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Knowledge And Perception The Among Dental Surgeons About A Periodontal Disease As A Risk Factor For Covid-19 Illness : A Web Based Questionnaire Study

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ABSTRACT

INTRODUCTION: A Periodontal disease (PD) composes a group of diseases comprising inflammatory aspects of the host and dysbiotic events that impinge the periodontal tissues and could have systemic significances. Discrete factors and comorbidities have been closely accomplices with PD such as diabetes, aging, hypertension etc., although, elementary mechanisms or causal correlations have not been authorized completely. Fascinatingly, these same factors have been extensively correlated with progression of severely graded form of coronavirus disease 2019 (COVID-19), an illness caused by coronavirus SARS-CoV-2. Since inflammatory and dysbiotic factors as well as comorbidities impinge the systemic health, it is feasible that periodontal status illustrate the possiblerisk of complications of COVID-19.

AIMS: To evaluate the Knowledge and perception among the dental surgeons about a Periodontal disease as a risk factor for covid-19 illness : a web based questionnaire study.

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SETTINGS AND DESIGN: A Questionnaire web based survey

METHODS AND MATERIAL: Survey consists of 21 questions related to knowledge and awareness about corona virus and periodontal disease as a possible risk factor for covid-19 illness was conducted and evaluated using percentage among 312 participants (195 females 117 males).

RESULTS: A total of 312 participants responded to the questionnaire. 67.1% had sufficient knowledge on the receptors that has high affinity for covid-19 disease, 81.7% dental surgeons had knowledge on periodontal disease that escalate risk for covid-19 related respiratory breakdown .46.8% and 21.9% had knowledge on pro inflammatory cytokine IL-6 and Th 17 enacts a considerablepart in the pathogenesis of covid-19 and periodontitis.

CONCLUSION: The study findings showed adequate awareness about corona virus and simultaneously showed inadequate awareness towards periodontal pathology as a hazardous factor for covid-19 illness among dental surgeons.

KEY-WORDS: Periodontal disease, COVID-19 illness, Dental specialists.

Introduction: On December 31st 2019, the China Health Authority modified the World Health Organization (WHO) to definite cases of pneumonia of idiopathic cause in the Wuhan City in Hubei Province in central China.{1}. On 12thof January 2020 coronavirus, was initially termedas the 2019- novel coronavirus (2019-nCoV) by World Health Organization. WHO officially termed the disease as coronavirus disease 2019 (COVID-19) and Coronavirus Study Group (CSG) of the International Committee proposed to name the new coronavirus as SARS-CoV-2, both issued on 11th of February 2020. SARS-CoV-2 resides to Beta coronavirus well-balanced with two exceptionally high infective viruses, SARS-CoV and MERS-CoV{2}. Using the genome sequences of SARS-CoV-2, RaTG13, and SARS-CoV, a farther study found that the virus is more disclosed to BatCoV RaTG13, a bat coronavirus that was earlier discovered in Rhinolophusaffinis from Yunnan Province {3}. SARS-CoV-2 is an enveloped and positive-sense single-stranded RNA (+ssRNA) virus {2}.

2019-nCoV enchanted the classical coronavirus structure with the “spike protein” in the membrane envelope, and further hadexpressed other polyproteins, nucleoproteins, and membrane proteins, such as RNA polymerase, 3-chymotrypsin-like protease, papain-like protease, helicase, glycoprotein, and accessory proteins {4}. The host range of a virus is driven by numerous molecular interactions, including receptor interaction. The envelope spike (S) protein receptor binding domain of SARS-CoV-2 was manifested structurally similar to that of SARS-CoV, regardless of amino acid variation at some key residues{5}. Farther considerable structural analysis firmly suggests that SARS-CoV-2 may use host receptor angiotensin-converting enzyme 2 (ACE2) to invade the cells {6}, the same receptor aiding the SARS-CoV to infect the airway epithelium and alveolar type 2 (AT2) pneumocytes, pulmonary cells that incorporate pulmonary surfactant {7}.

The common transmission routes of novel coronavirus comprise the undeviating transmission (cough, sneeze, and droplet inhalation transmission) and contact transmission (contact with oral, nasal, and eye mucous membranes). Dental patients and therapists can be prone to infective microorganisms, including viruses and bacteria that affect the oral cavity and respiratory complex. Dental care procedues every time carry the risk of 2019-nCoV infection due to the particularity of its procedures, which associates one-on-one communication with patients, and persistantvulnerebility to saliva, blood, and other body fluids, and the grasping of sharp -ended instruments. The infectious microorganisms can be transmitted in dental set ups through expiration of airborne microorganisms that can endure appended in the air for longer periods, straight contact with blood, oral fluids, or other patient stuff, contact of conjunctival, nasal, or

oral mucosa with droplets and aerosols consisting microorganisms resulting from an infected individual and propelled a short distance by coughing and communicating without a mask and indirect contact with infected instruments and/or environmental surfaces. Infections could be present by any of these conditions involved in an infected individual in dental set ups and hospitals, specially during the outbreak of 2019-nCoV[4].

Clinical manifestations of 2019-nCoV infection have an evident correlation with SARS-CoV where the major common clinical symptoms include fever, dry cough, dyspnoea, chest pain, fatigue and myalgia. fewer common symptoms include headache, dizziness, abdominal pain, diarrhoea, nausea, and vomiting [8].Acute complications such as hypoxaemia, acute ARDS, arrythmia, shock, acute cardiac injury, and acute kidney injury have been outlined among COVID-19 patients[9].

Oral diseases, including periodontitis (gum disease), are one of the major prevailing diseases globally . Periodontal disease has been contemplated as one of a muted pandemic which has a complicate multi-factorial pathophysiology with a document based evidence of immune mediated pathogenesis[10]. There has been manifestation of increased IL-17 producing cells in gingival tissue of patients suffering from both gingivitis and periodontitis as compared to healthy controls, not only this, elatedlevels of IL-17 have been reported in the serum of patients suffering from periodontal disease as well. This gives certainity to the fact that elevated levels of cytokines detected in locally inflamed gingival tissue mirror cytokine levels in the systemic circulation. There is also evidence in literature that non-surgical periodontal therapies leads to a fall in the levels of IL-17 both in the GCF (local) and serum (systemic) of patients with periodontal disease.

This common pathway of inflammatory response points towards a possible association between Periodontitis and COVID-19 related conflicting outcomes. Understanding of this association accentuates the importance of keeping periodontal disease under check and the value of maintaining meticulous oral hygiene in the COVID-19 era. It also points towards the possibility of the presence of periodontal disease as predisposing towards COVID-19 related conflicting outcomes [10].

Subjects and Methods: The aim is to evaluate the Knowledge and perception among dental surgeons about Periodontal disease as a possible risk factor for covid-19 illness : a web based questionnaire study.

A browser based survey has been conducted through online questionnaire (prepared in Google forms software comprising of 21 questions and ingressed using percentage with the purpose of assessing Knowledge and perception among dental surgeons about Periodontal disease as a possible risk factor for covid-19 illness among 312 participants.

Questionnaire study has been prepared in English to ease the completion and to get better understanding of the questions by the answerers. web questionnaires were conducted through electronic gadgets like computer/laptop/ smart phones. A web-based questionnaire helped in ease of data collection,, recording, and preservation of data. The added advantages of web based questionnaire were productive benefits and reduced time consumption.

The web survey form included self-explanatory questions and the distribution of responses has been surveyed using frequencies and percentages.

Results:

Three hundred and twelve (312) responses were obtained out of 400 survey forms which were sent to post graduates and Dental Specialists in India with a response rate of 78%. When asked about the animal species covid-19 disease spreads, it was revealed that 99% from Rhinolophus bat species followed by 1% Civet cats were the percentage of respondents. Most of the respondents claimed that novel corona virus is ss-RNA virus (59%) and 49.7% were aware of that spike protein is mainly responsible for the pathogenicity of covid-19 disease.

Among all the respondents 88.5% were aware that saliva is also

one of the diagnostic tool for covid-19 disease. 99.4% were aware of the clinical manifestations of covid-19 disease. Most of the answerers were aware of periodontal disease may increase the possible risk for covid-19 related respiratory breakdown (79.2%) followed by 20.8% were not aware of it.

45.8% were aware of IL-6 a pro inflammatory cytokine plays a crucial role in the pathogenesis of covid-19 and periodontitis and 79.5% were aware that raised IL-6 levels precipitate aspirational pneumonia in covid-19 patients resulting in death.

Among all the respondents, 65.7% were doubtful that elevated Th17 pathway responses plays a vital role in the pathogenesis of covid-19 disease and periodontitis followed by 21.2% were aware of it and 13.1% were not even aware of it and only 20.9% were aware that elevated Th17 pathway responses precipitate cytokine storm leading to organ shut down. 24% were aware that the point of care oral fluid biomarker technologies like MMP-8, helps in the assessment of risk of severe covid-19 infections and complications.

Discussion:

A Web based questionnaire was conducted among Dental specialists and Dental post graduates. Among them 99 % of the participants were aware of the species from which corona virus spreads. A study conducted by Zhou P et.al., found that the virus is the major analogous to BatCoV RaTG13, a bat - evolved coronavirus that was earlier detected in Rhinolophusaffinis from Yunnan Province, with 96.2% overall genome sequence identity[3]. An investigation confirmed that no evidence of recombination events has been detected in the genome of SARS-CoV-2 from other viruses evolving from bats such as BatCoV RaTG13, SARSCoV and SARSr-CoVs[3].Thoroughly, these findings advices that bats might be the actuall host of this virus[3,5].

59% and 49.7% were aware on type of the virus and protein responsible for the pathogenicity of the covid -19 disease respectively, a structured review conducted by Kramer A et.al., SARS-CoV-2 belongs to a Beta coronavirus together with two extensively high infectious viruses, SARS-CoV and MERS-CoV. SARS-CoV-2 is an highly enveloped and positive-sense single-stranded RNA (+ssRNA) virus [2] and an investigaton conducted by Hantak M. P et.al., stated that Spike protein from coronavirus can cohere to the receptors of the host to aid the viral entry into the target cells [11].

66.3% were aware of Angiotensin Converting Enzyme II receptors has high affinity for covid-19 disease, a study conducted by Hoffmann, M. et.al., A vital recombinant ACE2-Ig antibody, a SARS- CoV-specific human monoclonal antibody and the a serum from a convalescent SARS-CoV transmitted patient , which can counterbalance 2019-coV, confirmed ACE2 as a host receptor for 2019-nCoV [12].The immense affinity between ACE2 and 2019-nCoV S protein also implied that the population with higher grade expression of ACE2 might be more susceptible to 2019-nCoV [13].

99.4% and 39.4% were aware of symptoms and signs of covid-19 disease respectively, Clinical demonstation of 2019-nCoV infection have correaltions with SARS-CoV where the most typical symptoms include fever, dry cough, dyspnoea, chest pain, fatigue and myalgia [8,9]. fewer typical symptoms include headache, dizziness, abdominal pain, diarrhoea, nausea, and vomiting [8,9]. Based on the pathological report of the first 425 confirmed cases in Wuhan, the most typical symptoms include fever, dry cough, myalgia and fatigue with fewer typical include sputum production, headache, haemoptysis, abdominal pain, and diarrhoea[14]. Approximately 75% patients suffered with the bilateral pneumonia[15]. Different from SARS-CoV and MERS-CoV infections, however, is that very minimal COVID-19 patients show exclusive upper respiratory tract clinical signs and symptoms such as rhinorrhoea, sneezing, or sore throat, suggesting that the virus might have greater predilection for infecting the lower respiratory tract. Severe clinical manifestations such as hypoxaemia, acute ARDS, arrythmia, shock, acute cardiac injury, and acute kidney injury have been disclosed among the typical COVID-19

patients [15]. A practical based study among 99 patients found that approximately 17% patients developed ARDS and, among them, 11% died of evident multiple organ failure[15]. The median duration from first symptoms to ARDS was 8 days[8].

Periodontal Pockets(PP) can be an ideal manifestation for SARS-CoV-2 virus infection. The virus could be evidently find in PP a commending environment to replicate and to make it continuously into the oral cavity and mix with saliva, or to migrate systemically by utilizing the capillary periodontal complex. Hence, PP are vital plausible reservoirs for Sars-Cov-2 viruses [16].

Periodontal disease is an inflammatory microbial disease in which microbial causative factors induce a series of host responses that mediate inflammatory sequele, leading to tissue destruction in vulnerable individuals. The purpose of this study is to highlight the commonmost inflammatory mediators between periodontal disease and COVID-19 infection and suggesting that the periodontal disease may be a causative factor and/or exacerbate COVID-19 disease severity.

COVID-19–related morbidity and mortality have been ascribed to an overemphasized immune response. The ideal role of complement activation and its key contribution to illness severity is increasingly being recognized, and the term cytokine storm (CS) had been associated with the disease progression of COVID-19. CS is a hyperactive immune response characterized by the release of interferons, interleukins (IL), tumor-necrosis factors (TNF), chemokines, and several other mediators that can lead to dysregulation in the immune system and organ shutdown. CS implicits that the levels of released cytokines are deletorious to host cells. Laboratory results from clinical studies and autopsies on COVID-19 patients show elevated inflammatory markers, especially with the cytokines IL-6, IL-8, and TNFα[17] . In the present study, 79.2% were aware that periodontal disease may increase the possible risk for covid-19 related respiratory failure and 45.8% were aware that pro-Inflammatory cytokine IL-6 plays a major role in pathogenesis of covid-19 and periodontitis.

Elevated Th17 pathway responses have also been evidently reported in patients of SARS-CoV and MERS-CoV. Th17 type of inflammatory response is involved in the demonstration of the cytokine storm and adverse outcomes pertaining to pulmonary oedema and tissue damage in the pulmonologic infections including that caused by SARS-CoV-2 [18]. In the present study only 20.9% were aware that elevated Th17 pathway responses precipitate cytokine storm leading to organ shut down.

In the present study 29.5% were aware that oral fluid point of care analysis could be functional for the interdisciplinary screening, Medical professionals providing treatment to COVID-19 risk group patients could reap benefit from using point-of-care diagnostics for screening in case of the undiagnosed active periodontal disease [19].

Dentists have the finest skillfulness and equipment for diagnosing the periodontitis clinically. Based on the clinical and radiological examination, the stage and grade of periodontitis are defined to provide the accurate treatment for an individual patient. However, there are likely not the enough dental therapists to make this screening of periodontitis patients feasible, even if targeted directly to the COVID-19 risk groups. Modern day rapid point-of-care diagnostic technologies based on biomarkers in the oral fluids, such as aMMP-8, could offer a accurate fixation to this problem [18]. In the present study, 24% were aware that these point of care oral fluid biomarker technologies like MMP-8, helps in the assessment of threat of severe covid-19 infections and complications.

Therefore the findings of this study evidently point out that participants had sufficient knowledge about the origin, spread , transmission , signs and symptoms of corona virus, however participants showed little knowledge towards a periodontal disease as a possible risk factor for covid-19 illness. With the web based surveys, the

respondents are able to answer the major part of the questionnaire by means of marking their answers while connected to the proper internet. Then the marked responses are automatically recorded/saved in a surveying database, providing hassle-free handling of data and a quite minimal possibility of data based glitches.

Conclusion: The study findings showed adequate awareness about corona virus and simultaneously showed inadequate awareness towards a periodontal disease as a possible risk factor for covid-19 infection breakdown among dental specialists and post graduate students. Further studies are required for increasing awareness regarding the periodontal disease as a possible risk factor for covid-19 illness. Knowing that the periodontal disease has been accompliced with severe COVID-19 could help identify the actual risk factors and establish pertinent recommendations.

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Table 1: Questionnaire

Thank you very much for taking the time to respond to this the survey about knowledge and perception among dental surgeons about Periodontal disease as a risk factor for covid-19 illness. This survey is completely anonymous and only takes about 5-7 minutes of your time.

Q-1: Gender?

a) Male;
b) Female.

Q-2: Designation

a) Post graduate student;
b) Dental specialists.

Q-3: Do you know from which animal species covid-19 disease spreads?

a) Civet cats;
b) Rhinolophus bat species;
c) Camels.

Q-4: 2019 Novel corona virus is a --------- virus?

a) ds-DNA virus;
b) ss-DNA virus;
c) ds-RNA virus;
d) ss-RNA virus.

Q-5: Are you aware which protein is mainly responsible for the pathogenicity of covid-19 disease?

a) Spike protein;
b) Envelope protein;
c) Membrane protein;
d) Nucleocapsid protein.

Q-6: Do you know that saliva is a diagnostic tool for covid-19 disease?

a) Yes;
b) No;
c) Maybe.

Q-7 : Are you aware of receptors that has high affinity for covid-19 disease?

a) Angiotensin converting enzyme 1;
b) Angiotensin converting enzyme 2;
c) Either of the above;
d) Both of the above.

Q-8: Do you know the modes of transmission of covid-19 disease in dental office?

a) Air borne spread;
b) Contact spread;
c) Contaminated surface spread;
d) All the above.

Q-9 : Do you know how long corona virus thrives on plastic surfaces?

a) 24hrs ;
b) 3 days;
c) 7 days.

Q-10 : Do you know for how long corona virus remains active on the outside of the surgical mask?

a) 2 days;
b) 7 days;
c) 15 days.

Q-11: Do you know the signs and symptoms of covid-19 disease?

a) Yes;
b) No.

If yes, Symptoms of covid-19 include :

a) Fever, cough;
b) Headache, fatigue;
c) Lack of smell and taste;
d) Breathlessness;
e) All of the above.

Q-12: Signs of covid-19 include ;

a) Pneumonia;
b) Hypoxaemia;
c) Either of the above;
d) Both of the above.

Q-13: Are you aware that periodontal disease may increase risk for covid-19 related respiratory failure?

a) Yes;
b) No.

Q-14: Do you know which pro-Inflammatory cytokine plays a major role in the pathogenesis of covid-19 and periodontitis?

a) IL-6;
b) IL-4;
c) IL-10;
d) IL-13.

Q-15: Are you aware that raised IL-6 levels precipitate aspirational pneumonia in covid-19 patients resulting in death?

a) Yes;
b) No.

Q-16 : which of the below conditions increases the chances of aspirational pneumonia in patients suffering from covid-19 disease?

a) Diabetes;
b) Chronic respiratory disease;
c) Age>60 years;
d) Periodontal disease;
e) Asthma;
f) All the above.

Q-17: Do you know that elevated Th17 pathway responses plays a role in the pathogenesis of covid-19 disease and periodontitis?

a) Yes;
b) No;
c) Maybe.

If yes,

Q-18 : Are you aware that elevated Th17 pathway responses precipitate cytokine storm leading to organ shut down?

a) Yes;
b) No;
c) May be.

Q-19: Do you know oral fluid point of care analysis could be useful for interdisciplinary screening?

a) Yes;
b) No;
c) Maybe.

If yes,

Q-20: Are you aware that these point of care oral fluid biomarker technologies like MMP-8, helps in the assessment of risk of severe covid-19 infections and complications?

a) Yes;
b) No;
c) May be .

Q-21 : Can dental treatment alone decrease the likelihood of developing these super infections?

a) Yes;
b) No;
c) May be.

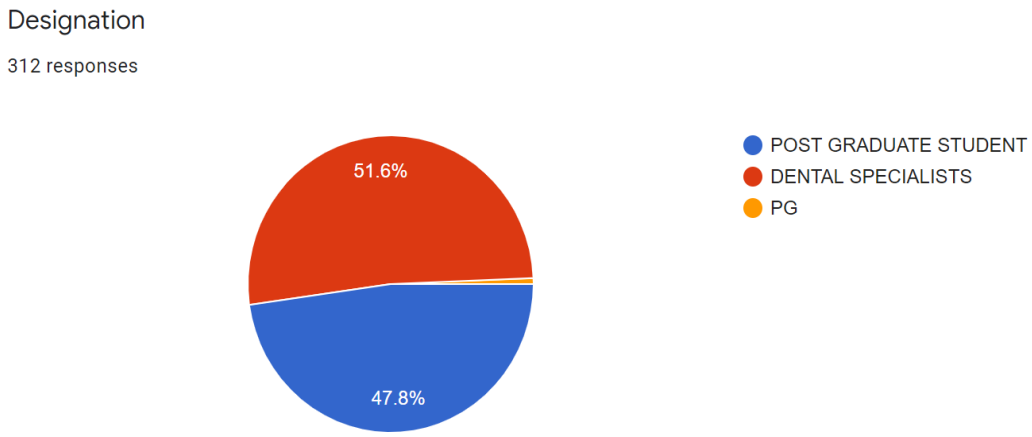
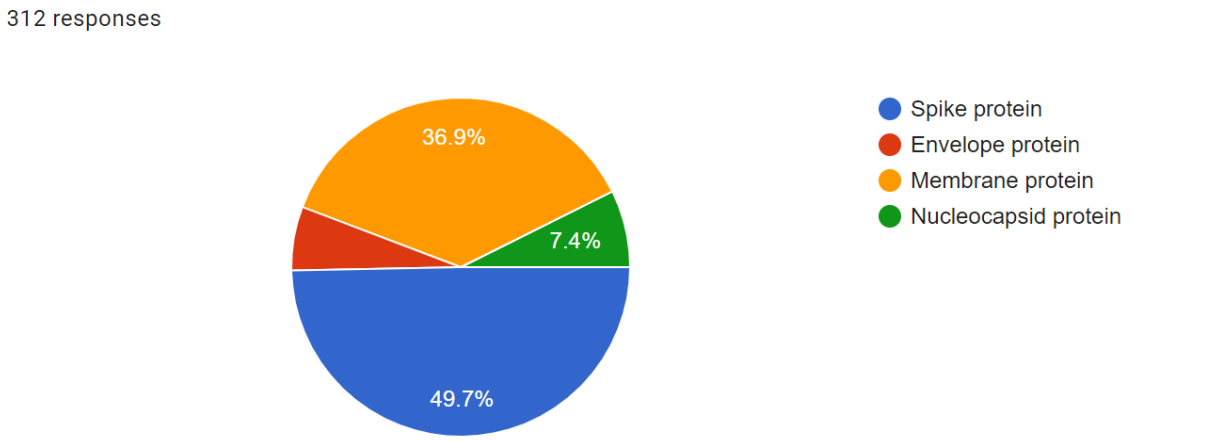
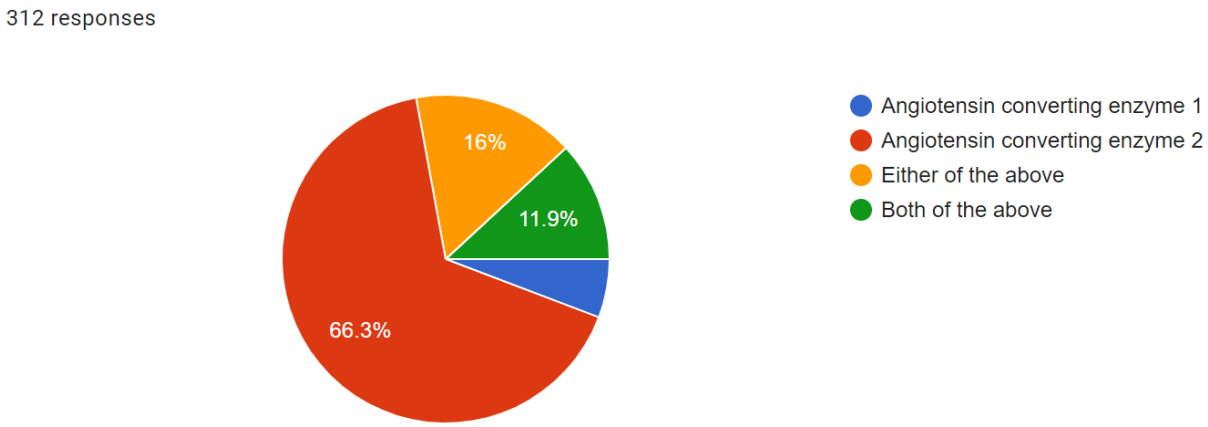


Fig 1 : Respondents provided in the survey

Fig 3 : Type of receptors selected by the respondents that has high affinity for covid-19 disease.

Fig 2 : Type of protein selected by the respondents for the pathogenicity of covid-19 disease.





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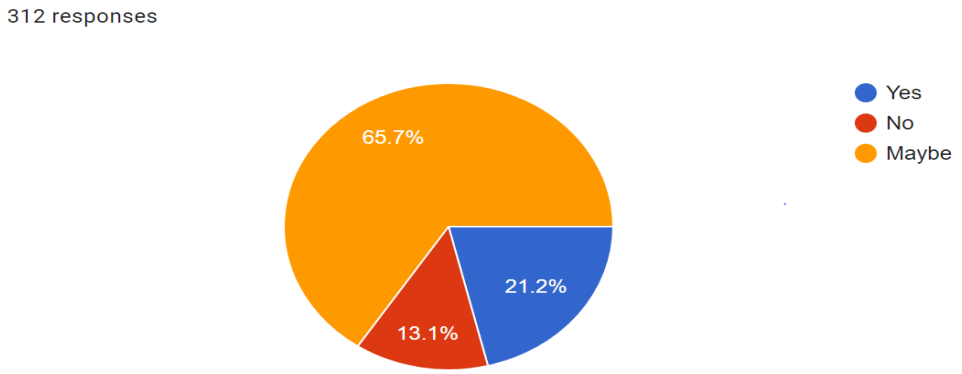

Fig 4 : Elevated Th17 pathway responses that plays a role in the pathogenesis of covid-19 disease and periodontitis

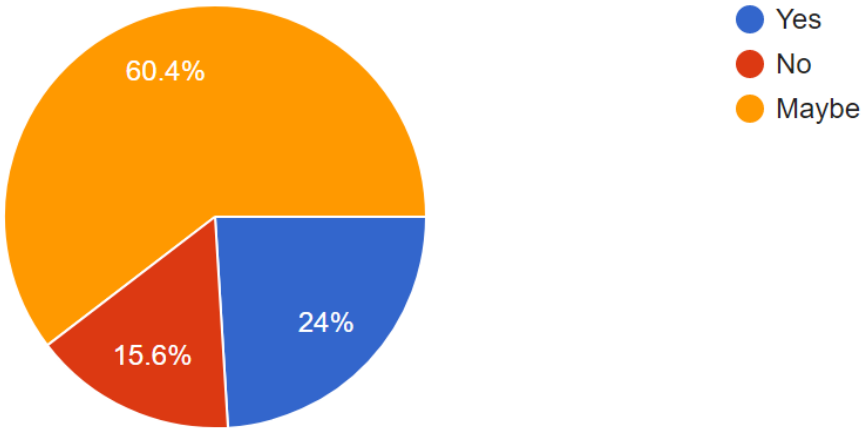

Fig 5 : Respondents for the awareness of point of care oral fluid biomarker technologies like MMP-8, helps in the assessment of risk of severe covid-19 infections and complications

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