Introduction and Rationale

COVID-19 is a recently emerged viral infection that started in Wuhan, China.\(^1\) Recently, World Health Organization (WHO) considered COVID-19 to be a pandemic after assessing the alarming levels of spread and severity. Infection with COVID-19 has serious consequences, which may lead to severe pneumonia and even death.\(^2\) Infected patients with COVID-19 may have no symptoms or symptoms like fever and dry cough, whereas some also have shortness of breath, fatigue, and other atypical symptoms, such as muscle pain, confusion, headache, sore throat, diarrhea, and vomiting.\(^3\) There is a high risk of infection between dental personnel and patients due to working in proximity while performing dental treatments.\(^4\) Dental healthcare workers (DHCW’s) are relatively considered to be a high-risk group for contracting COVID-19; also, oral healthcare settings can act as a means of disease transmission.\(^5\) Some reports suggest that the visitors of dental clinics either for awareness and perception of COVID-19 among final-year dental students, Sudan

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ABSTRACT

Background: Infection with COVID-19 has serious consequences, which may lead to severe pneumonia and even death. There is a high risk of infection between dental personnel and patients due to working in proximity while performing dental treatments. Objective: This study aims to assess the awareness about COVID-19 and its preventive measures among final-year dental students. Methods: Institutional-based cross-sectional study, among the final-year Bachelor of Dental Surgery students, the sample size was 288 participants during the period from August 8, 2020, to August 15, 2020. The data were collected using a self-administered questionnaire formed of a series of close-ended questions about sociodemographic characteristics, knowledge about COVID-19, prevention in dental clinic, and perception toward COVID-19. Data were analyzed using the Statistical Package for Social Science, version 25 (SPSS 20.0, Chicago, IL). The Chi-square test was used for the significance level, which was set at a value of \(P = 0.05\) or less for all analyses. Results: Form 288 students, the average age (measured in years) was 23.31 ± 1.8. (means ± SD). A total of 224 (77.8%) respondents were females. For COVID-19-related knowledge, 282 (97.9%) students possessed a high knowledge level, 4 (1.4%) had moderate knowledge, and only 2 (0.7%) showed poor knowledge. Also, 95% of participants responded correctly with a total agreement to questions regarding infection control measurements, the least agreement response (85%) was for: avoid aerosol-generating procedures whenever possible. There are statistically significant relations between knowledge score and gender \((P = 0.024)\), knowledge score and source of knowledge \((P = 0.017)\), and perceived severity and knowledge score \((P = 0.001)\). Conclusion: This study illustrated that the knowledge score among participants is good. There are associations between gender and level of knowledge, knowledge score and source of knowledge, and perceived severity and knowledge score.

Keywords: COVID-19, dental students, perception

INTRODUCTION

COVID-19 is a recently emerged viral infection that started in Wuhan, China.\(^1\) Recently, World Health Organization (WHO) considered COVID-19 to be a pandemic after assessing the alarming levels of spread and severity. Infection with COVID-19 has serious consequences, which may lead to severe pneumonia and even death.\(^2\) Infected patients with COVID-19 may have no symptoms or symptoms like fever and dry cough, whereas some also have shortness of breath, fatigue, and other atypical symptoms, such as muscle pain, confusion, headache, sore throat, diarrhea, and vomiting.\(^3\) There is a high risk of infection between dental personnel and patients due to working in proximity with these patients in performing dental treatments.\(^4\) Dental healthcare workers (DHCW’s) are relatively considered to be a high-risk group for contracting COVID-19; also, oral healthcare settings can act as a means of disease transmission. Some reports suggest that the visitors of dental clinics either for awareness and perception of COVID-19 among final-year dental students, Sudan.

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Settings for dental care carry the risk of COVID-19 infection, this is attributed to the nature of its procedures, which requires face-to-face communication with patients, and exposure to saliva, blood, and other body fluids, along with the handling of sharp instruments.

Since the emergence of the first confirmed case of COVID-19 in mid-March 2020 in Sudan, dental faculties have been closed and all further dental services have been suspended in dental schools’ clinics to minimize infection spread. The findings of this study would help in planning for an effective educational training program about COVID-19 and updating the infection control protocols for dental students to ensure maintenance of appropriate practices during the COVID-19 pandemic.

Material and Methods

Study Design and Population: Institutional-based cross-sectional study, the study population comprised the final-year Bachelor of Dental Surgery students in Khartoum state during the period from August 2020 to September 2020. A list of all public and private dental schools in Khartoum state was obtained from the Higher Ministry of Education. All dental students who are registered as final-year BDS students in these schools at the time of data collection and who are willing to participate were enrolled in the study. Students were contacted to fill a questionnaire through Google forms.

Sample size

The sample size was calculated using the online sample size calculator RaoSoft. Based on a sample frame of 1,120 students in the final-year BDS students and on the anticipated response of 50%, the minimum required sample size was 287 participants with a confidence level of 95% and a 5% margin of error.

Study instrument

The questionnaire was designed in English and formed of a series of closed-ended questions about sociodemographic characteristics, knowledge of dental students about COVID-19, knowledge about transmission prevention in dental clinic, and perception toward COVID-19. Questions were developed after reviewing pertinent literature and were based on the most recent available information from the World Health Organization, the Center for Disease Control and Prevention (CDC), and the World Dental Federation. Each question received one point, with a total possible knowledge score of 0–21; participants with a score of 0–7, 8–14, and ≥15 are considered to have poor, moderate, and good knowledge, respectively.

A specialist in infectious and communicable diseases was consulted to verify the content of the questionnaire. A pilot study was conducted on 50 subjects, to test the questionnaire validity and reliability. The data from the pilot study was removed from the final analysis.

Statistical analysis

The completed questionnaires data were analyzed using the Statistical Package for Social Science, version 25 (SPSS 20.0, Chicago, IL). Chi-square test was used for the significance level which was set at a value of P = 0.05 or less for all analyses. Numbers and percentages are presented for categorical variables and mean, and standard deviation (SD) is presented for continuous variables.

Ethical considerations

Approval from AlMaarefa University IRB. Consent was obtained from participants before data collection emphasizing the right of the participants to withdraw from the study at any point of time. AlMaarefa University’s Research and Ethical Committee Board, numbered (2/201), 08/12/2020.

Results

Result: Participants characteristics

During this study, a total of 338 participants completed the online survey questions. After excluding 50 respondents, who participated in the pilot study, the final sample consisted of 288 participants.

| Table 1: Demographic distribution of respondents |
| Variable | No. | % |
| Gender | | |
| Female | 224 | 77.8 |
| Male | 64 | 22.2 |
| Student residence during study period | | |
| Khartoum state | 269 | 93.4 |
| Other states | 19 | 6.6 |

| Table 2: General knowledge about COVID-19 |
| COVID-19 is a viral infection | Number | Percent |
| Yes | 200 | 69.4 |
| No | 88 | 30.6 |
| Average incubation period of COVID-19 is 1-14 days | | |
| Yes | 256 | 88.9 |
| No | 25 | 8.7 |
| I do not know | 7 | 2.4 |
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Table 1: Illustrated that the average age (measured in years) was 23.31 ± 1.8. (means ± SD).

Of the respondents, 224 (77.8%) were females. When identifying the place of residence during the study period, 269 (93.4%) students were in Khartoum state, whereas 19 students (6.6%) were living in other states.

Table 3: Clinical picture and mode of transmission

| Symptoms                                                                 | Number | Percent |
|--------------------------------------------------------------------------|--------|---------|
| Fever, cough, and shortness of breath are symptoms of COVID-19           |        |         |
| Yes                                                                      | 282    | 97.9    |
| No                                                                       | 2      | 0.7     |
| I do not know                                                            | 4      | 1.4     |
| Myalgia, sore throat, and diarrhea are possible symptoms of COVID-19     |        |         |
| Yes                                                                      | 244    | 84.7    |
| No                                                                       | 20     | 6.9     |
| I do not know                                                            | 24     | 8.3     |
| Acute loss of taste (dysgeusia) and smell (anosmia) may be early symptoms of the COVID-19 |
| Yes                                                                      | 259    | 89.9    |
| No                                                                       | 12     | 4.2     |
| I don’t know                                                             | 17     | 5.9     |
| Patient may present with no symptoms                                     |        |         |
| Yes                                                                      | 267    | 92.7    |
| No                                                                       | 9      | 3.1     |
| I don’t know                                                             | 12     | 4.2     |
| COVID-19 can spread from person to person through small droplets from the nose or mouth |
| Yes                                                                      | 279    | 96.9    |
| No                                                                       | 4      | 1.4     |
| I don’t know                                                             | 5      | 1.7     |

Table 4: High-risk groups and perceived severity of COVID-19

| Relatively high-risk group for COVID-19 | Number | Percent |
|----------------------------------------|--------|---------|
| Old people                             | 274    | 95.2    |
| Young adult                            | 7      | 2.4     |
| Children                               | 4      | 1.4     |
| I don’t know                            | 3      | 1       |
| Patients with underlying chronic diseases are at a higher risk of COVID-19 infection |
| Yes                                    | 277    | 96.2    |
| No                                     | 0      | 0       |
| I don’t know                            | 11     | 3.8     |
| Healthcare workers are at a higher risk of COVID-19 infection             |        |         |
| Yes                                    | 271    | 94.1    |
| No                                     | 12     | 4.2     |
| I don’t know                            | 5      | 1.7     |
| Antibiotic is the first line of treatment                                     |        |         |
| Yes                                    | 73     | 25.3    |
| No                                     | 167    | 58      |
| I don’t know                            | 48     | 16.7    |
| Coronavirus can be fatal                                                           |        |         |
| Yes                                    | 73     | 25.3    |
| No                                     | 167    | 58.0    |
| I don’t know                            | 48     | 16.7    |

Table 5: Knowledge about measures for preventing COVID-19 transmission in dental clinics

| Measure of prevention of COVID-19 transmission | Yes | No | %   |
|-----------------------------------------------|-----|----|-----|
| Frequently clean hands by using alcohol-based hand rub or soap and water | 274 | 95.1 |
| Agree                                         | 4   | 1.4|
| Disagree                                      | 10  | 3.5|
| Use personal protective equipment such as dental goggles, masks, and gloves |
| Agree                                         | 280 | 97.2|
| Disagree                                      | 1   | 0.3|
| Neutral                                       | 7   | 2.4|
| Advice patients to wear a cloth face covering or face mask when they come for an appointment |
| Agree                                         | 276 | 95.8|
| Disagree                                      | 2   | 0.7|
| Neutral                                       | 10  | 3.5|
| Routinely clean and disinfect surfaces in contact with known or suspected patients |
| Agree                                         | 284 | 98.6|
| Disagree                                      | 0   | 0   |
| Neutral                                       | 4   | 1.4|
| Avoid aerosol-generating procedures whenever possible: dental handpieces, the air/water syringe, and ultrasonic scalers |
| Agree                                         | 245 | 85.1|
| Disagree                                      | 7   | 2.4|
| Neutral                                       | 36  | 12.5|
| Use high evacuation suction and rubber dam in aerosol-generating procedures |
| Agree                                         | 261 | 90.6|
| Disagree                                      | 2   | 0.7|
| Neutral                                       | 25  | 8.7|
| Actively take the patient’s temperature when he comes to the clinic |
| Agree                                         | 264 | 91.7|
| Disagree                                      | 6   | 2.1|
| Neutral                                       | 18  | 6.3|
| Place chairs in the waiting room at least 6 feet apart |
| Agree                                         | 270 | 93.8|
| Disagree                                      | 3   | 1.0|
| Neutral                                       | 15  | 5.2|

Table 6: Perception toward COVID-19

| Perception             | Frequency | Percent |
|------------------------|-----------|---------|
| Very dangerous         | 166       | 57.6    |
| Not dangerous          | 5         | 1.7     |
| Moderately dangerous   | 112       | 38.9    |
| I do not know          | 5         | 1.7     |
| COVID-19 can be brought under control |
| Yes                    | 105       | (36.5%) |
| No                     | 99        | (34.4%) |
| I do not know          | 84        | (29.2%) |
| Total                  | 288       | 100     |
Figure 1: Indicated that with regards to the students’ source of information, 120 (41.7%) received information from WHO, CDC, and published journal articles followed by social media 115 (39.97%).

Figure 2: Showed that 282 (97.9%) students possessed high knowledge level, whereas 4 (1.4%) had moderate knowledge, and only 2 (0.7%) displayed poor knowledge based on (15 and above) high knowledge, (8–14) moderate knowledge, and (1–7) poor knowledge.

Table 2: Revealed that about 200 (69%) students thought COVID-19 is a viral infection and 89% of them knew the correct incubation period.

Table 3: Revealed that the highest correct answer rate 282 (98%) related to the knowledge item identified fever, cough, and shortness of breath as main symptoms of COVID-19. However, the item with the lowest correct-answer rates was: Myalgia (muscle ache), sore throat, and diarrhea are possible symptoms of COVID-19, 244 (85%) with 24 (8%) of students selected the answer “I don’t know.” A total of 279 (97%) students responded correctly to the mode of transmission question.

Table 4: Showed that 96% of students thought that healthcare workers are at a higher risk of COVID-19 infection, although only 25% of them thought COVID-19 can be fatal.

Table 5: Showed that 55% and above of students respond with a total agreement to questions regarding infection control measurements, the least agreement response (85%) was for question: avoid aerosol-generating procedures whenever possible: dental handpieces, the air/water syringe, and ultrasonic scalers. In addition, 90% and 93% have an agreement with the precaution of taking patients temperature upon arrival to the clinic and place chair in the waiting room at least six feet apart.

Table 6: Showed that a total of 166 (57.6%) dentists perceived COVID-19 as very dangerous and 112 (38.9%) perceived it moderately dangerous. The number of dental students who perceived it not dangerous and who answered “I don’t know” both represent 5 (1.7%).

A total of 99 (34.4%) thought that COVID-19 cannot be brought under control in 2020, whereas 84 (29.2%) reported “I don’t know” for this question and only several 105 (36.5%) reported positive thoughts toward the possibility of COVID-19 control this year.

Table 7: Relation between gender and knowledge score

Table 8: The relation between the source of knowledge and knowledge score

(Moreover, 25% said that antibiotic is the first line of treatment).

Figure 1: Source of information
Table 9: The relation between knowledge and perceived severity

| Knowledge Score | Poor | Moderate | High | Total |
|-----------------|------|----------|------|-------|
| 1.40% | 2 | 0 | 111 | 112 |
| 0.70% | 0 | 2 | 3 | 5 |
| 0.0% | 0 | 40.0% | 60.0% | 100.0% |
| Very Dangerous | 0 | 2 | 164 | 166 |
| 0.0% | 1.2% | 98.8% | 100.0% |
| Total | 2 | 4 | 282 | 288 |
| | 0.7% | 1.4% | 97.9% | 100.0% |

Table 9: Showed that there is a statistically significant relation student perception regarding COVID-19 is the severity and their knowledge score, \( P = 0.001 \).

Discussion

Dentists and dental students are at more risk of pathogens spreading through blood or other body fluids. A study by Singh and Purohit reveals that\(^8\) infection control measures are intended to reduce and prevent contamination from various microorganisms including COVID-19. Thus, the knowledge and attitude toward infection control measures by students who have started clinical training are very important. Less experienced students are likely to be more susceptible to infectious diseases as discussed in a study by Al-Maweri et al.\(^9\)

The high level of knowledge among this study group can be explained by the explosive flow of information in all media, especially after the confirmation of the first case in Sudan, this is similar to what happened in China, as shown in a study by Zhong et al.,\(^{10}\) wherein the majority of university students represented a high level of knowledge regarding COVID-19 infection. On the contrary, in a study by Umeizudike et al.,\(^{11}\) only half of the Nigerian students had adequate COVID-19-related knowledge.

More than half of the respondents in this study indicated their source of information to be the CDC and the WHO, which goes contrary to a study by Umeizudike et al.\(^{11}\) In their study, they found that the sources of knowledge were mainly social media.

In this study, most students knew the correct incubation period of COVID-19, which goes in line with a study by Umeizudike et al.\(^{11}\) among Nigerian students. Although this goes in contrary to the findings of a study by Khader et al.\(^{12}\) who reported that only one-third of the dentists in Jordan knew the correct incubation period, this may be justified because the Jordanian study was conducted at an earlier stage of the pandemic, which might have accounted for the disparity in the knowledge level of the correct incubation period.

The majority of the dental students knew the early and common features of the infection; this finding is vital and very important as students should be able to easily identify a suspected case and take the necessary immediate action and respond appropriately. This was also the case among Nigerian dental students and Jordanian studies among dentists (Umeizudike et al.,\(^{11}\) 2020; Khader et al., 2020).\(^{12}\)

The respondents in the present study indicated good knowledge of the preventive strategies for COVID-19, it worth noting that the vast majority of participants know the correct preventive measures of the disease (clean surface, use mask, and gloves, advise patients to use masks, hand washing) if this knowledge has been transferred to practice it would make a significant difference in the control of the disease.

Conclusions: The study group showed good knowledge generally regarding modes of transmission and preventive measures; however, more than one-third of the respondents perceive COVID-19 to be moderately dangerous or not dangerous. It is advised that researchers should investigate attitudes and practice toward COVID-19 preventive measures.

Ethical approval

All procedures performed in studies involving human participants were following the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (Ethical Approval No. 201/6).

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Nil.
Conflicts of interest

There are no conflicts of interest.

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