



Covid-19 And Periodontal Disease- A Review

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Abstract

Novel Coronavirus disease 2019 (COVID19) is a single-stranded RNA virus which finds its place in the corona viridae family. With a past history of severe acute respiratory syndrome coronavirus and the Middle East respiratory syndrome coronavirus, the World Health Organization (WHO) declared COVID-19 as a pandemic. Though the clinical presentation of COVID-19 patients could be asymptomatic or mild, sometimes the condition could worsen to pneumonia, pulmonary oedema, acute respiratory distress syndrome (ARDS), multiple organ dysfunction syndrome, or even death. Now it was observed that those who attained the critical state had the same comorbidities that were associated with periodontal disease (PD) vis a vis-diabetes, hypertension, obesity, age and gender. So the thought that, can PD be a risk factor for developing severe COVID-19 inspired this article.

Keywords: Corona; Pandemic; Periodontitis; Virus; WHO

Introduction

As we have passed through a short period of time since the outbreak of SARS-CoV-2, it is not surprising that we are still ill-informed about COVID-19 and many areas still remain uncharted. There are no second thoughts when one says that a healthy oral cavity acts as a barrier against many diseases. However does this hold true for COVID-19 also or for that matter is there any relationship between the two at all? As this thought gnawed through our minds, we went through all the accessible literature available, especially Pubmed to find an answer to this question.

Periodontal disease (PD) is a chronic, poly-microbial disease ^[1] whose duration, course and prognosis is modified by several factors like poor oral hygiene, systemic disease like diabetes^[2], tobacco chewing or smoking^[3], obesity^[4], age^[5], medication^[6] and hereditary^[7]. COVID-19 is a disease caused by novel

coronavirus named SARS-CoV-2^[8]. Usually the clinical presentation of COVID-19 patients is asymptomatic or mild, but sometimes the condition of few could worsen to pneumonia, pulmonary oedema, acute respiratory distress syndrome (ARDS), multiple organ dysfunction syndrome, or even death^[9]. It was witnessed in those patients whose condition worsened to critical state, that they had the same comorbidities that were linked to periodontal disease i.e. diabetes, hypertension, obesity, age and gender^[8, 10]. So it is quite natural to wonder that can PD be a risk factor for developing severe COVID-19?

Evaluation of the co-morbidities

Agging- Degenerative changes at the cellular level often affect the elderly, because it is not rare for them to have the following additional risk factors- poor oral hygiene, chronic diseases leading to the use of medications or habits like smoking, which can alter the gingival microbiota and allow the progression of

PD and even respiratory infections ^[11]. For these above reasons and also less stronger immune response than young people, these senile people are at a higher risk to severe COVID-19 illness ^[12].

Gender- Some studies have suggested that men are more susceptible to severe forms of PD than women probably due to differences in immune function and behavioural and environmental factors ^[13]. Parallely, it was observed that men were more prone to become seriously ill by COVID-19 than women for the above same reasons ^[14].

Systemic diseases- It is an established fact that diabetes mellitus (DM) and PD are bi-directionally related and that the presence of one predisposes a person to the other disease ^[15]. Relationship between severe COVID-19 and DM has been reinforced by chest tomography ^[16]. Hypertension is deliberated to be the main risk factor for cardiovascular disease (CVD) and epidemiological studies have shown an association between hypertension, CVD and PD ^[17]. The latter induces a chronic inflammatory response by boosting the creation of cytokines (Interleukin (IL)-1, IL-6, IL-8 and TNF- α) which control and intensify the levels of C-reactive protein (CRP) ^[18]. Hypertension is among the main comorbidities in COVID-19 infection ^[19].

Obesity- Adipose tissue secretes reactive oxygen species, pro-inflammatory cytokines (IL-6, IL-8, TNF- α) and adipokines like leptin and adiponectin which in turn modify the body response to bacteria in gingival tissue thus leading to PD ^[20]. Recent studies suggest that obesity and related complications increase the risk to develop severe COVID-19 illness ^[21].

Chronic obstructive pulmonary disease (COPD)- A recent study suggested that the severity of PD enhances the risk for COPD mortality in senile patients ^[22] Also it has been suggested that patients with pre-existing COPD have a 4-fold amplified risk to develop severe COVID-19 illness ^[23] possibly due to the increased production of angiotensin-converting enzyme 2 (ACE-2) in the airways of such patients.

Smoking- Smoking stimulates dysbiosis in periodontal tissue, encouraging the virulence factors of key periodontal pathogens, generates a favourable micro-environment for these pathogens and blemishes the immune response of the host ^[24]. That

smokers are 1.4 times more likely to suffer from severe COVID-19 was proposed in a recent study ^[25] and its cessation cuts the risk was suggested by another ^[26].

Immunodeficiency diseases- Patients with HIV or with immunodeficiency diseases are at a higher risk of PD due to the altered immune response ^[27, 28] and it is believed that the degree of immunosuppression may make such a patient at a higher risk to SARS-CoV-2 infection also ^[29].

Discussion

So based on the results of so many studies, a hypothesis can be built that both PD and COVID-19 share similar risk factors and hence PD can be a risk factor for COVID-19. Since periodontal health status has not been evaluated in patients with COVID-19 illness, it is challenging to determine this association. Patients of PD have a history of long standing chronic inflammation and above mentioned risk factors predispose them to COVID-19 which in turn leads to increased inflammatory response and cytokine storm ^[30].

Conclusion

It is too early to suggest a direct link between PD and COVID-19 though several studies on the common risk factors suggest a probable relation. Further studies on a large scale on the periodontal status of patients with COVID-19, will shed light on this dilemma.

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