

News and Perspectives

**Is There an Association Between Oral Health
and Severity of COVID-19 Complications?**

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News and Perspectives

**Is There an Association Between Oral Health
and Severity of COVID-19 Complications?**

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4 **Abstract**
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10 Most patients with severe complications from COVID-19 have underlying conditions
11 such as obesity, diabetes, and hypertension. In parallel, there is growing evidence for a link
12 between periodontitis and non-oral systemic diseases. The oral cavity is also a reservoir for
13 respiratory pathogens, and patients with periodontal disease are more likely to develop hospital-
14 acquired pneumonia than healthy individuals. We therefore hypothesize that improving oral
15 health could decrease the severity of COVID-19 symptoms and reduce the associated morbidity.
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Introduction

The new coronavirus SARS-CoV-2 was first detected in late 2019 and has quickly developed into a global pandemic [1]. Age is one of the highest risk factors for developing severe symptoms of COVID-19, the disease caused by infection with SARS-CoV-2 [2]. Thus, individuals over the age of 65 and those living in long-term care facilities are especially vulnerable to morbidity and mortality due to infection with SARS-CoV-2. However, persons with chronic lung disease, moderate to severe asthma, severe obesity, diabetes, chronic kidney disease, and liver disease are also at high risk for severe COVID-19 symptoms. A recent study lists hypertension, obesity, and diabetes as the three major underlying conditions with the most unfavorable outcomes in COVID-19 patients requiring hospitalization [3].

While COVID-19 can affect multiple organs in the body, including the kidneys and liver [4, 5], the main cause of mortality is due to the ability of SARS-CoV-2 to infect the respiratory tract, leading to severe pneumonia. Patients with COVID-19 display symptoms of fever, cough, dyspnea, and other complications associated with acute respiratory distress syndrome [6-8].

A salient feature of COVID-19 is its ability to trigger an excessive immune reaction in the host, termed a ‘cytokine storm’, which causes extensive tissue damage, particularly in the connective tissue of the lungs [9]. The lung pathology of patients who die from COVID-19 pneumonia includes edema, focal reactive hyperplasia of pneumocytes with patchy inflammatory cellular infiltration, and multinucleated giant cells [10].

Oral Health and Non-Oral Systemic Diseases

Over the past few years, it has been clear that oral health has a large impact on general health. Several studies suggest that cytokines or microbial products released systemically in

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4 response to oral infection causes inflammation in distant organs, which enhances development of
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6 systemic diseases such as Alzheimer’s disease, diabetes, atherosclerotic heart disease and
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8 cerebrovascular disease [11-14]. Research has also shown that poor oral health can increase
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10 complications of systemic diseases like diabetes, chronic kidney disease and liver disease [11,
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12 15, 16]. Conversely, obesity predisposes individuals to oral diseases, especially gingivitis and
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14 periodontitis [17].
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19 Furthermore, the oral cavity is a significant reservoir for respiratory pathogens, including
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21 *Chlamydia pneumoniae*; and patients with periodontal disease are more likely to develop
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23 hospital-acquired pneumonia as a complication [18-20]. Several mechanisms may explain the
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25 ability of oral pathogens to exacerbate lung infection, including aspiration of oral pathogens into
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27 the lower respiratory tract, especially in high-risk individuals; modification of mucosal surfaces
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29 along the respiratory tract by salivary enzymes, which thereby facilitate colonization by
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31 pathogens; and secretion of pro-inflammatory cytokines during periodontitis, which can promote
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33 adhesion to lung epithelium and lung colonization by respiratory pathogens [21, 22]. Improving
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35 oral hygiene may thus reduce oropharyngeal colonization and the risk of respiratory
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37 complications.
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43 It has also been shown that improved oral hygiene and frequent professional oral health
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45 care reduces the progression or occurrence of respiratory diseases, particularly in the elderly
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47 population and those in intensive care units [23]. This population is also most at risk for
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49 developing serious complications related to COVID-19 [24, 25].
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55 **Concluding Statement**

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4 Older adults and people of any age who have serious medical conditions such as chronic
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6 lung disease, diabetes, heart conditions or chronic kidney disease are at high risk for developing
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8 severe illness due to SARS-CoV-2 infection. At the same time, poor oral health increases the risk
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10 of developing the same medical conditions. Therefore, improving oral health in people of any
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12 age, by reducing their risk of developing non-oral systemic diseases, may reduce the morbidity
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14 of COVID-19 (Figure 1). Although the association between oral health and severity of COVID-
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16 19 symptoms appears logical, more research is needed to demonstrate the association
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18 empirically.
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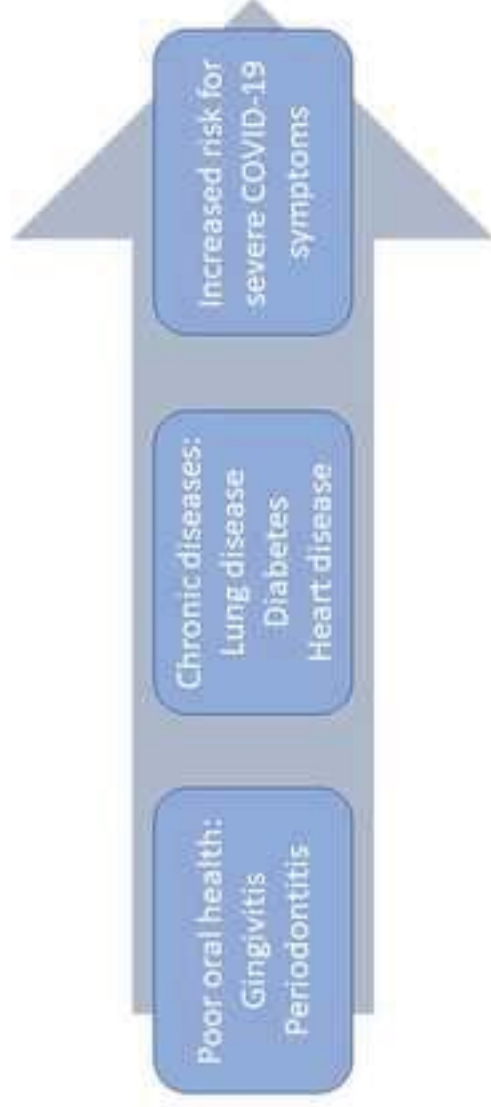
27 **Conflicts of interest**

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29 One of the authors (DMO) is an editor with Biomedical Journal. The other authors do not declare
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31 any competing interests.
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Figure Legend

Figure 1. Mechanisms that could cause poor oral health to exacerbate symptoms of COVID-19.



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