

Effect of COVID-19 on the Severity of Pre-Infection Oral Diseases; A Cross-Sectional Study

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Received: September 02, 2021; **Published:** October 20, 2022

Abstract

Introduction: Due to indirect intricate effect and intensified COVID-19 treatments, it is desired to examine whether certain oral conditions could be provoked by COVID-19 infection, chiefly those related to autoimmune etiology, compromised immune system and/or long-term pharmacotherapy.

Materials and Methods: We present a cross sectional study conducted among the Saudi general public using an online survey with 300 participants who recovered from a previous COVID-19 infection. The questionnaire included questions related to demographic data and oral health issues during and after the infection.

Results: 36.6% of the participants reported to have gingival bleeding before infection and 63.7% of those revealed that their gingival bleeding did not worsen during COVID-19 infection. Furthermore, 29% of the participants reported to have bad breath during or after infection and only 14.7% revealed that their mouth ulcers became severe during or after COVID-19 infection.

Conclusion: Overall, the survey results indicate that there is no significant effect of COVID-19 infection on the severity of pre-infection oral health conditions.

Keywords: COVID-19; Pre-Infection; Oral Diseases

Introduction

Health services throughout the globe face extraordinary circumstances as a result of the global COVID-19 pandemic. Due to indirect intricate effect and intensified COVID-19 treatments it is supposed that certain oral conditions could be provoked by COVID-19 disease, chiefly those with autoimmune etiology and/or connected to compromised immune system or long-term pharmacotherapy [1].

Latest investigations have testified that Covid-19 patients appear with oral manifestations and multiple clinical features. Ulcers, blisters, necrotizing gingivitis, opportunistic coinfections, salivary gland alterations, white and erythematous plaques and gustatory dysfunction were the most stated clinical oral manifestations in patients with Covid-19 [2]. As a whole, the lesions seem to be associated with the loss of smell and taste. Several reports reveal proofs of necrotic/ulcerative gingiva, oral blisters and hyper growth of opportunistic oral pathogens. SARS-CoV-2 displays tropism for endothelial cells and Covid-19-mediated endotheliitis will not merely stimulate inflammation

in oral tissues but can also expedite virus spread. In addition, raised levels of pro-inflammatory mediators in patients with Covid-19 and oral infectious disease can damage tissue homeostasis and lead to delayed disease resolution [2].

COVID-19 is connected with an aggravated inflammatory reaction that can lead to terminal consequences. Systemic inflammation is also a chief feature of periodontitis. It was documented that periodontitis was significantly related with an advanced risk of problems resulting from COVID-19 infection that can lead to ICU admission, necessity for aided ventilation and increased levels of markers associated with COVID-19 including D-dimer, WBC and CRP [3].

Oral mucosal lesions could be the outcome of several other factors, including stress as a result of social life limitations during COVID-19 lockdown, deficiency of oral hygiene, work pressure, or herpes simplex virus. Topical antiseptic oral applications suggested decreasing the oral viral load for example hydrogen peroxide-based mouth rinse solutions might also cause oral ulcers [4]. None of the cited studies, however, examined the effect of COVID-19 infection to existing oral health conditions [5].

Aims of the Study

- To determine the impact of covid-19 on existing oral health disease of adults in Saudi Arabia.
- To determine the relationship between COVID-19 infection and the other oral health problems, including gingival bleeding, ulcers, swelling and tooth ache.

Materials and Methods

Study design: This is a cross sectional study conducted among the Saudi general public using an online survey.

Study sample: 300 participants were utilized in this study whom recovered from a previous COVID-19 infection.

Study instrument: Online questionnaire was constructed consisting of questions related to demographic data followed by questions including oral health related issues during and after COVID-19 infection.

Statistical analysis: Collected data was analyzed using SPSS version 22, where descriptive statistics were conducted.

IRB approval: This proposal was registered to the Riyadh Elm University (REU) research center web portal followed by applying for an IRB approval before the collection of data.

Results

A total of 300 participants filled the survey, out of which 21% were males and 79% were females (Figure 1). Regarding the age groups, 16.8% belonged to 20 - 29 years, 33.7% to 30 - 39 years, 29.4% to 40 - 49 years, 15.4% to 50 - 59 years and 4.7% to 60+ years age group (Figure 2). Concerning the regions of residence, 36.9% lived in Riyadh, 4% in Jeddah, 51.6% in Eastern region and 7.5% in other cities (Figure 3). Table 1 show that 19.9% had oral diseases, 17.4% had chronic respiratory disease and 55.1% had other diseases. Concerning gingivitis, 36.6% reported to have gingival bleeding before infection. The study showed that 63.7% of the participants with gingivitis, (69 patients), did not experience any worsening of their existing gingival bleeding during or after COVID-19 infection. Concerning ulcers, 29% reported to have bad breath during and after infection and only 14.7% revealed that their mouth ulcers symptoms became more severe during COVID-19 infection. Concerning oral infections, 68.1% stated that their swelling symptoms did not worsen during COVID-19 infection, whereas only 24.7% revealed that their pre-infection tooth aches became worse during COVID-19 infection. Finally, 44.8% suffered from dry mouth, 52.7% from loss of taste sensation and 11.1% had burning sensation during COVID-19 infection (Figure 1 and 3).

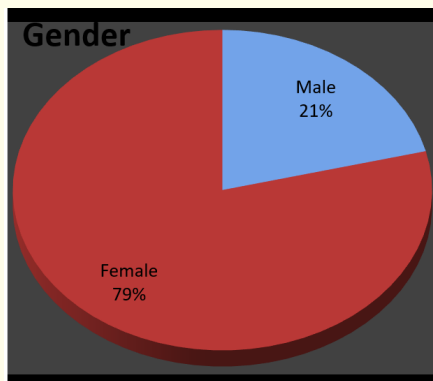


Figure 1: Gender ratio of study participants.

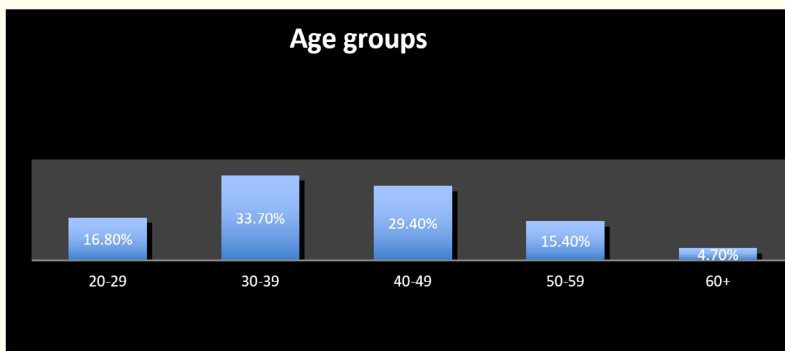


Figure 2: Age groups of study participants.

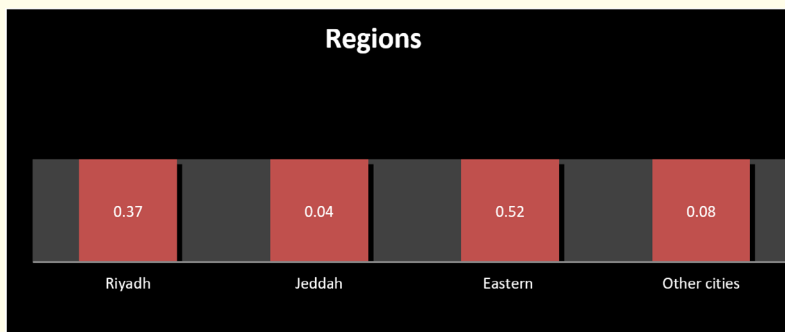


Figure 3: Regions of residence for study participants.

Questions	Responses
Do you have any of these diseases before your COVID-19 infection?	Oral diseases: 19.9% Chronic respiratory disease: 17.4% Cardiovascular disease: 4.7% Diabetes: 12.3% Hypertension: 15.7% Cancer: 2.5% Other: 55.1%
How many times do you brush your teeth during the day?	Twice or more: 46.2% Once daily: 43.4% Don't brush at all: 10.4%
Did you have gingival bleeding before infection?	Yes: 36.6% No: 63.4%
Did the gingival bleeding become worse during or after COVID-19 infection?	Yes: 20.8% No: 63.7% Not applicable: 16.5%
Did you have bad breath during or after covid-19 infection?	Yes: 29% No: 54% Not applicable: 16.9%
Did you have ulcers before your COVID-19 infection?	Yes: 15.8% No: 84.2%
Did your mouth ulcer symptoms become more severe during or after COVID-19 infection?	Yes: 14.7% No: 68.5% Not applicable: 16.8%
Did you have any swelling or abscess in your mouth or gum before your COVID-19 infection?	Yes: 21.1% No: 78.9%
Did your swelling or abscess become worse during or after COVID-19 infection?	Yes: 14.3% No: 68.1% Not applicable: 17.6%
Did you have a tooth ache before your COVID-19 infection?	Yes: 42.7% No: 57.3%
Did your tooth ache become worse during or after COVID-19 infection?	Yes: 24.7% No: 59.1% Not applicable: 16.1%
Did you suffer from any of these problems during or after COVID-19 infection?	Dry mouth: 44.8% Swollen tongue: 6.1% Bumps on the gum: 7.2% Loss of sense of taste: 52.7% Burning sensation in the mouth: 11.1% Tooth loss: 5% Others: 1.4%

Table 1: Survey questions with their responses.

Discussion

It was noticed from the findings that overall, there was no increase in the severity of existing oral diseases post COVID-19 infection. It is significant to observe the limitations for gaining access to oral health care because of the COVID-19 pandemic. These difficulties and collection of obstacles confronted by adults in accessing oral healthcare, which has been often formerly testified, may have contributed to the increased severity of pre-existing oral conditions, particularly for the most susceptible groups, such as patients living in Long Term Care Facilities (LTCFs), the homebound and older adults with dementia. Predictably, these COVID-19-related obstacles are expected to further diminish access to oral health, especially for the old aged and functionally reliant old adults. Consequently, the small, nonetheless proactive, group of oral health workers devoted to geriatric dentistry will be facing fresh and bigger tasks as the world restores after the COVID-19 pandemic [6].

In COVID-19, the reduced salivary gland secretions are frequently correlated with xerostomia and taste loss. Xerostomia is the idiosyncratic grievance of oral dryness, whereas salivary gland hypofunction is a different issue characterized by decreased salivary flow. In SARS-CoV infections, xerostomia might be intensified by reduced nasal breathing resulting from nasal congestion and rhinorrhea, where the oral breathing escalate and may end up impairing salivary gland function and xerostomia is secondary. Parallel to COVID-19-prompted oral mucosal lesions, pandemic-influenced psychosocial factors have a bigger influence on normal salivary gland function and quantitative secretions [7]. However, the prevalence of oral ulcers and other mucosal disorders was relatively low among the participants having COVID-19 infection in our study.

It can be observed from our findings that less than half of the participants reported brushing twice a day. To emphasize on the importance of tooth brushing, Warabi., *et al.* [8] revealed that oral care, comprising of tooth brushing and gargling, may be a factor in the extent of viral shedding, particularly among patients with mental as well as psychiatric disorders who are unable to brush their teeth of their own during isolated hospitalized phase. In addition to sputum and oropharyngeal secretions, saliva is stated as a dependable sample for the recognition of SARS-CoV-2. The SARS-CoV-2 viral load was found to be comparatively higher in the saliva than that in the oropharynx during the early stage of COVID-19. However, the viral load in the saliva decreased in day 9 of the illness. Therefore, researchers propose tooth brushing and gargling to remove collected non-infectious viral nucleic acid, leading to regular negative PCR test results and thus avoiding unnecessarily long hospital stays.

Conclusion

- Overall, there is no effect of COVID-19 infection on the severity of pre-existing oral diseases.
- Patients with COVID-19 infection must be emphasized on maintaining good oral hygiene as it is associated with early removal of virus from the oral cavity.

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Volume 21 Issue 11 November 2022

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