Oral Indicators and after effects of COVID-19

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ABSTRACT
Coronavirus-19 has affected the human species world over and got the life of each and every age group into a slow pace and wiped off two precious years 2020-2021 for all. Apart from affecting the respiratory system of an individual, coronavirus disease has its effect on oral cavity which gets displayed at an earlier stage. This display in the oral cavity can usually go unnoticed, but if it gets noted, can be of great help in the early diagnosis as well as treatment of COVID-19 before reaching its severity in many individuals. In oral cavity, lips, tongue, palate, buccal mucosa may show changes which can give a hint about the coronavirus disease. Salivary gland dysfunction, xerostomia, taste alterations, oral mucosal lesions are the most common oral cavity manifestations in individuals with coronavirus disease. Oral hygiene measures also play an important role in reducing the viral load within the oral cavity. As most of these presentations can be noticed at the asymptomatic phase of the coronavirus disease course, these signs can be taken into consideration for the timely diagnosis of this disease. Thus it helps in decreasing the transmission rate of COVID-19 between the individuals as quarantine and treatment measures can be started at the initial stage itself.

Introduction
Corona virus disease (COVID-19) started to endanger mankind from December 2019 and is still creating a great havoc in most parts of the world. Every age group is exposed and affected with Corona virus, lashing the normal life of all individuals. Along with the disease manifestations, the treatment protocol as well as the severity and after effects of the disease and mortality rate has hit mankind to its worst. It’s a great challenge for the healthcare sector dealing with this highly virulent virus which has spread worldwide in a very short time. Pulmonary and extrapulmonary manifestations have been reported in Covid 19 cases. Oral cavity always paves way to quick diagnosis as well as gives a clear picture of the prognosis of various diseases.¹ Saliva has been reported as media of transmission as well as diagnosis of the Coronavirus disease.²,³,⁴,⁵,⁶ Various changes in the oral cavity has been considered as a non invasive diagnostic criteria, thus giving a clue prior to the severity of the condition. Lips, tongue, palate, gingiva and the buccal mucosal changes were noticed, gustatory impairment being the most common.¹ Other oral lesions like ulcers, petechiae, small blisters white and erythematous plaques and gingivitis were noted. These oral lesions
appeared before or at the same time as the starting of respiratory symptoms. Hence oral mucosal lesions more likely presented as co-infections and secondary manifestations along with other clinical conditions.\textsuperscript{7}

**ORAL MANIFESTATIONS OF COVID -19**

**Loss of taste and Geographic tongue**-
Covid -19 patients have initial symptoms of cough, fever, myalgia and complain of taste dysfunction, sometimes loss of taste and smell can be the only symptom what the patient gives. Cough and muscle and joint pain is the most common symptom than the other symptoms. Other symptoms like dry mouth, anosmia and dysgeusia can also be the presenting symptoms. Runny nose, change of taste, facial pain are presented as symptoms of COVID 19.\textsuperscript{8}

Loss of taste is mainly because of the plaque and swollen palate and not because of any changes in the taste buds. Smell related changes is mainly due to the infection because of the viral load in the upper respiratory tract.\textsuperscript{1}

Geographic tongue is associated with COVID-19 is an inflammatory disorder which usually appears on the dorsal surface and lateral aspect of tongue.\textsuperscript{9} This COVID tongue appears to have bald and red areas of different sizes which is surrounded by an irregular white border. Emotional stress ,habits, systemic conditions can be some of the factors which may be responsible for COVID tongue. Viral load can be related to poor general and oral hygiene of an individual, which can create an appropriate habitat for COVID -19 to move on to a severe form. Poor oral hygiene and related conditions in the oral cavity is directly related to the high viral load. Decreasing this viral load will reduce the oral manifestations as well as at the systemic level. Thus maintaining a good and thorough oral hygiene practice can reduce the severity and morbidity involved in COVID-19.\textsuperscript{10,11}

**Dry mouth/Xerostomia**-
Dry mouth may be one of the initial manifestation of COVID -19 before the signs and symptoms in the upper respiratory tract. This symptom can be very useful for early diagnosis and treatment of the COVID patients. Freni et al outlined the signs of dry mouth in 32% of patients with COVID-19 which persisted in 2 % of subjects at the disappearance of COVID-19 symptoms.\textsuperscript{12} Another retrospective study showed xerostomia to occur before other symptoms in the disease sequele.\textsuperscript{13} The effect of the virus in the salivary glands can be a reason that can be considered for xerostomia in COVID patients. Other factors which can contribute to this may be the stress, anxiety and hospitalization during the course of the coronavirus disease.

Taste is considered to be a good stimulant for saliva secretion. Bidasee et al reported that 50% of the patients had reported both dysgeusia and xerostomia which shows that they are corelated.\textsuperscript{14} Knight A, in his study suggested that runny nose and congestion in patients which can lead to mouth breathing can result in dry mouth.\textsuperscript{15,16} Whereas, Bidasee et al reported no significant correlation between dysgeusia and nasal congestion or xerostomia with nasal congestion and rhinorrhea.\textsuperscript{14} Luo et al indicated a correlation between dry mouth and bitter taste of COVID-19 patients.\textsuperscript{17}

Yet another possible reason to be said is that loss of smell can cause the absence of indirect stimulation of saliva. Lechien et al n his investigation of three cases of parotitis in COVID patients suggested lymphadenitis in the parotid gland as a reason for xerostomia where in there is an increase in the parotid gland secretion leading to the blockage of the Stensen duct, saliva retention and dry mouth due to hyposalivation.\textsuperscript{18}
Another reason which can be mentioned for xerostomia can be a great number of medicines given in COVID patients which include antiviral drugs like remdesivir, ritonavir, lopinavir, hydroxychloroquine and interferons. Zinc deficiency, viral neurotransmission, inflammation of salivary glands and ACE2 expression in salivary glands are other possible mechanisms considered for xerostomia in COVID-19 patients.

Oral lesions, Ulcers and blisters-
In a few cases oral mucosal lesions have presented as primary symptoms and in a few cases they have occurred as secondary. These presentations when occur as primary symptom can help in the primary diagnosis. But they usually go unnoticed because of the lack or delay in intraoral examination during the clinic or hospital visit. Angela et al reported three cases of ulcerations and blisters on the palate and tongue resembling herpetic recurrent stomatitis. Among these three cases, one reported with blisters on the labial mucosa and desquamative gingivitis. All these cases were reported to be treated with topical antiseptics. Amorim Dos Santos et al showed that COVID-19 could potentially contribute to severe outcomes related to oral health leading to opportunistic fungal infections, recurrent oral herpes simplex virus infection, and gingivitis due to the weakened immune system or medications given for COVID-19.

Oral Candidiasis-
COVID-19 virus weakens the immune system and thereafter increases the opportunistic infections that usually get displayed in the oral cavity. Oral candidiasis has been recorded in patients with severe COVID-19, especially the ones with predisposing medical comorbidities and patients with antibiotic intake. Abanoub Riad et al reported cases of oral candidiasis in COVID patients. The dorsal aspect of tongue, soft palate, floor of the mouth, buccal mucosa and oropharynx were the affected areas seen with white membranous patches. These cases were reported to be treated with topical antifungals and local antibacterial mouth wash.

Other manifestations
Covid-19 virus disease could cause sialadenitis of submandibular salivary glands and inflammation of parotid glands. In a case report by Capaccio et al a 26-year-old man developed painful parotid gland swelling and the ultrasonography revealed enlarged and diffuse hypoechoic parotid gland. Corona virus mainly infects the sulcular and periodontal pocket epithelia and affects the periodontal tissues negatively. Prevotella intermedia is frequently detected in COVID-19 patients and Coronavirus could predispose patients to periodontal disease by bacterial coinfection mediated by Prevotella intermedia. Patel et al reported halitosis, intense gingival pain, and bleeding from the gingival sulcus in a patient suspected with COVID-19.

Oral manifestations of Mucormycosis in Post COVID-19 patients
Mucormycosis of the oral cavity presents with white fungal patches on the tongue, ulcers and gingivitis. Toothache, loosening of teeth and jaw involvement can also be presented in case of mucormycosis patients. These oral manifestations may be due to the deficient immune response seen in patients with COVID-19 or where patients who needed steroids during the treatment of COVID. Post COVID, long term diabetics, those with poor immune response and those with poor oral hygiene conditions can also present with oral manifestations of mucormycosis.
Discussion
Corona virus -19 which originated in Wuhan, China has affected the world population and wiped out the dreams of many and still continuing to affect the physical, mental, social and economic life of the humans. Oral cavity is one among the sites infected by the coronavirus and shows varied manifestations of the disease. Oral cavity has been regarded as a potential risk route in the spread of COVID-19. Salivary droplets of the infected people are super spreaders of the coronavirus. The viral load in the oral cavity is usually high, hence the reliability is considered high for oropharynx swab test. Lowering this viral load helps to reduce consequences at the systemic level as well as within the oral cavity. One of the great attempts to reduce the viral load is by maintaining a good oral hygiene. Good oral hygiene measures can reduce the morbidity as well as the severity of COVID-19.10,11

The inflammatory and infectious course of any illness is usually associated with decreased saliva. In case of the Corona virus disease, it is mentioned in literature that it has mucotropic and neuropathic effects which can affect the salivary glands in their basic function leading to decreased salivary flow and xerostomia.19 Medications during the treatment of this infection also have a hand in causing xerostomia which has to be mentioned.

Immune dysregulation plays a pivotal role in the manifestation of the disease. Comorbidities contribute greatly to the prognosis of COVID-19.30 The immune dysregulation in the coronavirus disease along with other underlying medical conditions can cause oral lesions and other opportunistic infections to arise. Emotional stress during the course of this pandemic can also cause herpetic lesions. It should also be noted that there is a lack of evidence to establish an efficient and safe drug against COVID-19 yet, and the ones used are related to many adverse reactions, including oral lesions. Mortazavi et al in their study concluded that it is unclear that all the oral manifestations are coexisting or that they are as a result of a cause and effect that the virus has the capability to present these signs.7

Conclusion
Oral cavity plays a very important role as it is one of the main routes of entry for bacteria, viruses, fungi which can affect the general health of a person. Oral manifestations can be either primary or secondary symptom in an individual with COVID-19. These manifestations in the oral cavity should be given emphasis and dealt with utmost attention. Treatment of the oral lesions along with good oral hygiene measures will help in decreasing the viral load and thereby minimizing the transmission rate.

References


