



LETTER TO THE EDITOR

Is dysbiosis a preponderant factor for the occurrence of oral lesions in SARS-CoV-2 positive patients? A critical analysis

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Since the COVID outbreak in December 2019 in Wuhan (Hubei, China), uncountable cases of oral alterations have been attributed to the novel coronavirus, although the real mechanism associated with the pathogenesis of the oral lesions remains poorly understood. Despite vasculitis and the individual's immune-mediated response playing a crucial role in the inflammatory process (Santana et al. 2021), these factors by themselves, do not justify the development of most alterations in the mouth.

In general, these oral manifestations were induced by previous infectious agents, especially the herpes virus (HSV-1 or HSV-2) and *C. albicans* (Etemad-Moghadam & Alaeddini 2021). These preliminary findings point to SARS-CoV-2 as likely being a secondary agent able to shoot 'triggers' to reactivate pre-existing diseases or favor the emergence of opportunistic infections like oral mucormycosis (Ahmed et al. 2021).

Alternatively, Corchuelo & Ulloa (2020) reported an asymptomatic case of COVID-19 in a patient that developed orofacial lesions in response to candidiasis. Curiously, Zarpellon et al. (2021) did not identify the presence of the virus in oral tissues of patients that developed a fatal frame of COVID-19, although lesions in oral mucous had been observed. Similarly, the modulating role of SARS-CoV-2 to induce unbalance in the oral microenvironment is notable, favoring the dysbiosis process correlated with disease severity (Soffritti et al. 2021).

Typically, dysbiosis is marked by "breaking" of mutualistic relation between the components of the microbiome, which provoke the proliferation of pathogenic agents against "protective" microorganisms (Zheng et al. 2020). Dysbiosis has been associated with a variety of organic disorders including metabolic alterations, autoimmune, and neurodegenerative diseases until cancer (Zheng et al. 2020). Concerning the oral cavity, caries, pseudomembranous candidiasis, and periodontal disease are the most common forms of oral dysbiosis. Interestingly, patients with chronic periodontitis are associated with a worse prognostic outcome of COVID-19, suggesting a possible bidirectional relation (Shamsoddin 2021).

Summarily, the same chemical mediators involved in periodontitis pathogenesis may potentiate the intensity of the immune response of individuals with COVID-19, causing a greater storm of cytokines and, subsequently, greater organic damage and worsening of the clinical frame (Shamsoddin 2021).

The unbalance of this microbiome can induce transient bacteremia, whose microorganisms may reach distant organs through the bloodstream, including the lungs (Parahitiyawa et al. 2009). Therefore, patients in mechanical ventilation whose oral hygiene becomes deficient are more prone to subsequent local injuries and associated systemic infections (Silva et al. 2020), which largely explains the presence of these oral manifestations predominantly seen in such respective groups. Secondly, the infection happens due to the accumulation of biofilm and local polymicrobial proliferation, favoring the establishment of a fundamental oral lesion itself (Etemad-Moghadam & Alaeddini 2021).

Finally, these findings reiterate the role of the human microbiome in the health- disease relation as well as the development and progression of several disorders, including COVID-19. Thus, the knowledge of the perturbative capacity of the virus in human microbiology may contribute to the development of future target therapies, to reduce severe cases of the disease and possible sequelae resulting from the infection.

REFERENCES

- AHMED E, ABOU-BAKR A, HUSSEIN RR, EL-GAWISH AA, RAS AE & GHALWASH DM. 2021. Oral mucormycosis in post-COVID-19 patients: A case series. *Oral Dis*: 10.1111/odi.13973.
- CORCHUELO J & ULLOA FC. 2020. Oral manifestations in a patient with a history of asymptomatic COVID-19: Case report. *International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases* 100: 154-157.
- ETEMAD-MOGHADAM S & ALAEDDINI M. 2021. Is SARS-CoV-2 an Etiologic Agent or Predisposing Factor for Oral Lesions in COVID-19 Patients? A Concise Review of Reported Cases in the Literature. *Int J Dent* 2021: 6648082.
- PARAHITIYAWA NB, JIN LJ, LEUNG WK, YAM WC & SAMARANAYAKE LP. 2009. Microbiology of odontogenic bacteremia: beyond endocarditis. *Clin Microbiol Rev* 22(1): 46-64.
- SANTANA LAM, LESSA AFN, AMANCIO AM, OLIVEIRA EM, BARBOSA BF & SOUZA LN. 2021. Vascular events induced by SARS-CoV-2 and their impact in oral health. *An Acad Bras Cienc* 93: e20211178. doi: 10.1590/0001-3765202120211178.
- SHAMSODDIN E. 2021. Is periodontitis associated with the severity of COVID-19?. *Evid Based Dent* 22(2): 66-68.
- SILVA D, CAMARGOS JH, RODRIGUES JG, NOGUEIRA LS, AZEVEDO DA, CARVALHO M & PINHEIRO MB. 2020. Impact of oral hygiene in patients undergoing mechanical ventilation in the COVID-19 pandemic. *Rev Assoc Med Bras* 66(Suppl 2): 96-101.
- SOFFRITTI I, D'ACCOLTI M, FABBRI C, PASSARO A, MANFREDINI R, ZULIANI G, LIBANORE M, FRANCHI M, CONTINI C & CASELLI E. 2021. Oral Microbiome Dysbiosis Is Associated With Symptoms Severity and Local Immune/Inflammatory Response in COVID-19 Patients: A Cross-Sectional Study. *Front Microbiol* 12: 687513.
- ZARPELLON A ET AL. 2021. Oral lesions and SARS-CoV-2: A postmortem study. *Oral Dis*: 10.1111/odi.14047.
- ZHENG D, LIWINSKI T & ELINAV E. 2020. Interaction between microbiota and immunity in health and disease. *Cell Res* 30(6): 492-506.

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