COVID-19 AND ITS ORAL MANIFESTATIONS IN POPULATION OF ISLAMABAD AND RAWALPINDI: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: *To assess the oral manifestations in the people of Islamabad and Rawalpindi affected with COVID-19.*

Materials and Methods: *Study design and setting: It is descriptive cross sectional study which was conducted on 250 both male and females participants who had suffered from COVID-19 over the duration of 6 months in Islamic International Dental Hospital Islamabad. Participants were from Islamabad and Rawalpindi. Questionnaire: Subjects participated in a web based questionnaire assessing the oral manifestations of COVID-19. These included facial pain, pain while eating(masticatory pain) , burning sensation in the oral cavity, dryness of mouth (xerostomia), loss of taste and oral mucosal lesions.*

Results: *Out of 250, 105male and 145 females participate in this study. 40 % (n=100) participants experienced pain in the face region out of whom 40% (n=40) had pain in the head region. 46% participants reported to have pain on mastication out of which 47.8% had pain on messeter muscle. 46% participants had burning sensations in the oral cavity.60% participant's experienced dry mouth. Moreover 70% participants experienced loss of taste sensations. Only 24% reported with oral mucosal lesions.6% participants developed blisters/ulcers out of which majority developed them on the tongue.*

Conclusion: *This study concluded that oral manifestations are important for early detection of COVID-19 patients and majority of these patients showed loss of taste.*

Keywords: *COVID -19, Oral Manifestations, Loss of taste, Oral symptoms*

INTRODUCTION

Corona virus disease 2019 is an infectious disease caused by corona virus. The virus spreads through droplets transmission and direct contact with oral, nasal eye and mucous membranes.[1] It is an ongoing pandemic rapidly progressing across the globe. Studies suggest that COVID-19 may become airborne through aerosols generated during clinical procedures.[2]

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Cough, fever and respiratory distress are the common symptoms.[2] The average incubation period for COVID-19 has been projected to be 5-6 days although the evidence suggests that it can last for as long as 14 days.[3] This time period is ideally accepted for medical monitoring and quarantine of potentially exposed individuals. As it is a viral disease, it is not surprising for it to show oral manifestations.[1]

Oral health researchers may play a vital role in early identification and diagnosis of the disease like dry mouth, ulcers, loss of taste and olfactory loss are also common and early signs of COVID-19 infection. According to study of scheme 1, Chimensos-Kustenes (2015), many patients reported

symptoms of oral ulcers, chewing, swallowing and speaking difficulties if they are associated with SARS-COV.2 virus.[4]

Study of Giacomeli at el (2020) suggests that dysgeusia is an oral symptom of COVID-19. According to many review articles, it is reported that the COVID-19 positive patients presented with the sudden loss taste and loss of anosmia.[5]

Social isolation has proven to be effective and had an extraordinary impact in avoiding contamination among the population.[6] Early detection of symptoms is essential and therefore some orofacial manifestations of viral infection may contribute to early diagnosis of COVID-19 infection. According to the study of Amen et al,a total of 32.8% patients reported loss of taste and it was more frequent in the female population.[1]

The objective of our study is to assess the oral manifestations of COVID-19 patients in population of Islamabad and Rawalpindi.

MATERIALS AND METHODS

This is a descriptive cross sectional study conducted at Islamic International Dental College, Islamabad. The duration of the study is six months from 1st March 2020 to 30th November 2020. It included a sample size of 250 including both male and female patients who had suffered from the COVID-19 virus. The study was approved by hospital ethical committee of Islamic International Dental Hospital, Islamabad with digital consent obtained from all participants.

A web-based survey tool, Google Forms was used to create the questionnaire. A standard digitally secured questionnaire link was sent to each participant (COVID-19 positive) on their mobile phones. Patients could submit the questionnaire only once.

A digital consent to participate in the study was obtained prior to completing the questionnaire. A new questionnaire was designed for this study because most available questionnaires did not include the epidemiological and various possible oral, taste, and smell manifestations of COVID-19 infection.

The questionnaire was designed in English language for ease of understanding. Questionnaire was based on two parts. The first part included questions regarding demographic data,any medical illness, smoking, oral hygiene status, use of medication and related allergies. The second part of the questionnaire includes 12 questions specifically related to orofacial manifestations related to COVID-19 patients. Sense of burning in the oral cavity, dryness of mouth (xerostomia),loss of taste, changes in the oral mucosa including sites of lesions were asked. For facial pain and masticatory pain, we added 3 pictures with labeling on different sites on face. Picture A was with front side view of face and while picture B and C with lateral view of face and with marking on muscles of mastication.

The questionnaire was used to assess the oral manifestations of COVID-19 patients. Data was collected and analyzed by SPSS version 23.

RESULTS

Demographic details:

The demographic details of the participants of our study are summarized in Table 1 Majority of the participants (n=165, 66%) had no allergy followed by 45(18%) participants who had pollen allergy. 15 participants (6%) stated they had dust allergy while 10 (4%) said they have seasonal allergy. 5 participants (2%) had penicillin allergy. Another 5 (2%) had sinusitis and 5 (2%) stated they have both pollen and dust allergy.

When asked about chronic medical condition majority (n=195, 78%) said they don't have any medical illness. The responses of other participants are illustrated in Table 2.

Out of 250 participants, 180(72%) stated that they are not currently taking any drugs whereas the remaining 28% said they do take medication.

Oral hygiene:

Results of oral hygiene are shown in Table 3 which shows that most of the people were with good oral health.

Oral manifestations:

Patients were asked about whether they had experienced pain on face. They were asked to score the pain on the scale of 1-10.0 represented no pain whereas 10 represented severe pain. Majority of the participants (n= 150, 60%) did not experience any pain on face, whereas 5 participants (6%) stated that they experienced severe pain on their face. Patients

were inquired about pain while mastication and were asked to score it. 135 (54%) were with no pain. When asked about sensation of burning in oral cavity, 135 stated that they did not have any such symptom. The remaining participants (n=115, 46%) scored the burning on scale of 1-10. 150 (60%) participants suffered from dry mouth while 175 (70%) experienced loss of taste sensation. Participants were asked if they had bleeding/ swelling in the oral cavity. 220 (88%) reported in a "No". Participants were then inquired about presence of oral mucosal lesions during being COVID-19 positive. 60 (24%) answered in a "yes". The overall summary of oral manifestations reported in 250 participants is given in Table 4.

100 participants who experienced pain were asked to identify the site of their pain. A picture was given for reference. 40 participants had pain on Site 5 while no participant reported to have pain on site 3 shown on Picture A. 115 participants who experienced pain while mastication, were asked to identify the site of the pain. 55 (47.8%) had pain on site 3 shown on Picture B and C . 60 participants who had oral mucosal lesion were asked about oral ulcers/blisters. 15 out of 60 participants (25%) said that they had ulcers/blisters. Those 15 participants were asked to figure out the site of ulcers/blisters. The overall responses of sites of facial pain, masticatory pain and ulceration/blisters are illustrated in Table 5.

45 (25.7%) participants had loss of all taste sensations including spicy, salty, sour and sweet. The other findings are illustrated in Table 6.

DISCUSSION

The Corona virus disease 2019 pandemic poses a threat to global health. Early diagnosis is an essential key to limit the outbreak of the virus.[7] A sudden, severe, isolated loss of smell, taste in the absence of other upper airway inflammatory disease (allergic rhinitis, chronic rhino sinusitis, nasal polyposis), should alert individuals affected by COVID-19.[8]

Multiple studies have shown that the loss of smell, loss of taste, ulcers, pain on mastication, burning mouth, xerostomia and facial pain are some

Table 1: Demographic details of 250 participants enrolled in our study

Age	**Frequency**	**(%)**
<30 years	140	(56%)
>50 years	10	(4%)
30-40 years	75	(30%)
40-50	25	(10%)
Gender		
Female	145	(58%)
Male	105	(42%)
Employment Status		
Employed	155	(62%)
Unemployed	95	(38%)

Table 2: Summary of the chronic medical conditions of the participants

Any known chronic medical condition?		
Asthma	10	(4%)
Asthma, Other	5	(2%)
Diabetes Mellitus	5	(2%)
Diabetes Mellitus, Asthma	5	(2%)
Diabetes Mellitus, Hypertension	5	(2%)
Hypertension	5	(2%)
Hypothyroidism	5	(2%)
None	195	(78%)
Other	15	(6%)
Total	250	(100%)

Table 3: Oral hygiene habits of the participants

Do you clean your teeth		
	Frequency	**(%)**
No	10	(4%)
Yes	240	(96%)
How often do you brush your teeth?		
less than once per day	55	(22%)
more than once per day	195	(78%)
Cleaning aids used?		
Mouthwash	5	(2%)
Toothbrush and Toothpaste	120	(48%)
Toothbrush and Toothpaste, Dental floss	15	(6%)
Toothbrush and Toothpaste, Dental floss, Mouthwash	45	(18%)
Toothbrush and Toothpaste, Dental floss, Tooth pick	5	(2%)
Toothbrush and Toothpaste, Mouthwash	35	(14%)
Toothbrush and Toothpaste, Mouthwash, Tooth pick	15	(6%)
Toothbrush and Toothpaste, Tooth pick	10	(4%)
Has your dentist diagnosed that you have gum disease?		
No	225	(90%)
Yes	25	(10%)

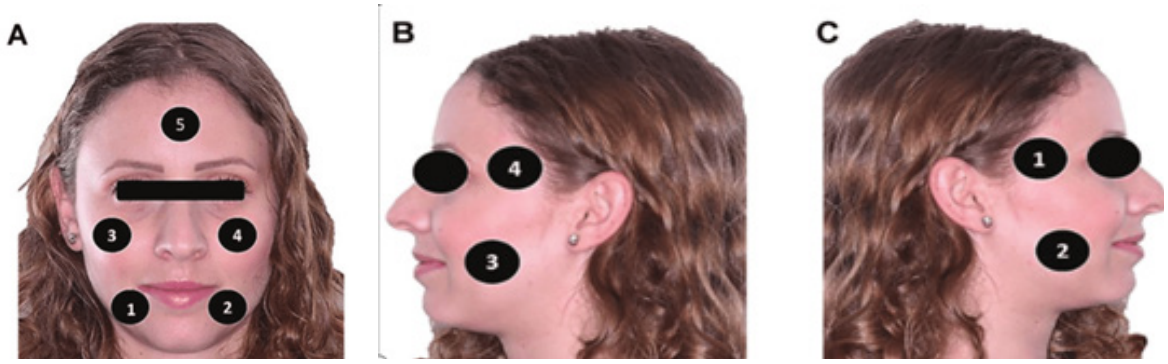
Table 4: Summary of oral manifestations as reported by 250 participants enrolled in our study

Score of pain on face		
Score	**Frequency**	**(%)**
.0	150	(60%)
1.0	5	(2%)
2.0	20	(8%)
3.0	5	(2%)
4.0	10	(4%)
5.0	25	(10%)
6.0	15	(6%)
7.0	15	(6%)
10.0	5	(2%)
Score of pain while chewing/mastication		
.0	135	(54%)
1.0	30	(12%)
2.0	5	(2%)
3.0	5	(2%)
4.0	15	(6%)
5.0	25	(10%)
6.0	20	(8%)
7.0	10	(4%)
8.0	5	(2%)

Score of burning in oral cavity		
.0	135	(54%)
1.0	20	(8%)
2.0	15	(6%)
4.0	10	(4%)
5.0	15	(6%)
6.0	20	(8%)
7.0	15	(6%)
8.0	15	(6%)
9.0	5	(2%)
Dry mouth		
No	100	(40%)
Yes	150	(60%)
Loss of taste sensation		
No	75	(30%)
Yes	175	(70%)
Bleeding and/or swelling in the oral cavity		
No	220	(88%)
Yes	30	(12%)
Oral mucosal lesions		
No	190	(76%)
Yes	60	(24%)

Table 5: Sites of facial pain, masticatory pain and ulceration/blisters

Site of facial pain	**Frequency**	**(%)**
1.0	5	(5%)
2.0	20	(20%)
4.0	35	(35%)
5.0	40	(40%)
Total	100	(100%)
Site of the masticatory pain		
1.0	5	(4.3%)
2.0	35	(30.4%)
3.0	55	(47.8%)
4.0	20	(17.4%)
Total	115	(100%)
Site of ulceration/ blisters		
Gingiva/gums	2	(13.3%)
Lips	1	(6.6%)
Palate	2	(13.3%)
Palate, Gingiva/gums	2	(13.3%)
Palate, lips	1	(6.6%)
Tongue	4	(26.7%)
Tongue, Gingiva/gums, lips	2	(13.3%)
Tongue, lips	1	(6.7%)
Total	15	(100%)



Picture A with front side of face

Picture B and C with lateral view

Table 6: Responses of the candidates when questioned "which taste sensations were lost"?

Which taste sensations were lost		
Taste Sensations	**Frequency**	**(%)**
Salty	10	(5.7%)
Salty, Sour, Sweet	30	(17.1%)
Salty, Sweet	5	(2.9%)
Sour	15	(8.6%)
Spicy	10	(5.7%)
Spicy, Salty	15	(8.6%)
Spicy, Salty, Sour	10	(5.7%)
Spicy, Salty, Sour, Sweet	45	(25.7%)
Spicy, Salty, Sweet	5	(2.9%)
Spicy, Sour	15	(8.6%)
Spicy, Sour, Sweet	5	(2.9%)
Sweet	10	(5.7%)
Total	175	(100%)

of the symptoms experienced by patients affected by COVID-19.[9]

In the present study it is suggested that the percentage of female population infected by covid 19 is higher than male population that is 58% and 42 %respectively. These results resonate with a study by Ameen at el who reported that the female population affected by COVID-19 was 70 %.[1]

Loss of taste and smell can be the first and only manifestation of COVID-19(10). According to the study conducted by Giacomeli - A-et al and song - et - al it was found that loss of taste was 30% and 21 %, respectively.[5] In contrast to these studies, in our study 70 % of COVID-19 positive patients lost their taste sensation.

According to the study conducted by Ameen Biadsee et al 52 % reported changes in taste sensation, 52 % patients reported a change in their spicy taste, 54% in salty taste, 53% in sour taste and 61 % in sweet taste which is in contrast to our study in which 70% reported changes in taste sensation.5.7 % patients reported a change in their spicy, sweet and salty taste whereas percentage for changes in sour taste was reported to be 8.6 %.[1]

Xerostomia is another symptom related to the patients infected with COVID-19. In our study, 60% of COVID-19 positive individuals suffered from xerostomia(2). Similar results were obtained by the study conducted by Ameen Biadsee et al in which 56% underwent Xerostomia.[1] Braunasirjani et al states in his study that 30 % of COVID-19 positive individuals suffered xerostomia.

There is also evidence of oral ulceration which is reported by 28 % of the patients in our study. In contrast to our study, the studies conducted by Bahzadiranmanesh-et al and Martin C-et al concluded that

68% a 25 % had oral ulceration respectively.[10, 11]

The sites for oral ulceration may vary in patients infected with COVID-19 and these mainly include hard palate, tongue and oral mucosa.[12, 13]

In our study,13.3 % patients presented with ulcers on mucosa, 13.3 % on hard palate and 26.7 % on tongue which is in contrast to the study conducted by Ansari - et - al in which 4% ulcers were present on mucosa, whereas percentage for ulcers on tongue and hard palate was reported to be 2%.[14]

The facial pain and pain on mastication are also other symptoms associated with COVID-19. In our study, the percentage of individuals suffering from facial pain is 60 % which is in contrast to studies conducted by Fernando - et - al and Ameen - et - al in which percentages are 70 % and 26 % respectively. Pain on mastication is around 55.4% in our study. Similarly, Ameen - Biadsee - et – al reported in his study that 11% patients suffered from pain on mastication.[1, 5]

Burning mouth is another oral manifestation linked with COVID-19 patients. In our study the percentage of patients suffering from burning mouth is 54 % which is in contrast to the study by BraunaSirjani et al is 15 % .[15]

In future, more such studies should be conducted with increased sample size and over a longer period of time. This will encompass more strains of COVID -19 and will lead to more accurate result.

CONCLUSIONS

Oral manifestations are considered to be initial symptoms of COVID-19. Therefore when the oral manifestations start appearing, the suspected individuals should self-quarantine even before being tested positive for COVID-19.This will help in minimizing the potential of spread of the disease. Regarding the taste disorders, our study concluded that majority of the patients presented with loss of taste.

LIMITATION

Systemic medications have numerous oral side effects. In this study, we did not consider this variable which can entail to inaccurate results.

Over the period of time, various strains of novel COVID-19 virus are emerging. However our study only contains data regarding the first strain in Pakistan.

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