

# Face masks during COVID-19 pandemic lockdown and self-reported seasonal allergic rhinitis symptoms\*

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## To the Editor:

Before the onset of COVID-19 pandemic, the use of protective face masks outside the healthcare setting was a "cultural" or "occasional" event, to reduce the spread of seasonal flu virus or the inhalation of chemicals in highly polluted geographic areas, respectively<sup>(1,2)</sup>. In many occupational settings the use of protective masks is common to avoid exposure to paints/solvents

or allergens e.g. where animals are handled<sup>(3-5)</sup>.

Although face masks might protect from allergens, surprisingly, so far very few studies have investigated the efficacy of masks in protecting from common outdoor allergens like pollens. Godoh et al. documented a reduced penetration of Japanese cedar pol-

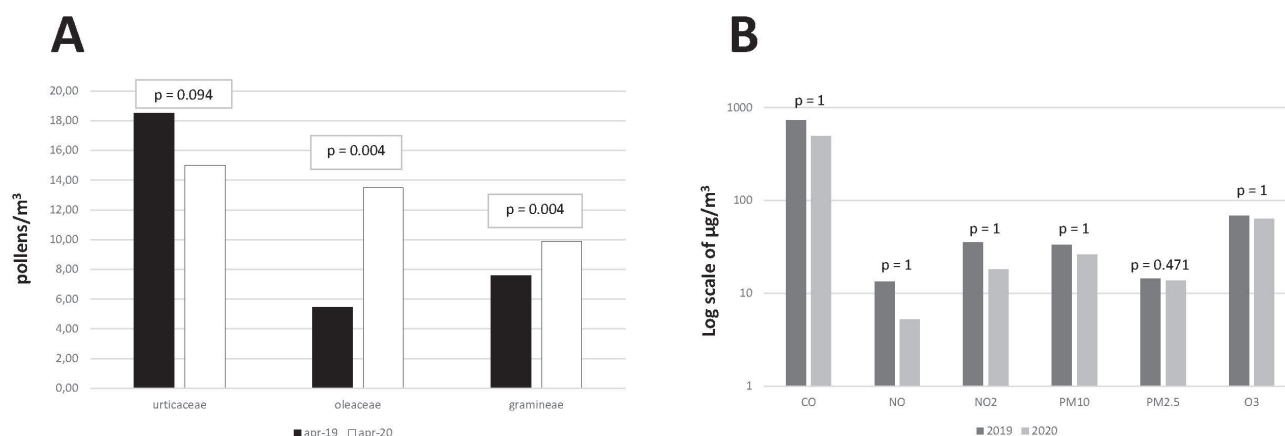


Figure 1. Monthly average counts/levels of the main allergenic pollens (A) and pollutants (B) in April 2019 and April 2020, in Campania Region (Italy).

lens in eyes and nasal cavities by using face-masks and eyeglasses, but no data were collected about symptoms<sup>(6)</sup>. Recently, Dror et al.<sup>(7)</sup> reported a decrease in symptom severity in 301 nurses with chronic allergic rhinitis assessed through a multicenter questionnaire. The nurses scored the severity of their allergic rhinitis symptoms before and after wearing face masks (surgical, N95, or both) for 1 week at work. Therefore, to our knowledge, no data are available on a possible role of face masks in reducing the symptoms of seasonal allergic rhino-conjunctivitis (SAR) induced by pollens.

In Campania region (Italy), during the COVID-19 lockdown, the use of protective masks outdoors has been mandatory since April 2020 to date.

Leveraging on this and on the fact that April is a peak period of pollen release of some common herbaceous species, such as *Parietaria*, the aim of this study was to investigate, in a real-world setting, the efficacy of face masks in protecting from pollen exposure and related symptoms.

Therefore, we compared, in patients with SAR, the self-reported symptoms experienced in April 2020 (with face masks) with the ones of April 2019 (without face masks) (McNemar's test), and the correlation with time-of-use of masks (Mann-Whitney test to compare the median hours of the improved patients versus the others), taking also into account the role of potential confounders (changes in pollen and pollution levels).

Thirteen Allergy units or Centres belonging to the Italian Association of Hospital and Territorial Allergologists (AAIITO, Campania Region), uniformly distributed over the whole territory, consecutively assessed outpatients, aged from 14 to 75 years old. Patient enrolment started on May 15 and ended on July 15, 2020. A case report form specifically designed for this study was completed during the control visits of each patient, recording the following data: demographic data, treatments, results of skin prick

tests for seasonal pollens, self-reported nasal (sneezing, runny nose, itching and obstruction) and ocular symptoms (itching, tearing) occurred in April 2020 compared to April 2019 (worsened, unchanged, improved). In addition, a time estimate of face masks' use outdoors during April 2020 was recorded, but it was asked only at the end of the interview to blind patients and avoid any detection bias in their self-assessment of symptoms. Only patients undergoing the same treatment (or no treatment at all) in April 2020 and 2019 were included in the analysis, to avoid confounders. To obtain these information as well as those regarding clinical symptoms we selected only patients with SAR who underwent control visits diagnosed before April 2019 by the same centres.

Since SAR severity strongly depends on the local pollen count and levels of environmental pollutants, this information was retrieved from the Regional Environmental Protection Agency Campania Region (ARPAC).

A >20% frequency of improved patients was considered as the minimal clinically importance difference, assuming a possible placebo effect accounting for up to 20% of patients reporting improvement. The same protocol was adopted by all the centres. Participants were fully informed about the study procedures before signing the informed consent.

A total of 291 patients with SAR were enrolled (females, 54.9%; males, 45%), all sensitized to at least one of the most common local pollen allergens (*Parietaria*, Grasses and *Olea europaea*)<sup>(8,9)</sup>, and presenting symptoms exclusively in spring season.

Subjects with sensitization to perennial allergens were excluded from the study. Our patients wore masks when they were away from home, and the daily average of outdoors mask use was 3.25±1.93 hours (from 1 to 10 hours).

Our data showed similar and even higher environmental pollen levels in April 2020, compared to April 2019 (Figure 1A), stable values of PM<sub>2.5</sub>, PM<sub>10</sub>, and O<sub>3</sub> (with slight increases of O<sub>3</sub> in

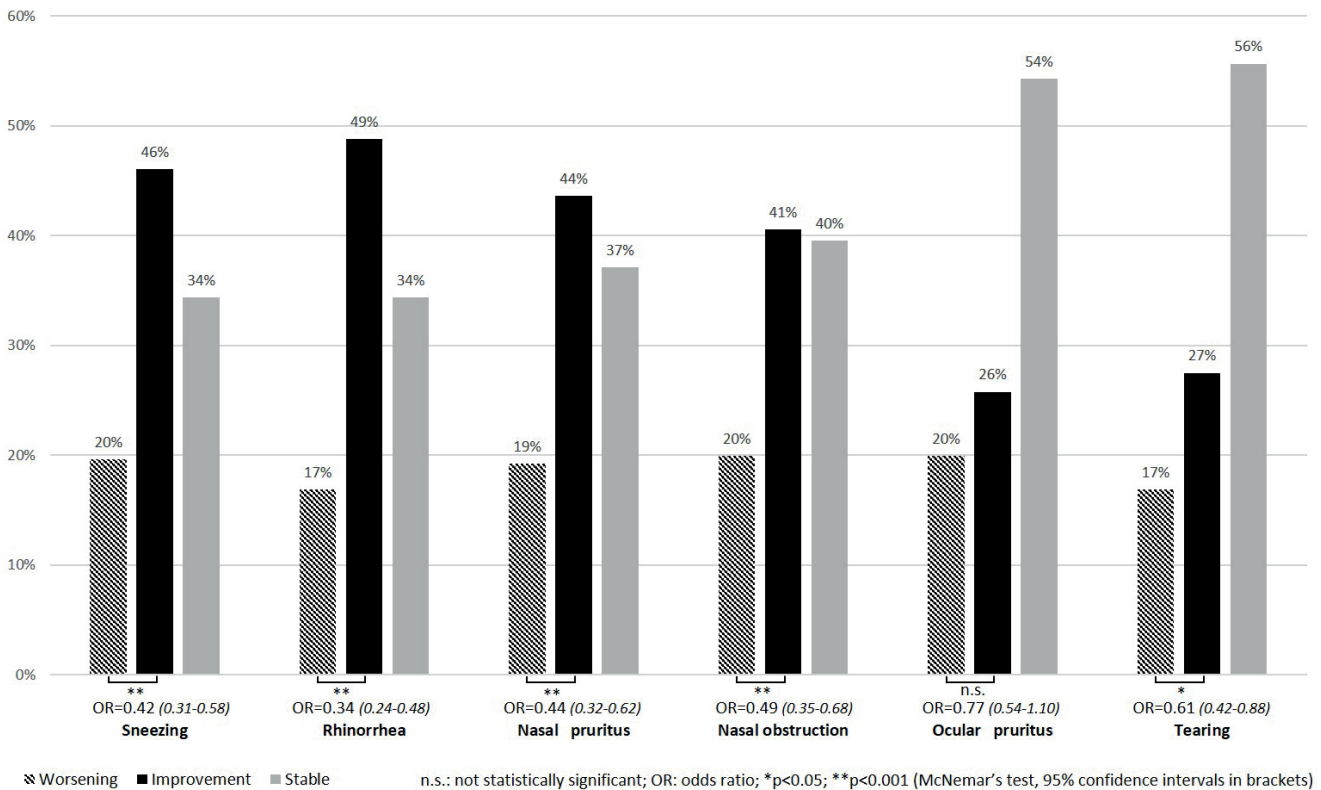


Figure 2. Frequency and type of change in rhino-conjunctivitis symptoms during April 2019 (without face masks) and during April 2020 (with face masks) pollen seasons (total number of patients: 291).

some zones), and a reduced trend of other pollutants (Figure 1B). At these conditions, in April 2020, the improvement after wearing face masks, in our 291 patients, was statistically significant ( $p < 0.05$ ) in nasal symptoms [sneezing (OR=0.42), rhinorrhea (OR=0.34), nasal pruritus (OR=0.44), nasal obstruction (OR=0.49)], but modest or not significant in ocular symptoms [ocular pruritus (OR=0.77), tearing (OR=0.61)], compared to April 2019 (Figure 2). Furthermore, there was a correlation between masks' time-of-use and improvements of most of nasal symptoms. In particular, the patients with improvements in sneezing, rhinorrhea, and nasal pruritus reported three hours of median face mask time-of-use, versus two hours of the other patients who reported no improvements in these symptoms ( $p$  value  $< 0.05$ ); conversely, no significant difference was observed in time-of-use of improvement versus non-improvement in nasal obstruction ( $p$  value  $> 0.05$ ). We think that this may be probably linked to the frequent finding that the mask itself causes a sensation of nasal obstruction in many individuals. Therefore, it cannot be excluded that its prolonged use may induce a perception of greater obstruction to upper airways. As expected, there was no correlation between mask time-of-use and ocular symptoms (both eye pruritus and tearing;  $p$  value  $> 0.05$ ).

The study has some limitations. Firstly, no validated questionnaires were used for symptoms' collection and grading. However,

we believe that this approach could mitigate the risk of recall bias: a direct comparison of symptoms between current and previous year may be more straightforward and reliable, instead of filling out burdensome questionnaires/scores retrospectively. Secondly, we could not define the type of masks used by our patients, mainly made of different washable fabrics, because of the well-known shortage of medical face masks during the first months of SARS-CoV2 pandemic. However, since these cloth masks showed efficacy despite their low quality, the hypothesis of a protective role of face masks is even more reinforced. Finally, a control group is lacking, because wearing face masks was mandatory.

## Conclusion

Although the concomitant role of other lockdown-related conditions cannot be excluded, the results of our real-world study suggest that simple non-professional face masks can reduce the nasal symptoms of SAR induced by seasonal pollens, at least during seasonal pollen peaks. Certified and professional face masks (e.g. N95, FFP2) are likely to be even more effective, since they are able to filter also the ultra-fine components of pollen grains. Further prospective, controlled studies, testing standardized face masks and/or eyeglasses, should be performed to confirm our preliminary findings.

### List of abbreviations

AAIITO - Italian Association of Hospital and Territorial Allergologists; ARPAC - Regional Environmental Protection Agency Campania Region; COVID-19 - Coronavirus Disease 2019; SAR - Seasonal Allergic Rhino-conjunctivitis; SARS-CoV2 - Severe Acute Respiratory Syndrome Coronavirus-2

### Conflict of interest

All authors declare that they have no conflict of interest.

### Authorship contribution

GL developed the concept, designed the research, and wrote the draft of the manuscript; FC, LC, AC, MC, FDB, IDI, AF, DG,

GI, RI, MLS, LN, FM, CM, AP, AP, CS, AS recruited patients and administered questionnaires; LC, MMart, ACG, GS carried out the statistical evaluations; MBB, MMil, PR, MMart shared the design and development of the research; PDA, GO, ES, MPI, MB, GDM provided data on pollen count and pollutant levels; all authors reviewed and approved the manuscript.

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