

# COVID-19, anosmia, and ageusia in atopic children

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## Abstract

More than a year and a half after the beginning of the coronavirus disease 2019 (COVID-19) pandemic, symptoms, such as loss of smell and taste (anosmia and ageusia, respectively), remain difficult to characterize and quantify, especially in children, since no validated tests to assess these disorders are available. However, these symptoms can also be seen in children, although less frequently than observed in the adult population. In this article, we present the results of a national survey that collected the responses of 267 Italian pediatricians on the presence of anosmia and ageusia in children affected by COVID-19. These data were then compared with existing literature.

## KEYWORDS

ageusia, anosmia, children, coronavirus, COVID-19, smell, taste, upper airway

## 1 | INTRODUCTION

It is now known that the clinical manifestations of coronavirus 2019 (COVID-19) in children are less severe than those seen in adults. Children are almost always asymptomatic or have symptoms similar to those of ordinary flu. COVID-19 symptoms are characterized by fever, gastrointestinal disorders, nasal congestion, pharyngodynia, skin manifestations, myalgia, arthralgia, and less frequent cough and pneumonia.<sup>1</sup> Regarding the involvement of the upper airways in children, symptoms such as both loss of smell and taste (anosmia and ageusia, respectively) would seem infrequent, unlike those found in adults. However, this finding is partially influenced by at least two factors: (1) the inability of

younger children to report these types of disorders and (2) the lack of valid diagnostic tests to evaluate anosmia and ageusia in the pediatric population.<sup>2</sup> From a pathophysiological point of view, it has been shown that coronaviruses can invade the central nervous system via the olfactory bulb, midbrain, and basal ganglia due to these viruses' capability of infecting neuronal cells by interacting with the conversion enzyme of human angiotensin 2 (ACE-2).<sup>3</sup> It also seems that people suffering from COVID-19 experience changes in taste and smell that are not necessarily accompanied by a runny nose or nasal obstruction. This finding would confirm that this symptomatology is linked to direct viral damage on the gustatory receptors and the olfactory bulb.<sup>2,3</sup> In 2020, the rhinosinusitis and conjunctivitis committee of the Italian Paediatric

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Society for Allergy and Immunology (SIAIP) published a survey that collected the responses from 99 Italian pediatricians concerning the impact of COVID-19 and the most frequently found clinical manifestations in affected Italian children. According to the collected data, anosmia and ageusia were not present in 71.4% and 69.2% of affected children, respectively.<sup>3</sup> Furthermore, when present, these symptoms were especially evident in the first phase of the disease (15.4% for the loss of smell and 17.6% for the loss of taste).<sup>4</sup> Recently, we decided to repeat the previous year's experience by involving a more significant number of pediatricians in another survey to verify which scenario of clinical manifestations has changed from COVID-19 one year after the previous pandemic peak.

This article presents the results of this new survey that focuses on the presence of anosmia and ageusia in the pediatric population.

## 2 | METHODS AND RESULTS

The questionnaire was designed and pre-tested in February 2021 by a working group of experts of SIAIP. The survey was emailed once in March 2021 to a sample of Italian pediatricians. The questionnaire was structured into different sections of 35 categorized and multiple-choice questions. Participants were allowed to complete only a single survey. The previously revised and confirmed paper version of the questionnaire was finally converted into a web-based survey with Google Drive (Google Drive™, © 2012 Google Inc. all rights reserved), a free internet platform applied for the creation of internet-based survey forms that allowed real-time digital archiving of collected data, real-time presentation of survey results, and simple downloading of all data of registered anonymized participants in an Excel<sup>®</sup> format for statistical analysis.

The survey questions analyzed for this article were divided into two sections: (1) Anosmia was one of the first symptoms reported in the literature. Among your patients, when did it occur? And (2) ageusia was one of the first symptoms reported in the literature. Among your patients, when did it occur?

Participants were allowed one answer: (1) at the beginning of the disease, (2) at the final stage of the disease, (3) throughout the duration of the disease, (4) even beyond healing, or (5) it was not present.

**TABLE 1** Prevalence of anosmia and ageusia in patients with SARS-CoV-2 infection

	Anosmia	Ageusia
At the beginning of the disease	16.4%	14.3%
At the final stage of the disease	4.6%	3.5%
Throughout the duration of the disease	6.3%	4.6%
Even beyond healing	5.9%	5.4%
It was not present	66.8%	72.2%

### Key Message

COVID-19 is a disease that involves both lower and upper airways, and although anosmia and ageusia are less frequent in the pediatric population, children should be investigated in any case using specific tests suitable for that population.

A total of 267 participants had participated in our survey and responded to our electronic questionnaire by March 31, 2021. The results are summarized in [Table 1](#).

## 3 | DISCUSSION

Our survey results demonstrated that about 30% of children affected by COVID-19 presented with taste and smell disorders. Anosmia seems to be more frequent than ageusia, and both occurred mainly during the first phase of the disease. About 5% of children would continue to complain of the persistence of these symptoms even after healing. The first consideration in this regard derives from comparison with the survey data carried out the previous year as the data were overlapping. After evaluating a larger sample, this method gives greater weight to the data presented that described that taste and smell disturbances would involve a third of children with COVID-19.

The data in the literature highlight the presence of smell and taste disturbances in children in percentages varying between 10% and 30%. Comparison with the literature is not easy because these symptoms are often included among the disorders affecting the upper airways, and they are difficult to quantify and characterize, especially in children.<sup>5-7</sup> It is good to indicate that our percentages were derived from a survey and not from an objective evaluation of the disorder. This bias can probably overestimate a symptom that is more typical of the adult population. A large meta-analysis study involving 3,739 COVID-19 patients found that the estimated rates of taste and olfactory disorders in patients with COVID-19 were 49.0% and 61.0%, respectively.<sup>8</sup> As for the onset and duration of symptoms, a systematic review was carried out on 17 articles highlighting that the COVID-19-associated onset of loss of smell and taste occurs 4 to 5 days after the onset of other symptoms and that these sensory symptoms last from 7 to 14 days.<sup>9</sup> The evaluation of symptoms, such as loss of taste and smell, is of great importance, especially for those forms of COVID-19 that are paucisymptomatic since these may be the only manifestations of the disease. Rapid recognition of these symptoms could be of fundamental importance for limiting disease spread. In this sense, more than a year and a half after the onset of the pandemic, little has been done to identify tests that can help quantify this type of sensory disturbance with sufficient sensitivity and specificity. *A fortiori*, this process becomes even more complex.

Regarding treatment, nasal steroids have been proposed for the treatment of COVID-19-associated loss of smell. However, steroid use is not recommended as it is not helpful. On the contrary, in concomitant allergic rhinitis, nasal steroids should not be suspended according to the AIR statement as it would result in poor control of rhinitis symptoms, including sneezing, and therefore more likely to spread the COVID-19 virus.<sup>10</sup>

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#### CONFLICT OF INTERESTS

Authors declared they have no conflict of interests.

#### AUTHOR CONTRIBUTION

**Giuseppe Fabio Parisi:** Conceptualization (equal); Writing-review and editing (equal). **Giulia Brindisi:** Writing-review and editing (equal). **Cristiana Indolfi:** Writing-review and editing (equal). **Lucia Diaferio:** Writing-review and editing (equal). **Giuseppe Marchese:** Writing-review and editing (equal). **Daniele Giovanni Ghiglioni:** Writing-original draft (equal). **Anna Maria Zicari:** Writing-review and editing (equal). **Michele Miraglia Del Giudice:** Conceptualization (equal); Supervision (lead); Writing-review and editing (equal).

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