



RESEARCH ARTICLE

The Retrospective Pilot Study of the Prevalence of Olfactory Dysfunction or Loss of Smell, Loss of Taste and Oral Manifestations among COVID-19 Positive Health Workers in Muscat, Oman

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Summary

Abstract: A retrospective study evaluating the prevalence of loss of smell, loss of taste and oral manifestations was carried out by framing an online questionnaire and disseminated among the health care workers including medical and dental students, who were afflicted with COVID-19.

Objective: The objective of this study was to find out the prevalence of the loss of smell, loss of taste (LOST) and oral manifestations and whether these (LOST & Oral manifestations) can be the premonitory manifestations and also whether these can predict the prognosis of COVID-19 disease.

Result: Our study showed that the loss of smell, loss of taste and dry mouth did occur before the other symptoms considerably in the COVID-19 infected health workers. All the infected health workers were in home quarantine phase and not hospitalized during the occurrence of COVID-19.

Conclusion: The loss of smell, loss of taste and oral manifestations can be the prodromal signs of COVID-19 and may be used as a screening tool to predict the severity of the disease.

Introduction

The closing of the year 2019 heralded with the rapid spread of the COVID-19 (SARS-COV-2) disease across the globe mapping almost all the countries and posing threat to the whole mankind [1,2].

The first-time occurrence of COVID-19 was reported by WHO among the patients exposed to seafood market in Wuhan city of China on 31st December 2019.

The causative microorganism of this disease was first identified and reported by Chinese Centre for Disease Control and Prevention (CCDC) on 7th January, 2020 followed by its notification to WHO [3,4]. As of July 2021, the disease did affect more than 195 million individuals causing over four million deaths worldwide [1]. In Oman the COVID-19 positive patients were first reported on 24 February 2020 and these COVID-19 affected patients had returned after travelling to Iran [5]. The main mode of human to human spread of COVID-19 virus has been found to be varied ranging from direct contact and airborne transmission. The dissemination of this virus is facilitated by sneezing, coughing, droplet inhalation and direct contact with the oral, nasal and eye mucous membrane of the asymptomatic or symptomatic carrier [6]. The time elapsed between the onset of infection till the appearance of signs and symptoms ranges from 0-24 days with an average of 5-7 days. The signs and symptoms of this disease have a diverse range of severity [2]. According to the report from WHO-China Joint Mission, most of the COVID-19 disease is of mild-moderate nature with only few cases (6.1%) tapering to serious condition and requiring hospital admission [3]. The disease is characterized by the common symptoms of fever, dry cough, fatigue and myalgia with few cases showing gastro intestinal tract (GIT) disorder that includes abdominal pain and diarrhea [2,3].

The COVID-19 infection has also shown the signs and symptoms featuring dysfunction of smell and taste as



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seen in other common upper respiratory viral infections and this has been supported by plenty of studies [7-9]. In fact, one of the recent studies have shown that smell and taste alterations occurs in about 75% of COVID-19 individuals [10]. These localised alterations have been seen as the only manifestations in mild infections or heralding symptoms of the severe COVID-19 disease progressing eventually to pneumonia. There is not much evidence of a direct link of other reported oral manifestations, like ulcerative, erosive, vesiculobullous and plaque like lesions, besides taste loss in COVID-19 [10,11]. However there have been reports that among the oral manifestations, the localized condition like xerostomia or dry mouth may be the common, initial manifestations or the sole presentation in COVID-19 patients besides gustatory and olfactory alterations [12,13]. The COVID-19 virus does show an initial manifestation of smell and taste alterations because presumably during the initial transmission, the virus comes in contact with the oral, nasal and eye mucosa. A study also reports, that the COVID-19 positive patients are more prone for these manifestations as compared to the COVID-19 negative individuals [14]. It becomes therefore imperative to study the initial nature and course of the disease or the prodromal signs and symptoms because an early recognition of the disease can facilitate the diagnosis and a quick management. Therefore, keeping this aim and objective in view, we conducted a web or online based questionnaire survey to find out the prevalence of dysfunction/loss of smell and taste (LOST) and oral manifestations related to COVID-19 disease among the health care workers (HCW) and dental/medical students of Oman. The aim and objectives of this study was also to relate the symptoms of taste and smell dysfunction and oral manifestations with the prognosis of the disease.

Methods

After the approval of the present study by Ministry of Health, Oman. We formulated a questionnaire especially for the HCW and dental/medical students (studying in Muscat). The health care workers that were targeted included the residents, post graduates, doctors, nurses, medical assistants and other allied health workers working in Muscat, Oman. A web based Survey Monkey [questionnaire link](#) was created, uploaded and circulated/posted (via WhatsApp) in September 2021 among the health workers and dental/medical students in Muscat. The online questionnaire ensured anonymity and confidentiality of the respondents. The participants were queried for their profession, work place, age, gender, smoking history, medical history and whether they experienced any signs and symptoms akin to upper respiratory infection (including loss of smell, loss of taste, oral manifestations) past 6-7 months retrospectively.

The online responses with incomplete history and the participants who did not go for COVID-19 testing

were not included in the study. The patients with a history of any nasal or sinus disease, Bell's palsy or medications known to cause taste disturbances were also disregarded. Furthermore the patients with psychological disturbances and recent surgeries of head and neck region were also removed from the list of study group.

Results

A total of 83 HCW's and medical/dental students retorted to the questionnaire, that was earlier uploaded and circulated via the link interface-Survey Monkey. All had a history of upper respiratory infection (URI) past 6 months, retrograde from September 2021. Out of the total responses, only 69 subjects admitted, that they tested for COVID-19 infection. Therefore, the remaining 14 were left out from the study group. The answered questionnaire forms for the study group of 69 individuals were further segregated into 2 groups on the basis of the declaration of the respondents, about their COVID status. About 58 respondents were identified and labelled as COVID-19 positive (GRP-I) while 11 were labelled as COVID negative (GRP-II).

The GRP-I comprised of 22 Doctors/Dentists (37.93%), 15 Medical Nurses (25.86%), 9 Residents/Interns (15.51%), 9 Auxiliary staff (15.51%) & 3 Medical assistants (5.17%). About 38 (65.51%) individuals in GRP-I worked mainly in hospital under Ministry of Health, Muscat, and 20 (34.48%) in private hospitals/polyclinic, Oman. The group GRP-II comprised of 9 (81.81%) Medical/Dental students (81.81%) and 2 Interns studying/working (18.18%) in Medical/Dental College in Muscat, Oman. All the individuals in GRP-I (58) were in an age range of 25-45 years (mean 35 years), while the GRP-II had all the young adults (11) in an age range of 18-24 years. The GRP-I presented with 51 males (87.93%) and 7 females (12.06%) while the GRP-II, that comprised of 11 individuals, had a balanced gender ratio with six males and five females with a ratio of 1:1.2.

Mostly the subjects of about 50 (88.40%) in GRP-I were non-smokers, however about 8 (13.79%) had smoking history, while in GRP-II, there was none with smoking history. Interestingly, about 42 (60.86%) subjects out of the total of 69 in GRP-I & GRP-II, who answered the questionnaire, had no evidence of significant medical history, however few respondents in GRP-I & GRP-II declared their medical history, for example; 14 (20.28%) of them had a history of diabetes, 10 (14.49%) had a history of hypertension, 1 (1.44%) had the history of allergic rhinitis/sinusitis, 1 (1.44%) respondent reported having undergone dental treatment/radiation while 1 (1.44%) had a history of asthma.

All the participants in GRP-I & GRP-II encountered the clinical signs and symptoms of a typical upper respiratory infection (URI) past 6-7 months retrograde. The

manifestations in the GRP-I, individuals predominantly were the occurrence of fever in 43 (74.13%) respondents, followed by sore throat/dry cough in 38 (65.51%), runny nose in 35 (60.34%), myalgia in 31 (53.44%), and GI symptoms in 2 (3.44%) individuals respectively. There were 15 (25.86%) subjects, who did not have any medical symptoms. In GRP-II, out of the total of 11 respondents, all observed and wrote about the constitutional signs and symptoms of fever. There was dry cough/sore throat in 9 (81.81%) subjects, followed by myalgia/fatigue in 2 (3.44%). The questionnaire forms were analysed for their answers to the queries relating to LOST and oral manifestations respectively. Most (about 77.58%) of the COVID-19 positive individuals could not identify the source of infection. The remaining members reported to have come in contact with the infected patients, while rendering the medical care in the hospital. The queries relating to the occurrence of loss of smell and loss of taste and oral manifestations were answered by the study group. It was revealed, that none of the subjects in GRP-II did experience any loss of taste and smell sensation or any oral manifestations. However, in GRP-I, the LOST was reported to have occurred together in 16 (44.82%) participants. There were 30 (34.48%) individuals, who reported the loss of smell sensation, while the loss of taste was reported in 10 (17.24%) individuals separately. Only 2 (3.44%) individuals had none of these signs and symptoms. The onset of the loss of smell was reported to have occurred mostly before the other symptoms in 38 (65.51%) individuals or with the other symptoms in 10 (17.24%) individuals and 2 (3.44%) individuals did not remember the onset. The onset of the loss of taste was also reported to have occurred before the other systemic manifestations in 31 (53.44%) individuals and in 10 (17.24%) with the other symptoms and in 7 (12.06%) after the other symptoms subsided. The remaining 10 (17.24%) subjects did not remember any loss of taste. During the LOST manifestations, more than half 47 (81.03%) individuals were home quarantined, while none were in the hospital and 11 (18.96%) respondents attended the Out Patient Department (OPD). The recovery of the loss of smell and or loss of taste varied from a period of five days to ten days and up to 30 days. Out of 58 COVID-19 positive subjects, about 45 (77.58%) people recovered from the of loss of smell &/or taste within a period of 30 days and 11 did recover from five days to ten days and two did not remember the recovery period. The overall COVID-19 disease after the observance of the loss of smell and taste worsened mostly in about 7 (15.21%) COVID-19 infected respondents and improved in nine (19.56) and was stable in 30 (65.21%). The loss of smell and loss of taste did resolve eventually in 55 (94.82%) and the same number did not receive any treatment for the disorders. More than half of the individuals 33 (53.44%) out of the total 58 respondents did not have any oral manifestations, however 18 (31.03%) wrote

about dry mouth as the oral manifestations during COVID-19 infection. About 3 (5.17%) individuals had swollen red tongue or sore tongue followed by two (3.44%) subjects each with a history of bleeding in gingiva and swelling/painless or painful ulcerations. The onset of the oral manifestations was seen in 25 (43.10%) individuals before the other symptoms and after the other symptoms in 26 (44.82%) subjects. The oral manifestations during post recovery period were seen in about seven (12.06%) individuals. The oral lesions resolved in more than 10 days as reported by most 38 (65.51%) affected COVID-19 positive patients. Other 20 (34.48%) individuals reported the oral lesion recovery in between 5-10 days respectively.

Discussion

Plenty of studies have emerged during COVID-19 pandemic, evaluating (LOST) among the COVID-19 infected patients [4,7-9,12,14,15]. We conducted an online Questionnaire-based study evaluating the prevalence of dysfunction or loss of smell, taste and oral manifestations among the COVID-19 positive HCW, working in Muscat, Oman. We chose HCW as the study group, because they could, perhaps interpret and answer the queries related to the signs or symptoms related to LOST& oral manifestations with accuracy. This study according to best of our knowledge is one of the few studies carried out in Muscat, Oman.

We, in our survey-Questionnaire, identified 58 COVID-19 positive & 11 COVID-19 negative responses respectively. The COVID-19 positive individuals comprised of more of doctors/dentists (37.93%) and medical/dental nurses (25.86%), followed by residents (15.51%) and medical auxiliaries (15.51%). This goes in agreement with the study that reported a high COVID-19 infection rate among doctors (53/100) and in nurses (50/1000) respectively in Milan during peak of COVID-19 disease [15]. The increased infection rate among doctors and nurses can be explained based on the fact that, these are the vulnerable groups of HCW, who came in contact with the COVID-19 patients, while rendering the health care. The 11 COVID-19 negative responses in the questionnaire received by us, included solely the medical/dental students. This COVID-19 negative status among medical and dental students, presumably could be due to the closure of onsite classes, confinement at home and resumption of online classes, thereby leading to less exposure to the virus. There was more prevalence of COVID-19 infection among young adults& elderly and in males (87.93%) in age range of 25-55 years. A study evaluating the epidemiological characteristics of COVID-19 patients in Oman also showed (75%) prevalence in males between the age range of 20-49 years [16]. The predilection of male gender among COVID-19 positive infected individuals also has been reported from the studies carried out in Oman, Italy and USA [5]. The reason of more COVID-19 positivity in

males is suggested to occur because they indulge more in outdoor activities, but our study, had both male and female health workers equally working in the hospitals and therefore this assumption does not apply to our study. The various pre-existing medical conditions and co-morbidities seem to be the predisposing factors for the symptomatic and severe COVID-19 infection according to the recent systematic review and meta-analysis of the prevalence of underlying diseases among COVID-19 infected patients [17]. The COVID-19 positive respondents, who answered our study questionnaire, were mostly non-smokers (88.40%). Out of the total respondents in GRP-I & GRP-II, considerable number of them (77.58%) had no pre-existing medical localised or generalised conditions. The minimal co-morbidities and the non-smoking status in most of the respondents could be the reason for the less severity of COVID-19 disease among the GRP-I. The disease was less severe and same can be seen in their answered questionnaire in which most of the health HCW reported that they were home quarantined and none was admitted to the hospital during their stint with COVID-19 infection. The COVID-19 positive individuals answered to the queries and it was identified that most of them had the clinical manifestations of fever (74.13%), sore throat/dry cough (65.51%), nasal stuffiness or rhinorrhoea (60.34%) and myalgia/fatigue (53.44%) and GI symptoms (34.38%). The various systematic reviews and meta-analysis and other studies have also reported the common occurrence of fever, cough, fatigue & rhinorrhoea/nasal stuffiness as the common symptoms in COVID-19 infected patients [17-20]. On the other hand, all the COVID-19 negative individuals also had a history of fever and a considerable group had dry cough/sore throat and few had a history of myalgia only.

After the analysis of the answers to the queries in the questionnaire, it was found that both the loss of smell and taste was reported by 16 (27.58%) and the loss of smell was separately observed by 30 (51.72%) respondents and the loss of taste was seen in ten (17.24%) individuals. The reason of the increased prevalence of loss of smell or olfactory dysfunction (OD) in our study is agreeable, because it is an established fact, that the smell impairment is one of the frequent symptoms of COVID-19 infection [21]. Although the pathogenesis of the OD is not still clear but it is suggested that the COVID-19 virus prefers the ACE2 receptors that are expressed in epithelial cells of oral mucosa and nasal mucosa [22]. A multicentric study in patients from China, France and Germany reported the loss of smell or the loss or taste in 19% before the other symptoms [14]. Our study showed the loss of smell and the loss of taste before the other systemic manifestations in (65.51%) and (53.44%) respectively. This strongly suggests that OD and loss of taste could act as a prodromal sign and strong indicator of COVID-19 disease. Most of the individuals recovered their loss of smell and taste

by about two months' time according to the study reported from Greece [21]. A systematic review also reveals the recovery of OD within 30 days that was similar to our study [23]. Furthermore, a multicentric European study reports the recovery of smell and taste within two weeks after the resolution of general symptoms, which is earlier than the recovery observed by most of the individuals in our study [24]. Our study showed more of OD and recovery of the same within 30 days and the condition of the patients was stable and in fact all the patients were home quarantined. A study in Brazil reports that OD is more prevalent in patients with mild flu-like symptoms [25]. Our study also showed the respondents having more of OD and this feature may reflect or predict good prognosis of COVID disease.

Besides the loss of taste, the other oral manifestations reported from the studies on COVID-19, are the manifestations of painful ulcers, macular-papular & vesiculobullous lesions [26]. The other cross-sectional study reports the difficulty in swallowing, burning mouth and bleeding through gingiva as the oral manifestations however, xerostomia was common and was seen in 44% individuals [27].

Our study also showed most of the individuals manifesting dry mouth in 18 individuals (31.03%) besides taste loss and this also goes in agreement with the above-mentioned cross-sectional study and other study from India that showed xerostomia in about 28% of individuals. There have been other studies also that show xerostomia as one of the oral manifestations of COVID 19 [28-30]. The xerostomia could have occurred due to the fever and dehydration.

Conclusion

Our study showed OD inclusive of gustatory dysfunctions and xerostomia that occurred before the disease occurrence. Therefore, these prodromal signs and symptoms of COVID can help to predict the disease occurrence and even the severity of the disease. This study had a limitation of small sample size and moreover, we had to depend on the answers to the queries, that was based solely on recall. Large scale study needs to be done to evaluate the prodromal signs and symptoms of the COVID-19 by accessing the hospital records.

References

1. Yazdanpanah N, Rezaei N(2022) Autoimmune complications of COVID-19. *J Med Virol* 94: 54-62.
2. Shi Y, Wang G, Cai XP, Deng JW, Zheng L, et al. (2020) An Overview of COVID-19. *J Zhejiang Univ Sci B* 5: 343-360.
3. Adil Md T, Rahman R, Whitelaw D, Jain V, Al-Ta'an O, et al. (2021) SARS-CoV-2 and the pandemic of COVID-19. *Postgrad Med J* 97: 110-116.
4. Ani RM, Acharya D (2020) Prevalence of anosmia and ageusia in patients with COVID-19 at primary Health Centre, Doha, Qatar. *Indian J Otolaryngol Head Neck Surg* 19: 1-7.

5. Faryal K, Al Badriya R, Al Zakwani I, Al Wahaibi AH, Al Awaidy ST (2020) Epidemiology of COVID-19 infection in Oman: Analysis of the First 1304 cases. *Oman Med J* 35: 145.
6. Naz S, Zahoor M, Sahibzada MUK, Ullah R, Alqahtani AS (2021) COVID-19 and SARS-COV-2: Everything we know so far-A comprehensive review. *Open Chem* 19: 548-575.
7. Lee Y, Min P, Lee S, Kim SW (2020) Prevalence and duration of acute loss of smell or taste in COVID-19 patients. *J Korean Med Sci* 35: 174.
8. Mullol J, Alobid I, Mariño-Sánchez F, Izquierdo-Domínguez A, Marin C, et al. (2020) The loss of smell and taste in the COVID-19 outbreak: A tale of many countries. *Curr Allergy Asthma Rep* 20: 61.
9. Abalo-Lojo JM, Pouso-Diz JM, Gonzalez F (2020) Taste and smell dysfunction in COVID-19 patients. *Ann Otol Rhinol Laryngol* 129: 1041-1042.
10. Obiefuna S, Donohoe C (2022) Neuroanatomy, nucleus gustatory. *Treasure Island* (FL).
11. Farid H, Khan M, Jamal S, Ghafoor R (2022) Oral manifestations of COVID-19-A literature review. *Rev Med Virol* 32.
12. Fantozzi PJ, Pampena E, Di Vanna D, Pellegrino E, Corbi D, et al. (2020) Xerostomia, gustatory and olfactory dysfunctions in patients with COVID-19. *Am J Otolaryngol* 41: 102721.
13. Saniasiaya J (2021) Xerostomia and COVID-19: Unleashing pandora's box. *Ear Nose Throat J* 100: 139.
14. Qiu C, Cui C, Hautefort C, Haehner A, Zhao J, et al. (2020) Olfactory and gustatory dysfunction as an early identifier of COVID-19 in adults and children: An International Multicenter Study. *Otolaryngol Head Neck Surg* 163: 714-721.
15. Mandić-Rajčević S, Masci F, Crespi E, Franchetti S, Longo A, et al. (2020) Source and symptoms of COVID-19 among Hospital workers in Milan. *Occup Med (Lond)* 70: 672-679.
16. Al Awaidy ST, Khamis F, Al Rashidi B, Al Wahaibi AH, Albahri A, et al. (2021) Epidemiological characteristics of 69,382 COVID-19 patients in Oman. *J Epidemiol Glob Health* 11: 326-337.
17. Khateri S, Mohammadi H, Khateri R, Moradi Y (2020) The prevalence of underlying diseases and comorbidities in COVID-19 patients; an updated systematic review and meta-analysis. *Arch Acad Emerg Med* 8: 72.
18. Alimohamadi Y, Sepandi M, Taghdir M, Hosamirudsari H (2020) Determine the most common clinical symptoms in COVID-19 patients: A systematic review and meta-analysis. *J Prev Med Hyg* 61: 304-312.
19. Sun P, Qie S, Liu Z, Ren J, Li K, et al. (2020) Clinical characteristics of Hospitalized patients with SARS-CoV-2 infection: A single arm meta-analysis. *J Med Virol* 92: 612-617.
20. Sharma R, Rana AK, Sharma VK, Mehrotra A, Babu H, et al. (2022) Clinical correlation and assessment of olfactory dysfunction with n-butanol in COVID-19 patients: Our experience. *Rhinology Online* 5: 30-36.
21. Printza A, Katotomichelakis M, Valsamidis K, Metallidis S, Panagopoulos P, et al. (2021) Smell and taste loss recovery time in COVID-19 patients and disease severity. *J Clin Med* 10: 966.
22. Ziuzia Januszewska L, Januszewski M (2022) Pathogenesis of olfactory disorders in COVID-19. *Brain Sci* 12: 449.
23. Jafar A, Lasso A, Shorr R, Hutton B, Kilty S (2021) Olfactory recovery following infection with COVID-19: A systematic review. *PLoS One* 16: e0259321.
24. Lechien JR, Chiesa Estomba CM, De Siati DR, Horoi M, Le Bon SD, et al. (2020) Olfactory and gustatory dysfunctions as a clinical presentation of mild-to-moderate forms of the coronavirus disease (COVID-19): A multicenter European study. *Eur Arch Otorhinolaryngol* 277: 2251-2261.
25. Mendonça CV, Mendes Neto JA, Suzuki FA, Orth MS, Machado Neto H, et al. (2022) Olfactory dysfunction in COVID-19: A marker of good prognosis? *Braz J Otorhinolaryngol* 88: 439-444.
26. Soares CD, Souza LL, de Carvalho MGF, Pontes HAR, Mosqueda-Taylor A, et al. (2022) Oral manifestations of coronavirus disease 2019 (COVID-19): A comprehensive clinicopathologic and immunohistochemical study. *Am J Surg Pathol* 46: 528-536.
27. Muthyam AK, Reddy MP, Kulkarni S, Srilatha A, Sahithi K, et al. (2022) Oral manifestations in COVID-19 patients: An observational study. *J Family Med Prim Care* 11: 1000-1005.
28. Ganesan A, Kumar S, Kaur A, Chaudhry K, Kumar P, et al. (2022) Oral manifestations of COVID-19 infection: An analytical cross-sectional study. *J Maxillofac Oral Surg* 1-10.
29. Chawla J, Navaneeth Y, Bakshi SS, Kalidoss VK, Yadav S, et al. (2022) Oral manifestations associated with COVID-19 disease: An observational cross sectional study. *J Oral Biol Craniofac Res* 12: 279-283.
30. Tsuchiya H (2021) Characterization and pathogenic speculation of xerostomia associated with COVID-19: A narrative review. *Dent J* 9: 130.