

## LETTER TO THE EDITOR

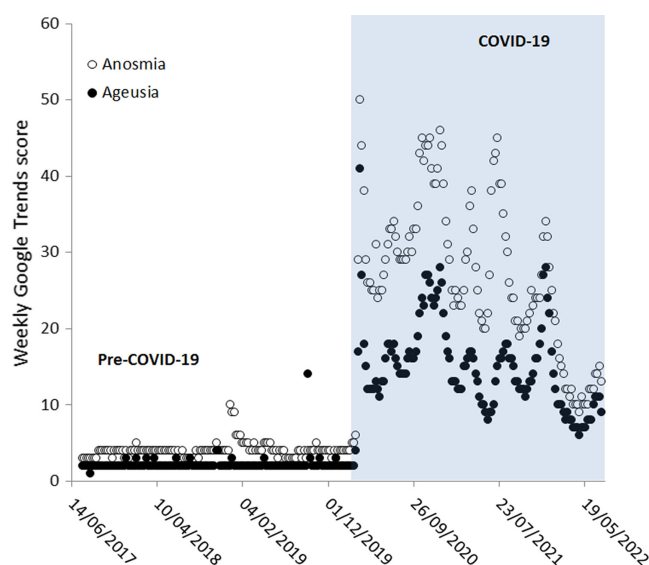
# Estimating the worldwide burden of COVID-19-related anosmia and ageusia

A variable impairment of chemosensory function, occasionally leading to anosmia (i.e., smell loss) or ageusia (taste loss), is now universally recognized as a relatively frequent symptom and/or complication in patients with coronavirus disease 2019 (COVID-19) (Xu et al., 2022), with prevalence comprised between 67 and 73% during acute infection and persistence as high as 50% after 6 months of follow-up (Reis et al., 2022). Since both these conditions are associated with unfavorable clinical and psychological consequences in the affected population, we conducted an infodemiological analysis to define the extent to which the worldwide burden of chemosensory dysfunction may have increased during the ongoing COVID-19 pandemic.

We investigated Google Trends (Google Inc. Mountain View, CA, US) with the search terms “anosmia” and “ageusia,” setting geographical location to “worldwide” and within a period comprising the past 5 years (i.e., between July 2017 and July 2022). The weekly Google Trends score for both terms “anosmia” and “ageusia,” thus mirroring their worldwide web popularity, was divided into two different periods, that is, “pre-COVID-19” (from July 2017 to February 2020) and COVID-19 (from March 2020 to July 2022; Cucinotta & Vanelli, 2020). The relative volumes of Google search for both terms were then compared between the COVID-19 and pre-COVID-19 periods with Mann–Whitney test (Analyse-it Software Ltd, Leeds, UK).

The main results of this worldwide infodemiological analysis are summarized in Figure 1. Compared with the pre-COVID-19 period, the median worldwide value, and interquartile range (IQR), of the weekly Google Trends score significantly increased by 6.5-fold for anosmia (26 with IQR 21–33 vs. 4 with IQR 4–4;  $p < 0.001$ ) and by 7.0-fold for ageusia (14 with IQR 11–14 vs. 2 with IQR 2–2;  $p < 0.001$ ) in the COVID-19 period. A gradual decrease of web searches volumes has become apparent after the progressive worldwide spread of the SARS-CoV-2 Omicron lineages (i.e., from December 2021; –52% for anosmia and –33% for ageusia), thus reflecting a lower risk of developing these conditions in patients with SARS-CoV-2 Omicron infection (Lippi et al., 2022).

In conclusion, the results of this infodemiological analysis reveal that the volume of Web searches for both anosmia and ageusia has considerably increased after emergence of the ongoing COVID-19 pandemic, thus presumably mirroring a dramatically increased worldwide burden of these conditions. This evidence would call for reinforcing preventive, diagnostic, and therapeutic measures,



**FIGURE 1** Worldwide weekly Google Trends score for “anosmia” and “ageusia” before and after the emergence of the coronavirus disease 2019 (COVID-19) pandemic.

in order to limit the unfavorable clinical and social consequences caused by such an increased burden of COVID-19-related chemosensory dysfunctions.

## AUTHOR CONTRIBUTIONS

**Riccardo Nocini:** Conceptualization; data curation; formal analysis; investigation; writing – review and editing. **Camilla Mattiuzzi:** Conceptualization; data curation; formal analysis; writing – review and editing. **Giuseppe Lippi:** Conceptualization; data curation; formal analysis; methodology; validation; writing – original draft.

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None.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

## PEER REVIEW

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