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Post-COVID-19 and Clinical Periodontal Treatment: Assessment of Knowledge and Health Risk Perception among UiTM Dental Students

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ABSTRACT

The COVID-19 pandemic had a significant impact on healthcare professionals, including dental students who are at risk of contracting and spreading the virus, particularly in providing clinical periodontal treatment to patients. Thus, it is crucial to assess the level of knowledge, attitude, and health risk perception towards COVID-19 among UiTM dental undergraduates in Malaysia during the COVID-19 pandemic. This cross-sectional study utilized the online method of GoogleForms. The questionnaire is adapted from a set of validated questionnaires from previous studies with some new questions validated to the Malaysian population. The inclusion criteria were Dental undergraduate students in UiTM Sungai Buloh from Year 1 to Year 5. Data was obtained from 396 undergraduates consisted of 41.67% preclinical and 58.33% clinical students. More than half (59.84%) students agree that dentists are more exposed to risk of COVID-19 infection than other health professionals. The mean score of the knowledge across academic years ranges from 67.58% to 78.17%. One third (31%) of clinical year students highly recommended the use of hand instruments during emergency dental treatment of COVID-19 patients. Regarding the perceived importance of Personal Protective Equipment (PPE), participants reported that the use of disposable gowns (89.07%), surgical masks (79.41%), N95 masks (70.16%), and double gloves (57.98%) helped them feel safe when treating patients during the COVID-19 pandemic. In conclusion, UiTM dental students were adequately informed regarding the clinical features of COVID-19 and its implication towards the delivery of clinical

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periodontal treatment regardless of their age, gender and academic years.

1. INTRODUCTION

Health is defined as a state of complete physical, mental, and social well-being, rather than merely the absence of disease or infirmity (Lang et al., 2018). In the context of oral health, the World Health Organization defines periodontal health as a state free from inflammatory periodontal disease as assessed clinically. However, the global maintenance of these health standards was profoundly challenged by the emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative agent of Coronavirus Disease 2019 (COVID-19).

Since its discovery in Wuhan, China, in late 2019, COVID-19 has evolved into a global health crisis. By early 2024, the virus had claimed more than 7 million lives and infected over 770 million people worldwide (WHO, 2024). While the administration of over thirteen billion vaccine doses has significantly reduced fatalities, the virus continues to persist through various "variants of concern" (VOCs). These lineages, including the Alpha, Beta, Gamma, Delta, and Omicron variants, are characterized by increased transmission rates and varying degrees of immune evasion, requiring continuous updates to public health strategies (WHO, 2024).

To mitigate the spread of the virus, global health authorities have emphasized rigorous supervision of positive cases, physical distancing, and strict hand and respiratory hygiene. Despite these measures, the inherent nature of certain professional environments creates unique vulnerabilities. The COVID-19 pandemic has had a substantial impact on the clinical practice of medical professionals, including dentists. It is well known that the SARS-CoV-2 virus spreads quickly through inhalation of aerosols and droplets (Rocha-Gomes et al., 2021).

The rapid spread of COVID-19 prompted the postponement of elective procedures and the strengthening of cross-contamination prevention measures in an effort to lessen the risks posed by patients who are still in the incubation stage, are unaware that they are infected, or actively try to hide their infection, undermining the efficacy of the current preventative measures. As a preventative measure, COVID-19 is also put through a rigorous screening procedure. This includes taking a temperature to make sure that only those without any symptoms are accepted. A thorough medical history is obtained, including details about current travel plans, recent travel experiences, and any prior close contact with COVID-19 cases. In Malaysia, these facts are collected manually or through the MYSejahtera smartphone application to evaluate a person's risk level.

Despite the adoption of stricter biosafety standards, dentists remain frequently exposed to significant levels of aerosols produced by rotating equipment during the manipulation of oral fluids and tissues. Similarly, COVID-19 has had a substantial influence on dental practices in Malaysia, necessitating changes to office layouts, additional personal equipment, patient screening, and higher dental material costs (Hamid et al., 2021).

In terms of the running of dental schools, the education of dental students has also been affected. In Malaysia, there are 13 institutions offering dentistry as a formal degree. The undergraduate degree in dentistry generally extends for five years, whereby during the third to the fifth year, the students are required to provide supervised clinical treatment to their patients.

The implementation of social distancing measures and university lockdowns has resulted in substantial disruptions to academic sessions within dental schools. According to the Ministry of Health’s (MOH) recommendations, students' clinical meetings with patients have been fully postponed even if didactic learning has transitioned to virtual learning during the early stages of the pandemic in 2020.

As a result, the Movement Controlled Order (MCO) has had a considerable impact on students at their higher education institutions. Therefore, in response, the Malaysian Deans Council has been forced to recommend a change of the Minimum Clinical Competency for dental undergraduate training, with a focus on the affected final year students in the 2019/2020 academic year. The new documents take into account that graduates' competency will not be jeopardized, and patient safety will be protected. The revised competency was approved by the Council, and the revised document, Minimum Clinical Experience/ Competency (Sp. Edition – COVID-19 Situation) March 2020, was posted on the MDC website (Ministry of Health Malaysia, 2020).

Dental schools may have a hard time adjusting their students to a new set of clinical teaching and learning due to the COVID-19 pandemic's ambiguous character and the appearance of new variants. Recent evidence highlights that ongoing pedagogical innovation is essential to address persistent clinical skill gaps among dental students in the post-pandemic era (Fahmi & Holenarasipur, 2025; Ibrahimov et al., 2025).

Currently, dental students are afraid of contracting COVID-19 or spreading the disease to others during their dental practice. This fear and anxiety may stem from a lack of knowledge on the necessary precautions and infection control procedures that should be followed to keep them safe and minimize the risk of contracting the disease. This highlights the importance of being aware and updated with the latest guidelines pertaining to providing dental treatment in the clinic setting (Sharaf & Kabel, 2021). Furthermore, emerging data underscores the need for continued institutional reinforcement of these protocols to ensure consistent student compliance (Park & Min, 2024; MDPI, 2025).

Various guidelines have been circulated and are available on the Malaysian Dental Council (MDC) and Ministry of Health Malaysia (MOH) websites, including "Procedures for Handling 2019-nCoV Screening in Dental Clinics," "Guidelines for Handling Issues Related to the Transmission of COVID-19 Outbreak Infection in MoH Dental Services," and "COVID-19 Post-Pandemic Movement Control Order Dental Health Services Guidelines."

The American Dental Association (ADA) advised precautions to lessen the risk of infection transmission in addition to the standard infection control protocol. These precautions included taking each patient's temperature, rinsing with 1 percent hydrogen peroxide prior to any dental procedures, stressing the use of rubber dams and high-volume suction during dental procedures, and disinfecting all surfaces, chairs, and door handles.

Aerosol Generating Procedures (AGP), which were specific to dentistry, might have put both the dentist and the patient at greater risk (Loch et al., 2021). AGP in dental practice could be undertaken with the recommendation to follow strict standards and full compliance with the use of Personal Protective Equipment (PPE), social distancing, appropriate cross-infection control, and additional precautionary measures such as using high vacuum suction, High-Efficiency Particulate Air (HEPA) filtration, and an extraction hood (Ministry of Health Malaysia, 2020).

Periodontitis is a chronic, multifactorial, inflammatory disease, associated with plaque biofilms and characterized by the progressive destruction of the tooth-supporting structures (Jin et al., 2003). Several microbial organisms are responsible for these diseases, which cause inflammation and loss of tooth-supporting structures (Jin et al., 2003).

The common symptoms of periodontitis include gingival inflammation, alveolar bone loss, periodontal pocketing, and clinical attachment loss (CAL). The initial stage of periodontal disease is gingivitis, a localized inflammation of the gingiva brought on by bacteria in dental plaque, a microbial biofilm that builds up on the teeth and gingiva. Gingivitis to severe loss of attachment to bone, ligament, and gingiva can result in a deep periodontal pocket, the disease's telltale sign. Future tooth loss will result from this. By

increasing the body's overall inflammatory burden, periodontal disease can aggravate inflammatory conditions like diabetes and atherosclerosis (Gotsman et al., 2007).

Based on the 2010 National Oral Health Survey of Adults, 9 out of 10 Malaysian adults suffer from gum disease and 18.2% of Malaysian adults suffer from severe periodontal disease (Ministry of Health Malaysia, 2020).

To mitigate the transmission of COVID-19 during periodontal therapy, various preventive measures were implemented both prior to and during clinical procedures. According to Kurt et al. (2021), practitioners were advised to conduct initial screenings to differentiate between routine concerns and true dental emergencies. In cases where patients exhibited symptoms or reported recent contact with a confirmed COVID-19 case, the administration of pharmacologic infection control agents was suggested. Furthermore, it was recommended that care for suspected or confirmed COVID-19 patients be conducted within negative pressure environments to prevent aerosol transmission. During the peak of the pandemic, clinical intervention was strictly limited to life-threatening conditions, including acute abscesses, severe necrotizing diseases, and oral lesions significantly impacting a patient's quality of life (Kurt et al., 2021).

The necessity of these rigorous clinical protocols implies that dental students must be thoroughly equipped with the latest evidence-based knowledge. Consequently, in the case of COVID-19, students may be expected to learn about the virus, its symptoms, appropriate disinfection protocols, and other protective measures—such as the use of FFP2 or FFP3 masks—through publicly available guidelines, university seminars, lectures, or institutional communications.

Assessing the perspectives of dental students on COVID-19 prevention will help to improve understanding of the factors that influence their COVID-19 prevention knowledge, attitude, and practice (KAP) (Aragão et al., 2022). The baseline information will aid in developing a more effective strategy to increase adherence to recommended guidelines to minimize and contain COVID-19 spread in clinical practice. Hence, this study aims to analyze COVID-19 knowledge, attitude, and practice among UiTM dental students, as well as its associated factors.

2. MATERIALS AND METHODS

2.1 SAMPLE

In this cross-sectional study, respondents were a total of 398 UiTM undergraduate dental students, whose year of study ranged from Year 1 to Year 5 (n=398) in 2022. 396 students out of 398 agreed to participate, resulting in a 99.5% response rate. Informed consent was given at the first page of the questionnaire for the agreement of participation.

2.2 DATA COLLECTION

Collection of the data was conducted using an online survey through Google Forms (www.googleforms.com). The questionnaire was adapted from a set of validated questionnaires from previous studies. The URL link of the online questionnaire was sent to participants using WhatsApp app and email. Year 1 and Year 2 students are required to respond to section A and B only, whereas Year 3 and above will respond to all 3 sections in the questionnaire.

The questionnaire was sent to the respective dental specialist to validate the content in terms of its relevance, clarity, simplicity, and ambiguity.

The questionnaire consist of 3 sections tabulated below :
Section A : Sociodemographic profile (4 Questions)
Section B : Knowledge and Attitude (22 Questions)

Section C : Health Risk Perception (15 Questions)

2.3 DATA ANALYSIS

Purposive sampling method was applied for this study as this study was conducted during the COVID-19 pandemic. The inclusion criteria were Dental undergraduate students in UiTM Sungai Buloh from Year 1 to Year 5. Based on the total population of 398 undergraduate students at UiTM Sungai Buloh, the minimum sample size required for this study was calculated to be 196 participants using Raosoft® software.

IBM SPSS 26 Software was used for all statistical evaluations. Descriptive analysis and bivariate analysis were done using Pearson's Chi Square Test on relevant variables to investigate statistically significant associations.

3. RESULTS AND STATISTICAL ANALYSIS

Table 1.1 shows the distribution of participants by faculty, age, year of study. All participants were from the UiTM dental faculty of 396 dental students: 308 females (78%) and 88 males (23%). Each year of study is roughly equally distributed, with the highest percentage being from year 1 (21.7%), followed by year 2 (19.95%), year 3 (19.95%), year 4 (19.2%) and year 5 (19.2%). 41.67% of the participants were preclinical year students and 58.33% were clinical year students. About half of participants have attended medical related courses on COVID-19 with the highest participation seen in webinars (59.1%), followed by lectures (52.16%), and demonstrations (13.38%). Similarly, about half of participants have attended dental specific courses on COVID-19 with the highest participation seen in lectures (51.51%), followed by webinars (47.22%), and demonstrations (4.3%). More than half (54.3%) respondents have had prior history of COVID-19 infection.

Table 1.1 Sociodemographic characteristics of participants

Characteristic	n (%)
Gender	
Male	88 (23%)
Female	308 (78%)
Academic Year	
Year 1	86 (21.7%)
Year 2	79 (19.95%)
Year 3	79 (19.95%)
Year 4	76 (19.2%)
Year 5	76 (19.2%)
Clinical/Preclinical Year:	
Preclinical	165 (41.67%)
Clinical	231 (58.33%)
Attended general or medical related COVID-19 courses:	
Demonstration	
Lectures	53 (13.38%)
Webinars	205 (52.16%)
Others	234 (59.1%)
	0
Attended dentistry related COVID-19 courses:	
Demonstration	17 (4.3%)

Lectures	204 (51.51%)
Webinars	187 (47.22%)
Others	0
Prior history of Covid infection	
Yes	215 (54.3%)
No	181 (45.7%)

4. DISCUSSION

Globally, COVID-19 has had a significant influence on education continuity (UNESCO, 2020). The requirement for university lockdowns and social distancing has had a significant impact on students and healthcare professionals (Aragão et al., 2022). Dental schools have shifted to online learning due to the high exposure to aerosols and possible risk of SARS-CoV-2 spread, which has complicated the delivery of clinical training (Wu et al., 2020). The recent increase in cases and fatalities has forced some universities to scale back their plans to reopen dental schools (Aragão et al., 2022). Despite some partial attempts to resume in-person activities. In Malaysia, the 13 dental institutions will face a formidable challenge when they return to providing direct patient care. In this case, adjusting to a novel patient care routine will necessitate organisation and readiness from schools, professors, staff, and students (Wu et al., 2020). Dental schools might plan their comeback by addressing the students' fundamental knowledge of the illness (Yildirim, 2020).

In this study, it was revealed how well-informed undergraduate dentistry students were on both the necessary infection control measures to be implemented during the current viral outbreak and the signs and symptoms of the Corona viral infection (COVID-19). Studies using questionnaires have proven to be very successful in learning about participants' preferences for personal protection equipment, as well as the awareness and knowledge of dental students about COVID-19. However, careful data collection and interpretation are necessary (Yildirim, 2020).

This is a cross-sectional study that utilises a questionnaire which collected information objectively through GoogleForms.com. High level of participation was noted (n=396), which exceeded the calculated sample size (n=196) and increased the validity and reliability of the obtained results. The high level of participation may be explained by the fact that COVID-19 is a current issue that worries and interests' dentists and dental students because they are unsure of the precise responses and actions that should be taken.

Analysis of the participants' responses showed 38% of respondents were able to correctly associate the acronym "COVID-19" with a disease caused by SARS-CoV-2. This disparity might be attributed to a lack of clarity or attention when the names "SARS-CoV-2" and "COVID-19" are used during awareness efforts and on the internet, which remains a valuable source of information. Researchers have demonstrated that governments should regulate the disinformation of the COVID-19 health issue caused by the media by adopting measures to regulate health information (Bennardo et al., 2020).

Most respondents were able to identify the possible sources of COVID-19 (78.79%) along with the various methods used to prevent the spread of the virus (75%). The level of awareness towards the disease's signs and symptoms, as well as the incubation period, is most likely related to their background, awareness campaigns, and online activities that informed and prepared them. It was also heartening to see that participants were aware of the major source of illness as well as the mechanism of transmission. These findings also highlighted respondents' understanding of the need of following protection guidelines and

how they should be implemented to prevent viral transmission from person to person (Bennardo et al., 2020).

Our results showed adequate knowledge toward the treatment of COVID-19 as 51.26% of the dental students answered that nonspecific drugs and supportive medical treatment were the only treatment available for infected patients. These findings signified the room for improvement in educational information that students had received during COVID-19 outbreak.

80.56% reported that the use of high-speed handpiece can increase the risk of transmission of COVID-19 while 81.51% would recommend the use of rubber dam to decrease the risk of transmission, especially in endodontic treatments. Most clinical year students would take preventive operative measures such as the use of hand instruments (95%), low speed handpiece (82.35%), and PPE such as double gloves (89%), and surgical masks (97%).

We noticed that the students were aware of pre-operative preventative procedures such as hand washing and the usage of protective equipment. The availability of efficient infection control methods, as well as the consistent use of appropriate levels of personal protective equipment, is one of the most important elements in ensuring the safety and health of medical professionals, healthcare workers, and dentists (PPE) (Aragão et al., 2022). Surgical masks are used to protect the nose and mouth from pathogen-containing large particles (such as droplets, sprays or splashes). It was also established that surgical masks do not form an effective seal against the skin of the face and are hence not advised for protecting against airborne infectious illnesses. Further improvements could be made regarding informing students of the benefits of N95 masks over surgical masks in regard to infection control during dental treatment (Aragão et al., 2022).

According to literature, aerosols and high-speed handpieces have the potential to spread bacteria and viruses to the dental practitioner and dental personnel. Operatory techniques to minimize or reduce aerosol formation, such as the use of manual instruments, rubber dams, and high vacuum suction, were also identified as preventative strategies to avoid the transmission of SARS-CoV-2 in dental settings (Aragão et al., 2022). Most participants chose hand instruments or low-speed handpieces for dental care of suspected COVID patients, indicating their understanding of the function of aerosols in viral infection dissemination and that effective dental management for a suspected COVID patient is preferred to be by hand instrumentation. In this context, consideration should be given to the modifications brought about by COVID-19 in patient care and surgical dentistry.

Due to the possibility of SARS-CoV-2 aerosol transmission, high-speed dental equipment should be avoided, and manual tools should be used when suitable. As clinical settings continue to adapt, these minimally invasive techniques remain a foundational component of modern infection control strategy (Park & Min, 2024). Furthermore, preventive and minimally invasive dentistry should be preferred, and the use of a rubber dam during dental treatment should be mandatory because it not only isolates the operating field but also reduces splatters of saliva and blood, lowering the risk of viral infection transmission through saliva.

95% of students would postpone dental treatment if the patient is presented with COVID-19 symptoms. These findings were consistent with a study performed by Guo et al. (2020), as well as a study conducted by Ahmed et al. (2020), who indicated that most dentists were afraid to perform dental treatment on a potentially infected patient (Bennardo et al., 2020).

In terms of knowledge, year 4 students scored the highest (78.17%) while year 1 students scored the lowest (67.58%). While students were able to identify the disease's incubation time, key symptoms, and contagious routes, they struggled to recognize the identity of the virus responsible for the pandemic we faced in 2020. The findings also revealed that few respondents had received practical training in preventative strategies, emphasizing the importance of seminars and hands-on activities before returning to

clinical practice (Aragão et al., 2022). This is further supported by recent evidence suggesting that structured, hands-on intervention programs are currently the most effective method for improving infection control compliance among dental students (MDPI, 2025). With their knowledge and perspectives of the condition now established, greater debate can be had regarding what dental schools should address in terms of clinical regulations and recommendations.

As for the limitations of this research, since it was a cross-sectional study, it only recorded the knowledge and awareness of dental students at the time of the survey and could not track the progress of dental students' knowledge and awareness over time. Also, because this is a self-reported study, replies may be biased. The social desirability bias, for example, refers to respondents' propensity to select responses that they perceive are more socially desirable and acceptable. We also highlight the crucial event and recency bias, which occurs because recent events are easier to recall and might be weighted more highly than previous or projected future occurrences. When too much information is delivered too soon, as in the current pandemic crisis, the recency effect increases. In this case, the recency effect may have influenced dental students' perceptions of clinical practice during the COVID-19 pandemic.

5. CONCLUSION

Regardless of their age, gender, or academic year, UiTM dental students showed acceptable general knowledge about COVID-19 and were adequately informed about the clinical features of COVID-19 and its implications towards the provision of clinical periodontal treatment. Dental schools must improve in addressing some aspects of the COVID-19 and its preventative measures, such as the significance of infection control for both clinical and preclinical dental students, in order to provide patients with safe dental care and to protect dentists and other healthcare professionals. We recommend that dental schools utilise our questionnaire to assess the circumstances they will face when students return for clinical practise and the areas in which they will need to focus.

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CONFLICT OF INTEREST STATEMENT

The authors declare no competing interests, whether financial or personal, that could have influenced the work reported in this paper. This includes no conflicts with the study's funders.

AUTHORS' CONTRIBUTIONS

Asruni Ab Ghani and **Luqman Hakim bin Mansor** carried out the research and data collection, and wrote the original manuscript. **Hafizul Izwan Mohd Zahar** conceptualized the study, supervised the project, contributed to the research design, and oversaw the research progress. **Nawwal Alwani Mohd Radzi** co-supervised the project and provided critical oversight, especially pertaining to data analysis.

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APPENDIX

Table 2.1 The Mean number of correct answers within the Knowledge and Attitude domains according to academic year

Academic Year	Knowledge Mean Score (SD)	Attitude Mean Score (SD)
Year 1	8.11 (1.70)	19.32 (2.44)
Year 2	8.12 (1.58)	18.31 (2.24)
Year 3	9.05 (1.58)	17.96 (2.44)
Year 4	9.38 (1.15)	17.64 (2.72)
Year 5	8.85 (1.47)	17.62 (2.33)

Table 3.1 Association between academic year with the Domain of Knowledge and Attitudes toward COVID-19

Domain (Knowledge)	Year 1 N= 81 n (%)	Year 2 N= 75 n (%)	Year 3 N= 80 n (%)	Year 4 N= 80 n (%)	Year 5 N= 79 n (%)	Total N= 396 n (%)	p-value
What do you identify with the acronym "SARS-CoV-2"? Correct answer Wrong answer	55 (67.9%) 26 (32.1%)	58 (77.3%) 17 (22.7%)	62 (77.5%) 18 (22.5%)	67 (82.7%) 14 (17.3%)	60 (75.9%) 19 (17.3%)	302 (76.3%) 94 (23.7%)	0.276
What do you identify with the acronym "COVID-19"? Correct answer Wrong answer	33 (40.7%) 48 (59.3%)	23 (30.7%) 52 (69.3%)	45 (56.3%) 35 (43.8%)	31 (38.8%) 49 (61.3%)	18 (22.8%) 61 (77.2%)	150 (38.0%) 245 (62.0%)	0.001
Is COVID-19 a contagious disease? Correct answer Wrong answer	79 (97.5%) 2 (2.5%)	75 (100%) 0 (0%)	79 (98.8%) 1 (1.3%)	81 (100%) 0 (0%)	79 (100%) 0 (0%)	393 (99.2%) 3 (0.8%)	0.267
What can be the symptoms of COVID-19? Correct answer Wrong answer	36 (55.6%) 45 (44.4%)	30 (40.0%) 45 (60.0%)	30 (37.5%) 50 (62.5%)	43 (53.1%) 38 (46.9%)	39 (49.4%) 40 (50.6%)	178 (44.9%) 218 (55.1%)	0.255
What is the period of incubation COVID-19? Correct answer Wrong answer	78 (96.3%) 3 (3.7%)	72 (96.0%) 3 (4.0%)	78 (97.5%) 2 (2.5%)	75 (92.6%) 6 (12.3%)	76 (96.2%) 3 (3.8%)	379 (95.7%) 17 (4.3%)	0.615
What is the possible source of COVID-19? Correct answer Wrong answer	69 (85.2%) 12 (14.8%)	50 (66.7%) 25 (33.3%)	64 (80.0%) 16 (20.0%)	71 (87.7%) 10 (12.3%)	58 (73.4%) 21 (26.6%)	312 (78.8%) 84 (21.2%)	0.008
How is it transmitted COVID-19? Correct answer Wrong answer	60 (74.1%) 21 (25.9%	56 (74.7%) 19 (25.3%)	61 (76.3%) 19 (23.8%)	67 (82.7%) 14 (17.3%)	57 (72.2%) 22 (27.8%)	301 (76.0%) 95 (24.0%)	0.577

Which of the following indications do you find useful in order to prevent the spread of the virus? Correct answer Wrong answer	53 (65.4%) 28 (34.6%)	45 (60.0%) 30 (40.0%)	61 (76.3%) 19 (23.8%)	75 (92.6%) 6 (7.4%)	63 (79.7%) 16 (20.3%)	297 (75.0%) 99 (25.0%)	0.001
How can patients currently be treated? Correct answer Wrong answer	29 (35.8%) 52 (64.2%)	34 (45.3%) 41 (54.7%)	42 (52.5%) 38 (47.5%)	49 (60.5%) 32 (39.5%)	49 (62.0%) 30 (38.0%)	203 (51.3%) 193 (48.7%)	0.004
In the context of exposure to the risk of contagion for medical doctors, dentists and other health professionals, which of the following statements do you agree with? Correct answer Wrong answer	48 (59.3%) 33 (40.7%)	46 (61.3%) 29 (38.7%)	55 (68.8%) 25 (31.3%)	45 (55.6%) 36 (44.4%)	43 (54.4%) 36 (45.6%)	237 (59.8%) 159 (40.2%)	0.366
Using a high-speed handpiece in performing the dental treatment can increase the risk of transmission of COVID-19 to the dentist and in between the patients. Correct answer Wrong answer	48 (59.3%) 33 (40.7%)	49 (65.3%) 26 (34.7%)	70 (87.5%) 10 (12.5%)	73 (90.1%) 8 (9.9%)	79 (100%) 0 (0%)	319 (80.6%) 77 (19.4%)	0.001
If screening for the dental patients showed a patient with fever and suspected to be a COVID-19 positive patient, will you postpone the dental treatment to another visit? Correct answer Wrong answer	69 (85.2%) 12 (14.8%)	71 (94.7%) 4 (5.3%)	77 (96.3%) 3 (3.8%)	81 (100%) 0 (0%)	78 (98.7%) 1 (1.3%)	376 (94.9%) 20 (5.1%)	0.001

Table 3.2 Association between preclinical and clinical year with the Domain of Knowledge and Attitudes toward COVID-19

Domain (Knowledge)	Preclinical	Clinical	Total N= 396 n (%)	p-value
What do you identify with the acronym "SARS-CoV-2"? Correct answer Wrong answer	113 (72.4%) 43 (27.6%)	189 (78.8%) 51 (21.3%)	302 (76.3%) 94 (23.7%)	0.149
What do you identify with the acronym "COVID-19"? Correct answer Wrong answer	56 (35.9%) 100 (64.1%)	145 (60.7%) 94 (39.3%)	150 (38.0%) 245 (62.0%)	0.492
Is COVID-19 a contagious disease? Correct answer Wrong answer	154 (98.7%) 2 (1.3%)	239 (99.6%) 1 (0.4%)	393 (99.2%) 3 (0.8%)	0.332
What can be the symptoms of COVID-19? Correct answer Wrong answer	66 (42.3%) 90 (57.7%)	112 (46.7%) 128 (53.3%)	178 (44.9%) 218 (55.1%)	0.394
What is the period of incubation COVID-19? Correct answer Wrong answer	150 (96.2%) 6 (3.8%)	229 (95.4%) 11 (4.6%)	379 (95.7%) 17 (4.3%)	0.724
What is the possible source of COVID-19? Correct answer Wrong answer	119 (76.3%) 37 (23.7%)	193 (80.4%) 47 (19.6%)	312 (78.8%) 84 (21.2%)	0.325
How is it transmitted COVID-19? Correct answer Wrong answer	116 (74.4%) 40 (25.6%)	185 (77.1%) 55 (22.9%)	301 (76.0%) 95 (24.0%)	0.535
Which of the following indications do you find useful in order to prevent the spread of the virus? Correct answer Wrong answer	98 (62.8%) 58 (37.2%)	199 (82.9%) 41 (17.1%)	297 (75.0%) 99 (25.0%)	0.001
How can patients currently be treated? Correct answer Wrong answer	63 (40.4%) 93 (59.6%)	140 (58.3%) 100 (41.7%)	203 (51.3%) 193 (48.7%)	0.001

In the context of exposure to the risk of contagion for medical doctors, dentists and other health professionals, which of the following statements do you agree with? Correct answer Wrong answer	94 (60.3%) 62 (39.7%)	143 (59.6%) 97 (40.4%)	237 (59.8%) 159 (40.2%)	0.894
Using a high-speed handpiece in performing the dental treatment can increase the risk of transmission of COVID-19 to the dentist and in between the patients. Correct answer Wrong answer	97 (62.2%) 59 (37.8%)	222 (92.5%) 18 (7.5%)	319 (80.6%) 77 (19.4%)	0.001
If screening for the dental patients showed a patient with fever and suspected to be a COVID-19 positive patient, will you postpone the dental treatment to another visit? Correct answer Wrong answer	140 (89.7%) 16 (10.3%)	236 (98.3%) 4 (1.7%)	376 (94.9%) 20 (5.1%)	0.001

Table 3.3 Association between academic year and association of periodontal disease and COVID-19

Domain	Year 1 N= 81 n (%)	Year 2 N= 75 n (%)	Year 3 N= 80 n (%)	Year 4 N= 80 n (%)	Year 5 N= 79 n (%)	Total N= 396 n (%)	p-value
Patients that are having respiratory viral infection could be put at risk of bacterial superinfection causing increased disease severity and mortality. Probably yes Definitely yes Definitely no	1 (1.2%) 50 (61.7%) 30 (37.0%)	2 (2.7%) 58 (77.3%) 15 (20.0%)	1 (1.3%) 60 (75.0%) 19 (23.8%)	1 (1.2%) 49 (60.5%) 31 (38.3%)	1 (1.3%) 55 (69.6%) 23 (29.1%)	6 (1.5%) 272 (68.7%) 118 (29.8%)	0.248
Mouth rinses can reduce the amount of virus load in saliva and do not completely eliminate COVID-19. Probably yes Definitely yes Definitely no	8 (9.9%) 55 (67.9%) 18 (22.2%)	12 (16.0%) 48 (64.0%) 15 (20.0%)	24 (30.0%) 42 (52.5%) 14 (17.5%)	25 (30.9%) 36 (44.4%) 20 (24.7%)	19 (24.1%) 42 (53.2%) 18 (22.8%)	88 (22.2%) 223 (56.3%) 85 (21.5%)	0.02
Periodontitis shares common risk factors with most chronic inflammatory diseases known to effect COVID-19 severity. Probably yes Definitely yes Definitely no	12 (14.8%) 58 (71.6%) 11 (13.6%)	11 (14.7%) 60 (80.0%) 4 (5.3%)	11 (13.8%) 61 (76.3%) 8 (10.0%)	21 (25.9%) 47 (58.0%) 13 (16.0%)	14 (17.7%) 60 (75.9%) 5 (6.3%)	69 (17.4%) 286 (72.2%) 41 (10.4%)	0.075
If a patient has periodontitis, it could reduce the protective function of the oral epithelial cell causing increased risk of invasion by COVID-19. Probably yes Definitely yes Definitely no	5 (6.2%) 52 (64.2%) 24 (29.6%)	3 (4.0%) 57 (76.0%) 15 (20.0%)	8 (10.0%) 55 (68.8%) 17 (21.3%)	11 (13.6%) 59 (72.8%) 11 (13.6%)	9 (11.4%) 58 (73.4%) 12 (15.2%)	36 (9.1%) 281 (71.0%) 79 (19.9%)	0.127

If a patient has periodontitis, more periodontopathic bacteria aspirate into lungs causing high expression of ACE2 in the bronchus and lungs. Probably yes Definitely yes Definitely no	2 (2.5%) 53 (65.4%) 26 (32.1%)	4 (5.3%) 61 (81.3%) 10 (13.3%)	7 (8.8%) 63 (78.8%) 10 (12.5%)	7 (8.6%) 64 (79.0%) 10 (12.3%)	5 (6.3%) 65 (82.3%) 9 (11.4%)	25 (6.3%) 306 (77.3%) 65 (16.4%)	0.008
Patients suffering from COVID-19 with periodontal disease are more likely to experience COVID-19 related pneumonia as compared to those who were not. Probably yes Definitely yes Definitely no	3 (3.7%) 59 (72.8%) 19 (23.5%)	8 (10.7%) 59 (78.7%) 8 (10.7%)	9 (11.3%) 63 (78.8%) 8 (10.0%)	11 (13.6%) 63 (77.8%) 7 (8.6%)	9 (11.4%) 63 (79.7%) 7 (8.9%)	40 (10.1%) 307 (77.5%) 49 (12.4%)	0.057
Patients suffering from COVID-19 with periodontal disease are more likely to require assisted ventilation as compared to those who were not. Probably yes Definitely yes Definitely no	6 (7.4%) 61 (75.3%) 14 (17.3%)	10 (13.3%) 54 (72.0%) 11 (14.7%)	15 (18.8%) 58 (72.5%) 7 (8.8%)	14 (17.3%) 62 (76.5%) 5 (6.2%)	20 (25.3%) 57 (72.2%) 2 (2.5%)	65 (16.4%) 292 (73.7%) 39 (9.8%)	0.008
Patients suffering from COVID-19 with periodontal disease are more likely to be admitted to a hospital as compared to those who have no periodontal disease. Probably yes Definitely yes Definitely no	9 (11.1%) 62 (76.5%) 10 (12.3%)	10 (13.3%) 57 (76.0%) 8 (10.7%)	13 (16.3%) 55 (68.8%) 12 (15.0%)	20 (24.7%) 59 (72.8%) 2 (2.5%)	21 (26.6%) 55 (69.6%) 3 (3.8%)	73 (18.4%) 288 (72.7%) 35 (8.8%)	0.012

Patients suffering from COVID-19 with periodontal disease have a higher mortality rate as compared to those who have no periodontal disease. Probably yes Definitely yes Definitely no	10 (12.3%) 60 (74.1%) 11 (13.6%)	12 (16.0%) 54 (72.0%) 9 (12.0%)	18 (22.5%) 54 (67.5%) 8 (10.0%)	21 (25.9%) 57 (70.4%) 3 (3.7%)	17 (21.5%) 56 (70.9%) 6 (7.6%)	78 (19.7%) 281 (71.0%) 37 (9.3%)	0.249

Table 3.4 Association between preclinical and clinical year and association of periodontal disease and COVID-19

Domain (Attitude)	Clinical	Preclinical	Total N= 396 n (%)	p-value
Patients that are having respiratory viral infection could be put at risk of bacterial superinfection causing increased disease severity and mortality. Probably yes Definitely yes Definitely no	3 (1.9%) 108 (69.2%) 45 (28.8%)	3 (1.3%) 164 (68.3%) 73 (30.4%)	6 (1.5%) 272 (68.7%) 118 (29.8%)	0.830
Mouth rinses can reduce the amount of virus load in saliva and do not completely eliminate COVID-19. Probably yes Definitely yes Definitely no	20 (12.8%) 103 (66.0%) 33 (21.2%)	68 (28.3%) 120 (50.0%) 52 (21.7%)	88 (22.2%) 223 (56.3%) 85 (21.5%)	0.001
Periodontitis shares common risk factors with most chronic inflammatory diseases known to effect COVID-19 severity. Probably yes Definitely yes Definitely no	23 (14.7%) 118 (75.6%) 15 (9.6%)	46 (19.2%) 168 (70.0%) 26 (10.8%)	69 (17.4%) 286 (72.2%) 41 (10.4%)	0.446

If a patient has periodontitis, it could reduce the protective function of the oral epithelial cell causing increased risk of invasion by COVID-19. Probably yes Definitely yes Definitely no	8 (5.1%) 109 (69.9%) 39 (25.0%)	28 (11.7%) 172 (71.7%) 40 (16.7%)	36 (9.1%) 281 (71.0%) 79 (19.9%)	0.020
If a patient has periodontitis, more periodontopathic bacteria aspirate into lungs causing high expression of ACE2 in the bronchus and lungs. Probably yes Definitely yes Definitely no	6 (3.8%) 114 (73.1%) 36 (23.1%)	19 (7.9%) 192 (80.0%) 29 (12.1%)	25 (6.3%) 306 (77.5%) 65 (16.4%)	0.007
Patients suffering from COVID-19 with periodontal disease are more likely to experience COVID-19 related pneumonia as compared to those who were not. Probably yes Definitely yes Definitely no	11 (7.1%) 118 (75.6%) 27 (17.3%)	29 (12.1%) 189 (78.8%) 22 (9.2%)	40 (10.1%) 307 (77.5%) 49 (12.4%)	0.023
Patients suffering from COVID-19 with periodontal disease are more likely to require assisted ventilation as compared to those who were not. Probably yes Definitely yes Definitely no	16 (10.3%) 115 (73.7%) 25 (16.0%)	49 (20.4%) 177 (73.8%) 14 (5.8%)	65 (16.4%) 292 (73.7%) 39 (9.8%)	0.001

Patients suffering from COVID-19 with periodontal disease are more likely to be admitted to a hospital as compared to those who have no periodontal disease. Probably yes Definitely yes Definitely no	19 (12.2%) 119 (76.3%) 18 (11.5%)	54 (22.5%) 169 (70.4%) 17 (7.1%)	73 (18.4%) 288 (72.7%) 35 (8.8%)	0.018
Patients suffering from COVID-19 with periodontal disease have a higher mortality rate as compared to those who have no periodontal disease. Probably yes Definitely yes Definitely no	22 (14.1%) 114 (73.1%) 20 (12.8%)	56 (23.3%) 167 (69.6%) 17 (7.1%)	78 (19.7%) 281 (71.0%) 37 (9.3%)	0.023

Table 3.5 Association between academic year and health risk perception towards COVID-19

Domain	Year 3 N= 78 n (%)	Year 4 N= 81 n (%)	Year 5 N= 79 n (%)	Total N= 238 n (%)	p-value
Do you recommend using a rubber dam during dental treatment to decrease the risk of transmission of COVID-19? Highly recommend Recommend Highly don't recommend	55 (70.5%) 23 (29.5%) 0 (0%)	64 (79.0%) 16 (19.8%) 1 (1.2%)	75 (94.9%) 4 (5.1%) 0 (0%)	194 (81.5%) 43 (18.1%) 1 (0.4%)	0.001
Which dental procedures do you recommend using a rubber dam with? Endodontic treatment Restorative procedures Crown preparation Pulpotomy for children	53 (67.9%) 22 (28.2%) 2 (2.6%) 1 (1.3%)	73 (90.1%) 8 (9.9%) 0 (0%) 0 (0%)	72 (91.1%) 7 (8.9%) 0 (0%) 0 (0%)	198 (83.2%) 37 (15.5%) 2 (0.8%) 1 (0.4%)	0.002
Disinfection of surfaces in between the patients should be done using Sodium hypochlorite Dettol Ethyl alcohol 70% Methyl alcohol 70%	14 (17.9%) 9 (11.5%) 52 (66.7%) 3 (3.8%)	9 (11.1%) 8 (9.9%) 56 (69.1%) 8 (9.9%)	7 (8.9%) 14 (17.7%) 49 (62.0%) 9 (11.4%)	30 (12.6%) 31 (13.0%) 157 (66.0%) 20 (8.4%)	0.226

Which type of mask do you prefer to wear for better protection during dental treatment? N95 Surgical mask	56 (71.8%) 22 (28.2%)	53 (65.4%) 28 (34.6%)	58 (73.4%) 21 (26.6%)	167 (70.2%) 71 (29.8%)	0.505
Surgical masks provide better protection for the person Wearing it In front of the one wearing it	53 (67.9%) 25 (32.1%)	63 (77.8%) 18 (22.2%)	59 (74.7%) 20 (25.3%)	175 (73.5%) 63 (26.5%)	0.358
Hand instrument Highly recommend Recommend Don't recommend Highly don't recommend	24 (30.8%) 48 (61.5%) 6 (7.7%) 0 (0%)	40 (49.4%) 38 (46.9%) 2 (2.5%) 1 (1.2%)	60 (75.9%) 16 (20.3%) 2 (2.5%) 1 (1.3%)	124 (52.1%) 102 (42.9%) 10 (4.2%) 2 (0.8%)	0.001
Low-speed handpiece Highly recommend Recommend Don't recommend Highly don't recommend	12 (15.4%) 51 (65.4%) 12 (15.4%) 3 (3.8%)	8 (9.9%) 58 (71.6%) 15 (18.5%) 0 (0%)	22 (27.8%) 45 (57.0%) 10 (12.7%) 2 (2.5%)	42 (17.6%) 154 (64.7%) 37 (15.5%) 5 (2.1%)	0.047

High-speed handpiece	11 (14.1%)	5 (6.2%)	11 (13.9%)	27 (11.3%)	0.563
Highly recommend	29 (37.2%)	36 (44.4%)	32 (40.5%)	97 (40.8%)	
Recommend	32 (41.0%)	35 (43.2%)	28 (35.4%)	95 (39.9%)	
Don't recommend	6 (7.7%)	5 (6.2%)	8 (10.1%)	19 (8.0%)	
Highly don't recommend					
Double gloves	58 (74.4%)	37 (45.7%)	43 (54.4%)	138 (58.0%)	0.003
Very important	12 (15.4%)	31 (38.3%)	31 (39.2%)	74 (31.1%)	
Important	6 (7.7%)	11 (13.6%)	5 (6.3%)	22 (9.2%)	
Neutral	2 (2.6%)	2 (2.5%)	0 (0%)	4 (1.7%)	
Not important					
Surgical mask	71 (91.0%)	55 (67.9%)	63 (79.7%)	189 (79.4%)	0.005
Very important	6 (7.7%)	21 (25.9%)	15 (19.0%)	42 (17.6%)	
Important	1 (1.3%)	5 (6.2%)	1 (1.3%)	7 (2.9%)	
Neutral					
N95 mask	58 (74.4%)	54 (66.7%)	55 (69.6%)	167 (70.2%)	0.573
Very important	13 (16.7%)	22 (27.2%)	19 (24.1%)	54 (22.7%)	
Important	7 (9.0%)	5 (6.2%)	5 (6.3%)	17 (7.1%)	
Neutral					

Disposable gown Very important Important Neutral	72 (92.3%) 5 (6.4%) 1 (1.3%)	68 (84.0%) 12 (14.8%) 1 (1.2%)	72 (91.1%) 7 (8.9%) 0 (0%)	212 (89.1%) 24 (10.1%) 2 (0.8%)	0.364
Overhead Very important Important Neutral Not important	53 (67.9%) 19 (24.4%) 5 (6.4%) 1 (1.3%)	59 (72.8%) 14 (17.3%) 8 (9.9%) 0 (0%)	57 (72.2%) 21 (26.6%) 1 (1.3%) 0 (0%)	169 (71.0%) 54 (22.7%) 14 (5.9%) 1 (0.4%)	0.175
Face shield Very important Important Neutral Not important	68 (87.2%) 8 (10.3%) 1 (1.3%) 1 (1.3%)	75 (92.6%) 5 (6.2%) 1 (1.2%) 0 (0%)	77 (97.5%) 2 (2.5%) 0 (0%) 0 (0%)	220 (92.4%) 15 (6.3%) 2 (0.8%) 1 (0.4%)	0.301
Protective eyewear (Goggles) Very important Important Neutral	54 (69.2%) 17 (21.8%) 7 (9.0%)	52 (64.2%) 20 (24.7%) 9 (11.1%)	65 (82.3%) 10 (12.7%) 4 (5.1%)	171 (71.8%) 47 (19.7%) 20 (8.4%)	0.142