



Research Article

## Oral manifestations of COVID-19 in a group of Sri Lankans infected with SARS-CoV-2

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### ABSTRACT

**Objectives:** COVID-19 due to SARS-CoV-2 is primarily a respiratory disease despite occasional systemic involvements. This study investigated orofacial manifestations of COVID-19 in a group of Sri Lankans.

**Materials and Methods:** A descriptive study was undertaken using 1112 COVID-19 patients managed at an intermediate care center in Penideniya, Peradeniya, Sri Lanka during January–May 2021. Demographic data, systemic, and orofacial manifestations of COVID-19 were recorded using a structured questionnaire administered over the telephone on participants' verbal informed consent.

**Results:** Study population (mean age = 34.1 ± 19 years) included 90 (8%) males and 1022 (92%) females, belonging to Sinhala (936; 84.2%), Tamil (105; 9.4%), and Muslim (71; 6.4%) communities. There were 712 (64%) married, 395 (35.5%) unmarried, and 05 (0.4%) divorced individuals. There were 16 (1.4%) participants who practiced betel chewing. All participants had been subjected to RAT or PCR for symptoms (249, 22.4%), contact tracing (680, 61.2%) or random checking (183, 16.5%). There were 644 (58%) patients with systemic manifestations, while 160 (14.4%) had orofacial manifestations such as dysgeusia (122, 11%), anosmia (86, 7.7%), and xerostomia (64, 5.8%). Orofacial manifestations were significantly associated with Sinhalese, married females (Chi-square = 15.9, 19.7, 4.7;  $P < 0.05$ ), presence of systemic manifestations (Chi-square = 48.7;  $P < 0.05$ ), and the absence of betel chewing habit (Chi-square = 16.7;  $P < 0.05$ ).

**Conclusion:** Approximately 14% of COVID-19 patients in this sample experienced orofacial manifestations predominantly dysgeusia (11%), anosmia (7.7%), and xerostomia (5.8%). Orofacial manifestations were significantly associated with Sinhalese, married females who had systemic manifestations of COVID-19 and those who were without betel chewing habit.

**Keywords:** COVID-19, SARS-CoV-2, Orofacial manifestations, Dysgeusia, Xerostomia

### INTRODUCTION

COVID-19 is primarily a disease of the respiratory tract, although multiple systemic involvements have been reported occasionally. Main clinical presentations of COVID-19 include sore throat, cough, sneezing, fever, headache, and myalgia. Intriguingly, several investigators have reported numerous orofacial manifestations of SARS-CoV-2 infection including taste and smell disturbances, xerostomia, salivary gland disorders, and mucosal lesions.<sup>[1-8]</sup> In an extensive review of patients admitted to hospital, Orilisi *et al.*<sup>[9]</sup> have reported that oral ulcers, cheilitis, and tongue lesions were more common before hospitalization, while perioral pressure ulcers, macroglossia, blisters, and oral candidiasis were more frequent during hospitalization of COVID-19 patients.

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These investigators have suggested that initial oral lesions could be related directly to COVID-19, while the latter could be caused by medical devices, treatments, prone position, and immunological impairment.<sup>[8]</sup>

It has been already demonstrated that ACE-2 receptors on the oral and salivary gland mucosa attract SARS-CoV-2 and facilitate COVID-19 infection of the salivary glands and oral mucosa giving rise to a battery of orofacial manifestations.<sup>[10,11]</sup> Orofacial manifestations of COVID-19 may be initial alarming signs that are often presented to the dental healthcare workers and the lesions may create a threat of cross-infection and infection transmission during aerosol generating dental procedures in particular. In addition, the early detection of oral manifestations of COVID-19 by the dental healthcare worker may help facilitate appropriate referral. However, studies that have assessed orofacial manifestations in active COVID-19 patients are hampered due to the risk of infection transmission. In a pioneering study, Natto *et al.*,<sup>[7]</sup> using a convenience sample of 109 COVID-19 patients, have reported that loss of taste was the most common oral manifestation, followed by desquamated gingivitis, coated tongue, and ulceration. Furthermore, Villarreal-Dorrego *et al.*<sup>[12]</sup> have reported that altered taste and a painful/burning mouth were common symptoms among 55 COVID-19 patients in Venezuela. These investigators have suggested that the oral examination may also be useful in confirming the COVID-19 patients.

Even though early detection of such conditions may be valuable in directing the patients for proper medical care, detailed oral examination in COVID-19 patients is limited due to the risk of infection transmission. As a result, studies to explore the orofacial manifestations of COVID-19 and the associated factors are inadequate, especially in south Asian region to date. Hence, the aim of this study was to investigate the orofacial manifestations of COVID-19 using a group of Sri Lankans affected with SARS-CoV-2 during the outbreak in early 2021.

## MATERIALS AND METHODS

A descriptive cross-sectional study was conducted using a pretested structured questionnaire which was developed according to the recent literature on orofacial manifestations of COVID-19. Convenience sample of COVID-19 patients ( $n = 1112$ ) who had been diagnosed with positive PCR or RAT test and treated in an intermediate care center in Penideniya, Peradeniya, Sri Lanka during January–May, 2021, was included as the study population. Questionnaire was administered over the telephone to the participants on the 7<sup>th</sup> day following positive PCR or RAT test and the responses were recorded. Ethical clearance for the study was obtained from the Ethics Review Committee of the National Hospital, Kandy, Sri Lanka (NHK/ERC/04/2021) and informed verbal

consent was obtained from all the participants in the study before data collection.

## Statistical analysis

Data were analyzed using descriptive statistics and the associations were assessed with Pearson Chi-square test using statistical software. Significance level was considered as  $P < 0.05$ .

## RESULTS

A total of 1112 COVID-19 patients (mean age of  $34.1 \pm 19$  years) consented and participated in the study. They included 90 (8%) males and 1022 (92%) females. Out of the total population, there were 16 (1.4%) participants with betel chewing habit. Other demographic data are summarized in [Table 1].

There were 644 (58%) patients with general symptoms and 160 (14.4%) patients having at least one orofacial manifestation of COVID-19. Data regarding the occurrence of general symptoms with regard to COVID-19 (fever, sore throat, coughing, sneezing, headache, myalgia, etc.,) and the numerous orofacial manifestations (anosmia, dysgeusia, xerostomia, oral ulceration, erythema, etc.,) are summarized in [Table 2].

The presence of orofacial manifestations was significantly associated with Sinhalese, married females (Chi-square = 15.9, 19.7, 4.7;  $P < 0.05$ ). Furthermore, orofacial manifestations were significantly common among patients who had systemic manifestations of COVID-19 (Chi-square = 48.7;  $P < 0.05$ ) and the absence of betel chewing habit (Chi-square = 16.7;  $P < 0.05$ ). Specific localized oral lesions were found in 15 patients as indicated in [Table 3].

## DISCUSSION

This study has explored the occurrence of orofacial manifestations of COVID-19 in a relatively bigger sample of Sri Lankans affected by SARS-CoV-2. Notably, 92% of the current sample of COVID-19 patients included females, because this intermediate care center was basically reserved for female patients. Considering the average age of these patients, young adults (mean age of  $34.1 \pm 19$  years) were largely affected by COVID-19. Supporting the foregoing data, Purba *et al.*<sup>[13]</sup> have reported that the mean age of COVID-19 affected patients in Indonesia was 35.3 years and 82% of the patients were females. Furthermore, an Iranian study has also revealed a high incidence of COVID-19 infections in the 30–39 and 40–49 year age groups.<sup>[14]</sup> Moreover, the young and adult population in USA had experienced more COVID-19 prevalence.<sup>[15]</sup> In general, preponderance to COVID-19 among young and adult population may have resulted by their close social interactions probably for

**Table 1:** Demographic data of the study population.

Demographic factor	Distribution		
	Sinhala	Tamil	Muslim
Ethnicity	936 (84.2%)	105 (9.4%)	71 (6.4%)
Marital status	Married 712 (64%)	Unmarried 395 (35.5%)	Divorced 5 (0.4%)
Reason for COVID-19 testing (RAT/PCR)	Symptomatic 249 (22.4%)	Contact tracing 680 (61.2%)	Random checking 183 (16.5%)

**Table 2:** General and orofacial manifestations of COVID-19 patients.

General symptoms	Present	Absent
Systemic	644 (58%)	468 (42%)
Orofacial	160 (14.4%)	952 (85.6%)
Specific symptoms	Present	Absent
Dysgeusia	122 (11%)	990 (89%)
Anosmia	86 (7.7%)	1026 (92.3%)
Xerostomia	64 (5.8%)	1048 (94.2%)

**Table 3:** Specific localized oral lesions of COVID-19.

Affected site	Type of lesion	Number of patients
Tongue	Whitish plaque	4
	Burning sensation	4
	Ulceration with bleeding	2
Hard palate	Whitish plaque	1
	Erythema	1
Lips	Whitish plaque	1
Angle of the mouth	Whitish plaque	1
	Erythema	1

academic, occupational, domestic, and recreational purposes and needs confirmation with further investigations.

It is also important to note that the married personnel (64%) were highly affected by COVID-19 in this study. This may be attributed to the fact that married personnel engaged in day to day domestic work and employment that may have created a higher exposures risk to SARS-CoV-2. Further, analysis of the ethnic composition of the patients revealed that majority Sinhalese followed by Tamils and Muslims had COVID-19 denoting the overall ethnic profile of the country [Table 1]. With regard to the diagnosis of patients with COVID-19, majority had been detected by RAT or PCR conducted for contact tracing (62%) rather than on symptoms (22%) or random checking (16%). Therefore, it is likely that the disease had been limited basically to isolated clusters in the society, where rapid transmission had taken place within via close contacts. Above findings may illustrate the importance of social distancing, respiratory etiquette, hand hygiene, and masking in prevention of the disease in the community.<sup>[16]</sup>

When the numerous disease manifestations were assessed, 58% of the participants had systemic manifestations, while 14.4% had orofacial manifestations [Table 2]. Intriguingly, orofacial manifestations were commonly experienced by the patients who had systemic manifestations of COVID-19. Therefore, the possibility of having both systemic and orofacial manifestations together was high compared to having either systemic or orofacial manifestations alone. In contrast, Mortazavi *et al.*<sup>[2]</sup> have reported that orofacial manifestations appeared at the asymptomatic early phase of COVID-19. On the other hand, another systematic review has shown prevalence of orofacial manifestations as 33% in COVID-19 patients.<sup>[5]</sup> Moreover, in a group of COVID-19 patients in Venezuela, Villarreal-Dorrego *et al.*<sup>[12]</sup> have reported that 40% of the patients had at least one oral manifestation. However, it is important to note that the occurrence of orofacial manifestations of COVID-19 may be underreported, mainly due to the lack of oral examination of patients with suspected and/or confirmed COVID-19. Accordingly, further studies may be useful to demystify conflicting observations regarding the prevalence of orofacial manifestations of COVID-19. In addition, occurrence of orofacial manifestations of COVID-19, in our sample, was significantly associated with Sinhalese, married females. This could be attributable to the fact that the majority in the present study were married Sinhalese females. Nevertheless, it is important to note that morbidity and mortality rates due to COVID-19 have been associated with racial differences in some parts of the world.<sup>[17]</sup> Hence, further epidemiological studies are warranted to compare the vulnerability of different communities to COVID-19 in Sri Lanka.

Intriguingly, orofacial manifestations were significantly associated with those who were without betel chewing habit. Besides, it is important to note that betel quid chewing habit may affect deleteriously on the oral soft and hard tissues leading to staining, ulceration, salivary and taste dysfunction, etc.<sup>[18]</sup> Accordingly, it could be hypothesized that betel chewing may have masked the subtle changes in the oral cavity induced by the infection of SARS-CoV-2. However, further studies using bigger sample of betel chewers affected with COVID-19 would be helpful to ascertain the above phenomenon.

Leading orofacial manifestations of COVID-19 identified in this study were dysgeusia (11%), anosmia (7.7%), and xerostomia (5.8%). These findings corroborated with the previous observations that the most common oral manifestations of COVID-19 were salivary gland dysfunction, xerostomia, taste and smell alterations, and oral mucosal lesions.<sup>[2]</sup> Moreover, in a comprehensive systematic review, Dos Santos *et al.*<sup>[1]</sup> have indicated that gustatory impairment was the frequent oral manifestation of COVID-19, with a prevalence of 45% that included 38% dysgeusia, 35% hypogeusia, and 24% ageusia. Furthermore, Fantozzia *et al.*,<sup>[19]</sup> in a retrospective survey of 326 COVID-19 patients, have reported that the taste dysfunction (59.5%) was the commonest manifestation, followed by xerostomia (45.9%) and olfactory dysfunctions (41.4%). Furthermore, Sheng *et al.*<sup>[20]</sup> in a study that covered a group of Taiwanese have reported that dysosmia and/or dysgeusia were common symptoms particularly in the early stage of COVID-19. Similarly, Natto *et al.*<sup>[7]</sup> in a group of Saudi patients who were symptomatic with COVID-19 have reported that loss of taste (43.4%) was the most prevalent specific oral manifestation. According to Villaroel-Dorrego *et al.*<sup>[12]</sup> who have assessed 55 COVID-19 patients in Venezuela, the taste disturbance rate was 60%. Biadsee *et al.*,<sup>[21]</sup> in a web-based questionnaire study using 140 COVID-19 patients, have reported that xerostomia was prevalent in 56% of the patients. Furthermore, in a Sri Lankan study that assessed 100 patients with COVID-19, it has been revealed that the prevalence of altered smell and taste as well as xerostomia amounted nearly up to 70%.<sup>[8]</sup> However, the prevalence rate of dysgeusia, anosmia, as well as xerostomia in the present study is relatively lower than the previous reports and further studies would be expedient to confirm their prevalence in Sri Lankan COVID-19 patients.

Huang *et al.*,<sup>[10]</sup> using COVID-19 autopsies, have showed that the cells of the oral epithelium, taste buds, and salivary glands express ACE2 and TMPRSS2 that attract SARS-CoV-2. Further, in an extensive review, Okadaa *et al.*<sup>[11]</sup> have shown that ACE2, TMPRSS2, and furin molecules in the oral mucosa and the salivary glands facilitate entry of SARS-CoV-2, leading to inflammation and cellular damage. Collectively, these investigators have confirmed that SARS-CoV-2 infected salivary glands and oral mucosa produced malfunction of salivary glands and the taste buds. Overall, it is reasonable to assume that SARS-CoV-2 infection of the salivary glands and the oral mucosa may lead to xerostomia as well as dysgeusia. Furthermore, olfactory dysfunction may indirectly alter the taste sensations physiologically.<sup>[22]</sup> Accordingly, infection of the olfactory epithelium by SARS-CoV-2 may bring about anosmia secondarily altering the taste sensation in COVID-19 patients, a phenomenon which warrants further investigation.

With regard to current study population, the most common specific lesions appeared on the oral mucosa included appearance of whitish plaque over the tongue, palate, lip and the angle of the mouth followed by burning sensation of the tongue. There were two patients who had ulceration and bleeding from the tongue and one person each presented with erythema of the hard palate and the angle of the mouth [Table 3]. In a comprehensive systematic review, Dos Santos *et al.*<sup>[1]</sup> have stated that oral mucosal lesions in COVID-19 patients included white and erythematous plaques, irregular ulcers, small blisters, petechiae, and desquamative gingivitis affecting tongue, palate, lips, gingiva, and buccal mucosa. In another study, it has been reported that the most common oral lesion in COVID-19 patients was oral ulceration followed by xerostomia, dysgeusia, gingival inflammation, erythema, and oral ulceration.<sup>[23]</sup> Although our findings substantiate the above, further studies using clinical examination of bigger patient samples would be beneficial to confirm exact prevalence of mucosal lesions due to COVID-19.

## CONCLUSION

Foregoing findings demonstrate that COVID-19 produces orofacial manifestations such as dysgeusia, anosmia, xerostomia, and mucosal lesions. Dental healthcare workers should be able to detect such COVID-19-related orofacial manifestations for the first time and refer patients for appropriate medical care. Inquiry about orofacial lesions from COVID-19 patients may also be vital in proper management. Finally, oral hygiene must be promoted in COVID-19 patients to avert any further clinical complications.

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## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Dos Santos JA, Normando AG, 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;100:141-54.
2. Mortazavi H, Rezaeifar K, Nasrabadi N. Oral manifestations of coronavirus disease-19: A mini-review. *Maced J Med Sci* 2020;8:286-9.
  3. Fisher J, Monette DL, Patel KR, Kelley BP, Kennedy M. COVID-19 associated parotitis. *Am J Emerg Med* 2021;39:254.e1-3.
  4. 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.
  5. 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 (Lausanne)* 2021;8:726753.
  6. Kano Y, Honda H. Herpetic glossitis due to therapies related to COVID-19. *BMJ Case Rep* 2021;14:e245681.
  7. Natto ZS, Afeef M, Khalil D, Kutubaldin D, Dehathem M, Alzahrani A, *et al.* Characteristics of oral manifestations in symptomatic non-hospitalized COVID-19 patients: A cross-sectional study on a sample of the Saudi population. *Int J Gen Med* 2021;14:9547-53.
  8. Hettiarachchi PV, Subasinghe SP, Medagedara D, Jayasinghe RD. Oral manifestations of COVID-19 patients-a Sri Lankan perspective. *Sri Lanka Dent J* 2021;51:81-8.
  9. Orilisi G, Mascitti M, Togni L, Monterubbiansi R, Tosco V, Vitiello F, *et al.* Oral manifestations of COVID-19 in hospitalized patients: A systematic review. *Int J Environ Res Public Health* 2021;18:12511.
  10. Huang N, Pérez P, Kato T, Mikami Y, Okuda K, Gilmore RC, *et al.* SARS-CoV-2 infection of the oral cavity and saliva. *Nat Med* 2021;27:892-903.
  11. Okadaa Y, Yoshimura K, Toyac S, Tsuchimochi M. Pathogenesis of taste impairment and salivary dysfunction in COVID-19 patients. *Jpn Dent Sci Rev* 2021;57:111-22.
  12. Villarroel-Dorrego M, Chacón L, Rosas R, Barrios V, Pernía Y, Vélez H. Oral findings in patients with COVID-19. *Actas Dermosifiliogr* 2022;113:183-6.
  13. Purba FD, Kumalasari AD, Novianti LE, Kendhawati L, Noer AH, Ninin RH. Marriage and quality of life during COVID-19 pandemic. *PLoS One* 2021;16:e0256643.
  14. Goshayeshi L, Rad MA, Bergquis R, Allahyari A, Hashemzadeh K, MUMS Covid-19 Research Team, *et al.* Demographic and clinical characteristics of severe COVID-19 infections: A cross-sectional study from Mashhad University of medical sciences, Iran. *BMC Infect Dis* 2021;21:656.
  15. Monod M, Blenkinsop A, Xi X, Hebert D, Bershan S, Tietze S, *et al.* Age groups that sustain resurging COVID-19 epidemics in the United States. *Science* 2021;371:eabe8372.
  16. Pan L, Wang J, Wang X, Ji JS, Ye D, Shen J, *et al.* Prevention and control of coronavirus disease 2019 in public places. *Environ Pollut* 2022;292:118273.
  17. Eskandari A, Brojakowska A, Bisserier M, Bander J, Garikipati VN, Hadri L. Retrospective analysis of demographic factors in COVID-19 patients entering the Mount Sinai health system. *PLoS One* 2021;16:e0254707.
  18. Anand R, Dhingra C, Prasad S, Menon I. Betel nut chewing and its deleterious effects on oral cavity. *J Cancer Res Ther* 2014;10:499-505.
  19. Fantozzia PJ, Pampenaa E, Di Vanna D, Pellegrinob E, Corbib D, Mammucarib S, *et al.* Xerostomia, gustatory and olfactory dysfunctions in patients with COVID-19. *Am J Otolaryngol* 2020;41:102721.
  20. Sheng WH, Liu WD, Wang JT, Chang S, Chang SC. Dysosmia and dysgeusia in patients with COVID-19 in Northern Taiwan. *J Famos Med Assoc* 2021;120:311-7.
  21. Biadsee A, Biadsee A, Kassem F, Dagan O, Masarwa S, Ormianer Z. Olfactory and oral manifestations of COVID-19: Sex-related symptoms a potential pathway to early diagnosis. *Otolaryngol Head Neck Surg* 2020;163:722-8.
  22. Dzaman K, Jadcak M, Rapiejko P, Syryło A, Jurkiewicz D. Assessment of the correlation between taste and smell functioning. *Pol Merkur Lekarski* 2005;19:280-2.
  23. Wu YH, Wu YC, Lang MJ, Lee YP, Jin YT, Chiang CP. Review of oral ulcerative lesions in COVID-19 patients: A comprehensive study of 51 cases. *J Dent Sci* 2021;16:1066-73.

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