

Periodontal Disease in Medically Compromised Patients and Its Relation with Covid-19

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Periodontal diseases can have systemic effects on our body. Diabetes, cardiovascular disease, hypertension etc., have a history of being associated with periodontal disease. Periodontal disease could indicate the severity of Covid-19. There has been no previous reporting of oral health status in Covid-19 patients. The knowledge of association of periodontal disease with severe Covid-19 could be an important contribution to slowing down the rate and spread of infection.

Periodontal disease is an inflammatory disease which involves gingiva and the supporting tissues like cementum, alveolar bone and periodontal ligament. It has affected nearly about 10 - 12 % of the total population in the world. Periodontal disease is more prevalent in medically compromised patients with diseases like asthma, diabetes, hypertension, cardiovascular diseases, liver diseases, kidney diseases and rheumatoid arthritis. The other risk factors for the occurrence of periodontal disease are tobacco smoking, ageing, poor oral hygiene, obesity etc.¹

Coronavirus (CoV) belongs to Coronaviridae family which are RNA viruses. Their size varies from 60 - 140 nanometre with spike-like projections on its surface. This strain of viruses is considered to be zoonotic in nature and cause respiratory illness in humans.¹ This viral disease has affected lakhs of people in United States and had resulted in a high mortality rate. It was declared a pandemic by WHO on the 11th of March 2020. Comorbid conditions such as diabetes, hypertension, asthma, ageing, obesity and gender pose a greater risk for Covid-19. We wanted to evaluate as to whether periodontal disease along with comorbid conditions share a contributing risk factor for developing Covid-19.

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RISK FACTORS FOR DEVELOPING COVID 19 ALONG WITH PERIODONTAL DISEASE

Diabetes Mellitus

Diabetes mellitus (DM) is a disorder characterised by an imbalance in glucose homeostasis that can affect the various organs.² One of the main features of diabetes is the uncontrolled sugar levels, which can lead to periodontal disease (PD), so PD maybe an indicator of diabetes. Diabetes causes severe alterations in vascular, cellular and host repair processes.^{3,4} Increasing evidence supports an association between severe Covid-19 and DM. It has been supported by different clinical and radiographic parameters such as chest x-rays which show definite changes in patients with diabetes. It is a possibility that the expression of angiotensin-converting enzyme-2 (ACE-2) may be affected in patients with severe Covid-19. This receptor expression has been found to be greater in diabetics than in non-diabetic patients due to treatment with ACE inhibitors and angiotensin II type I receptor blockers (ARBs).⁵ In both periodontal disease and Covid-19, the immune response is altered by external and internal factors. Diabetes is a common factor that predicts the severity of both PD and Covid-19, it can therefore be surmised that PD could also predict the severity of Covid-19.

Cardiovascular Disease (CVD)

One of the major risk factors for CVD in adults is hypertension.⁶ Studies have proven the association of periodontal disease to be a risk factor for CVD and high blood pressure.⁷ Any viral and bacterial infection (in the form of periodontal disease) increases cytokine production interleukins (IL-6, IL-1, IL-7) and tumour necrosis factor alpha (TNF- α) there by raising the C-reactive proteins (CRP) levels. Increased CRP levels is associated with CVD and hypertension.⁷

Angiotensin II type-1 inhibitors (ARB's) are consumed by patients with CVD which increases the expression of ACE-2. Increased expression of ACE-2 further increases the risk of Covid-19 in patients with hypertension and CVD in periodontally compromised patients.⁸

Smoking

Smoking is a factor very closely associated with the development of periodontal disease, and it affects the progression, severity and response to treatments of this condition. Smoking has also been found to be a potential risk factor for Covid-19 illness, smokers being 1.4 times more prone for having Covid-19 illness. Patients with periodontal disease and with smoking history are more susceptible for Covid-19 illness in its worst form.⁹

Asthma

Asthma is characterised by chronic inflammation of airways. There is a positive correlation between asthma and Covid-19 as proved by numerous studies conducted beforehand. It was suggested that asthma could be a risk factor for PD in adults. Now, it is said that asthma could be a reason for severe Covid-19 illness; however, asthma had lower prevalence than expected in Covid-19 patients. Conflicting results have been

found in patients suffering from asthma with periodontal disease in relation to Covid-19.¹⁰

Cancer

In recent years, the development of cancer has been linked to PD. This can be attributed to inflammation, systemic translocation of periodontal pathogens through the weakened periodontal epithelium, systemic immune dysregulation and the increase in circulating cytokines and chemokines. The severity of Covid-19 can be high in cancer patients as they are considered to be high risk patients with other associated comorbidities. Thus, a patient with periodontal disease suffering from cancer is more prone to Covid-19 illness.¹¹

Liver Disease

Association has been found between periodontal disease and liver diseases (LD). While Covid-19 has been known to cause liver injury. Covid-19 can easily be acquired by patients with liver disease with PD.¹²

Ageing

Ageing has been associated with periodontal disease in several ways. Elderly patients with poor oral hygiene, underlying systemic disease if any and ongoing medications contribute to periodontal disease. Patients above 70 years of age, with comorbid conditions and with periodontal disease are at the highest risk for Covid-19.¹³

Pregnancy

Pregnancy results in physiological changes in a pregnant woman. Increased progesterone levels alter the gingival response causing dysbiosis. Although the association of pregnancy and periodontal disease is controversial, few cases have been reported of periodontal disease in pregnant women. High progesterone and estrogen levels make the pregnant women more susceptible for respiratory tract infection and diabetes. Thus, Covid-19 infection in pregnancy can result in preeclampsia and low birth weight babies. Diagnosis of SARS-CoV-2 in pregnant women with PD and other comorbidities can complicate pregnancies.¹⁴

CONCLUSIONS

Although, there is enough evidence to propose that PD acts as a risk factor for Covid-19. PD along with disorders such as diabetes and CVD can act as a triggering factor for Covid 19. Since periodontal health status has not been assessed in patients with Covid-19 illness, it is difficult to determine this association. Thus, more studies are required to assess the role of periodontal disease along with other comorbidities in the occurrence of Covid-19 illness.

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