



## Oral Manifestations in Covid-19 Patients Among the Bangladeshi Population: A Cross-Sectional Study

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### Abstract

**Background:** COVID-19 is a multi-system all-pervasive disease with protean manifestations, and its major signs and symptoms, such as incessant dry cough, fever, and pneumonia, are well known. Yet, its mucocutaneous manifestations, particularly those of the oral cavity, appear to be little recognized. This may be due either to the rarity of oral manifestations of COVID-19, or poor detection of such symptoms by attending physicians who may do only a cursory examination of the oral mucosa because of the overwhelming gravity of the other major systemic presentations. Nevertheless, there are now a considerable number of reports, including systematic reviews, on oral manifestations of COVID-19 in the literature. This observational study was performed to determine the oral manifestations among COVID-19 patients. **Material & Methods:** A cross-sectional study was carried out among COVID-19 recovered patients. 120 Covid 19 recovered patients were purposively selected as study samples. All the samples diagnosed as mild and moderate cases of COVID-19 disease were selected based on inclusion and exclusion criteria. **Results:** The study comprised the majority of males (68%) where females represent (32%) of the study population and the mean age was 39.3±12.4. Oral manifestations among study subjects during and after the disease illness including loss of taste being the commonest symptom (40%), followed by erythema and coated tongue (7.5%), mouth ulcerations (6.7%) and dry mouth (1.7%). The study revealed that the 41-60 age group subjects represented the highest (43%) oral manifestations. **Conclusions:** Early identification of oral symptoms in COVID-19 recovered or suspected cases can help a dentist or a general physician to diagnose high-risk groups, mitigate transmission, and promote overall health.

**Keywords:-** Oral Manifestations, Covid-19 and Cross-Sectional.

## INTRODUCTION

Coronaviruses are a family of viruses that were described for the first time in 1960. They are characterized by having a corona-like structure formed by spike proteins. In 2019, a new type of coronavirus, SARS-CoV-2, was discovered,

generating the coronavirus disease 2019 (COVID-19), which spread rapidly throughout the world, and is responsible for the current pandemic.<sup>[1,2]</sup> SARS-CoV-2 enters cells through the receptor angiotensin-converting enzyme 2 (ACE2). Once contact is established, an enzyme is needed to cut the binding protein S and



activate the entry of the virus into the cell. One of the enzymes involved in this process, including transmembrane protease serine protease 2; once inside the cell, releases the genetic material and begins to replicate it using the host cell's machinery. One of the main consequences of SARS-CoV-2 infection is the generation of an immune response accompanied by high cytokine production accompanied by a weak interferon response. After the infiltration of macrophages and neutrophils into the affected tissue, the cytokine storm phenomenon follows.<sup>[3,4]</sup> The above process has been correlated with the severe forms of COVID-19, which is characterized by developing a fever, cough, chest pain, dyspnea, and pneumonia (among others), becoming life-threatening.<sup>[5]</sup> Severe Acute Respiratory Syndrome (SARS-CoV-2) virus has shaken the globe with an ongoing pandemic of COVID-19 (Corona Virus) and has set challenges to every corner of the modern health care setting. The oral mucosa and saliva are high-risk sites for higher viral loads and dental health care professionals are considered a high-risk group. COVID-19-induced oral lesions and loss of taste and smell are common clinical complaints in the dental health care setting.<sup>[5,6]</sup> The Severe acute respiratory syndrome (SARS-CoV-2) virus has been found to cause a wide range of non-specific oral mucosal lesions, but the specific diagnosis of these mucocutaneous lesions as COVID-19 lesions will facilitate the prevention of SARS-CoV-2 in dental health care settings and aid in proper patient management patients with coronavirus disease 2019 (Covid19).<sup>[6]</sup> Moreover, the prevalence of clinical oral manifestations remains unclear. For this reason, oral manifestations of COVID-19 are a rising topic of interest in the field of oral health care,

and more research with a better study design is needed to clarify the association between COVID-19 and oral manifestations. Therefore, this study aims to investigate the types of oral manifestations and their prevalence in patients with COVID-19 in a cross-sectional study.

## MATERIAL AND METHODS

A cross-sectional study was conducted between April 2021 to February 2022, among COVID-19 recovered patients. 120 Covid 19 recovered patients were purposively selected as the study sample. All the samples diagnosed as mild and moderate cases of COVID-19 disease were selected based on inclusion and exclusion criteria. The study was conducted by the Declaration of Helsinki. Patients completed a consent form to participate in the survey and the clinical examination. A convenience sample was taken from all COVID-19 confirmed cases by reverse transcription polymerase chain reaction (RT-PCR). The patients were symptomatic and non-hospitalized and were present at the hospital to pick up their first COVID-19 medications. They were followed up until they showed negative test results.

### Inclusion Criteria

- Subjects with laboratory-confirmed COVID-19- positive RT- PCR reports.
- Subjects who have recovered from COVID-19 disease either under home isolation or in hospital.
- Mild and moderate cases, who did not undergo any kind of intensive care therapy.
- Subjects who completed a minimum isolation period of 2 weeks.
- Subjects who will give written consent.

## Exclusion Criteria

- Uncooperative subjects.
- Subjects who submitted the unfilled/partially filled questionnaire.
- Subjects having any common symptoms related to COVID- 19 like fever, cough, cold, etc., at the time of interview.
- Subjects who were diagnosed as COVID- 19 positive more than 3 months back.

This was a cross-sectional study. The sample size calculation was not applicable due to few published case reports, which are not sufficient to estimate the prevalence. All selected patients agreed to participate in the study. Primary outcomes were the type and prevalence of oral manifestations in patients with COVID-19. Secondary outcomes were the time of duration and location of lesions. Data were collected in an Excel datasheet. For quantitative variables, descriptive statistics were performed (mean and standard deviation were calculated), while frequency and percentage were used for qualitative variables. After a normality check, we used a Student's t-test for quantitative variables and a Chi-squared test or a Fisher's test for qualitative data. A level of  $p < 0.05$  was considered statistically significant. A close-ended, validated, questionnaire containing questions was used to collect information regarding health status, oral hygiene practices, and symptoms in the oral cavity during and after the disease manifestation. Data were checked & edited after collection, and then processed and analyzed by the appropriate method (SPSS-20). Data were presented in the form of tables and graphs to compare the

findings. Data were presented in the form of tables and graphs. Descriptive statistics will be presented with frequency tables. Association was illustrated with cross tables and tests of significance. Bar and pie charts were generated to illustrate descriptive statistics. Collected information is compiled, analyzed, and edited using the software SPSS (version 24.0) (IBM) Chicago, Illinois. Ethical approval was obtained from the ethical review committee of ..... Collage and Hospital, ....., Bangladesh.

## RESULTS

This is a cross-sectional study; 120 COVID- 19 recovered patients were enrolled and analyzed in this study. [Table 1] shows the samples' characteristics according to age, sex, marital status, occupation, oral hygiene, general Covid 19 symptoms and co-morbidities. The oral symptoms of the study population are described in [Table 2] on behaving during and after the disease; most patients lose their tasting ability, 29(60%) patients during COVID-19 and 14 (29%) patients after COVID-19. [Figure 1] shows the oral manifestations; 48 patients lost their tasting ability, nine patients were erythema & desquamated, 9 had a coated tongue, eight patients had an ulcer and blistered, and four patients had pain & soreness, and only three patients had dry mouth. There were 43% of patients from the age group 41-60, 35% of patients were over >60 years, and 22% of patients were from the age group 20-40. These are the oral symptoms according to age group [Figure 2]. [Figure 3] shows the duration of oral symptoms says in days.



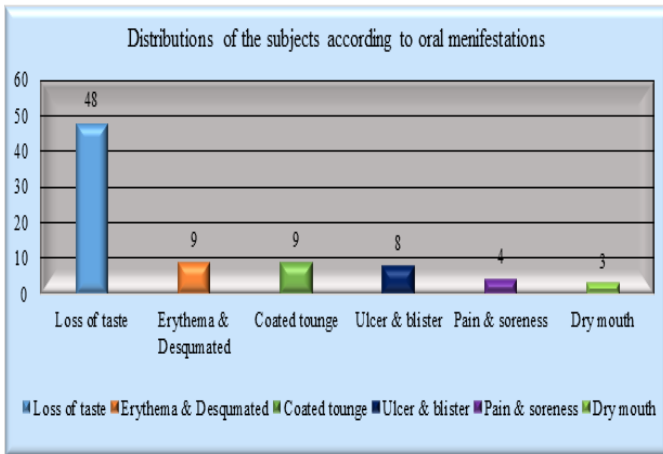
**Table 1:** Characteristics of the representing samples.

Variable	Overall	Presence of oral symptoms	Absence of oral symptoms	p-value
Age				
Age	39.3±12.4	39.1±12.2	38.5±13.4	0.528
Sex				
Male	81(68)	51(63)	30(37)	0.637
Female	39(32)	21(54)	18(46)	
Marital status				
Married	89(74)	50(56)	39(44)	0.076
Unmarried	31(26)	17(55)	14(45)	
Occupation				
Health service	11(9)	7(64))	4(36)	0.927
Non-health service	109(91)	62(59)	47(41)	
Oral hygiene				
Good	48(40)	19(40)	29(60)	0.762
Fair	41(34)	18(44)	23(56)	
Poor	31(26)	23(74)	8(26)	
General Covid 19 symptoms				
Fever	83(69)	42(51)	41(49)	0.572
Sore throat	43(34)	25(58)	18(42)	0.617
Running nose	21(18)	12(57)	9(43)	0.580
Cough	79(66)	57(72)	22(28)	0.627
Shortness of breath	24((20)	14(58)	11(42)	0.915
Nausea	32(27)	21(66)	11(34)	0.414
Vomiting	13(11)	6(46)	7(44)	0.331
Headache	69(58)	23(33)	46(67)	0.101
Muscle pain	93(78)	48(52)	45(48)	0.552
Diarrhoea	34(28)	23(68)	11(32)	0.042*
No smell	56(47)	31(55)	25(45)	0.001*
Co-morbidity				
Diabetes	11(9)	8(73)	3(27)	0.171
Hypertension	8(7)	3(38)	5(62)	0.470
Asthma	3(2)	1(25)	2(75)	0.598
Epilepsy and arthritis	2(1.5)	1(50)	1(50)	0.937

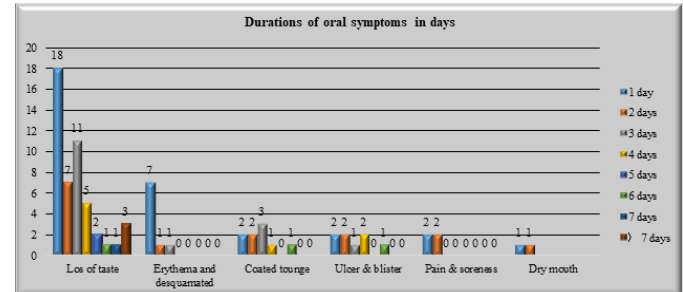
**Table 2:** Distribution of oral symptoms.

Distribution of subjects based on their oral symptoms				
Variable	During disease (n%)		After Disease (n%)	
	Yes	No	Yes	No
Loss of taste	29 (60)	19 (40)	14 (29)	34 (71)

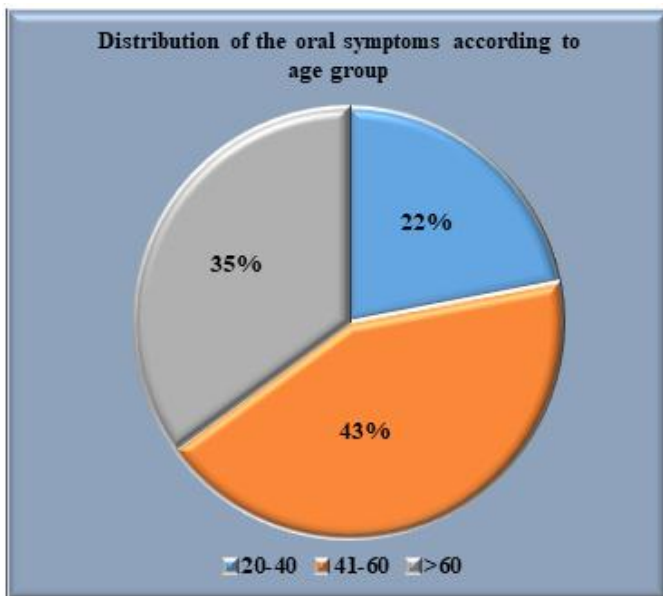
Erythema & Desquamated	7 (78)	2 (22)	1 (11)	8 (91)
Coated tongue	8 (89)	1 (11)	2 (23)	7 (77)
Ulcer & blister	6 (75)	2 (25)	1 (13)	7 (87)
Pain & soreness	2 (50)	2 (50)	1 (25)	3 (75)
Dry mouth	2 (100)	0 (0)	1 (50)	1 (50)



**Figure 1:** Distributions of the subjects according to oral manifestations.



**Figure 3:** Durations of oral symptoms in days.



**Figure 2:** Distribution of the oral symptoms according to age group.

## DISCUSSION

Loss of taste, erythema, coated tongue, xerostomia, swallowing difficulty, mouth ulcerations, blister, soreness of oral mucosa, and altered taste sensation with different frequency was observed in our study subjects. The data was relevant as it had similarities with other research findings.[\[7,8,9,10,11\]](#) The associated possible cause for this may be multidrug therapy, immune-compromised state, chemosensory degradation of cells in COVID-19 patients, and oral/nasal cavity as the main route of infection. Taste disorder, which was the most common outcome seen in our study subjects with a prevalence of 72%, had similarities with previous studies done by Santos et al. who reported gustatory impairment with a prevalence of 45% in COVID-19 patients.[\[12,13\]](#) Freni et al. also reported xerostomia, dry eyes, auditory discomfort along with gustatory, and olfactory dysfunction with a prevalence of 70% and 92%, respectively, in their COVID-19 patients.[\[14\]](#) As ACE-2 receptors are in abundance in salivary



glands, tongue, and oral mucosa, the neuroinvasive properties of the SARS- CoV- 2 virus cause chemosensory degradation leading to various manifestations in the oral cavity including altered taste.<sup>[7,15,16,17]</sup> Bizarre oral symptoms were reported in a study done by Iranmanesh et al. like aphthous ulcers, herpetiform lesions, ulcers, erosions, white and red plaques, exanthema- like lesions, necrotizing periodontal disease, xerostomia, erythema multiforme, mucositis, fissured tongue, etc., Likewise, in the present study few subjects had halitosis, aphthous ulcers, swallowing difficulty, fissured tongue, and xerostomia.<sup>[18]</sup> Furthermore, Presas et al. reported cases of oral ulceration, and glossodynia among COVID- 19 patients.<sup>[19]</sup> Few other studies also reported cases of necrotizing periodontal disease, commissural cheilitis, and bilateral atrophy of the tongue as an extrapulmonary manifestation in COVID-19 recovered patients.<sup>[20,21]</sup> Several hypotheses are explaining how the loss of taste may be related to COVID-19.<sup>[22,23,24,25]</sup> One of these hypotheses suggests that the normal function of taste buds can be affected by rhinitis triggering a related local inflammatory response, although the loss of taste may happen without any nasal mucosal inflammation.<sup>[25,26]</sup> Another hypothesis states that the loss of taste could be attributed to COVID-19 drug treatment side effects.<sup>[23,24]</sup> However, it still appeared in COVID-19 patients who were found to be drug-free. Other oral symptoms have been suggested as potential manifestations of COVID-19 and published in a few case reports and letters to the editor.<sup>[19,27,28]</sup> These suggestions were controversial, as the symptoms may have been caused primarily by the SARS-CoV-2 or were a secondary manifestation.<sup>[26,27]</sup> These symptoms included

lesions in several oral locations, while this study showed the same nonspecific pattern of oral clinical features, such as ulcers, and blisters. A study published by Ansari et al found several ulcers in two COVID-19 patients. They attributed these ulcers to the effects of stress as a trigger factor.<sup>[27,29]</sup> Meanwhile, Martín Carreras-Presas et al suggested COVID-19 as a possible cause of desquamative gingivitis, ulcers, oral pain, and blisters.<sup>[30]</sup> These ulcers could be diagnosed as canker sores, fever blisters, aphthous ulcers or herpes type 1, which could be related indirectly to COVID-19 patients through stress, and nervous habits, grinding, and increased blood pressure, poor diet, type 2 diabetes.<sup>[31,32]</sup> Moreover, COVID-19 medications were less likely to contribute to the oral manifestations, since patients did not use them and they came to the hospitals/ clinics to pick up their medications. Oral hygiene is an aspect that should not be left aside, and it is of great importance to encourage the patient to reinforce hygiene techniques. Recent studies have shown that patients with poor oral hygiene increase the severity of COVID-19 symptoms. In contrast, in patients who maintained good oral hygiene, the symptoms of COVID-19 decreased significantly ( $P < .001$ ).<sup>[33]</sup> By maintaining adequate oral hygiene, the overpopulation of microorganisms is considered opportunistic, and the appearance of infections type C Albicans is avoided.<sup>[7,13,34,35,36]</sup>

### Limitations of the study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

## CONCLUSIONS

Our study evaluated mild and moderate cases of COVID-19 disease and conspicuous oral manifestations found in them were loss of taste, erythema, coated tongue, xerostomia, swallowing difficulty, mouth ulcerations, and blister, soreness of oral mucosa during the disease and post-recovery. In this present era, when we have started living with this disease, early identification of oral symptoms in

COVID-19 recovered or suspected cases can help a dentist or a general physician to diagnose high-risk groups, mitigate transmission, and promote overall health. Since COVID-19 is a novel infectious disease with insufficient data on pathogenesis and clinical features, a long-term follow-up with a multidisciplinary approach is highly recommended for all COVID-19 recovered patients backed by health informatics data to support further research and prevent many post-COVID-19 complications.

## REFERENCES

1. Chung JY, Thone MN, Kwon YJ. COVID-19 vaccines: the status and perspectives in delivery points of view. *Adv Drug Deliv Rev.* 2021;170:01-25.
2. Liu X, Liu C, Liu G, Luo W, Xia N. COVID-19: progress in diagnostics, therapy and vaccination. *Theranostics.* 2020;10:7821-35.
3. Hu B, Guo H, Zhou P, Shi ZL. Characteristics of SARS-CoV-2 and COVID-19. *Nat Rev Microbiol.* 2021;19:141-54.
4. Hu B, Huang S, Yin L. The cytokine storm and COVID-19. *J Med Virol.* 2021;93:250-6.
5. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of coronavirus disease 2019 (COVID-19): a review. *JAMA.* 2020;324:782-93.
6. Neuman BW, Buch Mei MJ. Supramolecular architecture of the coronavirus particle. *Adv Virus Res.* (2016) 96:1-27. doi: 10.1016/bs.aivir.2016.08.005
7. Sinjari B, D'Ardes D, Santilli M, Rexhepi I, D'Addazio G, Di Carlo P, et al. SARS-CoV-2 and oral manifestation: An observational, human study. *J Clin Med.* 2020;9:3218.
8. Mortazavi H, Rezaeifar K, Nasrabadi N. Oral manifestations of coronavirus disease-19: A Mini-review. *Open Access Maced J Med Sci.* 2020;8:286-9.
9. Dziedzic A, Wojtyczka R. The impact of coronavirus infectious disease 19 (COVID-19) on oral health. *Oral Dis.* 2021;27(Suppl 3):703-6.
10. Fu L, Wang B, Yuan T, Chen X, Ao Y, Fitzpatrick T, et al. Clinical characteristics of coronavirus disease 2019 (COVID-19) in China: A systematic review and meta-analysis. *J Infect.* 2020;80:656-65.
11. Aragonese J, Suárez A, Algar J, Rodríguez C, López-Valverde N, Aragonese JM. Oral manifestations of COVID-19: Updated systematic review with meta-analysis. *Front Med.* 2021;8:726753.
12. Amorim Dos Santos J, Normando AGC, Carvalho da Silva RL, Acevedo AC, De Luca Canto G, Sugaya N, et al. Oral Manifestations in Patients with COVID-19: A Living Systematic Review. *J Dent Res.* 2021 Feb;100(2):141-154. doi: 10.1177/0022034520957289.
13. Amorim Dos Santos J, Normando AGC, Carvalho da Silva RL, De Paula RM, Cembranel AC, Santos-Silva AR, et al. Oral mucosal lesions in a COVID-19 patient: New signs or secondary manifestations? *Int J Infect Dis.* 2020;97:326-328. doi: 10.1016/j.ijid.2020.06.012.
14. Freni F, Meduri A, Gazia F, Nicastro V, Galletti C, Aragona P, et al. Symptomatology in head and neck district in coronavirus disease (COVID-19): A possible neuroinvasive action of SARS-CoV-2. *Am J Otolaryngol.* 2020;41(5):102612. doi: 10.1016/j.amjoto.2020.102612.
15. Pedrosa MS, Sipert CR, Nogueira FN. Salivary glands, saliva and oral findings in COVID-19 infection. *Pesqui Bras Odontopediatria Clín Integr.* 2020;20(Suppl 1):e0104.
16. El-Kady DM, Gomaa EA, Abdella WS, Ashraf Hussien R, Abd ElAziz RH, Khater AGA. Oral manifestations of COVID-19 patients: An online survey of the Egyptian population. *Clin Exp Dent Res.* 2021;7:852-60.



17. Baghizadeh Fini M. Oral saliva and COVID- 19. *Oral Oncol.* 2020;108:104821.
18. Iranmanesh B, Khalili M, Amiri R, Zartab H, Aflatoonian M. Oral manifestations of COVID- 19 disease: A review article. *Dermatol Ther.* 2021;34:e14578.
19. 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.* 2021;27(Suppl 3):710- 12.
20. Díaz Rodríguez M, Jimenez Romera A, Villarroel M. Oral manifestations associated with COVID-19. *Oral Dis.* 2022;28 Suppl 1(Suppl 1):960-962. doi: 10.1111/odi.13555.
21. Patel J, Woolley J. Necrotizing periodontal disease: Oral manifestation of COVID- 19. *Oral Dis.* 2021;27(Suppl 3):768- 9.
22. Cox MJ, Loman N, Bogaert D, O'Grady J. Co-infections: potentially lethal and unexplored in COVID-19. *Lancet Microbe.* 2020;1:e11. doi:10.1016/S2666-5247(20)30009-4
23. Gallo Cde B, Mimura MA, Sugaya NN. Psychological stress and recurrent aphthous stomatitis. *Clinics (Sao Paulo).* 2009;64: 645-648.
24. Mariz B, Brandão TB, Ribeiro ACP, Lopes MA, Santos-Silva AR. New insights for the pathogenesis of COVID-19-related dysgeusia. *J Dent Res.* 2020;99:1206. doi:10.1177/0022034520936638
25. Vaira LA, Salzano G, Petrocelli M, Deiana G, Salzano FA, De Riu G. Validation of a self-administered olfactory and gustatory test for the remotely evaluation of COVID-19 patients in home quarantine. *Head Neck.* 2020b;42:1570-1576. doi:10.1002/hed.26228
26. Amorim Dos Santos J, Normando AGC, Carvalho da Silva RL, et al. Oral manifestations in patients with COVID-19: a living systematic review. *J Dent Res.* 2021;100:141-154. doi:10.1177/0022034520957289
27. Vieira AR. Oral manifestations in coronavirus disease 2019 (COVID-19). *Oral Dis.* 2021;27 Suppl 3(Suppl 3):770. doi: 10.1111/odi.13463.
28. Al-Mutawa SA, Shyama M, Al-Duwairi Y, Soparkar P. Oral hygiene status of Kuwaiti schoolchildren. *East Mediterr Health J.* 2011;17:387-391. doi:10.26719/2011.17.5.387
29. Rodan R, Khlaifat F, Smadi L, Azab R, Abdalmohdi A. Prevalence and severity of gingivitis in school students aged 6-11 years in Tafilah Governorate, South Jordan: results of the survey executed by National Women's Health Care Center. *BMC Res Notes.* 2015;8:662. doi:10.1186/s13104-015-1532-y
30. Dikshit S. Fibrinogen degradation products and periodontitis: deciphering the connection. *J Clin Diagn Res.* 2015;9:ZC10-12.
31. Ansari R, Gheitani M, Heidari F, Heidari F. Oral cavity lesions as a manifestation of the novel virus (COVID-19). *Oral Dis.* 2021;27 Suppl 3:771-772. doi: 10.1111/odi.13465.
32. Pellegrino R, Cooper KW, Di Pizio A, Joseph PV, Bhutani S, Parma V. Coronaviruses and the chemical senses: past, present, and future. *Chem Senses.* 2020;45:415-422. doi:10.1093/chemse/bjaa031
33. Kamel AHM, Basuoni A, Salem ZA, AbuBakr N. The impact of oral health status on COVID-19 severity, recovery period and C-reactive protein values. *Br Dent J.* 2021;24:1-7.
34. Corchuelo J, Ulloa FC. Oral manifestations in a patient with a history of asymptomatic COVID-19: case report. *Int J Infect Dis.* 2020;100:154-7.
35. Riad A, Gomaa E, Hockova B, Klugar M. Oral candidiasis of COVID-19 patients: case report and review of evidence. *J Cosmet Dermatol.* 2021;20:1580-4.
36. Fantozzi PJ, Pampena E, Di Vanna D, et al. Xerostomia, gustatory and olfactory dysfunctions in patients with COVID-19. *Am J Otolaryngol.* 2020;41:102721.

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