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LETTER TO THE EDITOR

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Unaffected asthma control in children with mild asthma after COVID-19

The pandemic COVID-19 has been afflicting the whole world for over a year. Initially, asthma has been considered a risk factor for enhanced COVID-19 susceptibility, and COVID-19, like other pneumotropic viruses, has been supposed to worsen asthma. Namely, the Centers for Disease Control and prevention still states that adults of any age with a series of conditions, including asthma (moderate to severe), might be at an increased risk for severe illness from the virus that causes COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/).

Despite this belief, evidence is growing about the relationship between asthma and COVID-19, mainly in children. Frenkel and colleagues have recently concluded that children have milder COVID-19 than adults and are spared mostly from the severe acute respiratory syndrome.[1] Moreover, it has been documented that asthma and allergies were rare comorbidities in Italian hospitalized COVID-19 patients.[2] Consistently, we initially reported that on 52 children hospitalized (24 males, mean age 6.2 years) for COVID-19, only 1 required high-level care, and, more interestingly, only 2 patients (4%) were allergic (atopic dermatitis and allergic rhinitis), and 1 patient (2%) was asthmatic.[3] Notably, allergy and asthma prevalences are 32% and 11%, respectively, in our geographic area. Allergic diseases are usually characterized by eosinophilia; most children with asthma display the type 2 high phenotype.[4] Therefore, we argued for a potential role provided by eosinophils in protecting from COVID-19.[4] Eosinophils play an active role in contrasting viral infections. Consistently, eosinopenia is a common feature in COVID-19, correlates with COVID-19 severity, and is normalized after recovery.[5]

However, the real impact of COVID-19 on asthma courses, mainly concerning asthma control, has not been extensively investigated. Therefore, we aimed to explore the possible effect of COVID-19 in a large group of children regularly followed at a tertiary allergy/asthma clinic. We, therefore, considered the COVID-19 in 1205 children with asthma followed-up from September 1 to March 1.

The diagnosis of asthma was previously performed according to validated criteria (GINA guidelines), and treatment was tailored based on asthma control and severity levels. During this pandemic period, telemedicine has been implemented. Consequently, we timely and continuously performed consultations. In this regard, it has to be noted that we always contacted the children's families before the scheduled visit, also requiring information about suspected COVID-19 ("COVID-19 triage"). During the COVID-19 pandemic, many patients did not attend the clinic, but doctors provided a phone-based consultation. If the asthma control was satisfactory, the visit was postponed, but we confirmed the appointment if the clinical condition worsened.

We included in this study all children with documented COVID-19 (using molecular diagnosis from a nasal swab). Demographic, clinical, and functional parameters were reported as pre-COVID-19 data, corresponding to the last visit before COVID-19 infection. Post-COVID-19 outcomes were collected at the first visit after the infection. Data were summarized as mean with standard deviation for continuous variables and as frequencies and percentages for categorical variables. Intra-group comparisons for repeated measures were performed with the McNemar test or Wilcoxon signed-rank test, as appropriate. All tests were two-sided, and $p \leq .05$ was considered statistically significant.

Table 1 showed the characteristics of 16 children (12 males, mean age 12.8 years) who had COVID-19. Five children had atopic dermatitis in clinical remission, and 14 had allergic asthma. At baseline, such as immediately before COVID-19, nine (56.3%) children had intermittent asthma and seven (43.8%) mild. The severity of COVID-19 was mild in nine (56.3%) children and moderate in four (25%); three had asymptomatic COVID-19. The intragroup analysis showed that the asthma control level did not significantly change, even though there was an improvement trend as the controlled children passed from 9 to 14, whereas partly controlled children diminished from 7 to 2 ($p = .06$). The inhaled corticosteroid dosage remained essentially unchanged. Asthma exacerbations tended to decrease. As concerns lung function, all parameters tended to increase even though without statistical significance. Reversibility, such as positive response to bronchodilation test, was unmodified.

These findings seemed to suggest that COVID-19 prevalence in a large group of asthmatic children followed in a tertiary allergy/asthma clinic could be low, at least in the considered period. Moreover, these results showed that COVID-19 did not affect the asthma control in the followed children with mild asthma.

However, the current experience had some limitations. First, we considered a selected population of children followed by a tertiary allergy/asthma clinic and consequently treated with the gold-standard care level. Moreover, the study was cross-sectional; further visits could give definitive outcomes about the COVID-19 impact on asthma. The number of COVID-19 children with asthma was small; thus, some subjects might have had asymptomatic COVID-19 or missed diagnosis.

TABLE 1 Demographic, clinical, and functional characteristics of 16 children with asthma and COVID-19

Characteristics at baseline				
Age (years)	12.8 ± 4.42			
Sex, males	12 (75.0%)			
BMI (kg/m^2)	20.9 ± 4.63			
Ethnicity, Caucasian	12 (75.0%)			
Atopic dermatitis	5 (31.3%)			
Allergy (allergic asthma/allergic rhinitis)	14 (87.5%)			
Asthma severity				
Intermittent	9 (56.3%)			
Mild	7 (43.8%)			
COVID-19 severity				
Asymptomatic	3 (18.8%)			
Mild	9 (56.3%)			
Moderate	4 (25.0%)			
Pre- vs. post-COVID-19	**Pre-COVID**	**Post-COVID**	**$\Delta\%_{post\text{-}pre}$**	***p* Value**
Asthma control				
Controlled	9 (56.3%)	14 (87.5%)		.06
Partially controlled	7 (43.8%)	2 (12.5%)		
Steroids daily dose				
No	7 (43.8%)	9 (56.3%)		.16
Low	5 (31.3%)	5 (31.3%)		
Medium	4 (25.0%)	2 (12.5%)		
Exacerbations	5 (31.3%)	1 (6.3%)		.13
FVC (% predicted)	100.1 ± 9.84	103.2 ± 14.68	3.2 ± 11.27	.34
FEV_1 (% predicted)	99.3 ± 13.83	106.0 ± 20.56	6.4 ± 11.26	.05
Reversibility of FEV_1 to BD	4 (25.0%)	3 (18.8%)		.99
FEV_1/FVC	97.9 ± 15.38	103.7 ± 19.21	6.3 ± 13.07	.09
MEF_{50} (% predicted)	97.4 ± 9.04	99.9 ± 31.88	4.2 ± 19.06	.47

On the other hand, the implementation of telemedicine in our clinic allowed us to follow the children better, as direct contact with doctors provided thorough monitoring of clinical conditions. Notably, lockdown, social distancing, and facial masks significantly improved asthma control, mainly concerning asthma exacerbations. Consistently, a positive collateral effect of COVID-19 was the impressive reduction of respiratory infection, a leading cause of exacerbations. Another relevant point was the timescale between pre- and post-COVID-19 visits; we included patients with, at least, 4-month intervals.

On the other hand, we would underline the opportunity given by the COVID-19 pandemic about the relevant role of telemedicine in implementing asthma care. In this framing, the interplay between patients and hospital and primary care doctors and specialists significantly improved. In this context, children with COVID-19 were more closely followed, and the care intensity was reinforced and further reset.

In conclusion, the present study suggested that COVID-19 could not worsen the asthma course, mainly asthma control, preventive measures, including lockdown, social distancing, and facial mask, contributed to reducing risk factors, and telemedicine can provide significant support in asthma care.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHORS CONTRIBUTIONS

Maria A. Tosca: Conceptualization (equal); writing review and editing (equal). **Marco Crocco**: Conceptualization (equal); investigation (equal); writing review and editing (equal). **Donata Girosi**: Data curation (equal); investigation (equal). **Roberta Olcese**: Data curation (equal); investigation (equal). **Irene Schiavetti**: Software (equal); supervision (equal). **Giorgio Ciprandi**: Supervision (equal); writing original draft (equal).

DATA AVAILABILITY STATEMENT

Data are available on request from the authors.

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