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Natural vaccines accumulated in face masks during COVID-19: Underappreciated role of facial masking

Nilesh Kumar Sharma [a], Sachin Sarode [b,*], Gargi Sarode [b]

[a] Dr. D.Y. Patil Institute of Biotechnology and Bioinformatics, Dr. D.Y. Patil Vidyapeeth, Pimpri, Pune, 411018, Maharashtra, India
[b] Dr. D.Y. Patil Dental College and Hospital, Dr. D.Y. Patil Vidyapeeth, Pimpri, Pune, 411018, Maharashtra, India

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ABSTRACT

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a causal agent behind coronavirus disease 2019 (COVID-19). Despite promising developments in therapeutic and preventive avenues, the importance of facial masking is a key factor for the protective measures among exposed human populations. Preclinical and clinical data on the importance of facial masking concerning asymptomatic over symptomatic COVID-19 cases is limited. The recent introduction of the concept of SARS-CoV-2 associated molecular particle patterns (SAMPPs) as a natural vaccine has opened new avenues for the comprehensive development of immunity. To take this further, the scope of natural vaccines accumulated in facemasks during facial masking needs to be highlighted that may directly or indirectly contribute to building adaptive immunity among human populations. This paper attempts to discuss the underappreciated contributions of facial masking in the management of COVID-19 at the global level.

1. Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing coronavirus disease 2019 (COVID-19) unleashed a devastating impact on society.[1,2] Several reports have addressed the pathogenesis and preventive aspects of COVID-19.[3–5] The impact of universal facial masking is discussed in the context of infectivity and severity of COVID-19. Several explanations are proposed on the linking of facial masking with adaptive immunity and increasing cases of asymptomatic patients.[6–10] However, preclinical and clinical experimental evidence is not substantial. In the pursuit of the same, we attempted to propose a novel conceptual design based on the usage of face mask and the development of adaptive immunity to support the aforementioned outcomes of facial masking in the general population.

2. Face mask and SARS-CoV-2

Facial masking was adapted all over the world to mitigate the spread of SARS-CoV-2. Gandhi et al.[9] took this opportunity to hypothesize the impact of universal face masking with the potential generation of adaptive immunity among exposed human populations due to minimal exposure of infectious components of SARS-CoV-2. There is a lack of direct clinical and biochemical evidence related to such claims. Few authors also proposed scientific explanations on the possibilities of natural vaccines in the form SARS-CoV-2 associated molecular particle patterns on the inanimate surfaces, face masks, and other potential physical surfaces during sanitization using alcohol and detergents which are anionic, cationic and nonionic, and zwitterionic.[10–12]

3. Personal hygiene products and impact on SARS-CoV-2

Alcohol-based hand sanitizers contain 60–95% ethanol, isopropanol or n-propanol, glycerol 1.45% v/v, and hydrogen peroxide (H2O2) 0.125% v/v. Alcohol-free hand sanitizers comprise of disinfectants such as benzalkonium chloride (BAC) and triclosan.[11–15] Liquid-hand wash includes chemicals such as surfactants (sodium palmate, sodium lauryl sulfate (SLS), betaines, amides, triclosan), pH adjuster (citric acid, KOH, NaOH), viscosity enhancers (sodium chloride, carbomers, polymers), and preservatives (phenoxyethanol, benzyl alcohol, isothiazolinone). Laundry detergents contain anionic surfactants (alkyl benzene sulfonates), non-ionic detergents (polyoxyethylene, glycoside, glycolic acid), and enzymes (protease, amylase, and lipase).[13–15] Chemical

* Corresponding author. Department of Oral Pathology and Microbiology, Dr. D.Y. Patil Dental College and Hospital, Dr. D.Y. Patil Vidyapeeth, Sant-Tukaram Nagar, Pimpri, Pune, 411018, India.
E-mail address: drsachinsarode@gmail.com (S. Sarode).

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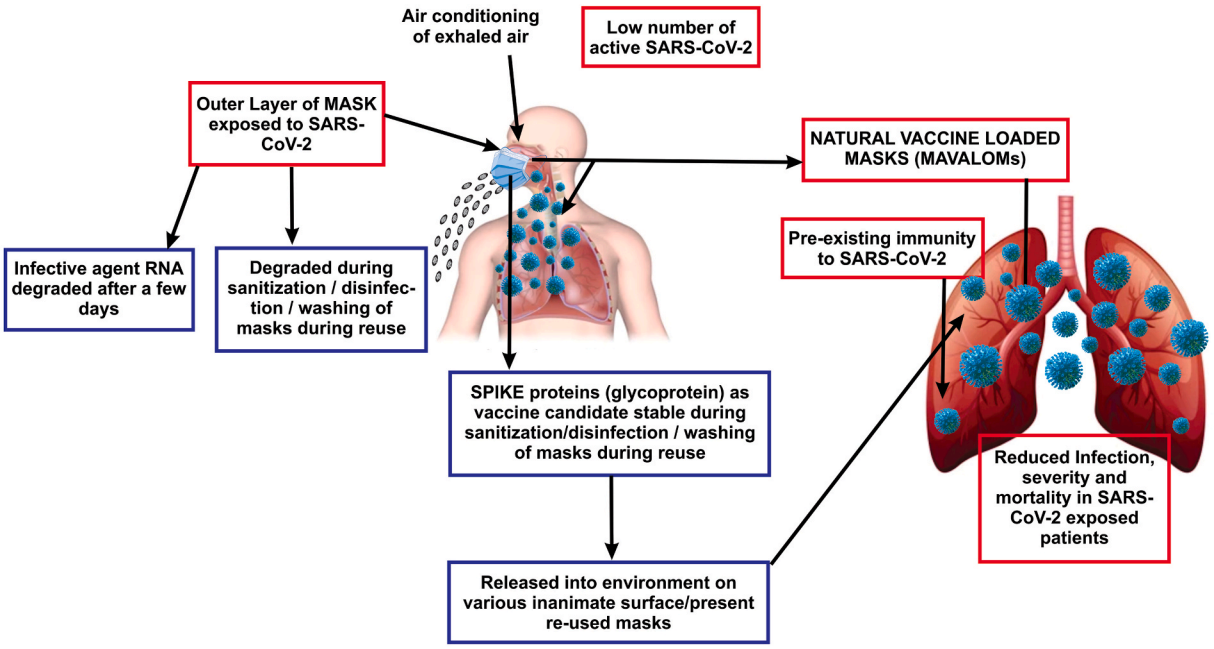

Fig. 1. A model on natural vaccines accumulated in face masks and low risk to SARS-CoV-2 infection.

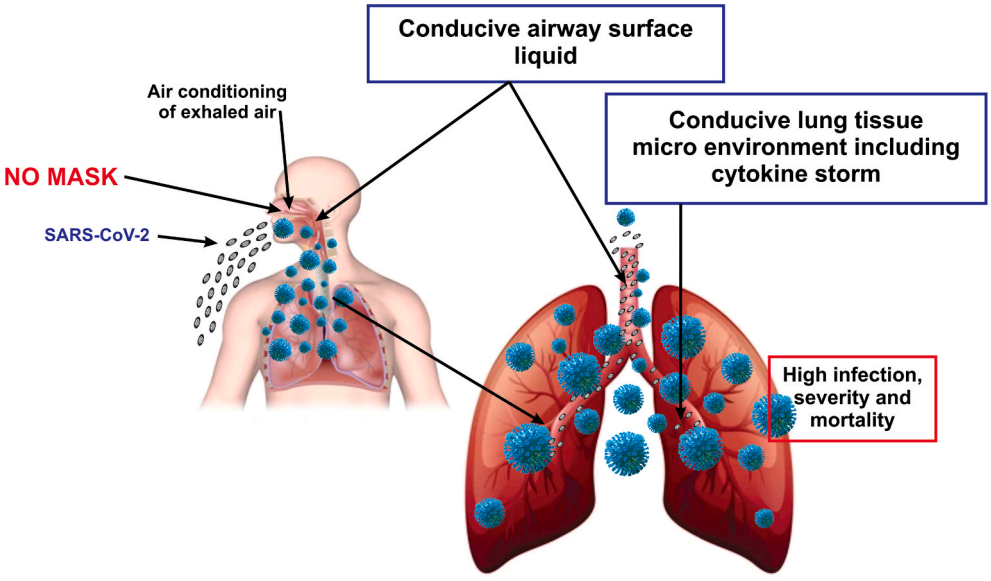

Fig. 2. A model on high severity and mortality by SARS-CoV-2 in the absence of facial masking.

compositions of various sanitizers, detergents, hand wash, and surfactants are suggested to show direct or indirect denaturing effects upon the RNA components of SARS-CoV-2.[15–17] The chemical stability of SARS-CoV-2 biological components such as RNA and lipid is reduced by variations in environmental conditions including sanitization, disinfectants, and use of detergents during washing.[18–25] Conversely, the SPIKE-2 glycoprotein shows appreciable stability with environmental exposures.[22–25]

Experimental data supports that the routine use of sanitizers, disinfectants, and detergents may efficiently denature lipid layer and alkaline labile RNA components of SARS-CoV-2.[15–25] A proposition is made that the SPIKE-2 glycoprotein remains stable to an extent enabling potential antigenic components to develop adaptive immunity.[21–25]

4. Proposed hypothesis

An intriguing question is raised to know how many SARS-CoV-2 particles are created in our environment and a fraction of that is in the form of natural vaccine accumulated in the masks. A proposition on natural vaccines accumulated in masks is supported by the existing understanding that shedding and secretions of SARS-CoV-2 infected patients are predominantly through facial structures like nose and mouth covered by face masks. Here, a proposed model on natural vaccines accumulated in masks as a potential reason behind developed adaptive immunity and the reduced severity and mortality by SARS-CoV-2 is presented (Fig. 1). Additionally, a model without masks and high severity and mortality among COVID-19 patients is depicted (Fig. 2).

5. Linking with epidemiological data

There is a significant shift in the percentage of asymptomatic COVID-19 patients from 40% to more than 80%.[25–27] The contribution of SARS-CoV-2 associated molecular particle patterns or facial masking is suggested as an indirect factor towards the generation of adaptive immunity in the human populations against SARS-CoV-2. Therefore, high asymptomatic/presymptomatic cases compared to symptomatic cases and decreased mortality rate may be indirectly attributed to facial masking. It would be interesting to see the epidemiological data on the correlation of use of facial masking with the proper guidelines and impact of severity and mortality due to COVID-19. Altogether, the contribution of natural vaccines accumulated in face masks is the need of the time to be highlighted at preclinical and clinical level, and society at large. This will serve as an additional factor towards the sensitization on use of facial masking and its indirect role in the prevention of COVID-19.

6. Future studies

The authors agree that there is a lack of direct clinical data on natural vaccines accumulated in facemasks and the severity of COVID-19. In future, a study may be designed to answer a pertinent question that may help to estimate the impact of different styles and designs of face masks on the proposed existence of natural vaccines accumulated in face masks. The best study model in this regard would be animal face masking in a controlled environment infested with SARS-CoV-2 and its accumulated particles. Furthermore, natural vaccines accumulated in face masks among the SARS-CoV-2 exposed human populations may be impacted by the social behavior and individual habits such as frequency of touching the facial structures.

7. Conclusion

In summary, we propose a discussion in a larger perspective across the globe by preclinical and clinical researchers, and epidemiologists to see the prospects of use of masks that may contribute towards minimal exposure of infectious components of SARS-CoV-2 and natural vaccines accumulated in masks that may help for the development of potential adaptive immunity among exposed human populations. This will provide a new dimension to the various attributes of facial masking and would also be applicable to future viral pandemics. Moreover, this paper will also help in providing a befitting reply to the facial mask hesitancy among the general population.

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Declaration of competing interest

All the authors associated with present manuscript declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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