Presenting prevalence, characteristics and outcome of asthmatic patients with T2 diseases in hospitalized subjects with COVID-19 in Madrid, Spain

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Recent publications have reported the characteristic of COVID-19 patients; where the prevalence of asthma is described as equal to or inferior to that general population. In a series from China, 11.4% had drug allergy and 1.4% had urticaria but no patient with asthma, allergic rhinitis, food allergy, nor atopic dermatitis were notified [1]; and in another study with 548 patients, asthma was reported in 0.90% [2]. Prevalence of asthma in COVID-19 has been described in 5.6% of patients in Italy [3], 5.2% in Spain [4], 14% in UK, [5]and 17% in the US [6], similar to the prevalence in general population of these countries [7, 8]. However, clinical characteristics of asthmatic patients and their outcomes have been poorly studied. Recently, Mahdavinia et al. describes that pre-existing asthma is a predictor for longer intubation duration in COVID-19 affected, especially in patients younger than 65y.o. [9].

We aim to report the prevalence of asthma and T2 diseases on a sample of hospitalized patients with COVID-19. Clinical and laboratory characteristics, as well as their

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outcomes were compared with a population of COVID-19 patients without T2 diseases at Fundación Jiménez Díaz University Hospital in Madrid (FJDUH).

The Institutional Ethics Board approved the study of FJDUH. We asked the Technology Department for a random sample of 200 consecutive patients over 18y.o. from the 567 hospitalized with COVID-19 suspicion between March 1st and March 21st, 2020. Only 189 were finally included due to having confirmed the diagnosis by positive COVID-19 polymerase-chain-reaction test.

A retrospective review of electronic medical records was performed. The demographic and clinical characteristics of this cohort are detailed in the Table S1. Data analyzed and comparisons between asthma patients against non-asthmatic patients are described in supplement.

From a total 189 patients, 44 (23.28%) had a T2 disease, with drug allergy (13.70%) being the most frequent, followed by allergic rhinitis (7.40%) and asthma with 11 patients (5.80%). Four patients exhibited food allergy, one had nasal polyps, two had chronic urticaria and one atopic dermatitis. We found 20 patients with aeroallergen sensitization, primarily to pollens (n=13) and dust mites (n=5).

From 11 asthmatic patients, six were diagnosed by specialist (Allergist or Pulmonologist) and the other five in Primary Care. Six had allergic asthma; two of them were sensitized to pollens and pet dander's, the other three only to pollen, and one left was self-reported.

Six had intermittent-asthma using short-acting-ß2-agonist as-needed and five with moderate-asthma on treatment with long-acting-ß2-agonist combined with inhaled glucocorticoid (LABA/GCI). Two of them with low-dose-LABA/GCI (one had prednisone 5mg/daily for rheumatoid arthritis) and the other three with medium-dose LABA/GCI (one had montelukast 10mg/daily) [10]. Ten from the eleven had well-controlled asthma, and one had partially controlled asthma (medium-dose-LABA/GCI and montelukast). Only one from the five patients with moderate-asthma had good compliance with treatment.

Two patients had an asthma exacerbation on admission for COVID-19. One of them died in ICU due to complication of orotracheal-intubation, a woman of 70y.o. with allergic moderate-asthma on treatment with medium-dose-LABA/GCI and montelukast, with bad compliance of inhaled treatment and other comorbidities (severe sleep-apnea-hypopnea-syndrome, obesity); she was treated with LABA-GCI during hospitalization and received systemic GC. The second patient with asthma exacerbation was a woman of 42y.o. with allergic moderate-asthma and obesity, active smoker, type 2diabetes, and bad compliance with inhalation therapy; she received inhaled LABA-GCI during hospitalization but not systemic GC. Two asthmatics were admitted at ICU; one previously described and the other one, a female 52y.o., non-obese, with hypertension, hyperlipemia, diabetes, and non-allergic well controlled moderate-asthma, with good compliance of treatment and no asthma exacerbation during admission, who was finally discharge. Two asthmatic patients died during admission; one previously described, and the other one a 71y.o. female with hypertension, ex-smoker with non-allergic moderate-asthma with poor compliance. She was infected by COVID-19 the second day after abdominal surgery in the hospital (incarcerated inguinal hernia with good outcome of

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the surgery). All patients received medication according to a changing protocol for COVID-19 uploaded at supplements.

Comparing the asthmatic and non-asthmatic group (Table 1), females were predominant in asthmatic patients (p=0.056; CI 95%=0.07535-1.005). There were no significant differences between age, body mass index, smoking habit nor non-T2 comorbidities. The association of allergic rhinitis was significantly higher in asthmatic patients (p=0.0004; CI 95%=3.627-29.912). No statistical difference was found between groups in chest X-Ray findings, symptoms of COVID-19, hospitalization days, ICU admissions, nor deaths. Although, the non-asthmatic group had higher D-dimer on admission (four times higher), not significant differences were found in comparison to asthmatic group (p=0.0846). No significant differences were found with other laboratory findings (leukocytes, eosinophils, lymphocytes, C reactive protein, D-dimer, ferritin) on admission or at discharge between both groups.

The prevalence of asthma in this study agrees with the majority of published data in Europe and is similar to general population in Spain [8,11].

Other main objectives were to describe the relationship between T2 diseases and COVID-19 hospitalization needs. In our cohort of 189 patients, T2 diseases had the same prevalence as our general population; then, it seems not to be an aggravating factor for requiring hospitalization due to COVID-19.

Asthma patients were predominantly female, as reported in other asthma with COVID-19 series [8]. Asthma seems not to be a risk factor for suffering COVID-19, for need of ICU admission or mortality. No significant differences between laboratory findings were found between both groups. Of note, only two of the asthmatic patients had asthma exacerbation on-admission. One of them needed ICU care and finally died but is

important to note that had other comorbidities, similarly to another asthmatic who died. This coincidence could explain the fatal outcome.

Limitations of our study are the lack of lung function tests which weren´t performed due to restrictions recommended during COVID-19[12] and the small group of asthmatics studied but is the first report detailing asthma characteristics in patients with COVID-19. Our results agree with asthma prevalence in other series, and the same can be said of the prevalence of atopic diseases. These results could be explored in larger cohorts to confirm these findings.

Conflict of interest

JS reports having served as a consultant to Thermofisher, MEDA, Novartis, Sanofi, Leti, Faes Farma, Mundipharma, and GSK; having been paid lecture fees by Novartis, GSK, Stallergenes, Leti, and Faes Farma; as well as having received grant support for research from Thermofisher, Sanofi, and ALK. VdP reports having served as a consultant to Astra Zeneca and GSK; having been paid lecture fees by Astra Zeneca and GSK. MJRN reports receiving a grant support for research from Astra Zeneca and GSK, to serve as a consultant to Astra Zeneca and GSK and to have received payments for lectures by Astra Zeneca and GSK. Other authors declare no conflicts of interest.

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Table. Characteristics of asthmatic patients hospitalized with COVID-19.

ASTHMA GROUP (n=11)		
Asthma diagnosis-No (%)	By specialist (allergist or pulmonologist)	6 (54.54)
	Primary Care	5 (45.45)
Asthma severity-No (%)	Intermittent	6 (54.55)
	Mild	0 (0.00)
	Moderate	5 (45.45)
	Severe	0 (0.00)
Asthma treatment-No (%)	SABA monotherapy	6 (54.55)
	Inhaled steroids monotherapy	0 (0.00)
	Inhaled LABA/low-dose-GCI	2 (18.18)
	Inhaled LABA/medium-dose-GCI	2 (18.18)
	Inhaled LABA/medium-dose-GCI with Antileukotrienes	1 (9.09)
	Inhaled LABA/high-dose-GCI	0 (0.00)
	Biologics	0 (0.00)
Asthma control-No (%)	Well controlled	10 (90.91)
	Partially controlled	1 (9.09)
	Poor controlled	0 (0.00)
Asthma characterization-No (%)	Allergic	6 (54.54)
	Non-allergic	5 (45.45)

No: number. SABA: short-acting-ß2-agonist. LABA: long-acting-ß2-agonist. GCI: glucocorticoid inhaled

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