

Editorial



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Periodontal health and the initiation and progression of COVID-19

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The outbreak of coronavirus disease 2019 (COVID-19) has evolved rapidly into a public health crisis as it has spread exponentially throughout the world. Although most patients with COVID-19 present a mild disease course, severe cases are usually complicated by acute respiratory distress syndrome and usually involve an exacerbated immune response, characterized by excessive levels of pro-inflammatory cytokines and widespread tissue damage that may lead to septic shock and multi-organ damage. In fact, about 14% of COVID-19-positive cases develop severe disease requiring hospitalization and oxygen support, 5% need admission to the intensive care unit, and around 2% die.

The implications of oral health—and in particular periodontal health—in this pandemic viral infection can be viewed from 3 different angles:

1. Is the oral cavity relevant in the transmission and pathogenicity of SARS-CoV-2?

The infectivity of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) depends on the ability of its virus to enter cells using the transmembrane protein angiotensin-converting enzyme (ACE2) as the primary receptor and portal of entry into the cell. There is clear evidence that epithelial cells in the oral cavity mucosa show a high level of ACE2 expression, and since the oral cavity is one of the first interfaces between the exterior and body, there is a high potential that this pathway of viral colonization and infection is critical for the onset of COVID-19. This fact has clear implications for the implementation of measures to prevent viral colonization in the oral cavity, not only in terms of physical barriers (masks, screens, etc.), but also for the identification of effective oral antiseptics that may impact the transmission and pathogenicity of SARS-CoV-2. Recent investigations (both *in vitro* and *in vivo*) have shown that oral rinses based on povidone-iodine and cetylpyridinium chloride have virucidal activity and may be used for preventing COVID-19 infectivity, although we need clinical trials to verify this hypothesis.

2. What is the impact of periodontal diseases as a risk factor for increased severity in COVID-19 patients?

Until recently, there was no evidence that patients with periodontitis could have a higher chance of increased severity of COVID-19. However, a recent study published in the *Journal*

of Clinical Periodontology presented evidence that periodontitis is significantly associated with a higher risk of complications from COVID-19. That study was conducted using data from national electronic health records in Qatar, including 568 COVID-19 patients. After adjusting for potential confounders, periodontitis was significantly associated with death (odds ratio [OR]=11.17), assisted ventilation (OR=4.03) and intensive care unit (ICU) admission (OR=3.57), compared to controls. This means that periodontitis patients have about a 10 times higher chance of dying, a 4 times higher chance of needing assisted ventilation, and about a 3.5 times higher chance of entering an ICU if infected with COVID-19. Furthermore, blood levels of white blood cells, D-dimer, and C-reactive protein were significantly higher in periodontitis patients, which means that periodontitis patients have a higher chance of developing an aberrant immune and inflammatory response, the so-called “cytokine storm” responsible of the rapid deterioration of many COVID-19 patients.

3. What is the impact of periodontal diseases as a risk of death in hospitalized COVID-19 patients in need of assisted ventilation?

There is evidence that periodontitis is associated with pneumonia in hospitalized patients in need of assisted ventilation. This association is mainly due to the aspiration of bacterial pathogens residing in the oral cavity—mainly within the periodontal pockets—in periodontitis patients, and once aspirated, the lack of appropriate host defenses may promote a direct pathway of these pathogens into the lungs, exacerbating the patient's health status. Furthermore, there is evidence that some periodontal pathogens may upregulate the expression of ACE2 receptors in pulmonary alveolar cells, thus enhancing viral entrance into these cells and causing pulmonary function to deteriorate. Since the presence of bilateral pneumonia and the need for assisted ventilation are key indicators of COVID-19 disease deterioration and increased risk of death, there is a clear need not only to pay close attention to oral hygiene and the administration of oral antiseptics in the hospital setting to reduce potential oropharyngeal colonization, but also to diagnose and treat periodontitis patients before they reach the hospital.

In summary, periodontitis has shown evidence to act as a co-factor in increasing the infectivity and severity of COVID-19, which underscores once more the need to implement preventive and therapeutic measures to reduce the global burden of severe periodontal disease.