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A Preliminary Survey on the Oral Manifestation of COVID-19 in the First and Second Waves in Bhubaneswar, City of Odisha, India

Ruchi Bhuyan[1], Sanat Kumar Bhuyan[2], Jatindra Nath Mohanty[3], Nihar Ranjan Panda[4], Varsha Bhuyan[5], Priyadarshini Ojha[6], Pallavi Priyadarshini[7], Gangadhar Sahoo[8]

[1,3,4,5,6,7,8]IMS & SUM hospital Siksha O Anusandhan University (Deemed to be), Bhubaneswar, Odisha, India
[2]IDS, Siksha O Anusandhan University (Deemed to be), Bhubaneswar, Odisha, India

ABSTRACT

Background: In both waves of COVID-19 infections, loss of taste was noted in a disproportionately high number of individuals. However, there is a considerable risk of dental disease during and after COVID -19 infections. **Aim:** Our aim here is to study the oral manifestation of the COVID -19 infections and make a comparison of the severity of presentation in the second wave with the first wave among the general population in Bhubaneswar, city of Odisha, India.

Methods: A detailed online questionnaire was developed focusing on the oral manifestation during both the waves using Google forms.

Results: Out of a total of 380 RT PCR positive cases, 91/169 and 167/211 cases with oral manifestation were obtained in the first and second waves, respectively. We found 41 (24.26%) in the first wave and 63 (29.85%) in the second wave of patients with oral manifestations over the age of 50. Patients receiving oxygen or using a ventilator were found to be 15 (8.9%) in the first wave and 59 (28%) in the second wave.

Conclusion: This is the first study to evaluate the correlation of oral infection with COVID 19 in different waves. This difference could be correlated with the virulence of viruses with mutated strains.

Keywords: COVID-19, Epidemiology, Oral Features, Dental Diseases, Oral Health

INTRODUCTION

This survey was done in Bhubaneswar, Odisha, to look at the oral symptoms that emerged during the first and second waves, as well as the precautions and steps taken to improve oral hygiene and the number of visits to dental clinics.COVID-19, which was initially discovered in China's Wuhan province, has spread to a number of countries.[1,2] In India, COVID-19's first wave, which began in early June 2020 and terminated in mid-February 2021, gradually increased in intensity until late September 2021.[3,4] The first wave of infection was gradual and steady due to the union government's extensive preventive measures, which included a severe shutdown, effective contact tracing, and public gathering restrictions.[5] However, the second wave was a disaster, owing to an unexpected 5-6 times higher rate of infection, vague contact tracing, a government agency's nonserious precautionary approach, and, most importantly, the COVID guidelines' inappropriate behaviour by the general public.[6] The dominant mutant variant of COVID-19 was shown to cause the second wave to have a shortened incubation period and much more transmissible characteristics.[7] There was a significant difference in general symptoms in the

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Correspondence: Dr. Sanat Kumar Bhuyan (Email: sanatkumarbhuyan@soa.ac.in)

first wave, which were primarily fever, cough, and loss of taste, but there was more epithelial involvement in the second wave, which included skin rash, conjunctivitis, sore throat, oral ulcers, xerostomia, malaise, and neurological disorders.[8,9] The SARS-CoV-2 virus enters human cells through ACE2 receptors found in the mouth and upper respiratory tract epithelial cells in the nasal cavity. It can also be found in the tongue, digestive system, and saliva, all of which are notable microbe reservoirs. Studies show that the SARS-COV-2 virus has been found to spread through the oral mucosa. Herpetic ulcers, candidiasis, and aphthous ulcers are common manifestations of COVID-19 infection. [12, 13] Several studies have reported on the severity of COVID-19 infection based on general symptoms, but very few have focused on oral health characteristics. Patients who had mechanical ventilators, both invasive and non-invasive, or routine oxygen assistance, had a fungal infection in their mouths and nostrils.[10,11] In this study, we explored the variation in oral features in the general population before and after COVID-19 infections. Furthermore, the data were compared with two waves, with the mutated virus showing a difference in the manifestation of features in terms of severity.

METHODOLOGY

Study design: This study was conducted among the general community in Bhubaneswar, Odisha, to examine the oral symptoms that emerged during the first and second waves, as well as the precautions and measures taken on oral hygiene and the number of visits to dental clinics.

Data collection: The survey was conducted entirely online. Participants who had access to the Internet have voiced their opinions. With the consent of the participants, a complete online questionnaire was created using Google forms. The link was then sent to students, research organizations, and health workers via multiple messengers, including What's app, Facebook, and other social media networks, and eventually to the majority of the general public in Bhubaneswar. A total of 549 people with a COVID-19 infection responded to the survey. Dry mouth, loss of taste, bleeding gums, tooth pain, burning sensations in the mouth, mouth ulcers, abnormal tooth mobility/loosening of teeth, and no oral symptoms were among the oral symptoms included in the study. All symptoms reported by the participants were reconfirmed by telephonic calls, and those with major dental problems were asked to report to the hospital for clinical examination and treatment.

Statistical analysis: Numbers and percentages, as well as averages and standard deviations, are used to present data. The $\chi 2$ test (categorical variables) or the student's t-test was used to make statistical comparisons between two groups. For comparative analysis, oral features were obtained for the first and second waves of the COVID 19 pandemic, oral features were obtained for comparative analysis. The criterion for statistical significance was established at p 0.05. SPSS 25.0 was used to do all the statistics.

RESULTS

Only 380 of the total 549 responses were identified as RT-PCR positive, with 169 from the first wave and 211 from the second wave included in the study. Participants had a mean age of 63 ±17 in the first wave and 57 ± 18 in the second wave, with a p-value of 0.001. In the first wave, 60 (35.5 %) males and 109 (64.5 %) females were counted out of the total infection. In the second wave, we discovered that 96 (45.5%) of the males and 115 (55% of the females) were infected. In terms of occupation, we discovered that 113 (66.9 %) and 99 (46.9 %) health workers were infected in the first and second waves, respectively, whereas other non-health workers were infected in lower numbers, notably 56 (33.1 %) in the first wave and 112 (53.1 %) in the second wave. In terms of marital status, the first and second waves found 62 (36.7 %) and 106 (50.2 %) married people, respectively. In the first and second waves of COVID 19, the proportion of unmarried people was 107 (63.3 %) and 105 (49.8 %), respectively. Interestingly, we found that non-addicted patients outnumbered addicted patients, with 12 (7.1%) and 29 (13.7%) addicted people infected by COVID 19 in the first and second waves, respectively, whereas 157 (92.9%) and 182 (86.3%) non-addicted people were infected with a p-value of 0.001 in the first and second waves of infection, respectively. In the case of oral symptoms and characteristics of COVID-19 infection, we obtained a hospitalization rate of 54 (32%) in the first wave and 88 (41.7%) in the second wave, i.e., p-value 0.001. Oxygen support or ventilator use was 15 (8.9 %) in the first wave and 59 (28%) in the second wave, with a significant p-value of 0.001 in both (Table 1).

The comparison of oral features in COVID 19 infection patients in two different waves revealed that there was no variation in the first and second waves of burning sensations in the mouth. In our study, we obtained 4 (2.4%) in the first wave of 169 infected patients and 5 (2.4%) in the second wave of 211 patients. Dryness of the mouth was found to be 36 (17.1 %) in the second wave, compared to 4 (2.4%) in the first wave, p-value 0.236. Similarly, with a significant p-value of 0.001, the loss of taste feature was 81 (33.8%) in the second wave and 52 (31.3%) in the first wave of COVID infection (Table 2).

In the first and second waves, 91/169 and 167/211 cases with oral manifestation were obtained, respectively. We discovered 41 (24.26%) and 63 (29.85%) patients with oral manifestations over the age of 50 (Table 3). Our findings show a significant relationship between age and oral manifestation, with a p value of 0.046.

In terms of oral manifestation, we discovered 43 (47.25 %) and 74 (44.31 %) hospitalization cases in the first and second waves, respectively.

Table 1: Demographic profiling and other characteristics of patients infected with COVID-19 in the first and second waves of COVID-19

Features	First Wave (N=169)	Second Wave (N=211)	P-value
Age	63 ± 17	57 ± 18	< 0.001*
Gender			
Male	60(35.5%)	96(45.5%)	
Female	109(64.5%)	115(54.5%)	0.521
Occupation			
Health workers	113(66.9%)	99(46.9%)	
Non-health workers	56(33.1%)	112(53.1%)	0.232
Marital Status			
Married	62(36.7%)	106 (50.2%)	
Unmarried	107(63.3%)	105(49.8%)	0.256
Addictions of any			
Yes	12(7.1%)	29(13.7%)	
No	157(92.9%)	182(86.3%)	< 0.001*
Hospitalization			
Yes	54(32%)	88(41.7%)	
No	115(68%)	123(58.3%)	<0.001*
Oxygen support/Ventilator			
Yes	15(8.9%)	59(28%)	
No	154(91.1%)	152(72%)	<0.001*

* p<0.05: significant, *NS- Non-Significant, χ^2 test (categorical data), t-test (Continuous data)

Table 2: Comparison of oral features of covid-19 in the first and second wave

Oral Features	First Wave (N=169)	Second Wave (N= 211)	P-value
Burning sensation in the mouth	4(2.4%)	5(2.4%)	NS
Dryness of mouth	4(2.4%)	36(17.1%)	NS
Loss of taste	52(31%)	81(38.6%)	<0.001 *
Mouth ulcer	4(2.4%)	8(3.8%)	NS
Tooth mobility	2 (1.2%)	0(0%)	NA
Tooth pain	3(1.8%)	7(3.3%)	NS
Bleeding gum	4(2.4%)	7(3.3%)	NS
Throat pain	0(0%)	3(1.4%)	NA
Others	18(10.7%)	20(9.5%)	NS
No symptoms	78(46.4%)	44(21%)	NS

* p<0.05: significant, *NS- Non-Significant, NA- Not applicable, χ^2/Fisher exact test (categorical data)

Table 3: Association of oral manifestation with age group, hospitalization and oxygen support

Features	1st wave (N=91) (%)	2nd wave (N=167) (%)	P-value
Age			
18-30	15(8.87)	32(15.16)	
31-40	13(7.69)	43(20.37)	
41-50	22(13.01)	29(13.74)	
>50	41(24.26)	63(29.85)	0.046
Hospitalization			
Yes	43(47.25)	74(44.31)	
No	48(52.75)	93(55.69)	0.023
Oxygen support/Ventilator			
Yes	15(16.48)	59(35.32)	
No	76(83.52)	108(64.68)	0.012

*p<0.05: significant, χ2test (categorical data)

The results show that there was a significant association between hospitalization and oral manifestation, with p = 0.023. Similarly, we observed 15 (16.48%) and 59 (35.32 %) oxygen support/ventilator cases with regard to oral manifestation, and the p value (p = 0.012) indicates that the result was statistically significant (Table 3).

DISCUSSION

Multiple manifestations of SARS-CoV-2 infection have been described in the literature to date, and the cause is typically anticipated as multidirectional and indirect. Prolonged hospitalization, profuse use of drugs, and immune-compromised state may lead to hypo salivation, which may lead to ulcers in the oral cavity. Poor care for oral hygiene in the ICU and cross-contamination with ventilator tubes may also aggravate the oral diseases. [14] In India, both the first and second waves of COVID infection led to an increase in oral manifestations. [8, 9] In our study in eastern India, we also observed a variety of oral characteristics, such as dry mouth, bleeding gums, loss of taste, tooth discomfort, throat pain, tooth mobility, etc. It may not be the direct manifestation of COVID 19, but in the survey, patients reported increased dental visits after COVID-19 infection with symptoms, particularly in the second wave. Furthermore, as far as we know, no effective and safe pharmacological agent aligned with COVID-19 has been identified yet, and the potential ones are linked to a variety of adverse reactions, including oral lesions, as reported by Godinho et al., 2020; Mehra et al., 2020; and National Center for Biotechnology Information, 2020).[15,16] Likewise, COVID-19 acute infection, as well as the related treatment procedures, may play a role in negative oral health outcomes.

Because the COVID-19 variants during the second wave are more contagious and have evolved into more damaging, it is anticipated that the second wave will develop major oral health problems such as taste, epithelial changes, and other oral diseases. [17, 18, 14] Between the two waves, there was a substantial difference in taste alteration among the positive patients, with more participants opting for taste change during the second wave. Bitter and salty tastes were chosen by more participants than sweet tastes. A similar result was reported in the change of mouth/mucosa color, with 13% reporting a change in mouth/mucosa color, dry mouth, loss of taste, bleeding gums, tooth pain, burning sensation in the mouth, mouth ulcers, severe tooth mobility/loosening, no symptoms, or any other oral traits were categorized. [8,9] Our study also found that dryness of the mouth was 36 (17.1%) in the second wave, compared to 4 (2.4%) in the first wave, p-value 0.236. Similarly, with a significant p-value of 0.001, the loss of taste feature was 81(38.6 %) in the second wave and 52 (31.3%) in the first wave of COVID infection. These were comparable with other reported studies. Significantly, the hospitalization cases with oxygen and ventilator demands were increased, as in our case, and we found the significant

values. During both waves, most individuals indicated dryness of the mouth and loss of taste. As reported in prior studies [19, 20, 21], loss of taste was reported by 133 people out of a total of 380 participants. According to a study by Ren et al., early symptoms of coronavirus in the oral cavity, even before cough and fever, will aid in the early diagnosis and prevention of COVID-19, as well as the protection of dental surgeons and staff from infection. [22] A study in older people infected with COVID-19 found that oral hygiene, stress, and underlying systemic disease are the main causes of oral disease in COVID-19 in dependable older people. This was comparable to our study, in which both waves of oral features were found in older people, with a predominance in the second wave. This could be due to increased hospitalization and the need for oxygen and ventilator support in the second wave compared to the first. This has been reported in previous studies as well, and it could be due to cross contamination in the ICU, improper sterilization of ventilator tubes, and overuse of drugs that can cause hypo-salivation, and improper oral care during hospitalization of patients with COVID-19 infections. [9,14,23,24]

CONCLUSION

Because most viral infections are accompanied by mouth ulcers, fungal infections, and other mucosal alteration with eruptions and soreness, we explored the correlation between SARS-CoV-2 virus infection and oral symptoms in two waves of infections and related their severity to the virus's virulence. We found a significant association between oral manifestation of COVID-19 to older age and in hospitalized patients with oxygen or ventilator support.

REFERENCES

1. Ali I. COVID-19: Are We Ready for the Second Wave? Disaster Med Public Health Prep. 2020 Oct;14(5):e16-e18. Epub 2020 May 7. PMID: 32379015; PMCID: PMC7239772. https://doi.org/10.1017/dmp.2020.149
2. Jain VK, Iyengar KP, Vaishya R. Differences between First wave and Second wave of COVID-19 in India. Diabetes Metab Syndr. 2021 May-Jun;15(3):1047-1048. Epub 2021 May 8. PMID: 33992554; PMCID: PMC8106236. https://doi.org/10.1016/j.dsx.2021.05.009
3. Moona AA, Islam MR. Mucormycosis or black fungus is a new fright in India during covid-19 pandemic: Associated risk factors and actionable items. Public Health Pract (Oxf). 2021 Nov;2:100153. Epub 2021 Jun 21. PMID: 34179859; PMCID: PMC8215889. https://doi.org/10.1016/j.puhip.2021.100153
4. COVID-19 Dashboard, https://www.mygov.in/covid-19 (Accessed on 20 July 2021).
5. Mahajan P, Kaushal J. Epidemic Trend of COVID-19 Transmission in India During Lockdown-1 Phase. J Community Health. 2020 Dec;45(6):1291-1300.
6. Kar, S. K., Ransing, R., Arafat, S., & Menon, V. Second wave of COVID-19 pandemic in India: Barriers to effective governmental response. (2021). EClinicalMedicine, 36, 100915. https://doi.org/10.1016/j.eclinm.2021.100915
7. Lazarevic I, Pravica V, Miljanovic D, Cupic M. Immune Evasion of SARS-CoV-2 Emerging Variants: What Have We Learnt So Far? Viruses. 2021 Jun 22;13(7):1192. PMID: 34206453; PMCID: PMC8310325. https://doi.org/10.3390/v13071192
8. Jain VK, Iyengar KP, Vaishya R. Differences between First wave and Second wave of COVID-19 in India. Diabetes & metabolic syndrome. 2021 May 8. doi: 10.1016/j.dsx.2021.05.009.
9. Kamble P, Daulatabad V, John N, John J. Synopsis of symptoms of COVID-19 during second wave of the pandemic in India. Hormone Molecular Biology and Clinical Investigation. 2021 Dec 7. doi: 10.1515/hmbci-2021-0043.
10. Iranmanesh B, Khalili M, Amiri R, Zartab H, Aflatoonian M. Oral manifestations of COVID-19 disease: A review article. Dermatol Ther. 2021 Jan;34(1):e14578. Epub 2020 Dec 13. PMID: 33236823; PMCID: PMC7744903. https://doi.org/10.1111/dth.14578
11. Al-Khatib A. Oral manifestations in COVID-19 patients. Oral Dis. 2021 Apr;27 Suppl 3:779-780. Epub 2020 Jul 7. PMID: 32521067; PMCID: PMC7307069. https://doi.org/10.1111/odi.13477
12. Iranmanesh B, Khalili M, Amiri R, Zartab H, Aflatoonian M. Oral manifestations of COVID-19 disease: A review article. Dermatol Ther. 2021 Jan;34(1):e14578. Epub 2020 Dec 13. PMID: 33236823; PMCID: PMC7744903. https://doi.org/10.1111/dth.14578
13. Amorim Dos Santos J, Normando AGC, Carvalho da Silva RL, De Paula RM, Cembranel AC, Santos-Silva AR, Guerra ENS. Oral mucosal lesions in a COVID-19 patient: New signs or secondary manifestations? Int J Infect Dis. 2020 Aug;97:326-328. Epub 2020 Jun 9.
14. Dziedzic A, Wojtyczka R. The impact of coronavirus infectious disease 19 (COVID-19) on oral health. Oral diseases. 2021 Apr;27:703-6. doi: 10.1111/odi.13359.
15. Godinho GV, Paz AL, de Araújo Gomes EP, Garcia CL, Volpato LE. Extensive hard palate hyperpigmentation associated with chloroquine use. British journal of clinical pharmacology. 2020 Nov;86(11):2325-7. doi: 10.1111/bcp.14313.
16. Mehra MR, Ruschitzka F, Patel AN. Retraction—Hydroxychloroquine or chloroquine with or without a macrolide for treatment of COVID-19: a multinational registry analysis. The Lancet. 2020 Jun 13;395(10240):1820. doi: 10.1016/S0140-6736(20)31324-6.
17. Martín Carreras-Presas C, Amaro Sánchez J, López-Sánchez AF, Jané-Salas E, Somacarrera Pérez ML. Oral vesiculobullous lesions associated with SARS-CoV- 2 infection. Oral Dis 2020;(May), doi:http://dx.doi.org/10.1111/odi.13382.
18. Putra BE, Adiarto S, Dewayanti SR, Juzar DA. Viral exanthem with "pin and needles sensation" on extremities of COVID-19 patient. Int J Infect Dis 2020;(May), doi: http://dx.doi.org/10.1016/j.ijid.2020.05.020 pii: S1201-9712(20)30327-1.
19. Botros N, Iyer P, Ojcius DM. Is there an association between oral health and severity of COVID-19 complications?. biomedical journal. 2020 Aug 1;43(4):325-7.
20. Brian Z, Weintraub JA. Peer Reviewed: Oral Health and COVID-19: Increasing the Need for Prevention and Access. Preventing chronic disease. 2020;17.DOI: http://dx.doi.org/10.5888/pcd17.200266.
21. Farook FF, Nuzaim MN, Ababneh KT, Alshammari A, Alkadi L. COVID-19 pandemic: oral health challenges and recommendations. European journal of dentistry. 2020 Nov 24.doi: 10.1055/s-0040-1718641.
22. Ren YF, Rasubala L, Malmstrom H, Eliav E. Dental care and oral health under the clouds of COVID-19. JDR Clinical & Translational Research. 2020 Jul;5(3):202-10.
23. Marchini L, Ettinger RL. COVID-19 pandemics and oral health care for older adults. Special Care in Dentistry. 2020 May;40(3):329. doi: 10.1111/scd.12465.
24. Kamel AH, Basuoni A, Salem ZA, AbuBakr N. The impact of oral health status on COVID-19 severity, recovery period and C-reactive protein values. British dental j. 2021 Feb 24:1-7.