

## Oral hygiene risk factor

Sir, I would like to inform readers about the potential connection between high bacterial load in the mouth and complications associated with COVID-19 infection.

Oral hygiene should be improved during a COVID-19 infection in order to reduce the bacterial load in the mouth and the risk of a bacterial superinfection. We recommend that poor oral hygiene be considered a risk to COVID-19 complications, particularly in patients predisposed to altered biofilms due to diabetes, hypertension or cardiovascular disease. Bacteria present in patients with severe COVID-19 are associated with the oral cavity, and improved oral hygiene may reduce the risk of complications. Whilst COVID-19 has a viral origin, it is suspected that in severe forms of the infection, bacteria plays a part, increasing the chance of complications such as pneumonia, acute respiratory distress syndrome, sepsis, septic shock and death.<sup>1</sup>

The development and severity of complications following a COVID-19 infection depend on numerous host and viral factors that will affect a patient's immune response. Whilst

80% of patients with COVID-19 infections have mild symptoms, 20% progress to have a severe form of infection associated with higher levels of inflammatory markers (Interleukin 2, 6, 10) and bacteria.<sup>2,3</sup> They also exhibit a remarkably higher neutrophil count and lower lymphocyte count than in mild patients.<sup>4</sup> A high neutrophil count is abnormal for a viral infection, but common for a bacterial infection, suggesting that in severe cases of COVID-19, bacterial superinfection is common.

The three main comorbidities associated with an increased risk of complications from COVID-19 are diabetes, hypertension and cardiovascular disease.<sup>5</sup> These comorbidities are also associated with altered oral biofilms and periodontal disease. Periodontopathic bacteria are implicated in systemic inflammation, bacteraemia, and pneumonia.<sup>6</sup> Bacteria present in the metagenome of patients severely infected with COVID-19 included high reads for *Prevotella*, *Staphylococcus*, and *Fusobacterium*, all usually commensal organisms of the mouth.<sup>7</sup> Over 80% of patients in ICU exhibited an exceptionally high bacterial load,<sup>3</sup> and treatment has been successful with a dual regime of an antiviral and an antibiotic.<sup>8</sup> It is

clear that bacterial superinfections are common in patients suffering from a severe case of COVID-19.

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## References

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