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Knowledge and Awareness of COVID-19 among Dental Students, Interns, Clinicians and Academics

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ABSTRACT

Introduction: *COVID-19 is a highly infectious disease caused by an RNA virus belonging to a large family of coronaviruses. WHO declared COVID-19 as a public health emergency and classified it as a pandemic.* ***Aim:*** *The study aims to evaluate and assess knowledge with regards to COVID-19 among dental students, interns, clinicians and academics in Riyadh, Saudi Arabia.* ***Methodology:*** *A cross-sectional study was conducted among 366 dental students, interns, joint academic appointee, and full-time faculty. Data was collected using an electronic based questionnaire distributed through E-mails. Data was entered and analyzed using SPSS Version 23 with a significance value of $p<0.05$. Chi-square test was used to compare categorical variables.* ***Results:*** *Almost all participants acquire adequate level of knowledge regarding the mode of transmission, incubation period and symptoms of COVID-19. Approximately half of the participants 205 (56%) thought that standard precautions in the dental clinics were insufficient in the management of suspected cases of COVID-19. Nearly all participants thought that elective dental treatment should be deferred, and only emergency treatment can be provided. However, there was a poor response regarding the correct survival duration of COVID-19 on plastic or stainless-steel surfaces and the use of pre-operational hydrogen peroxide mouth rinse as a method of preventing transmission.* ***Conclusion:*** *This study identified areas where participants lacked the knowledge in managing COVID-19 with the best methods available especially at an undergraduate level. In order to have a more efficient and appropriate response for future pandemics, dental curriculums and educational activities should pro-actively provide training opportunities.*

Keywords: Knowledge of COVID-19, Dental practitioners, Cross sectional study, Dental precautions, Disease transmission, Infection control

Abbreviations: COVID-19: Corona Virus Disease 2019; WHO: World Health Organization; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2; MERS-CoV: Middle East Respiratory Syndrome; SARS-CoV: Severe Acute Respiratory Syndrome; ICTV: International Committee on Taxonomy of Viruses; COPD: Chronic Obstructive Pulmonary Disease; CT: Computed Tomography; RT-PCR: Reverse Transcriptase Polymerase Chain Reaction; CDC: Centers for Disease Control and Prevention; KSAU-HS: King Saud bin Abdulaziz University for Health Sciences; JAA: Joint Academic Appointees

INTRODUCTION

Corona virus disease 2019 (COVID-19) is a highly infectious disease caused by a new strain of coronavirus SARS-CoV-2. It was first reported December 19 in the city of Wuhan, China. SARSCoV-2 is an RNA virus belonging to a large family of coronaviruses that are known to cause illnesses such as the Middle East Respiratory Syndrome

(MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). According to the International Committee on Taxonomy of Viruses (ICTV), SARS-CoV-2 is of the same species as SARS-CoV, but of a different strain and therefore given the name COVID-19 by the World Health Organization (WHO) [1]. COVID-19 a Zoonotic infection linked to bats and pangolins, and thought to have originated in a live animal market [2-4]. The virus has the ability to spread in communities, among individuals, without knowing how or where they became infected [2,5]. The proportion of people infected has rapidly increased since the WHO report on the 31st of March, 2020, with more than 800,000 infected cases globally to now exceeding 7 million in June 2020 [6]. The majority of clinical manifestations (80%) are mild and may include a variety of symptoms, such as fever, dry cough, shortness of breath, and fatigue [3]. More severe presentations of COVID-19 are the development of sputum production, headache, hemoptysis, diarrhea, and vomiting [2,3,7]. Finally, a high mortality risk has been associated with patients developing pneumonia or acute respiratory distress syndrome. Population groups at risk of developing pneumonia or acute respiratory distress include older adults or patients with a pre-existing chronic illness such as, asthma, COPD, diabetes, cardiovascular disease, or immunosuppression [6,8,9]. The diagnosis for COVID-19 is made by identifying contact history, clinical manifestations, radiographic changes on CT chest imaging, and laboratory tests. Currently, laboratory diagnostics offer the most accurate and reliable results, and include Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) tests. RT-PCR is mainly used to detect viral RNA from respiratory secretions such as expectorated sputum, oropharyngeal, and nasopharyngeal samples. It is important to note that a negative RT-PCR test result will not exclude the patient from having the virus and other diagnostic criteria should be considered. Due to the COVID-19 virus being novel, no vaccines have been developed and no effective antiviral treatment has been identified. The current treatment approach of COVID-19 consists of early detection, isolation, and providing supportive care for developing symptoms [8,9]. Transmission of COVID-19 is primarily through respiratory droplets generated from an infected person during sneezing, coughing, talking, and direct contact through physical transfer of microorganisms between an infected person and a susceptible host. It can also be transmitted indirectly by an intermediate object such as a contaminated object used by the infected person. Dental procedures are highly likely to expose both patients and professionals, due to the close contact of dental team members and patients. Additionally, the majority of dental procedures generate and aerosolize a large number of droplets containing saliva and blood. Incubation periods for the virus are said to range from 2-14 days increasing the likelihood of post dental treatment spread [2,10]. The CDC has provided strict guidelines in dealing with all patients as carriers. Patients identified with respiratory symptoms should be provided with surgical masks and quarantined immediately in a separate room. Guidelines also include that body temperature for both patients and dental staff should be measured before entering the dental office [2,7]. Hand hygiene was found to be the most critical measure in reducing the risk of transmitting COVID-19, in addition to disinfecting surfaces thoroughly. Dentists should defer any elective procedures, while limiting treatment to dental emergencies in order to decrease the chance of spreading the virus [3]. If a patient presents with a dental emergency, additional precautions are needed during the procedure. Precautions include personal protective equipment, such as masks, gloves, gowns, and face shields, while using 4-handed technique for better infection control. The use of rubber dams and high-volume saliva ejectors can help in minimizing aerosolization during dental procedures [2,9]. Guidelines and precautions to the COVID-19 virus have only recently been provided and require that both dentists and students actively acquire updated knowledge that will likely continue to change as the behavior of COVID-19 is better understood. As far as the authors knowledge no study has looked at the knowledge and awareness among academics, clinicians, and undergraduate students. Identifying and addressing deficiencies of knowledge among these groups, will play a vital role in reducing disease spread.

MATERIALS AND METHODS

A one-month duration cross-sectional study was conducted to assess knowledge of dental students and faculty in King Saud bin Abdulaziz University for Health Sciences (KSAU-HS), Riyadh, Saudi Arabia. Ethical approval was obtained from the Institutional Review Board. Using StatDisk and data from a previous study, the sample size was estimated by calculating percentages that range from (1%-97%) which resulted in a maximum sample size of 360 to achieve a 95% confidence interval for the prevalence, with a margin of error of 5%. The participants were selected using a non-probability convenient sampling. Dental students, interns, and faculty of KSAU-HS who agreed to take part and provided informed consent were included in the study. Faculty were further divided into full timers and Joint academic appointees (JAA). JAA are faculty in King Abdulaziz dental center (hospital based tertiary center) in addition to the university. Other schools' dental students and faculty were excluded. The data was collected using a piloted

self-administered structured questionnaire in an electronic form. The questionnaire was divided into two sections with 14 questions. The first section has three questions that are mainly about demographic data such as (age, gender, and profession). The second section consists of 11 questions covering general knowledge about symptoms of COVID-19, precautions and practices, covering: incubation period, standard precautions, and prevention methods. The data collected was entered and analyzed using SPSS Version 23 (IBM Corporation, Armonk, NY, USA). Chi-square test was used to compare categorical variables. p-value less than 0.05 were set to be statistically significant.

RESULTS

A total sample of 366 participants was reached, with 221 females representing 60% of the sample. The sample includes dental students, interns, joint academic appointee, and full-time faculty (Table 1). Almost all of the participants 350 (96%) believed that dentists are at a high risk of exposure to COVID-19. The majority of participants 323 (88%) chose droplets as the mode of transmission for COVID-19. Most of the participants believed that common symptoms of COVID-19 are fever, cough, and shortness of breath. Skin rash, on the other hand, represented the least common symptom (Table 2). Two hundred and seventy-two (74%) of the participants believed that 1 meter is the minimum distance for social distancing. Only 136 (37%) chose the correct survival duration of COVID-19 on plastic or stainless-steel surfaces, which is 72 hours. Majority of the participants 334 (91%) identified the correct incubation period of COVID-19 (2-14 day). One hundred and two participants (28%) believed that standard precautions in a dental practice are sufficient in the management of suspected cases of COVID-19, while 205 (56%) believed standard precautions were insufficient. More than half of the participants 281 (77%) believed that only emergency treatment could be provided to suspected COVID-19 patients. More importantly, 173 (48%) of the participants believed that aerosols generated form dental treatment could stay in the air for hours and was found to be statistically significant when joint academic appointees (79%) were compared to others ($p<0.05$) (Table 3). Only 142 (38%) of the participants believed that four handed dentistry should be performed when treating COVID-19 patients. Among these participants, there was a significant difference ($p<0.05$) between dental students, interns, joint academic appointee, and full-time faculty, yet all groups did not exceed 56%. D1, D2 and D3 were scoring less in comparison to others (Table 3). Most of the participants chose hand wash and sanitizers, personal protective equipment, rubber dam use and surfaces disinfection as necessary methods in the prevention of transmission of COVID-19 in dental clinics. Although 275 (75%) chose rubber dam as a preventive method, about 91 (25%) of the participants did not believe that rubber dam use is an important method of prevention. About 94 (25%) of the participants chose chlorohexidine mouth wash, and only 46 (13%) of the participants chose hydrogen peroxide mouth wash prior to dental visits as a necessary method in the prevention of COVID-19 transmission (Table 4). Chlorohexidine mouthwash was statistically significant between undergrad compared to others, while Hydrogen Peroxide mouthwash usage was statistically significant between JAA compared to other study participants. Only 43.3% of the full timers chose Chlorohexidine mouthwash prior to the dental visit as a preventive measure while, 24.6% of the JAAs chose hydrogen peroxide mouthwash prior to the dental visit as a preventive measure (Table 5). Also, 249 (68%) of the participants chose isolation room as a necessary prevention method (Table 4). Furthermore, about 46 (80%) of the JAA answered with yes, which was found to be statistically significant ($p<0.05$)

Table 1 Distribution of participants according to the profession

Profession of participants	N	Percentage (%)
D1 dental students	62	17%
D2 dental students	62	17%
D3 dental students	58	16%
D4 dental students	43	11%
Dental interns	54	15%
Joint academic appointee	57	16%
Full time faculty	30	8%

Table 2 Participants' awareness of COVID-19 symptoms

Variable	N	Percentage (%)
cough	342	93%
Shortness of breath	331	90%
Fever	350	96%
Runny nose	64	18%
Fatigue	231	63%
Headache	227	62%
Muscle pain	144	39%
Skin rash	11	3%

Table 3 Participants awareness of aerosol survival in the air and performance of four handed dentistry according to the profession distribution

Profession	Answer	Aerosol survival in the air	Four handed dentistry
D1	Yes	12 (19.4%)	13 (21.0%)
	No	18 (29%)	7 (11.3%)
	Don't know	32 (51.6%)	42 (67.7%)
D2	Yes	21 (33.9%)	13 (21.0%)
	No	21 (33.9%)	18 (29.0%)
	Don't know	20 (32.3%)	31 (50.0%)
D3	Yes	27 (46.6%)	18 (31.0%)
	No	15 (25.9%)	21 (36.2%)
	Don't know	16 (27.6%)	19 (32.8%)
D4	Yes	22 (51.2%)	24 (55.8%)
	No	8 (18.6%)	11 (25.6%)
	Don't know	13 (30.2%)	8 (18.6%)
Intern	Yes	29 (53.7%)	30 (55.6%)
	No	6 (11.1%)	7 (13.0%)
	Don't know	19 (35.2%)	17 (31.5%)
JAA	Yes	45 (78.9%)	27 (47.4%)
	No	6 (10.5%)	15 (26.3%)
	Don't know	6 (10.5%)	15 (26.3%)
Full timer	Yes	17 (56.7%)	17 (56.7%)
	No	4 (13.3%)	5 (16.7%)
	Don't know	9 (30.0%)	8 (26.7%)

Table 4 Awareness of transmission preventive measures of COVID-19 in dental clinics

Variable	N	Percentage (%)
Hand soap cleaning	333	91%
Hand sanitizers	299	81%
Personal protective equipment	355	97%
Pre-operative chlorohexidine mouth wash	94	25%

Pre-operative hydrogen peroxide	46	13%
Rubber dam isolation	275	75%
Clinical surface disinfection	326	89%
Adequate ventilation	248	67%
Isolation room	249	68%

Table 5 Awareness of transmission preventive measures of COVID-19 in dental clinics distributed according to profession

Profession	Answer	Chlorhexidine mouthwash	Hydrogen peroxide mouthwash	Using rubber dam
D1	Yes	11 (17.7%)	9 (14.5%)	39 (62.9%)
	No	51 (82.3%)	53 (85.5%)	23 (37.1%)
D2	Yes	8 (12.9%)	6 (9.7%)	38 (61.3%)
	No	54 (87.1%)	56 (90.3%)	24 (38.7%)
D3	Yes	14 (24.1%)	5 (8.6%)	50 (86.2%)
	No	44 (75.9%)	53 (91.4%)	8 (13.8%)
D4	Yes	6 (14.0%)	1 (2.3%)	34 (79.1%)
	No	37 (86.0%)	42 (97.7%)	9 (20.9%)
Intern	Yes	22 (40.7%)	6 (11.1%)	44 (81.5%)
	No	32 (59.3%)	48 (88.9%)	10 (18.5%)
JAA	Yes	20 (35.1%)	14 (24.6%)	47 (82.5%)
	No	37 (64.9%)	43 (75.4%)	10 (17.5%)
Full timer	Yes	13 (43.3%)	5 (16.7%)	23 (76.7%)
	No	17 (56.7%)	25 (83.3%)	7 (23.3%)
Chi square value		24.5	13.6	18.326
p-value		<0.05	<0.05	<0.05

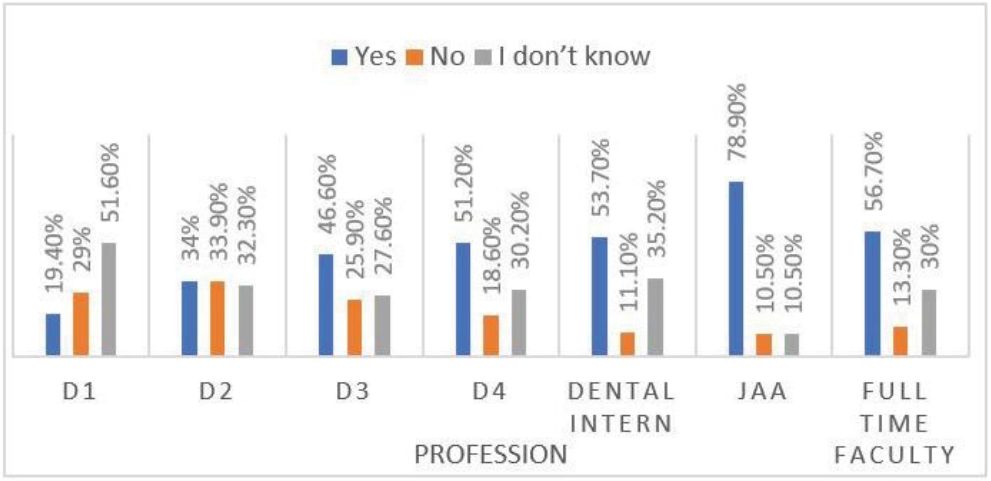

Figure 1 Perceived knowledge of aerosols survival in the air after dental treatment

DISCUSSION

COVID-19 is a highly infectious disease requiring strict infection control measures. To decrease the spread of the disease among the community and dental healthcare providers, a high level of knowledge is crucial and must be ob-

tained. Only a few studies have examined the degree of knowledge of COVID-19 among dental health care providers. In this study, the level of knowledge was examined among a sample of dental students, interns, JAA, and full-time faculty from King Saud bin Abdulaziz University for Health Sciences in Riyadh, Saudi Arabia. Among the findings of all participants, an adequate level of knowledge was found with regards to mode of transmission and symptoms of COVID-19. These findings are comparable to the results reported by Khader, et al., in their study among Jordanian dentists [11]. Another finding in our report that was contradictory to the Khader, et al., report was that participants in our study acknowledged that dentists are at a high risk of exposure to COVID-19 and that it poses a serious threat while in the Khader, et al., report they perceived COVID-19 as moderately dangerous [11]. The difference in findings is most likely to the difference in timing of administration of questionnaire as ours was completed at a later date and our participants were exposed to more information. In this study, participants' knowledge varied regarding the survival duration of COVID-19 on plastic and stainless-steel surfaces, which according to WHO is 72 hours. Almost all participants knew the correct incubation period of COVID-19 which is (7-14) days, while Khader, et al., reported that responses were highly variant (with less than half the participants choosing the correct answer). More than half of the participants think that standard precautions in dental clinics are not enough in the management of suspected cases of COVID-19, which is supported by CDC recommendation of adding additional precautions including the surgical mask (N95) to the personal protective equipment. Majority of the participants believe only urgent dental management can be provided to suspect COVID-19 patients, exhibiting great knowledge with the recent ADA recommendation of postponing any elective treatment for the safety of the patients and the staff. As a recommendation from the WHO, at least one-meter distance should be between people, and in this study a large percentage of participants answered accordingly. Furthermore, almost all of the JAA believe that aerosols generated from dental treatment can stay in the air in comparison to other study participants who generally did not know or did not believe that COVID-19 aerosols may stay in the air (Figure 1). These findings further stress that the concept of aerosolization and protection against such procedures need to be enforced. Only a minority of participants thought that four handed dentistry should be performed when treating COVID-19 patients, which is recommended by CDC in order to reduce aerosol production. This result is similar to Javed et al. which stated that only 42% of participants recommended four handed dentistry. These findings highlight the lack of knowledge regarding the importance of four handed dentistry in the prevention of spread of COVID-19 [12]. Regarding other methods of preventing transmission, participants had sufficient knowledge of the different methods but were not aware of the more effective methods, including the pre-operational use of hydrogen peroxide mouth rinse. Participants in this study have answered more positively to the chlorhexidine mouth wash even though hydrogen peroxide is a more effective rinse in reducing viral load. These findings highlight the biased nature in decision, favoring chlorhexidine mouth rinses (a more commonly used rinse in dental settings). Also, 25% of the participants did not think rubber dam isolation is an effective method of transmission prevention, and although they are not the majority, it is worrisome due to the ability of reducing the risk of transmission by minimizing aerosol production and spatter. There is a general difference between responses made by juniors (students and interns) and the more experienced clinicians and faculty. The differences may be attributed to the fact that management of similar situations such as the COVID-19 pandemic is lacking in dental curriculums and was obtained from other sources. The knowledge exhibited was most likely due to the late distribution of the questionnaire giving participants time to learn from webinars and updated articles. The importance of such finding is detrimental to future pandemics for both undergraduates and dental professionals. It emphasizes the need for pre-pandemic preparation by post-graduate training and dental curricular courses. The current perceived awareness level of COVID-19 is attributed to the huge efforts of countries and institutions including the world health organization (WHO) to spread knowledge through periodic educational courses and programs on COVID-19.

Limitations

The study may be subject to selection bias since social media habits and awareness differ between individuals.

CONCLUSION

This study identified areas where participants lack knowledge to the best methods available in managing COVID-19 especially in juniors when compared to seniors. In future, dental curriculums and post-graduate educational activities should be provided routinely and before the situation arises for a more efficient response and management of similar pandemics.

Clinical Significance

The role of dental students and professionals in the prevention of COVID-19 is critical. Awareness is lacking and should be raised amongst dental students, interns, clinicians and academics in order to reduce the risk of transmitting disease. Delivery of multiple activities targeting both professionals and undergraduates by incorporating into dental curriculums and workshops will provide clear guidelines for management and prevention of future pandemics.

DECLARATIONS

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Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

[1] Saudi Ministry of Health. Coronavirus disease 19 (COVID-19) Guidelines. Saudi Arabia: Saudi Center for Disease Prevention and Control, 2020.

[2] Peng, Xian, et al. "Transmission routes of 2019-nCoV and controls in dental practice." *International Journal of Oral Science,* Vol. 12, No. 1, 2020, pp. 1-6.

[3] Spagnuolo, Gianrico, et al. "COVID-19 outbreak: An overview on dentistry." I*nternational Journal of Environmental Research Public Health*, Vol. 17, No. 6, 2020, pp. 1-3.

[4] Sabino-Silva, Robinson, Ana Carolina Gomes Jardim, and Walter L. Siqueira. "Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis." *Clinical Oral Investigations*, Vol. 24, No. 4, 2020, pp. 1619-21.

[5] Coronavirus Disease 2019 (COVID-19), Centers for disease control and prevention, 2020. https://www.cdc.gov/coronavirus/2019-ncov/faq.html

[6] Coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care, American Association of Endodontists, 2020. https://www.aae.org/specialty/clinical-resources/coronavirus-disease-19-covid-19-implications-for-clinical-dental-care/

[7] ADA Coronavirus Center for Dentists, 2020.

[8] He, Feng, Yu Deng, and Weina Li. "Coronavirus disease 2019: What we know?" *Journal of Medical Virology*, Vol. 92, No. 7, 2020, pp. 719-25.

[9] Meng, L., F. Hua, and Z. Bian. "Coronavirus disease 2019 (COVID-19): Emerging and future challenges for dental and oral medicine." *Journal of Dental Research*, Vol. 99, No. 5, 2020, pp. 481-87.

[10] World Health Organization. Infection prevention and control of epidemic-and pandemic-prone acute respiratory infections in health care. Geneva: World Health Organization, 2014. https://apps.who.int/iris/bitstream/handle/10665/112656/9789241507134_eng.pdf?sequence=1

[11] Khader, Y., et al. "Dentists' Awareness, Perception, and Attitude Regarding COVID-19 and Infection Control: Cross-Sectional study among Jordanian Dentists." *JMIR Public Health and Surveillance*, Vol. 6, No. 2, 2020, p. e18798.

[12] Javed, M. Q., A. M. Khan, and S. Nawabi. "Dental faculty's knowledge and attitude regarding COVID-19 disease in Qassim, Saudi Arabia." *Research Square,* 2020. pp. 1-19.