 17]. This is reflected in the latest GINA update (2022), which pointed out the importance of continuing treatment with asthma medications during the pandemic, paying attention that stopping treatment could lead to a potentially dangerous worsening of the disease [2]. Most of patients in our study adhered to the therapy for asthma maybe that was one of the reasons we did not find worsening and exacerbations of the disease.

CONCLUSION:

According to the analyses of the study, COVID-19 infection is not a risk factor for asthma exacerbations. The leading causes for the severity of the coronavirus infection in asthmatics are the age and some concomitant diseases.

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