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Research Article

Assessing Knowledge among Dentists in Saudi Arabia of Proper Dental Settings for Treating Patients During COVID-19

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Abstract

Introduction: Dentists have a high risk of infection with COVID-19 because they are in close contact with patients' oral cavities and saliva.

Aim: This study aimed to assess the level of knowledge among dentists and dental students in Saudi Arabia about proper dental settings for treating patients during COVID-19.

Methods: A self-reporting questionnaire was used in this cross-sectional study with 137 participating dentists and dental students across Saudi Arabia. The questionnaire assessed participants' knowledge using 15 multiple-choice questions regarding COVID-19 dental settings and sources of information about COVID-19. SPSS software and linear regression, ANOVA, and t-test were used to analyze the data, with the significance level set to a p-value of 0.05.

Results: A total of 25.50% of participants visited the Saudi Center for Disease Prevention and Control (Weqaya) website. Most (92%) got their information from medical or health professionals. Participants had a mean of 7.91 (standard deviation = 1.9) correct answers, with a range of 3 - 12 where the maximum knowledge score was 15. Only 5.10% were aware of the proper settings of negative pressure rooms and natural ventilation. Participants from the eastern region had significantly ($p = 0.006$) less knowledge than other regions. Knowledge increased significantly with age ($p = 0.006$) and years of practice (0.003).

Conclusion: Dentists and dental students in Saudi Arabia have acceptable levels of knowledge about COVID-19 dental settings. Nonetheless, more efforts should be directed to improving knowledge about COVID-19 dental settings through continuing education.

Keywords: *COVID19; Dental Students; Dentists; Dental Setting*

Introduction

Coronavirus disease 2019 (COVID-19) is a pandemic that became a global health emergency concern in January 2020 [1]. It began in December 2019 in Wuhan, China, as multiple pneumonia cases of unknown etiology spread rapidly all over the world, without exception

[2,3]. In Saudi Arabia, the first case of COVID-19 was announced in March 2020 [4], and it has manifested as a frightening virus that affected daily routines and lives. According to the dashboard provided by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, more than 111.8 million confirmed COVID-19 cases have already been reported globally, including more than 2.47 million deaths by February 23, 2021 [5,6].

COVID-19 is considered by experts to be more concerning than MERS-CoV and SARS-CoV [7]. COVID-19 is a highly contagious respiratory illness due to viral infection caused by the beta-coronavirus, and the symptoms can be severe enough to cause death [8,9]. Symptoms of COVID-19 infection include fever, sore throat, dry cough, shortness of breath, hemoptysis, vomiting, diarrhea, muscle pain, weakness, stiffness, headache, confusion, irregular chest computed tomography, and the loss of the senses of smell and taste [8-10]. COVID-19 disease can range from asymptomatic, mild symptoms (most cases) to more severe symptoms, including severe respiratory distress that requires mechanical ventilation (20% - 30%) [8]. Recurrent COVID-19 means that the cured patient may still transport the virus, and therefore, an additional cycle of viral screening and quarantine may be required [11]. The mortality rate is around 10% of those infected with COVID-19, with a higher incidence rate for people older than 60 years and patients who are immunocompromised [8]. To date, there is no available absolute treatment for COVID-19, which means that the best technique for fighting this illness is preventing it [12,13]. Nevertheless, more efforts are directed toward treating the symptoms [2] and vaccinating everyone [14,15].

Airborne aerosols and droplets have been determined to be the main passages for the broadcast of COVID-19 in dental offices [16,17]. Airborne content can be distributed to a distance of 18 inches from the operator site [18]. As a result, because they are in close contact with patients' oral cavities and saliva, dentists have a high risk of being infected with COVID-19 [19,20]. The close contact places them in more danger due to findings that viable virus may be contained in saliva and spread by little droplets through talking, sneezing, coughing, or using high-pressure irrigation systems like ultrasonic scalers or handpieces [21]. The virus may also be transmitted in dental settings through inhalation of aerosol droplets from asymptomatic patients infected with COVID-19; contact of provider conjunctival, nasal, or oral mucosa by droplets from an infected patient, or other direct contact with body fluids from patients infected with COVID-19 [21]. Infection may also occur after indirect contact with contaminated equipment or surfaces [17]. Therefore, it is not effective to use only the standard protective measures in a dental setting for preventing infection with COVID-19, especially from asymptomatic cases [22].

Suggestions and advice to restrict the expansion of COVID-19 have been distributed by the World Health Organization (WHO) [1] and other health regulatory bodies around the world. According to the Saudi Center for Disease Prevention and Control (Saudi CDC, also called Weqaya), certain strict standards and precautions for controlling COVID-19 are recommended to have successful prevention of transmission of COVID-19 in dental settings, including observing proper hand hygiene, disinfection of all surfaces in the clinic, the use of personal protective equipment (including masks, gloves, gowns, and goggles or face shields), and the additional use of N95 masks for routine dental procedures [23]. Additional recommendation have been suggested for the dental field, including the use of anti-retraction handpieces, rinsing the mouth with hydrogen peroxide before dental procedures, applying high-power saliva suctioning, using a rubber dam, teledentistry, postponement of elective or scheduled dental procedures, and performing only urgent procedures [11,22,24].

The basic knowledge about COVID-19 among dentists in Saudi Arabia is acceptable according to one national study [4,25]. However, a few other studies have investigated the knowledge levels of dental professionals about COVID-19 infection control in a dental setting [26]. One study in conducted in Riyadh, Saudi Arabia, found that the levels of knowledge about dental setting control of COVID-19 infection was low, with a mean of 1 ± 0.92 out of 6 [26]. Most of the participants in the study had not read the Saudi CDC website to learn about the latest guidelines for protection, and this was significantly related to their low levels of knowledge [26]. Notably, the levels of knowledge in that study were not significantly different between males and females, as they had been in previous studies. Nevertheless, the authors highlighted that their study had a very narrow scope of questions, and the results cannot be generalized as it was conducted in only two universities in a single region of Saudi Arabia.

Aim of the Study

Therefore, this study aimed to assess the levels of knowledge of dentists and dental students in Saudi Arabia regarding the proper dental settings for treating patients during the COVID-19 pandemic.

Methods

Participants

The researchers selected a quantitative cross-sectional design based on the purpose of the study, which was to assess the knowledge of dentists and dental students about the proper dental settings for treating patients during the COVID-19 pandemic. In this study, dental settings included all dental clinics in Saudi Arabia. The inclusion criteria were dentists and dental students in Saudi Arabia, and the exclusion criteria for participation was refusal to sign the study's informed consent form. Convenience sampling was used in this study. The data collection method was an electronic questionnaire distributed through social media to recruit participants.

Procedure

An electronic self-administered English-language questionnaire was used to collect data for this study. The questionnaire was distributed through social media platforms (WhatsApp, Telegram, Twitter, and Facebook) using research team members' personal accounts and professional group subscriptions. Participants were required to open a link to complete the self-administered study questionnaire and were first presented with the informed consent statement noting that clicking next to being the questionnaire would be considered a sign of consent to participate in the study. The questionnaire required 5 - 10 minutes to complete. All data were treated anonymously, and identifiable data were destroyed. All of the completed questionnaires were gathered electronically for data analysis.

Questions were adapted from a previously used questionnaire [26] and included guidelines from the Saudi CDC [23]. The questionnaire had five questions gathering demographic variables, followed by three questions regarding past experiences dealing with the Saudi CDC and sources of information about the pandemic. Next, there were 15 knowledge questions in four domains: 1) Four questions dealing with patients who have a cough or other respiratory symptoms (e.g. coughing or sneezing). 2) Three questions regarding caring for patients with suspected COVID-19 infection. 3) Five questions related to performing an aerosol-generating procedure (e.g. using a handpiece or ultrasonic scaling) in patients with COVID-19. 4) Four questions about isolation precautions for COVID-19 infection control. Each of the knowledge questions were presented as multiple choice and had only one correct choice. The knowledge questions will be scored and added for a total score, where 0 was the lowest score and 15 was the highest. This study was approved by Saudi Ministry of Health by the number KFHRC/01072021/2.

Statistical analysis

Data analyses were conducted using Microsoft Excel and SPSS v.15 software (IBM, Inc., Armonk, NY, USA). Descriptive statistics (count/percentages for categorical variables, mean/standard deviations, and median/interquartile range for continuous variables) were calculated. Statistical significance was assessed via liner regression, ANOVA and t-test. The statistical significance level was set at a p-value of 0.05.

Results

A total of 137 participants answered the study questionnaire. They had a mean (m) age of 29.84, with a standard deviation (SD) of 8.3. The median of years practicing dentistry was 1, with an interquartile range of 6, a maximum of 41, and a minimum of 0. Participant demographic data are provided in table 1.

Variable		n	%
Gender	Male	38	27.70%
	Female	99	72.30%
Nationality	Saudi	115	83.90%
	Non-Saudi	22	16.10%
Practice	Dental student	30	21.90%
	Intern	20	14.60%
	General dentist	59	43.10%
	Resident (Board)	6	4.40%
	Specialist	12	8.80%
	Consultant	10	7.30%
Where do you currently work or study?	Governmental organization/ college	76	55.50%
	Private organization/college	49	35.80%
	Not currently working	12	8.80%
In which region of Saudi Arabia do you currently live?	Western	86	62.80%
	Central	17	12.40%
	Southern	11	8.00%
	Eastern	12	8.80%
	Northern	11	8.00%
Have you visited the Saudi Center for Disease Prevention and Control (Weqaya, or Saudi CDC) website?	Yes	35	25.50%
	No	102	74.50%
Have you received any guidance or advice regarding proper dental practices during COVID-19?	Yes	112	81.80%
	No	25	18.20%

Table 1: *Demographic data of study participants.*

Participants had differences in the resources they used to get official guidance and COVID-19 information, as shown in table 2. Most participants (92%) retrieved their information from the media or other health professionals, while only 1.5% of the participants said that they had gathered no information on COVID-19 guidance.

Resource	No. of respondents who selected	%
Medical/health professionals	126	92.00%
Official websites	95	69.30%
Social media	93	67.90%
Friends	71	51.80%
No resources were used	2	1.50%

Table 2: *Resources used by participants for official guidance and COVID-19 information.*

Participants had mean correct answers of 7.91 (SD = 1.9), with a range of 3-12, which was lower than the maximum possible knowledge score of 15. Participants' answers to each of the questions are provided in table 3. The t-test and ANOVA revealed that there were no significant relationships between total knowledge scores and gender, nationality, or type of practice. However, ANOVA did show a significant difference in total knowledge scores related to the region of Saudi Arabia (p = 0.006). According to a post hoc test, participants from the eastern region (m = 6.25, SD = 2.73) had significantly lower scores than participants from the western region (p = 0.036, m = 7.87, SD = 1.71), central region (p = 0.036, m = 8.23, SD = 1.48), southern region (p = 0.12, m = 8.72, SD = 1.61), and northern region (p = 0.12, m = 8.72, SD = 2.10). Other comparisons between groups showed no significant differences. However, there were significant relationships of the total knowledge score with age (p = 0.006, r-squared = 0.054) and years of clinical practice (p = 0.003, r-squared = 0.064).

Question	Answers	n	%
When dealing with patients who have a cough or other respiratory symptoms, (e.g., coughing or sneezing)			
What is the recommended minimum distance you should keep away from them in meters?	0.5	4	2.90
	1*	35	25.50
	1.5	93	67.90
	I do not know.	5	3.60
Where do you need to put patients with the same etiological diagnosis while they wait?	In single rooms.*	63	46.00
	In different rooms.	45	32.80
	With their relatives.	9	6.60
	I do not know.	20	14.60
You need to use	Easy footwear.	1	0.70
	Eye protection.*	110	80.30
	Cotton scrubs.	13	9.50
	I do not know.	13	9.50
For the patient	Make patients wear medical masks ONLY in the dental treatment rooms.	29	21.20
	Force the patient to LEAVE the hospital to protect others.	24	17.50
	Limit patient movement IN the institution.*	75	54.70
	I do not know.	9	6.60
When caring for patients with suspected COVID-19			
Use personal protective equipment (PPE) when?	Use PPE when entering the room and remove PPE when leaving.*	109	79.60
	Use PPE when entering a room and do not remove the PPE when leaving.	13	9.50
	Do not remove PPE until you go home.	14	10.20
	I do not know.	1	0.70
When possible, to prevent transmission of COVID-19, you should	Use reusable equipment.	10	7.30
	Use disposable equipment.*	119	86.90
	Not use any equipment.	5	3.60
	I do not know.	3	2.20

If equipment needs to be shared among patients	Clean and disinfect/sterilize between each patient use.*	113	82.50
	Clean and disinfect/sterilize after 24 hours.	18	13.10
	Clean and disinfect/sterilize after 72 hours.	1	0.70
	I do not know.	5	3.60
When performing an aerosol-generating procedure (e.g. using a handpiece or ultrasonic scaling) in patients with COVID19			
In a negative pressure room, how many times per hour is it required that the air in the room be replaced?	4	38	27.70
	8	19	13.90
	12*	7	5.10
	I do not know.	73	53.30
In a natural ventilation room, what is the minimum required quantity of air in liters per second per patient?	120	26	19.00
	140	10	7.30
	160*	7	5.10
	I do not know.	94	68.60
You should use which PPE?	Single face mask.	17	12.40
	Double face masks.	9	6.60
	N95 respirators or equivalent.*	107	78.10
	I do not know.	4	2.90
Which type of room should you use?	Adequately ventilated single room.*	107	78.10
	Room that has been closed for 24 hours.	3	2.20
	Room with sunlight.	10	7.30
	I do not know.	17	12.40
When performing an aerosol-generating procedure during the COVID-19 pandemic	Avoid the presence of unnecessary individuals in the room.*	107	78.10
	No special precautions need to be taken for the presence of other people in the room.	5	3.60
	Patients and relatives can be in the room.	8	5.80
	I do not know.	17	12.40
Isolation precautions for COVID-19 infection control measures			
In symptomatic confirmed patients, how many negative respiratory samples are needed to discontinue isolation precautions?	One sample.	25	18.20
	One sample, then a second sample after 24 hours.*	25	18.20
	One sample, then a second sample after 72 hours.	50	36.50
	I do not know.	37	27.00
In asymptomatic confirmed patients, how many negative respiratory sample/s is/are needed to discontinue designated facility isolation precautions?	One sample.	46	33.60
	One sample, then a second sample after 24 hours.*	20	14.60
	One sample, then a second sample after 72 hours.	23	16.80
	I do not know.	48	35.00
What is the proper initial test for COVID-19?	Body temperature.	32	23.40
	COVID respirator.	18	13.10
	COVID PCR.*	80	58.40
	I do not know.	7	5.10

Table 3: *Participant answers to dental setting knowledge questions.*

**: Correct answer.*

Discussion

Our results indicated that dentists and dental students have moderate levels of knowledge about COVID-19 in a dental setting. Most of the participants were not able to answer the questions related to the negative pressure room and natural ventilation room settings. In addition, a majority were not aware of the required negative respiratory sample before discontinuing isolation precautions. The total knowledge scores were not related to gender, nationality, or type of practice. However, participants from the southern region of Saudi Arabia had lower levels of knowledge than other areas. Also, knowledge scores increased with increased age or years of practice. The main resource for information regarding COVID-19 for the respondents was other medical and health professionals.

This study was vital because dentistry is considered one of the most hazardous occupational environments in the health field and has been linked to cross-infection between patients and dental staff [27,28]. In fact, the COVID-19 pandemic caused more serious problems for the dental field and increased the risk of infection [29]. Multiple articles have illustrated the likelihood of infection with COVID-19 in dental environments [30] and recommended the use of proper disinfection materials and proper protective measures in dental clinics [31].

Our study indicated that the level of knowledge regarding COVID-19 in dental settings is considered moderate, which is similar to previous studies in Saudi Arabia [4,25]. However, it contradicts one prior Saudi Arabian study that found the levels of knowledge to be low [26]. It should be noted that the two studies with similar results [4,25] investigated dentists' and dental students' knowledge about COVID-19 information in general and not specifically about dental settings, as was the case with the study from Aljarbou., *et al* [26]. It is suggested that the differences between our results and that study [26] are related to the use of different sets of questions. The author of the previous article highlighted the use of a narrow scope of questions, whereas in our study, we used more comprehensive questions to assess wider areas of knowledge. In addition, the Aljarbou., *et al*. study [26] used a sample from only one region of Saudi Arabia (Riyadh), while we recruited participants from all over Saudi Arabia. It is important that stakeholders in hospitals and dental colleges conduct a series of lectures and continuing education dedicated to improving knowledge about COVID-19 dental settings given the crucial need to cope with the COVID-19 pandemic. In fact, one recent study highlighted the importance of dental students taking extra classes in crisis management [32].

Our study is similar to the Riyadh study [26] that indicated there was no difference in the levels of knowledge between males and females. Our results additionally indicated that other demographic variables, including nationality and type of practice, were also not significantly related to levels of knowledge. Conversely, our data showed that people from the southern region of Saudi Arabia might have lower levels of knowledge in comparison to other regions. However, this finding might be attributed to the low number of participants from the southern area. Future studies might make use of clustered or quota sampling to help confirm such findings.

Our results showed that 25.5% of the participants visited the Saudi CDC (Weqaya) website to get information. This percentage is very similar to a previous study in Saudi Arabia, which had a result of 24.72% [26]. This makes clear that it is important for authorities in hospitals and dental colleges to advise dentists and dental students to visit the Saudi CDC (Weqaya) website for authoritative information. This is particularly important since the Saudi CDC (Weqaya) was transformed into the public health commission by royal decree on March 2, 2021, underscoring the importance of that institution. Dental students and dentists need to receive reliable information about meeting national standards of precautions for coping with COVID-19 as an offset to the rampant spread of misinformation [33,34] on the topic.

It is also important to note that a considerable number of participants used social media to get information on the pandemic (67.9%). Despite the observed efforts of authorities in Saudi Arabia to spread information via social media, local articles might not have investigated their other sources. A Chinese article indicated that social media might be a promising venue for distributing knowledge about COVID-19, but found that is was being underutilized [35]. Thus, it is recommended that future studies be conducted to assess the level of usefulness of social media for distributing accurate information regarding COVID-19 in the future.

Our study had some strengths, including the goal of including dentists and dental students from across Saudi Arabia and the use of more comprehensive questions to assess a wider range of knowledge about COVID-19 in a dental setting. However, there were also some limitations, including the use of a self-reported questionnaire, a small sample size, and the use of convenience sampling. It is recommended that a more extensive study be conducted to assess dentists' and dental students' knowledge about COVID-19 dental settings using a larger sample size, given that a relatively small sample size was used to validate our results.

Conclusion

Dental professionals (students and practicing dentists) in Saudi Arabia have acceptable levels of knowledge about COVID-19 dental settings; however, one of the areas that had lower scores was the vital aspect of the need for a negative respiratory sample in order to stop patient isolation. Eastern region participants had the lowest levels of knowledge, but we found that knowledge increases with more years of practice and with age. We recommend that infection control representatives in dental hospitals and educational bodies provide a number of workshops to improve dental professionals' knowledge about COVID-19 control in a dental setting.

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