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Evaluation of oral manifestations in COVID patients an original research

Dr. Samiksha Dubey
MDS, Prosthodontist, JRF Periodontology, KGMU, Lucknow, Uttar Pradesh, India.
Corresponding author email: drsamikshadubey@gmail.com

Dr. Rishal Mohammed. P
Consultant Oral and maxillofacial pathologist, Malappuram, Kerala.
Email: rishaljafar@gmail.com

Dr. Harmeet Singh
Reader, Department of Conservative Dentistry and Endodontics, Maharaja ganga singh dental college Sri Ganganagar, Rajasthan.
Email: drharmeet786@gmail.com

Dr. Alavala Vasavi Nikitha
MBBS, MD, Department of Anaesthesia, NRI Medical College And General Hospital, china kakani, Guntur, AP.
Email: Nikkismiling4u@gmail.com

Dr. Chitikesi Lavanya
BDS, Tutor, Tirumala institute of dental sciences, Nizamabad.
Email: lavanyabds01@gmail.com

Dr. Preetha Anand
Senior lecturer, Oral medicine and Radiology, AIMST UNIVERSITY, bedong Semeling 08100 kedah malaysia.
Email: preetha_anand@yahoo.com

Dr. Damarasingu Rajesh
OMFS, PhD Scholar, Dept of OMFS, Narsinhbhai Patel Dental College and Hospital, Sankalchand Patel University, Visnagar, Gujarat.
Email: rajeshoralsurgeon@gmail.com

***Abstract*---**Introduction- The continuum emerging viral diseases are a threat to mankind and moreover are a serious concern to the public health. The current lethal COVID-19, a SARS-CoV-2 is a highly contagious disease, which propagated quickly all over the world. Similar to other influenza-like viral infections, symptoms such as fever, dry cough, myalgia, arthralgia, headache, diarrhea, dyspnea,

and fatigue were reported among COVID-19 patients. Evidence suggests that the oral cavity is affected by this virus either directly or indirectly. Aim & Objective- The aim of this observational study was to determine the oral manifestations among COVID-19 patients. Materials and Methods- A questionnaire-based cross-sectional study was carried out among the patients recovered from COVID-19. A sample of 120 subjects, diagnosed as mild and moderate cases of COVID-19 disease were selected based on inclusion and exclusion criteria. Results-The study comprised an almost equal number of male (64%) and female (56%) participants and among them, 48% belong to the health professional group. Approximately 55% of subjects were aged above 35 years and 45% below 35 years. Oral manifestations among the study subjects during and after the disease illness included xerostomia being the commonest symptom (42%), followed by swallowing difficulty (15%), mouth ulcerations (8.5%), chewing problem (9%), gum bleeding (5%), and burning sensation (3%). Conclusion- Xerostomia, frequent aphthous ulcers, burning mouth and difficulty in swallowing were the frequently encountered symptoms in study subjects during the disease and also post recovery. It is of great help for a dentist or a general physician if there is early identification of oral symptoms in COVID-19 recovered or suspected cases in order to diagnose the high-risk groups, reduce the transmission, and moreover promote the overall health.

***Keywords*---**COVID-19, Oral Manifestation, Xerostomia.

Introduction

The emergence of viral diseases is threat to mankind and are a serious concern to the public health. In the last millennium, several viral epidemics such as the severe acute respiratory syndrome coronavirus (SARS-CoV-2) emerged in 2002–2003, H1N1 influenza in 2009, Middle East Respiratory Syndrome Corona-Virus (MERS-CoV) in 2012, and finally, SARS CoV-2 or COVID-19 hit the world in December 2019. Intriguingly, in almost all of these pandemics, the causative viruses belong to the same family Coronaviridae, and have their origin from bats, later moving to mammalian hosts and then finally infect the humans, making their dynamics spurious.[1]The latest lethal SARS-CoV-2 or COVID-19 is a highly contagious disease that spread quickly across the world and on January 30, 2020 was declared a Public Health Emergency of International Concern (PHEIC) and on March 11, 2020 a pandemic by the World Health Organization.[2] There were 174,502,686 reported cases of COVID-19 disease till June 12, 2021, resulting in 3,770,361 deaths.[3] The symptoms reported in COVID-19 patients were similar to other influenza-like viral infections such as fever, dry cough, dyspnoea, headache, myalgia, arthralgia, diarrhoea and fatigue. The generalized body weakness and fatigue are the common symptoms in subjects who were even less symptomatic.[4]However, the duration, frequency and magnitude of these symptoms depend on an individual's immunity. As per the reports, most of the COVID-19 cases are mild (65%), while 30% of the infected patients may develop severe disease, and 5% may become critically ill requiring the mechanical support

due to the complications like pneumonia or acute respiratory distress syndrome (ARDS).[5-7] The clinical presentation also involves the oral cavity such as taste alterations, nonspecific oral ulcerations, and aphthous stomatitis, pigmentation, hypogeusia, , mucositis, petechiae, drug eruptions, angular cheilitis, xerostomia, necrotizing periodontal disease, desquamative gingivitis and opportunistic infections such as mucormycosis, candidiasis, herpetiform lesions and aspergillosis.[5-11] Reviews by Singh *et al.*[12] and Farid *et al.*[13] confirmed anosmia, ageusia, hyposalivation, and mucosal ulcerations to be a common finding in COVID-19 patients. Sometimes, few manifestations pop up later in the disease or after the patients become seronegative for this virus. As it is said that oral cavity is the mirror of general health, many times it becomes the site for the appearance of initial symptoms.[14] Persuading the knowledge and acquaintance of these oral symptoms can help primary and general care physicians to diagnose asymptomatic, less symptomatic, and post-COVID-19 patients with deteriorating immune status. The early diagnosis in such cases can warn the healthcare providers in order to strictly adhere to the preventive protocols and can make them examine the patients' existing health conditions which will avoid the further worsening of their systemic diseases. The high viral concentration was found in throat and nasal cavity and thereby making this route the main source of transmission and also the preferred site for virus isolation. Because of the vicious nature of this disease and its multiple and variable symptoms, the present study was aimed to investigate the prevalence of the oral manifestations among COVID-19 patients.

Materials and Methods

A questionnaire-based, cross-sectional study was carried out among the COVID-19 recovered patients regarding the general health status, oral hygiene practices, and also the symptoms in oral cavity during as well as after the illness. Ethical clearance was obtained from the Institutional Review and written consent from all subjects were taken. Moreover, the anonymity and confidentiality were maintained. A sample of 120 subjects, who were diagnosed with mild and moderate cases of COVID-19 disease was selected on the basis of inclusion and exclusion criteria. Data were collected between 3 weeks to 4 months from date of diagnosis of theCOVID-19 disease, which was confirmed by positive RT-PCR (real-time reverse transcriptase-polymerase chain reaction) reports. The inclusion criteria were as follows- The subjects who have given the written consent for the study. The subjects with laboratory-confirmed COVID-19-positive RT-PCR reports. Those who have recovered from COVID-19 disease either under home isolation or in the hospital. The cases which were mild and moderate and did not undergo any kind of intensive care therapy. The subjects who completed a minimum isolation period of 2 weeks. While exclusion criteria were uncooperative subjects. Those who had submitted the unfilled/partially filled questionnaire. The subjects having any common symptoms related to COVID-19 like fever, cough, cold, etc., at the time of interview. The subjects who were diagnosed as COVID-19 positive more than 4 months back.

In the present study, during the survey the data was obtained from the study participants by either of the following methods- through a personal interview, by telephonic interview, or by online survey using Google forms. Most of the subjects

have personal interviews to the examiner. All the preventive measures were followed to control the disease transmission during the interview such as the use of personal protective equipment, mouth masks, maintenance of hand hygiene, and also the social distancing. All the subjects were interviewed in open spaces or well-ventilated rooms. After the interview, the filled questionnaire was collected in a separate box and reviewed after a rest period for analysis. Due to the risk of disease transmission, the oral examination on patients was not performed by the examiner. The aim and objective of the study was explained to the subjects who were approached for the telephonic interviews, they were also explained regarding the common symptoms that are found in oral cavity during and after COVID-19 disease. They preferred to fill the questionnaire sent to them in Google forms by referring attached file of clinical pictures showing oral manifestation in COVID-19 patients. The questionnaire was a close-ended, validated, questionnaire containing 20 questions was used to collect information regarding the general health status, the symptoms in the oral cavity during and after the disease manifestation and also oral hygiene practices. The following information was gathered from study subjects- Demographic details i.e., age, gender, occupation, history of a previous dental visit, oral hygiene practices, smoking history. Disease-related details i.e., the date of diagnosis, transmission in family, also regarding home isolation and hospitalization, and any other general symptom related to COVID-19. The oral manifestations such as xerostomia, taste alteration and its duration, swallowing and chewing problems, burning sensation or any mouth ulcerations, gingival and periodontal status, any tooth-related problem. Any other unusual symptoms experienced during the disease course. Also, post-COVID-19 care or any vitamin supplementation. The answers were bifurcated as Yes or No, which were kept in two categorical variables, and also codified. Because of the nature of our survey, the data was computed for the descriptive statistics for most of the questions. The answers obtained prior to and during the disease manifestation were compared through the Chi-square test in order to assess the statistical significance. The statistical significance for the different variables was checked by the level of P value < 0.05.

Results

The demographic distribution of study subjects shows almost equal participation from all groups. As far as the oral hygiene practices were concerned, most of the study subjects used tongue cleaner daily (90%), although only 30% of the subjects brushed their teeth twice daily. Total of 95% of study participants had more than 20 teeth, and have claimed not having any loose teeth, prosthesis (89%) in their oral cavity. Moreover, a considerable percentage of subjects visit their dentist regularly (52%). It was observed that around 54% of study subjects were on the vitamin supplementation during the recovery phase i.e., 2 weeks following the confirmed infection and around 25% of the patients had general symptoms. The study comprised an almost equal number of male (64%) and female (56%) participants (Graph- 1) and among them, 48% belong to the health professional group. Approximately 55% of subjects were aged above 35 years and 45% below 35 years (Graph-1). Regarding the oral manifestations among study subjects (Graph- 2) during the illness, it was noticed that xerostomia was the commonest symptom i.e., xerostomia being the commonest symptom (42%), followed by swallowing difficulty (15%), mouth ulcerations (8.5%), chewing

problem (9%), gum bleeding (5%), and burning sensation (3%). Although other symptoms decreased by the frequency in the recovery period, the burning sensation and frequent mouth ulcerations increased. Approximately 70% of the patients reported altered taste, which lasted for more than a week in around 50 % of patients. The other oral symptoms reported during the disease were halitosis, fissured tongue and loss of taste with prevalence of 3%. When the comparison was done for presence of oral symptoms based on age and gender, a statistically significant value emerged only for symptoms like chewing problems, especially in patients aged >30. It was observed in the present study that when variables like presence of comorbidity in the subjects were compared with the oral symptoms *P* value was significant i.e., $P = 0.021$ only for the swallowing difficulty, which was evident in the systemically compromised patients. There was no significant association between the presence of oral symptoms like xerostomia, altered taste sensation, mouth ulcerations, burning sensation, gingival bleeding when compared among the healthcare providers and comorbid patients.

Discussion

Approximately 65 % of the study subjects reported simultaneous infection in their family members because of the fast infectivity and contagious nature of coronavirus and despite taking all the preventive measures there was high rate of infectivity among the healthcare workers which was causing difficulty in the management of this disease. However, on a positive note, around 80% of the subjects recovered under the home-isolation representing the mild-moderate form of the severity similar to other research findings. Several oral manifestations such as xerostomia, altered taste sensation, swallowing difficulty, mouth ulcerations, and gingival bleeding and burning of oral mucosa with different frequency was observed in the subjects of current study. The data was relevant as it had similarities with other research findings. [6,15] The taste disorder, which was the most common outcome seen in the subjects of current study, had similarities with previous studies done by Santos *et al.* [5,7] who reported gustatory impairment with prevalence of 45% in COVID-19 patients. The observations by Freni *et al.* [4] also comprised of xerostomia, dry eyes, auditory discomfort along with gustatory, and olfactory dysfunction with a prevalence of 70% and 92%, respectively, in their COVID-19 patients. As we know that ACE-2 receptors are in abundance in the salivary glands, tongue, and oral mucosa, thereby the neuroinvasive properties of SARS-CoV-2 virus causes the chemosensory degradation leading to the various manifestations in oral cavity including the altered taste sensation.[6,11] The oral symptoms were reported in a study done by Iranmanesh *et al.* such as the aphthous ulcers, herpetiform lesions, ulcers, erosions, white and red plaques, exanthema-like lesions, necrotizing periodontal disease, xerostomia, erythema multiforme, mucositis, fissured tongue, etc. Similarly, in the present study few subjects had aphthous ulcer, halitosis, swallowing difficulty and fissured tongue. Moreover, the observations by Presas *et al.* [8] also comprised of oral ulceration, glossodynia among the COVID-19 patients. Some other studies also reported the cases of necrotizing periodontal disease, commissural cheilitis, and bilateral atrophy of tongue in COVID-19 recovered patients. [9,10,16] There was no significant difference observed in the presence of general symptoms in the current study based upon the demographic variations. However, the subjects who had underlying systemic conditions and who were health professionals and had a high

prevalence of general symptoms, this might be due to the frequent exposure to viral load among professionals and also because of the low immune response among the subjects with systemic illness. The current study had certain limitations such as due to the risk of transmission and lack of patient consent for examination, the oral examination among study subjects could not be done. Also, because most of the findings in the present study were self-reported, it might be subjected to the reporting bias. Thereby, we had tried to minimize this by guiding the participants for the self-evaluation of oral cavity, also by producing the clinical pictures of reported oral manifestations, and moreover, explaining to them about the associated COVID-19 symptoms.

Conclusion

The current study evaluated the mild and moderate cases of COVID-19 disease and conspicuous oral manifestations found in them were xerostomia, frequent aphthous ulcers, swallowing difficulty, and burning mouth during the disease and post recovery. COVID-19 is a novel infectious disease with the insufficient data on its pathogenesis and the clinical features, a long-term follow-up with a multidisciplinary approach is highly recommended for all the COVID-19 recovered patients backed by the health informatics data in order to support the further research and moreover to prevent many post-COVID-19 complications.

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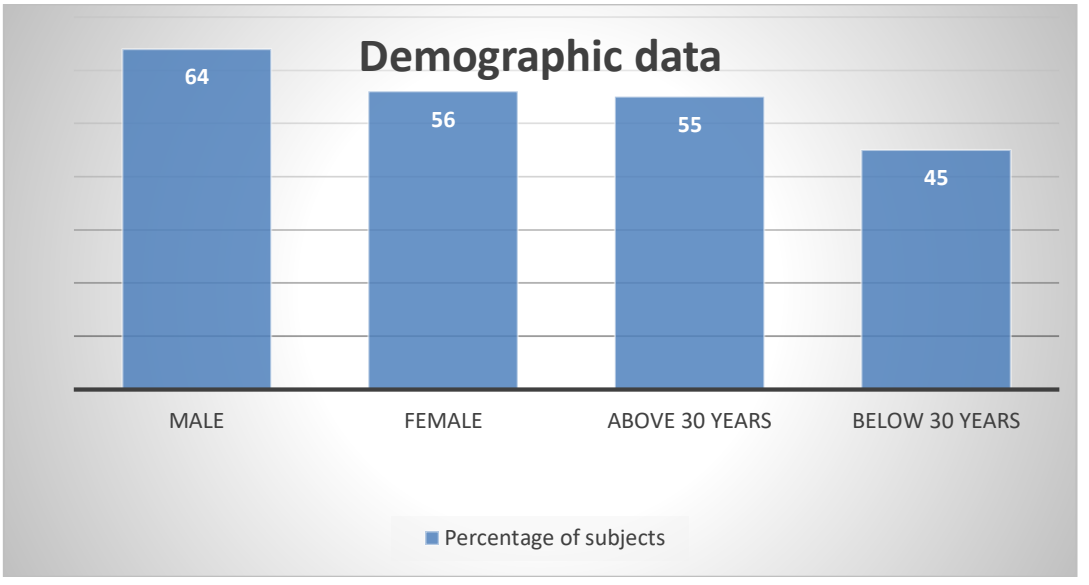
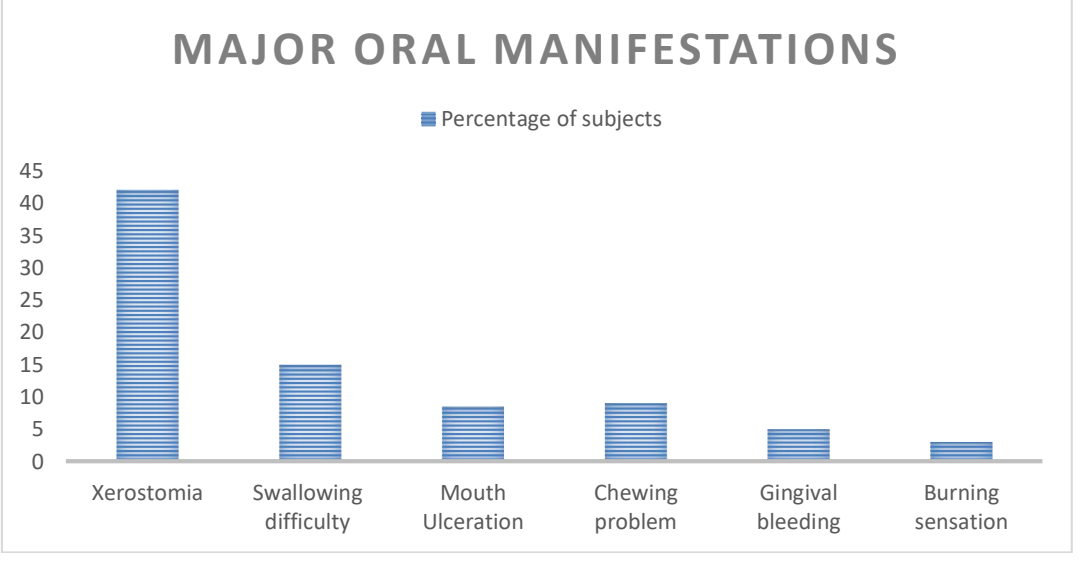


Graph- 1: Showing demographic data (in percentage) of subjects



Graph- 2: Showing percentage of subjects having oral manifestations