CE-RESEARCH LETTER TO THE EDITOR

Asthma in patients admitted to emergency department for COVID-19: prevalence and risk of hospitalization

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Dear Editor,

Current literature suggests that the prevalence of asthma among COVID-19 patients is similar to global one and that asthma does not appear to increase the risk of developing severe COVID-19. [1–8] Published data come from studies on patients admitted to hospital for COVID-19, whereas little or no evidence are available on the setting of emergency department (ED).

Aims of our study were to assess in consecutive adult patients admitted to emergency room for COVID-19:

1. The prevalence of asthma;
2. The relationship between history of asthma and risk of hospitalization.

This study was approved by the institutional review board of our hospital, the Fondazione Policlinico Universitario Agostino Gemelli—IRCCS, Rome, Italy.

We retrospectively reviewed the electronic health records of all patients with age ≥ 18 years, symptoms compatible with COVID-19, and evidence of SARS-CoV2 infection using a molecular nasopharyngeal swab performed during admission to ED of our hospital. There were two enrollment periods: between March and May 2020 and between October and December 2020.

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We consecutively reviewed the medical records of 816 patients. After the exclusion of 82 due to incomplete data, 734 patients were available for the present study.

Their demographic and clinical characteristics are listed in Table 1.

We reported data as percentages for categorical variables and as mean (standard deviation) for continuous variables. We compared categorical variables by the χ^2 test or the Fisher exact test, and continuous variables by the independent t-test or the non-parametric Mann–Whitney U test. We performed the statistical analysis using IBM SPSS 20 software (IBM Corp., Armonk, NY, USA). P values of < 0.05 was considered statistically significant.

Among 734 newly diagnosed COVID-19 patients, we identified 18 subjects with a history of asthma (2.5%), a much lower prevalence than expected. According to a 2020 national report on the epidemiological impact of chronic diseases in general practice, asthma has a national prevalence of 9.1%, and a local prevalence (Lazio) of 8.8% [9]

A total of 579 out of 734 were hospitalized (78.9%): 6/18 (33.3%) in the group with history of asthma with respect to 573/716 (80%) in the one without asthma. The difference resulted to be statistically significant ($P < 0.00001$).

None of the 12 patients with asthma and COVID-19 discharged at home were readmitted to the ED of our hospital in the following month.

Our data agree with the current literature suggesting that asthma is not a risk factor for COVID-19. Furthermore, our results are extremely similar to the only other data on Italian epidemiology by Caminati et al. In 2000 COVID-19 patients admitted to 5 hospitals in the Northern Italy, the authors found a prevalence of asthma of 2.1%. [10] As mentioned above, to the best of our knowledge, the present study is the only one performed on an

Table 1 Demographic and clinical and laboratory characteristics of patients admitted to Emergency Department for COVID-19

	Asthma (n = 18)	No Asthma (n = 716)	P
Age (years ± SD)	56.1 ± 13.6	62.5 ± 17.2	ns
Males	55.6%	61.2%	ns
BMI	27.5 ± 7.6	26.0 ± 4.3	ns
History of smoke	22.2%	44.3%	ns
Mean number of medications at home	1.8 ± 0.9	1.5 ± 1.6	ns
Mean number of comorbidities	1.8 ± 2.0	2.6 ± 3.0	ns
Systemic steroids	11.1%	3.1%	ns
ICS	33.3%	0.8%	P < 0.00001
ACE-inhibitors/ARB	27.8%	32.2%	ns
SpO2%	93.6 ± 8.8	93.4 ± 8.5	
pO2/fO2	306.7 ± 84.4	339.1 ± 108.1	ns
SBP (mmHg)	124.1 ± 16.9	127.2 ± 22.7	ns
DBP (mmHg)	75.6 ± 11.9	77.5 ± 13.7	ns
HR	93.0 ± 10.8	89.9 ± 17.5	ns
CRP (mg/L)	62.7 ± 83.2	78.2 ± 81.8	ns

ICS inhaled corticosteroids, *ARB* angiotensin receptor antagonist, *SBP* systolic blood pressure, *DBP* diastolic blood pressure, *HR* heart rate, *CRP* C-reactive protein

ED population, more representative of the entire clinical severity spectrum of symptomatic SARS-CoV2 infection.

Some physiopathological considerations can help to explain this "asthma paradox" in COVID-19.

As is well known, there are two main steps affecting the entry of SARS-CoV-2 into host cells: the angiotensin converting enzyme 2 (ACE-2) receptor and the Transmembrane Serine Protease 2 (TMPRSS-2), the first binding and the second priming the viral spike protein. [11] Asthma patients have no overexpression in the ACE-2 gene in either sputum or lung resection specimens compared to healthy subjects, suggesting that asthma is not at increased risk of SARS-CoV2 infection. [12, 13] The use of inhaled corticosteroids (ICS), which are the mainstay of asthma treatment, is associated in a dose-dependent manner with reduced expression of ACE-2 and TMPRSS-2 mRNA. [12] In addition, the polarization of the inflammatory response toward an overexpression of T helper (Th) 2 cytokines, typical of at least a subgroup of asthmatic patients, may counteract the typical Th1 response in COVID-19, thus reducing the risk of complications due to the pro-inflammatory Th1-cytokines, IL-6 among others [14].

Our study has some intrinsic limitations: retrospectivity, lack of a control group, inability to better characterize the asthmatic pattern due to the ED setting, the small number of patients with asthma not allowing to explore other outcomes.

However, the present study suggests that, in patients admitted to ED with new diagnosis of COVID-19, a history of asthma is not common and, if present, it should not be considered per se as an indication for hospitalization.

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Declarations

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