AWARENESS ABOUT ORAL MANIFESTATIONS OF COVID-19 AMONG DENTAL RESIDENTS AND FACULTY - A KAP SURVEY

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Abstract: The coronavirus disease (COVID-19) is a highly transmittable and pathogenic viral infection caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus-2). CoVs are positive-stranded RNA viruses with a crown appearance. Coronaviruses cause ARDS (acute respiratory distress syndrome) which develops sepsis, pneumonia, aspiration of gastric content, and major trauma. The symptoms of corona include fever, cough, tiredness, shortness of breath, headache, chills, sore throat. Oral manifestations included ulcer, erosion, bulla, vesicle, pustule, fissured or depapillated tongue, macule, papule, plaque, pigmentation, halitosis, whitish areas, hemorrhagic crust, necrosis, petechiae, swelling, erythema, and spontaneous bleeding. Aim of the study is to determine the awareness of oral manifestations of COVID19 among dental residents and faculty in an institution. A survey was conducted using a descriptive survey design of dental faculties and practitioners who were randomly selected. Participants were explained about the aims and objectives of the study being conducted in detail. All dental practitioners and faculties in the study voluntarily completed a questionnaire consisting of 10 close-ended questions in dental residents and faculties across Chennai were shortlisted based on the inclusion and exclusion criteria. The oral cavity is mostly the first site of oral manifestations of most of the diseases. COVID-19 patients have a wide variety of signs and symptoms, so the study of these manifestations will contribute to the early diagnosis and isolation of infected patients. The percentage of awareness regarding the oral manifestations of COVID-19 with Dental faculties and dental residents. 48.04% of dental residents are aware of oral manifestations and 15.69% of dental residents are not aware of the oral manifestations. 13.73% of faculties are aware of oral manifestations and 22.55% are not aware of the oral manifestations. Dental residents and faculties must be aware of the various oral signs and symptoms of COVID-19, as most of the COVID-19 patients are asymptomatic or there may be the initial

and the only symptoms present in a patient when they visit a Dental Clinic. Awareness regarding initial symptoms is crucial and suspected patients should be referred to a dedicated COVID-19 facility where the diagnosis and further management can be properly done. The oral cavity is mostly the first site of symptoms of many diseases. Dental residents and faculties are at high risk of encountering COVID19 due to interaction with the oral cavity, saliva, and blood which increases the high risk of transmission of COVID19. In order to prevent the transmission of the disease and to diagnose the disease early to avoid major complications of COVID19.

Keywords: oral manifestations, COVID19, dental residents, faculties, innovative survey

INTRODUCTION

The coronavirus disease (COVID-19) is a highly transmissible and pathogenic viral infection caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus-2) (1) (2). SARDS-CoV-2 is phylogenetically related to severe acute respiratory syndrome-like bat viruses therefore bats could be the primary reservoir. Coronaviruses belong to the family Coronaviridae in Nidovirales order (3). Corona represents crown-like spikes on the outer surface of the virus, thus named coronavirus. The virion is an enveloped particle that contains a spike, membrane, and envelope proteins (4).

They are large single-stranded RNA viruses isolated from animal species. CoVs are positive-stranded RNA viruses with a crown appearance (5). Coronaviruses cause ARDS (acute respiratory distress syndrome) which develops sepsis, pneumonia, aspiration of gastric content, and major trauma. The symptoms of corona include fever, cough, tiredness, shortness of breath, headache, chills, sore throat. The virus is easily spreadable as it is highly contagious and spreads through close contact or droplets of infected people. The subgroups of the coronaviruses family are alpha, beta, gamma, and delta coronaviruses (6).

The coronavirus spike protein is a multifunctional molecular machine that mediates coronavirus entry into host cells viral entry relies on the interplay between virion and host cells (7). Infection initiated by the interaction of viral particles with specific proteins of the cell surface. After initial binding to the receptor, enveloped viruses fuse their envelope to host cell membranes and deliver the nucleocapsid to target cells (8). The dual play of spike protein is in entry by mediating receptor binding and membrane fusion. The fusion process involves a large conformational change of spike protein. Coronaviruses have a wide set of receptors that trigger fusion. The important role of spike protein in cell tropism.

Coronaviruses are capable of adapting to new environments through mutation and recombination with ease and programmed to alter host range and tissue tropism efficiently (9). Magnified cytokine storm plays a vital role in inducing the inflammatory response in covid disease in the lungs leading to respiratory collapse (10). Many immune mechanisms have been proposed to induce the same. STAT1 is a key protein in interferon-mediated immune

response antagonized by a virus that leads to an increased response threshold of immune cells to interferons during CoV (11)

Oral health plays a pivotal role in overall health, well-being, and quality of life. With the emergence of the COVID-19 pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), insights into the relationship between SARS-CoV-2 and oral diseases are urgently needed to elucidate the oral manifestations of SARS-CoV-2 (12). Dysgeusia is the first recognized oral symptom of novel coronavirus disease (COVID-19).infections (13). Oral manifestations included ulcer, erosion, bulla, vesicle, pustule, fissured or depapillated tongue, macule, papule, plaque, pigmentation, halitosis, whitish areas, hemorrhagic crust, necrosis, petechiae, swelling, erythema, and spontaneous bleeding (14). The most common sites of involvement include tongue, labial mucosa and palate.

The common lesion found in the oral cavity are aphthous stomatitis, herpetiform lesions, candidiasis, vasculitis, Kawasaki-like, EM-like, mucositis, drug eruption, necrotizing periodontal disease, angina bullosa-like, angular cheilitis, atypical Sweet syndrome, and Melkerson-Rosenthal syndrome (15). Lack of oral hygiene, opportunistic infections, stress, immunosuppression, vasculitis, and hyper-inflammatory response secondary to COVID-19 are the most important predisposing factors for onset of oral lesions in COVID-19 patients. Patients with diabetes mellitus were more to opportunistic infections and especially prone to COVID19 (16). The aim of the study is to determine the awareness of oral manifestations of COVID19 among dental residents and faculty.

MATERIALS AND METHODS

A survey was conducted using a descriptive survey design of dental faculties and practitioners who were randomly selected. Participants were explained about the aims and objectives of the study being conducted in detail. All dental practitioners and faculties in the study voluntarily completed a questionnaire consisting of 10 close-ended questions in dental residents and faculties across Chennai were shortlisted based on the inclusion and exclusion criteria.
 The study population included dental residents and faculties across Chennai
- Inclusion criteria- dental residents and faculties
- Exclusion criteria- dental students

The data for this study was taken from the questionnaire-based survey. A total sample of 200 participants was included who met the inclusion criteria were included in the study. These 200 participants were dental residents and faculties. Dental students were excluded from the study. Data was reviewed by an external reviewer. Data were recorded in Microsoft Excel 2016 (Microsoft office 10) and later exported to SPSS statistical package for social science for windows versions, 20.0, SPSS Inc, (Chicago IU, USA) and subjected to statistical analysis. The Chi-square test was employed with a level of significance set at $p<0.05$.

RESULTS

The oral cavity is mostly the first site of oral manifestations of most of the diseases. COVID-19 patients have a wide variety of signs and symptoms, so the study of these manifestations will contribute to the early diagnosis and isolation of infected patients (17). Figure 1: Pie chart shows the response of the number of females and males. 60.78% of participants are females and 39.22% of participants are males. Figure 2: Pie chart shows the response of the dental residents and faculties. Responses of dental residents which is 63.73% and faculties which is 36.27%. Figure 3: Pie chart shows the responses of ulcer manifestations. 64.71% of participants responded as yes and 35.29% of participants responded as no. Figure 4: Pie chart shows the responses of common sites of oral lesion. 59.80% of participants responded as tongue, 22.55% of participants responded as labial mucosa and 17.65% participants responded as palate. Figure 5: Pie chart shows the response of oral manifestations. 61.76% of participants responded as yes and 38.24% of participants responded as no. Figure 6: Pie chart shows the responses of common oral manifestations. Figure 7: Pie chart shows the response regarding gender prevalence. Figure 8, denotes the percentage of awareness regarding the oral manifestations of COVID-19 with Dental faculties and dental residents. 48.04% of dental residents are aware of oral manifestations and 15.69% of dental residents are not aware of the oral manifestations. 13.73% of faculties are aware of oral manifestations and 22.55% are not aware of the oral manifestations. Figure 9 denotes that among dental residents 39.22% responded that ulcer is an oral manifestation of COVID19 and 24.51% responded that ulcer is not an oral manifestation. Among dental faculties, 25.49% responded that Ulcer is an oral manifestation of COVID19 and 10.78% responded that it is not an oral manifestation. Figure 10, denotes the common oral manifestations. Among dental residents, 8.82% responded that fever, candidiasis, ulcer, tumor as oral manifestation, 6.86% responded that necrosis, carcinoma is the oral manifestations, 33.33% responded ulcer, vesiculobullous lesion, dysgeusia, candidiasis, 3.92% responded to all of the above and 10.78% responded none of the above are the oral manifestations. Among dental faculties, 4.90% responded to necrosis and carcinomas as oral manifestation, 12.75% responded to ulcer, vestibullous lesion, dysgeusia, and candidiasis as oral manifestation, 12.75% responded all of the above and 6.86% responded as none of the above as the oral manifestations. Figure 11 represents the awareness of dental residents and faculties regarding the gender prevalence of oral manifestations of COVID-19. Among dental residents, 41.18% responded that it is equally prevalent in both genders, 15.69% responded that it is prevalent only in males and 6.86% responded that it is prevalent only in females. Among dental faculties, 15.69% responded that it is prevalent in both genders equally, 7.84% responded that it is prevalent only in males and 12.75% responded that it is prevalent only in females. Figure 12 denotes the awareness of dental residents and faculties about the common site of oral lesion of COVID-19. Among dental residents, 42.16% responded as tongue, 9.80% responded as the palate and 11.76% responded as labial mucosa. Among dental faculties, 17.65% responded as tongue, 7.84% responded as the palate and 10.78% responded as labial mucosa.
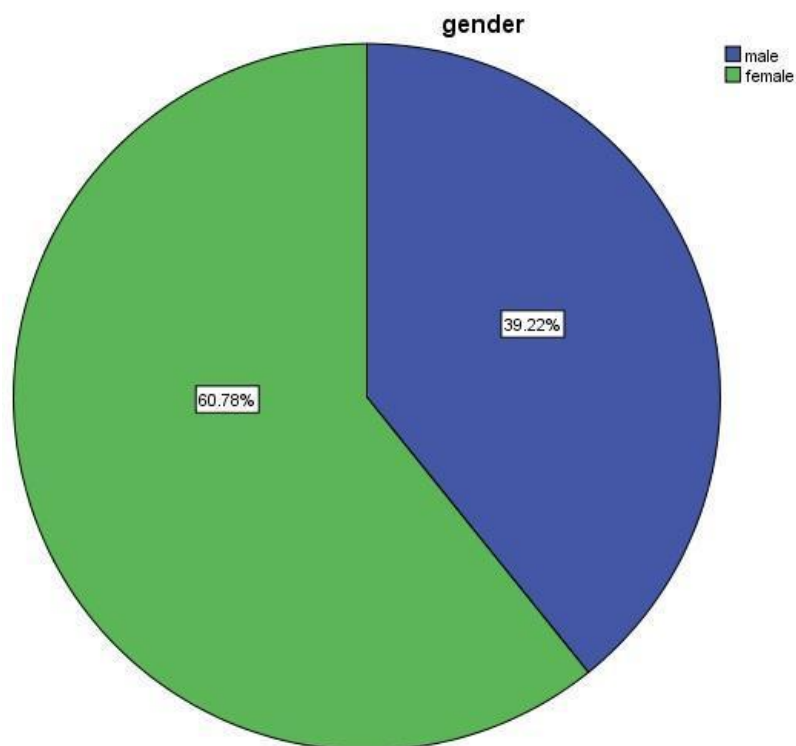
Figure 1: Pie chart shows the response for the number of females and males. 60.78% of participants are females and 39.22% of participants are males. The green color denotes females and the blue color denotes males.
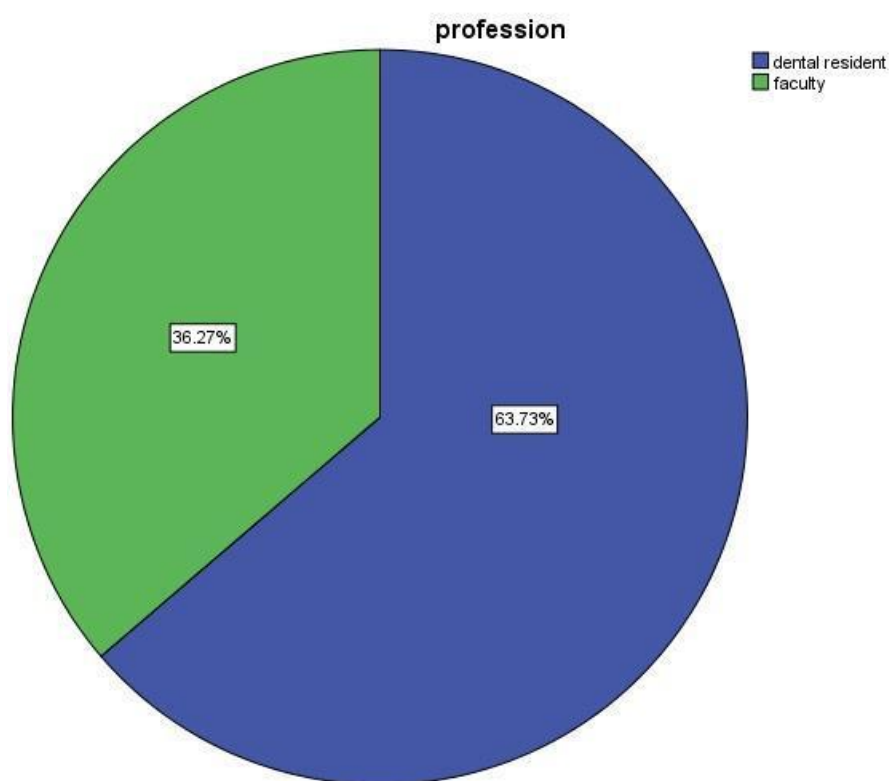

Figure 2: Pie chart shows the response for profession of dental residents and faculties. Blue color denotes dental residents which is 63.73% and green color denotes faculties which are 36.27%.
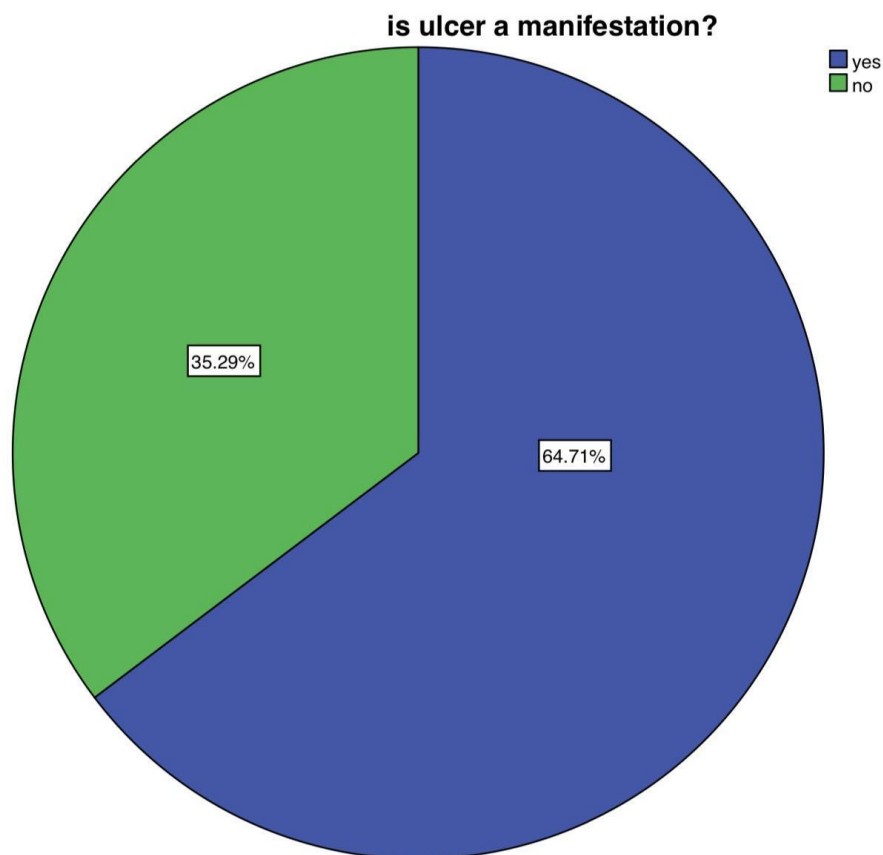
is ulcer a manifestation?

Figure 3: Pie chart shows the responses for knowledge about ulcer manifestations. 64.71% of participants responded as yes and 35.29% of participants responded as no. The green color denotes no and the blue color denotes yes.

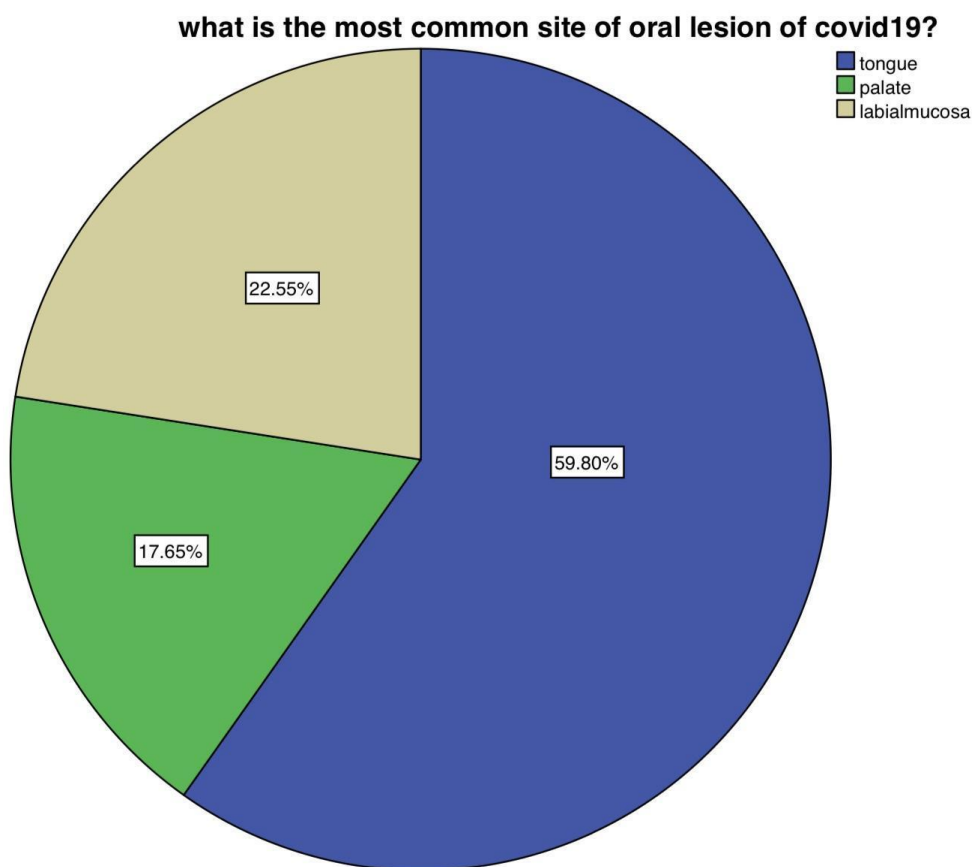**what is the most common site of oral lesion of covid19?**

Figure 4: Pie chart shows the responses for knowledge about common sites of oral lesion. 59.80% of participants responded as tongue, 22.55% of participants responded as labial mucosa and 17.65% participants responded as palate. The green color denotes palate, white color denotes labial mucosa and the blue color denotes tongue.
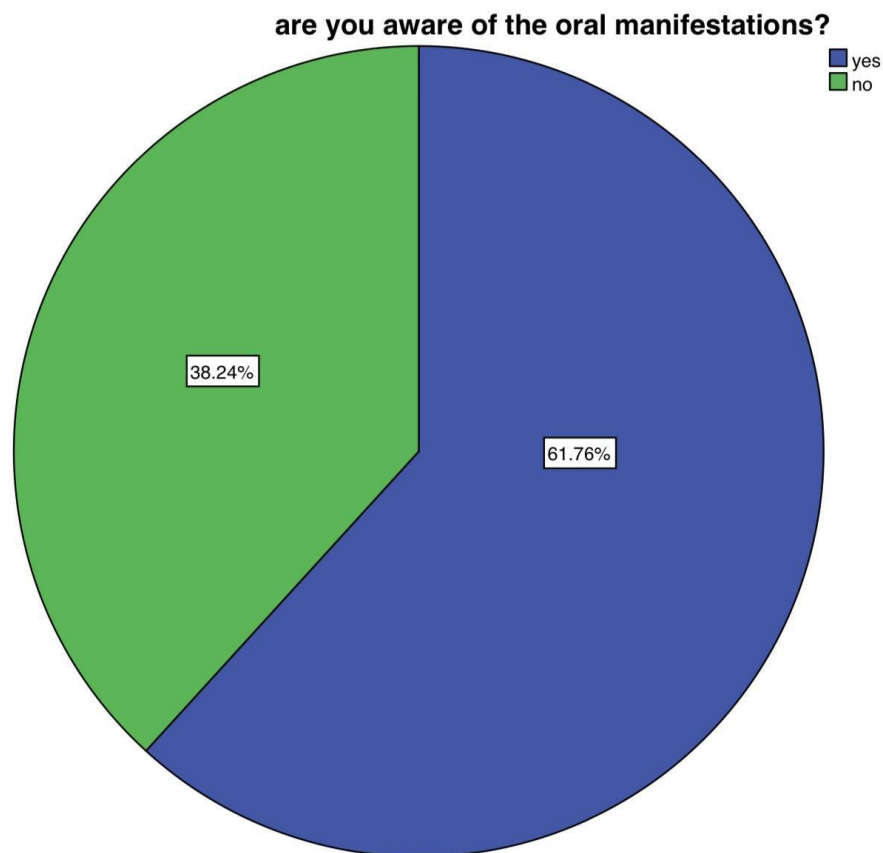

are you aware of the oral manifestations?

Figure 5: Pie chart shows the response for knowledge about presence of oral manifestations. 61.76% of participants responded as yes and 38.24% of participants responded as no. The green color denotes no and the blue color denotes yes.
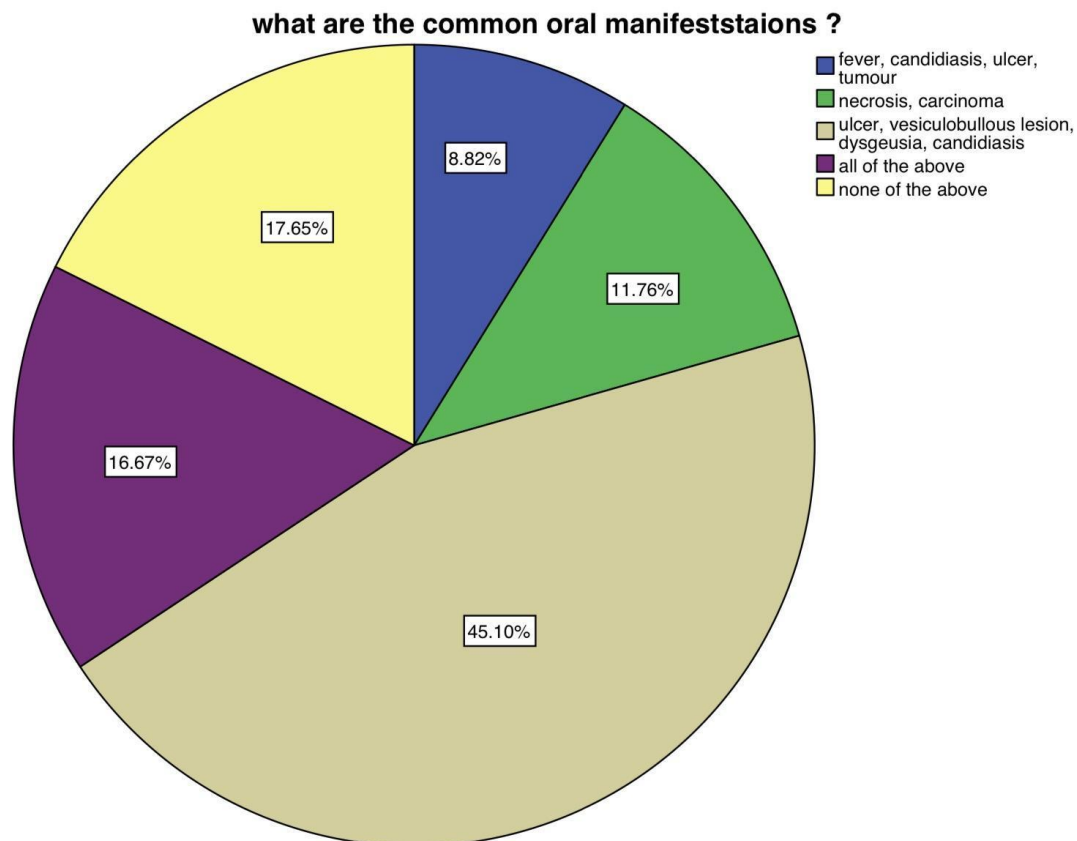
Figure 6: Pie chart shows the responses for knowledge about common oral manifestations. Blue color denotes fever, candidiasis, ulcer, tumor. Green color denotes necrosis and carcinoma. White color denotes ulcer, vestibullous lesion, dysgeusia, candidiasis. Violet color denotes all of the above and yellow colors denote none of the above.
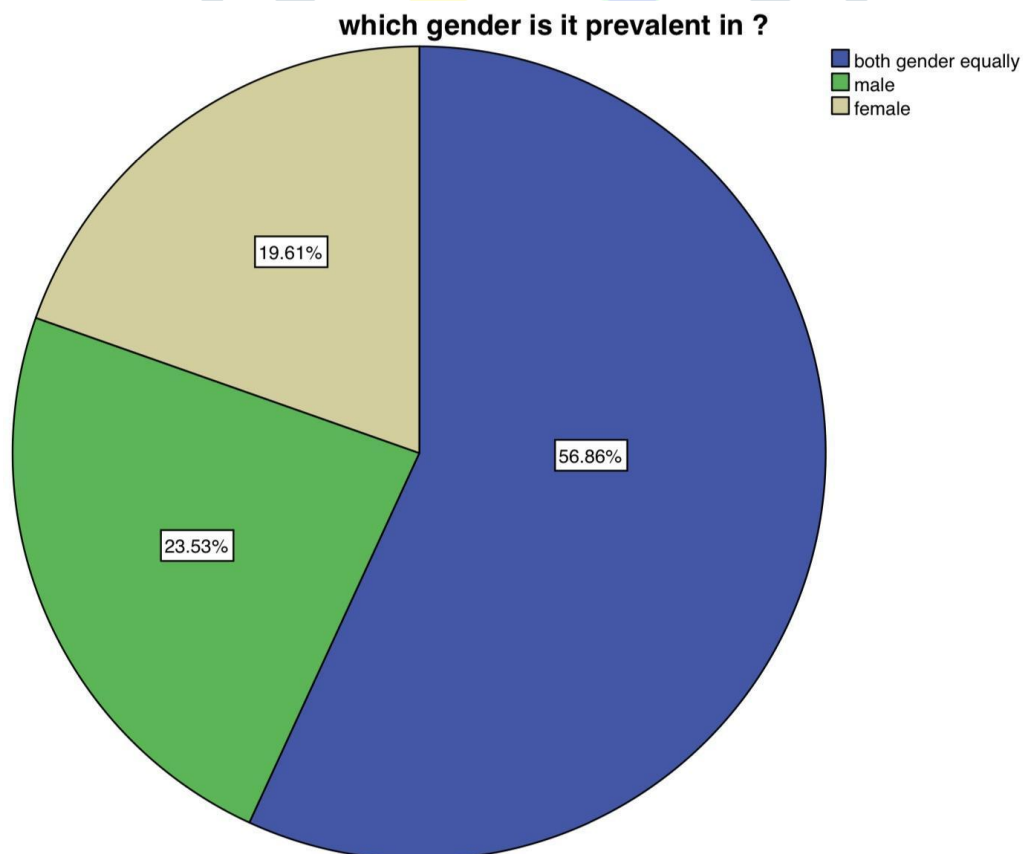
Figure 7: Pie chart shows the response regarding gender prevalence. The green color denotes males, blue color denotes both gender equally and white color denotes females.
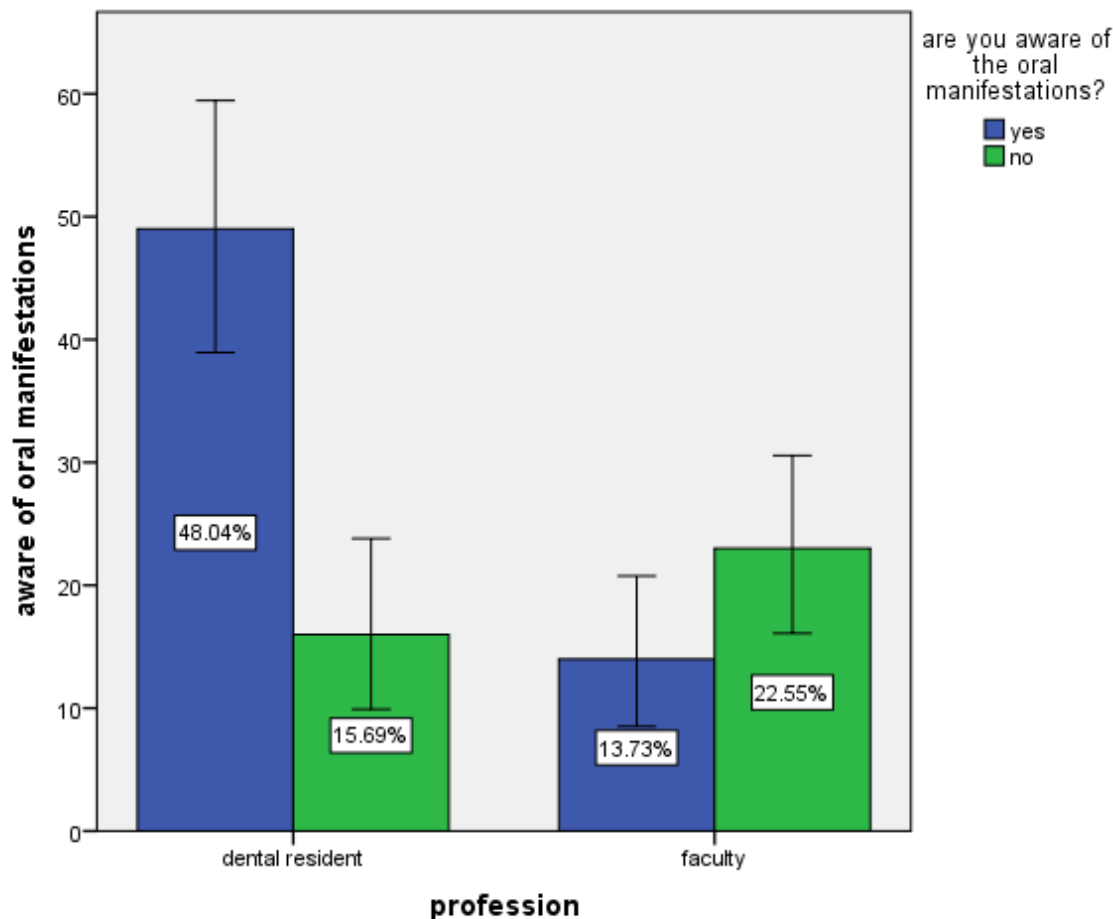

Figure: 8 Bar Chart represents the associations between the awareness of oral manifestations of COVID-19 with Dental faculties and dental residents. The X-axis represents the profession and Y-axis represents the number of responses for the awareness of oral manifestations of COVID19. The blue color denotes yes and the green color denotes no. 48.04% of dental residents are aware of oral manifestations and 15.69% of dental residents are not aware of the oral manifestations. 13.73% of faculties are aware of oral manifestations and 22.55% are not aware of the oral manifestations. Majority of dental residents are aware. Pearson chi-square test shows p-value is 0.15, (p-value > 0.05) Hence, it is statistically not significant.
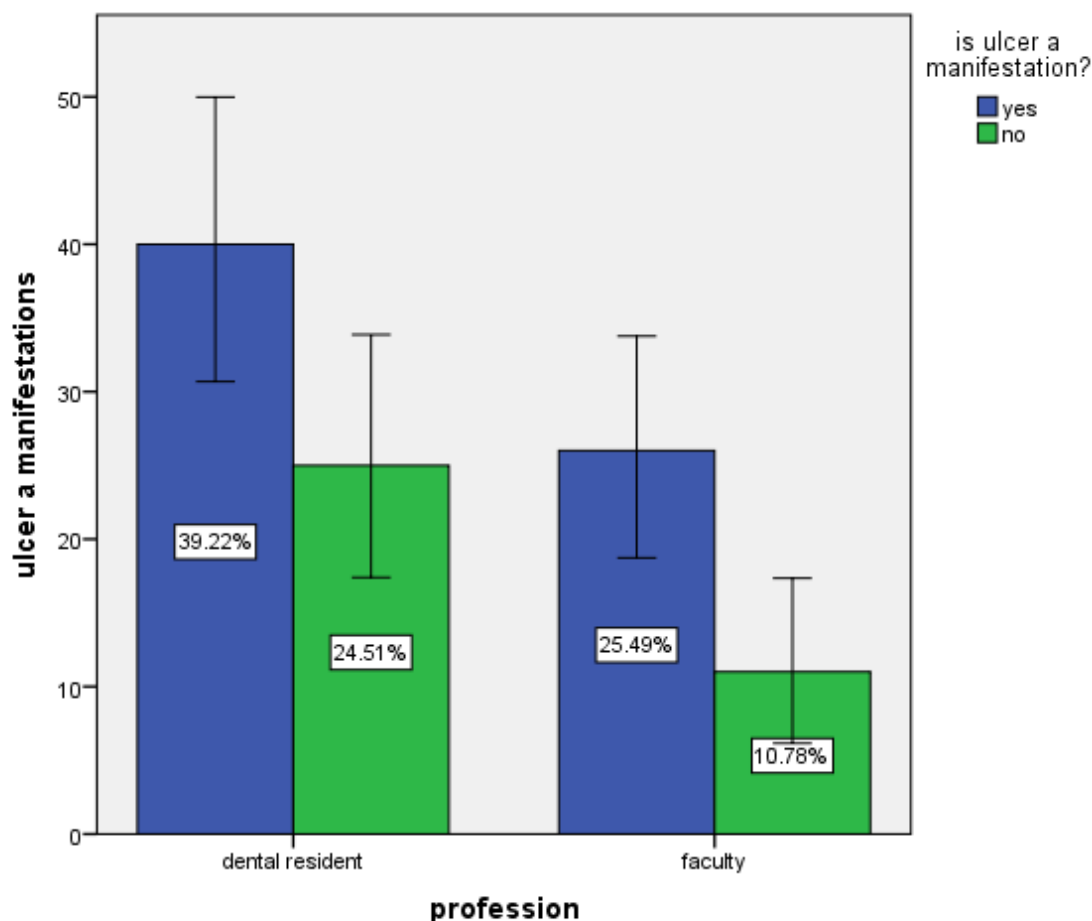
Figure 9: The bar chart represents the association between the profession and ulcer manifestations. The X-axis represents the profession and Y-axis represents ulcer manifestations. Blue color denotes yes and green color denotes no. Among dental residents, 39.22% responded as yes and 24.51% responded as no. Among faculty, 25.49% responded as yes and 10.78% responded as no. Majority of dental residents are aware. Pearson chi-square test shows p-value is 0.15, (p-value > 0.05) Hence, it is statistically not significant.
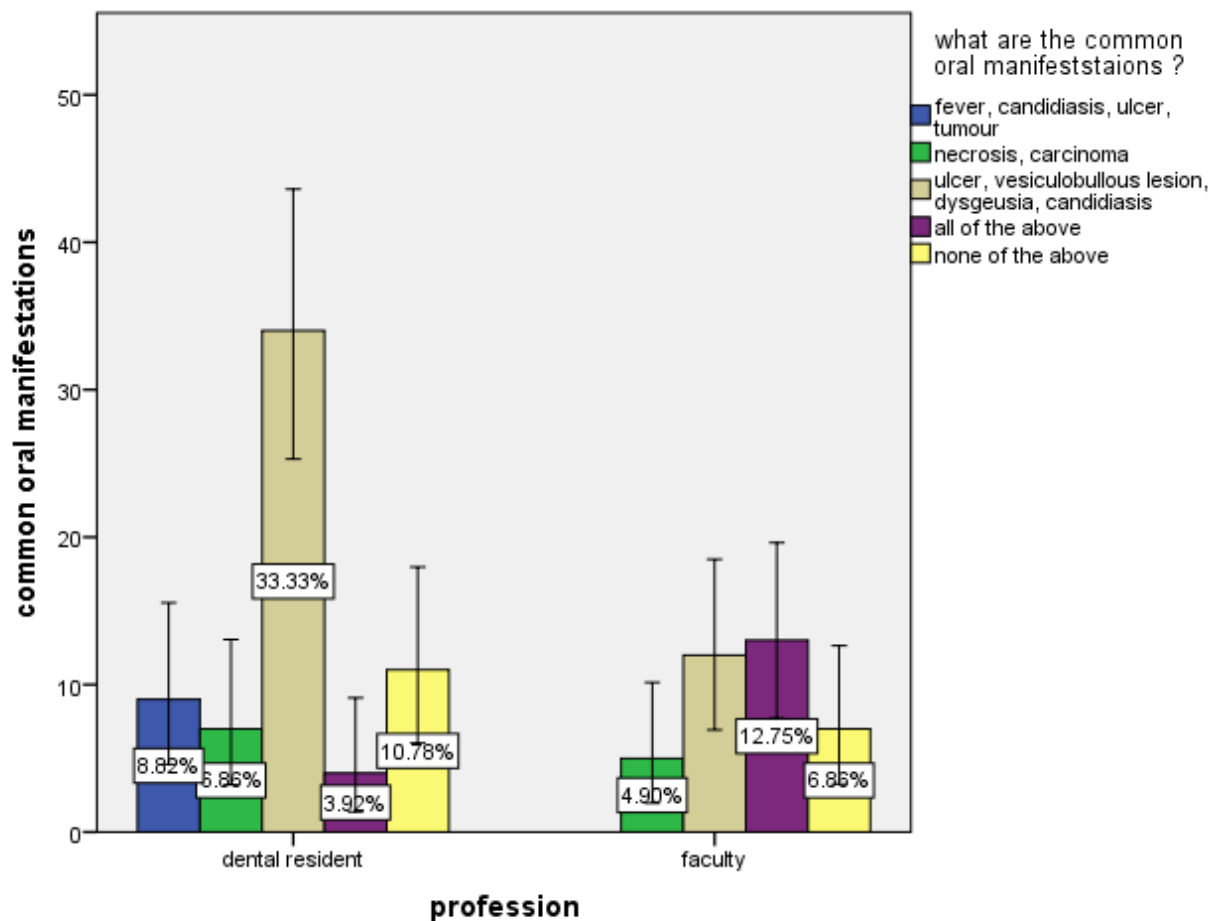
Figure 10: the bar graph represents the association between profession and common oral manifestations of COVID19. The X-axis represents the profession and Y-axis represents the common oral manifestations. Blue color denotes fever, candidiasis, ulcer, tumor. Green color denotes necrosis and carcinoma. White color denotes ulcer, vestibullous lesion, dysgeusia, candidiasis. Violet color denotes all of the above and yellow colors denote none of the above. Majority of dental residents are aware. Pearson chi-square test shows p-value is 0.15, (p-value > 0.05) Hence, it is statistically not significant.
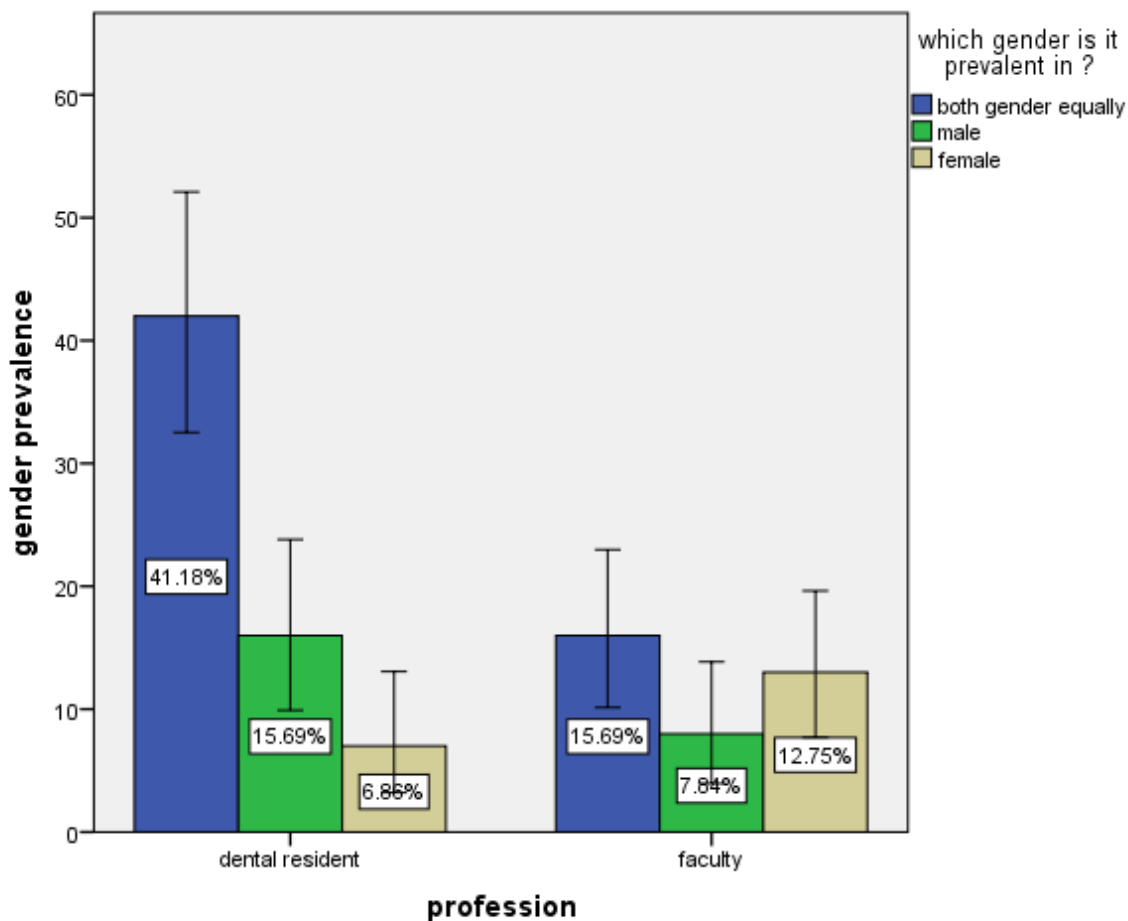
Figure 11: bar chart represents the awareness of dental residents and faculties regarding the gender prevalence of oral manifestations of COVID-19. The X-axis represents the profession and the Y-axis represents the number of responses by the male and female. Blue color denotes both genders equally, green color denotes males and white color denotes females. Majority of dental residents responded that both are affected equally. Pearson chi-square test shows p-value is 0.01, (p-value < 0.05) Hence, it is statistically significant.
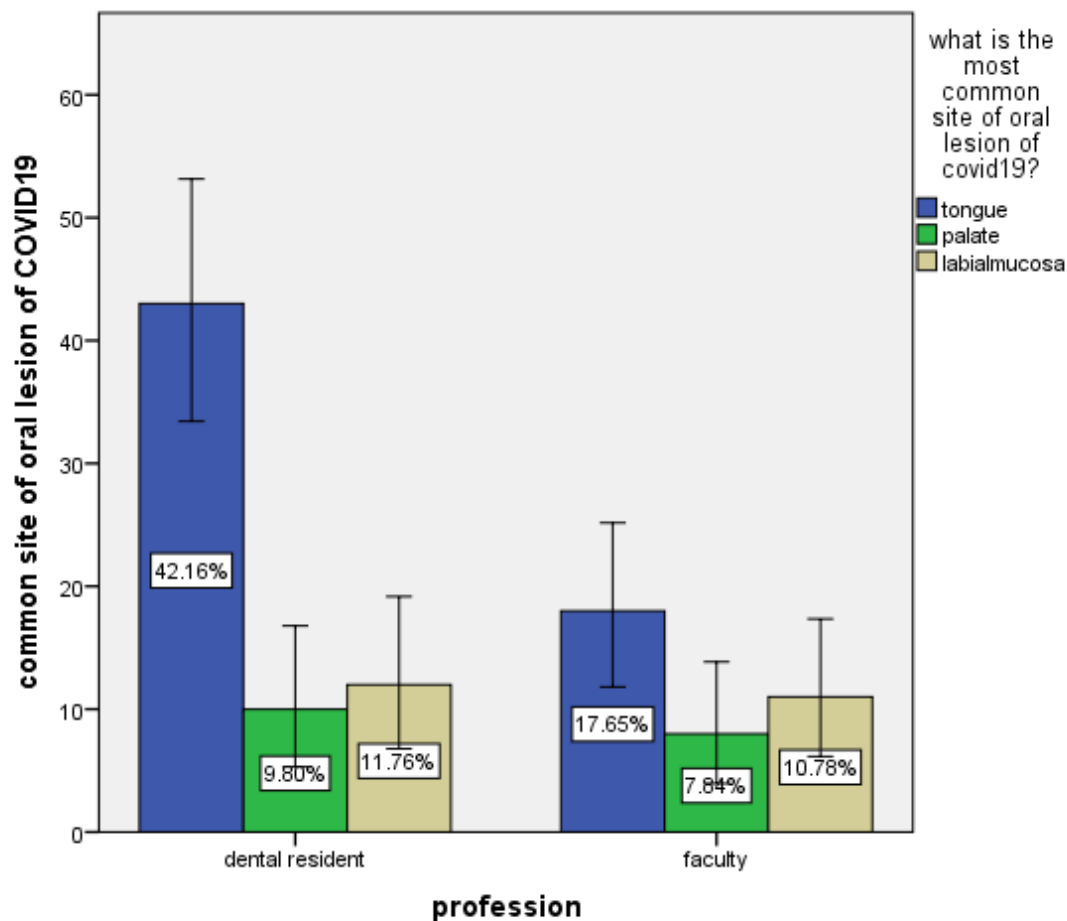
Figure 12: bar chart representing the awareness of dental residents and faculties about the common site of oral lesion of COVID-19. The X-axis represents the profession and the Y-axis represents the number of responses regarding the common site of oral lesion of COVID19. The blue color denotes the tongue, the green color denotes the palate and the white color denotes the labial mucosa. Majority of dental residents responded that tongue is more affected. Pearson chi-square test shows p-value is 0.01, (p-value < 0.05) Hence, it is statistically significant.

DISCUSSION

This survey study revealed a high prevalence of salivary gland-related symptoms supporting the beneficial effect of saliva on virus detection and the negative impact of saliva on viral transmission hypotheses (18). Respiratory infection incidence will then increase by enhancing virus adhesion and colonization and destroying the oral mucosa surfaces and airways, thus, decreasing antimicrobial peptides and proteins (19)

However, T-cell receptors for human pathogenic saliva can be the initial portal of the virus to the body; thus, the proliferation of the COVID-19 in the salivary gland may be responsible for the spread of infection from asymptomatic patients (20). This study found that the dental residents and faculties are aware of the common oral manifestations of COVID19 and was in agreement with the previous study which stated that these oral

manifestations could be due to viral incidence (21). This study found that it related with a similar study which stated that dysgeusia and anosmia were found to be in COVID19 (22). Another study had similar findings which showed that oral manifestations are more prevalent in females than males (23) In a similar study by vinayachandran, the results indicate that candidiasis, ulcer, vesibullous lesion, dysgeusia are the most common oral manifestations found in COVID19 patients (24). Previous studies indicated that pemphigus vulgaris and oral submucous fibrosis were some of the oral manifestations seen post covid19 (25) (26) (27). In a similar study by Dina, it is considered that oral ulcer is a manifestation of COVID19 (28). In a similar study, it was observed that tongue, labial mucosa, and palate were the common sites of oral manifestations of COVID19 (29). Previous study stated that along with unexplained ulcers in the oral cavity, desquamative gingivitis, herpetiform ulcers on attached gingiva, blisters/irregular ulcers on the tongue's dorsal surface (29). Previous studies have stated that utilization of tobacco products is a global epidemic that causes a health threat among people and has had a huge impact on oral health. Previous research is done in oral cancer and oral pre-malignant lesions, many articles were published by a team of researchers (30) (31) (32) (33) (34) (35) (36) (37) (38) (33) (39) (40) (41) (42) (43) (44). From previous studies it was found that tobacco smokers were more prone to develop oral squamous cell carcinoma and premalignant lesion and henceforth these patients would be more prone to develop COVID19 (45). From previous studies it was found that malignant transformation of the dermoid cyst in the oral cavity could again affect the immunity of an individual (46). Previous studies have been done on variability of drug responsiveness to anti-inflammatory drugs and these studies should be used to evaluate the responsiveness against COVID19 as an alternative treatment. It has been put forth by previous studies that dental surgeons sometimes face violence at the workplace so it is important for dental surgeons to act accordingly during these situations since these alarming situations have increased more due to COVID19 panic (47).

CONCLUSION:

Dental residents and faculties must be aware of the various oral signs and symptoms of COVID-19, as most of the COVID-19 patients are asymptomatic or there may be the initial and the only symptoms present in a patient when they visit a Dental Clinic. Awareness regarding initial symptoms is crucial and suspected patients should be referred to a dedicated COVID-19 facility where the diagnosis and further management can be properly done. Dental residents and faculties should abide by the prevalent precautionary guidelines as they are at very high risk to encounter COVID-19 due to their close contact with patients and exposure to saliva and blood during treatment. Telephonic consultation should be preferred, and elective treatment should be deferred until the COVID-19 situation improves.

ETHICAL APPROVAL:

Ethical clearance from the institutional ethical committee board of University Dental Hospital was obtained prior to the study (Ethical Approval Number: SDC/SIHEC/ ……………………….)

CONFLICTS OF INTEREST:

The authors declare no potential conflict of interest

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