

Knowledge, Attitude and Awareness Levels of Dentists in Saudi Arabia Regarding COVID-19 Pandemic

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ABSTRACT

BACKGROUND

Covid-19 is a severe acute respiratory infection spreading worldwide. Sufficient dentists' knowledge, attitudes and correct practices are crucial for the prevention of Covid-19 in Saudi Arabia and all other countries. The objectives of this study were to understand the levels of knowledge, awareness and attitude of dentists in Saudi Arabia regarding Covid-19, and to investigate their treatment approaches in dental practices both before and during the pandemic.

METHODS

This questionnaire was prepared in May 2020 and distributed to dentists working in Saudi Arabia who were members at the Saudi Commission for Health Specialties and Saudi Dental Society. In order to pick the study subjects from our sampling frame, a simple random sampling methodology was used. The questionnaire comprised of a series of questions pertaining to sociodemographic characteristics, the knowledge and attitudes of dentists toward Covid-19, and dental approach before and during the pandemic. The data was statistically analysed to determine any significant association between the dentists' workplace and the measures followed in the dental clinic ($P < 0.05$).

RESULTS

Four hundred and twelve dentists completed the questionnaire forming a response rate of 52 %. The majority of dentists showed a high level of knowledge, attitude and awareness regarding Covid-19. There was an association between the workplace and preventive measures in the dental clinic ($P < 0.05$).

CONCLUSIONS

The majority of dentists in this survey had high knowledge and awareness of Covid-19. Most of them followed the recommended preventive measures in their clinics. As Saudi Arabia still suffers from outbreaks of Covid-19 infection, continuous assessment of dentists' knowledge and practice is crucial.

KEY WORDS

Covid-19, Dentist, SARS-CoV-2, Saudi Arabia

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DOI: 10.14260/jemds/2021/334

How to Cite This Article:

Abduljalil M, Gunal-Abduljalil B, Almasri A.

Knowledge, attitude and awareness levels

of dentists in Saudi Arabia regarding

COVID- 19 pandemic. J Evolution Med Dent

Sci 2021;10(21):1605-1610, DOI:

10.14260/jemds/2021/334

Submission 23-10-2020,

Peer Review 08-03-2021,

Acceptance 16-03-2021,

Published 24-05-2021.

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BACKGROUND

Coronavirus disease 2019 (Covid-19) originated from the city of Wuhan, China. The outbreak of (Covid-19) spread rapidly to other parts of the world.¹ The World Health Organisation (WHO) declared that this outbreak constituted a public health emergency of international concern on January 30, 2020.² This novel coronavirus belongs to a family of single-stranded RNA viruses known as Coronaviridae.³ This family of viruses is known to be zoonotic or transmitted from animals to humans.⁴ Other examples of this family include severe acute respiratory syndrome corona virus (SARS-CoV), which was first identified in 2002, and middle east respiratory syndrome corona virus (MERS-CoV), which was first identified in 2012.⁵⁻⁷ The novel coronavirus was initially named 2019-novel coronavirus (2019-nCoV) and is officially known as severe acute respiratory syndrome corona virus 2 (SARS-CoV-2).⁸

The human-to-human transmission rate of SARS-CoV-2 has increased exponentially since mid-January 2020 and has spread unchecked to countries all over the world, particularly to Europe, North America and Asia-Pacific. Covid-19 was declared a universal epidemic or pandemic, by the WHO on March 11, 2020, with significant changes occurring in professional life as well due to the adverse conditions caused by the pandemic. Most symptoms of SARS-CoV-2 cases are mild or moderate in severity. Dry cough, fever, shortness of breath, and fatigue symptoms are observed in most cases; other symptoms can also manifest, such as muscle pain, head and throat pain, diarrhoea and nausea.⁹

It is an established fact that coronavirus is mainly transmitted through direct contact with the infected person, especially when that person coughs, sneezes or speaks.¹⁰ SARS-CoV-2 is also likely to spread in a relatively closed environment with high concentrations of aerosol. Thus, the environment during routine dental treatments increases the potential risk to dentists, assistant staff and patients.¹¹ Dentists are at high risk of contracting Covid-19, due to face-to-face communication with patients; exposure to saliva, blood and other body fluids; and use of sharp instruments for the dental procedures. In fact, it has been stated that dentists are more likely to be affected by the new coronavirus disease than other doctors and nurses.¹² In this critical era, understanding the spread of an airborne disease and its seriousness in dentistry necessitates application of special measures in addition to the standard precautions.¹³ Practical guidelines have been recommended for dentists and dental staff by the Centers for Disease Control and Prevention (CDC), the American Dental Association (ADA) and the WHO in order to control the spread of Covid-19.¹⁴⁻¹⁶

The Covid-19 pandemic spread to the Kingdom of Saudi Arabia (KSA) was on March 2, 2020, when the Ministry of Health confirmed the first case in the kingdom.¹⁷ From that date through October 17, 2020, the world has experienced more than 39 million confirmed cases of Covid-19, including approximately 1.1 million deaths, reported to the WHO. In Saudi Arabia, in the same time span, there have been 341,495 confirmed cases of Covid-19, with 5, 144 deaths.¹⁸ Since the KSA is one of the countries affected by the Covid-19 pandemic, it is important that dentists in the KSA follow these guidelines / recommendations.

This cross-sectional study aimed to understand the level of knowledge, awareness and attitude of dentists in Saudi Arabia regarding the Covid-19 pandemic, and to contribute to the scientific data in the field of dentistry by investigating treatment approach in dental practice before and during the pandemic.

METHODS

After ethical approval was obtained from the Scientific Research Ethics Evaluation Board (YDU / 2020 / 79 - 1078), an online questionnaire was designed in Google Forms. The study population consisted of dental health professionals working in different states of Saudi Arabia who were members at the Saudi Commission for Health Specialties and the Saudi Dental Society. This survey was distributed randomly to those dentists who were practicing dentistry in May 2020. In order to pick the study subjects from our sampling frame (list of all practicing dentists), sample size was taken based on the conveniences of the study.

The data was collected through two methods - 1) sending the questionnaire by email or other social media to the dentists; 2) getting in direct contact with participants at their workplace. The questionnaires were anonymous in order to maintain the privacy and confidentiality of all participants (and their information) in the study.

The survey questions were designed following a review of relevant literature, along with national and international guidelines from the World Health Organization (WHO), Centre for Disease Control (CDC), and Saudi Ministry of Health (MOH) regarding Covid-19.¹⁴⁻¹⁶ The questionnaire consisted of a series of questions pertaining to sociodemographic characteristics, the dentists' knowledge and attitudes of dentists toward Covid-19, and dental approaches before and during the pandemic.

The questions were multiple-choice, and the questionnaire was divided into four sections: dentists' demographic and profession-related characteristics, dentists' awareness regarding SARS-CoV-2 data, dental approaches before and during the pandemic, and infection control measures for preventing Covid-19.

Statistical Analysis

The data was entered into Excel (Microsoft Corporation, Redmond, WA, USA) and processed with the statistical software International Business Machines Statistical Package for the Social Sciences (IBM SPSS) Statistics (version 22.0; IBM Corp., Armonk, NY, USA). Chi-square tests were used to determine significant associations between the dentist's workplace and the measures followed in the dental clinic. For statistical analyses, P values of < 0.05 were accepted as statistically significant.

RESULTS

A total of 412 dentists completed the questionnaire forming a response rate of approximately 52 %. Table 1 summarises the characteristics of the dentists enrolled in the study. Two

hundred twenty-eight of the respondents were men, and 184 were women. Age was divided into two sections: < 30 (26.5 %) and ≥ 30 (73.5 %). The majority of the participants were general practitioners (65.3 %) and only 15.5 % of them were academicians. The respondents worked in different health sectors, although most of them worked in special clinics. The dentists ranged widely in their years of professional experience.

	Variable	Number (Percent)
Age	< 30	109 (26.5 %)
	≥ 30	303 (73.5 %)
Gender	Male	228 (55.3 %)
	Female	184 (44.7 %)
Specialty in dentistry	General practitioner	269 (65.3 %)
	Specialist	143 (34.7 %)
Occupation	Dental practitioner	348 (84.5 %)
	Academician	64 (15.5 %)
Health sector	Governmental hospital	56 (13.6 %)
	Private hospital	117 (28.4 %)
	Private clinic	151 (36.6 %)
	Governmental university	37 (8.9 %)
	Private university	51 (12.5 %)
Years of experience in the profession	1 - 5 years	137 (33.2 %)
	6 - 10 years	101 (24.5 %)
	11 - 15 years	90 (21.9 %)
	≥ 16 years	84 (20.4 %)

Table 1. Characteristics of the 412 Dentists Enrolled in the Study

	Variable	Number (Percent)
Symptoms of Covid-19	Fever	408 (99 %)
	Cough	391 (94.9 %)
	Difficulty breathing	403 (97.8 %)
	Fatigue	307 (73.8 %)
	Muscle or body aches	333 (80.8 %)
	Headache	356 (86.4 %)
	Loss of taste or smell	356 (86.4 %)
	Congestion or runny nose	265 (64.3 %)
	Nausea or vomiting	219 (53.2 %)
	Diarrhoea	246 (59.7 %)
Transmission methods of Covid-19	Between people who are in close contact	386 (93.7 %)
	Infected person coughs	388 (64.2 %)
	Infected person sneezes	385 (93.4 %)
	Infected person talks	317 (76.9 %)
Incubation period	Touching the infected surfaces	405 (98.3 %)
	2 - 14 days	282 (68.4 %)
	1 - 7 days	6 (1.5 %)
	7 - 14 days	69 (16.7 %)
People in high risk to get infected	14 - 21 days	55 (13.3 %)
	Older adults (more than 65 years)	281 (68.2 %)
	People with asthma	270 (65.5 %)
	People with liver diseases	142 (34.5 %)
	People with chronic lung disease	269 (65.3 %)
	People with diabetes	205 (49.8 %)
	People who have serious heart conditions	229 (55.6 %)
	People with severe obesity	129 (31.3 %)
	People who are immunocompromised	254 (61.7 %)
	All of them are in high risk	215 (52.2 %)
N95 masks are available in different sizes	True	276 (67 %)
	Wrong	29 (7 %)
	No idea	107 (26 %)
When do you change N95 mask if you use it?	After every patient	64 (15.5 %)
	Once a day	190 (46.1 %)
	When becomes dirty or wet	35 (8.5 %)
	After using devices produce aerosol	68 (16.5 %)
In addition to N95, FDA suggested using of Equivalent masks such as KN / KP95, PFF2, P2, DS / DL2, KOREAN SPECIAL 1st	True	251 (60.9 %)
	Wrong	6 (1.5 %)
	No idea	155 (37.6 %)

Table 2. Dentists' Awareness Regarding SARS-CoV-2 Disease.

In the second section of the questionnaire, questions about Covid-19 information were prepared and asked the

participants to investigate their awareness. The questions and the dentists' responses are shown in Table 2. Most participants stated that they knew the main symptoms of SARS-CoV-2 (fever, cough, difficulty breathing, fatigue, muscle or body aches, loss of taste or smell), and half of the respondents also knew the other symptoms in addition to the main ones which were confirmed by CDC (headache, congestion or runny nose, nausea or vomiting, diarrhoea). Approximately 90 % of the participants knew the transmission methods of Covid-19 including people who are in close contact, infected person coughs, infected person sneezes, infected person talks, touching the infected surfaces. When asked about the incubation period, 68.4 % of the respondents knew that the period was 2 - 14 days.

	Variable	Number (Percent)
Equipment used before Covid-19 pandemic period	Surgical mask	394 (95.6 %)
	N95 mask	24 (5.8 %)
	Gloves	396 (96.1 %)
	Eye protection glasses	335 (81.3 %)
	Disposable lab coat	296 (71.8 %)
	Face shield	286 (69.4 %)
	Dental cap	122 (29.6 %)
Equipment used during Covid-19 pandemic period	Shoes cover	227 (55.1 %)
	Surgical mask	193 (46.8 %)
	N95 mask	298 (72.3 %)
	Gloves	405 (98.3 %)
	Eye protection glasses	376 (91.3 %)
	Disposable lab coat	396 (96.1 %)
	Face shield	394 (95.6 %)
Frequency of washing the lab coat before Covid-19 pandemic	Dental cap	311 (75.5 %)
	Shoes cover	367 (89.1 %)
	Disposable lab coat (one use)	182 (44.2 %)
Frequency of washing the lab coat during Covid-19 pandemic	Once a day	129 (31.3 %)
	2 - 3 times a week	90 (21.8 %)
	Disposable lab coat (one use)	323 (78 %)
Going out somewhere with the same clothes worn in the clinic before Covid-19 pandemic period	Once a day	84 (20 %)
	2 - 3 times a week	5 (2 %)
Going out somewhere with the same clothes worn in the clinic during Covid-19 pandemic period	Yes	305 (74 %)
	No	107 (26 %)
Frequency of changing the surgical mask before Covid-19	Yes	17 (4.1 %)
	No	395 (95.9 %)
	After every patient	341 (82.8 %)
Frequency of changing the surgical mask during Covid-19	After 2 - 3 patient	31 (7.5 %)
	Once a day	15 (3.6 %)
	After using devices produce aerosol	22 (5.3 %)
Working hour changing after Covid-19	After every patient	379 (92 %)
	After 2 - 3 patient	6 (1.5 %)
	Once a day	8 (1.9 %)
Frequency of changing the surgical mask during Covid-19	After using devices produce aerosol	13 (3.2 %)
	Working hours decreased	300 (72.8 %)
	Working hour increased	0 (0 %)
	Same working hours	10 (2.4 %)
The clinic completely closed	The clinic completely closed	102 (24.8 %)

Table 3. Dentists' Approaches in the Dental Practices before and during Covid-19 Pandemic.

The CDC has stated that older adults, people with asthma, liver diseases, chronic lung disease, diabetes, serious heart conditions, severe obesity and people who are immunocompromised are at higher risk for severe illness and need to take extra precautions.¹⁵ These high-risk groups were identified by half of the dentists in this survey. Additionally, 67 % of the respondents knew that the N95 mask has different sizes, and about 61 % of them reported that the following statement is true "The Food and Drug Administration (FDA) recommended using masks equivalent to N95 quality during the Covid-19 period such as KN / KP95, PFF2, P2, DS / DL2,

and Korean special 1st". This information about N95 masks was derived from the FDA.¹⁹ The third part of the questionnaire consisted of questions about the dentists' approaches in their dental practices, both before and during Covid-19 pandemic. The first question was about the equipment used by dentists to prevent infections. Three hundred ninety-four dentists stated using surgical masks before the pandemic; this number decreased during the pandemic, and the use of N95 mask increased (72.3 %). Respondents' use of other protective equipment such as eye protection glasses, disposable lab coats, face shields, dental caps and shoe covers increased after the outbreak of the pandemic. The pre-pandemic frequencies of washing the lab coat were increased by washing the lab coat every day, washing 2 - 3 times a week, or using a disposable lab coat. However, 78 % of the respondents stated that they use disposable lab coats during the pandemic. Approximately 96 % of the dentists stated that they do not leave the clinic with the same lab coat during the pandemic. Majority of the participants reported changing the surgical mask after every patient, both before and during the pandemic. The working hours of 300 respondents decreased after the pandemic outbreak (Table 3).

The final part of the questionnaire included questions about the dentists' attitudes in preventing Covid-19 infection in the clinic (Table 4). The CDC suggests measuring the body temperature of workers in dental clinics twice a day. 46.4 % of the respondents in the study measured temperature once a day and 47.8 % measured temperature twice a day. The dentists were asked about the dental procedures performed in their clinics and most of them (81.1 %) stated that they performed procedures only for the emergency cases (pain, swelling or trauma), while 31.6 % stopped all dental procedures during Covid-19. The measures taken for preventing Covid-19 transmission in dental clinics were asked and the responses are summarised in Table 4. Of the participants, 44.2 % followed all the preventive measures in the clinic which was suggested by the CDC.

The last question asked was whether the dentists followed any prevention measures when using devices that produce aerosol.

Table 5 shows the association between dentists' workplaces and the measures followed in the dental clinic. Chi-square tests showed that there were associations between the dentists' workplace and the measures except for avoiding intra-oral x-rays and making the patients rinse their mouth before starting the treatment with P values of 0.418 and 0.716, respectively.

	Variable	Number (Percent)
How many times do you check the dental workers temperature?	Once a day	191 (46.4 %)
	2 times a day	197 (47.8 %)
	Once a week	9 (2.2 %)
The dental procedures that you perform during Covid-19 period	Only emergency cases	334 (81.1 %)
	Stopped all dental procedure during Covid-19	130 (31.6 %)
	Restorative fillings	32 (7.8 %)
	Non-emergency endodontic treatment	23 (5.6 %)
	Non-emergency tooth extraction	21 (5.1 %)
	Periodontal scaling	16 (3.9 %)
	Prosthetic	12 (2.9 %)
Infection control measures in the dental clinic during Covid-19 period	Orthodontic treatment	11 (2.7 %)
	Surgical procedures	32 (7.8 %)
	Taking the main complaint from the patients via telephone before accepting them in the clinic	318 (77.2 %)
	Allow only the patient to enter the clinic without their relatives	370 (89.8 %)
	Taking the patient's temperature and asking about any Covid-19 symptoms within 14 days	359 (87.1 %)
	Provide the social distance (2 m) between patients in the waiting room	271 (65.8 %)
	Avoid intraoral x-rays	293 (71.1 %)
	Make the patients to rinse their mouth with hydrogen peroxide or povidone before starting the treatment	187 (45.4 %)
	Avoid using devices produce aerosol as much as possible	319 (77.4 %)
	Heat sterilisation of the handpiece if used after every patient	341 (82.8 %)
If the devices produce aerosol, the following measures are applied	Sufficient ventilation after every patient in the clinic	352 (85.4 %)
	Using absorbable sutures in surgical cases	254 (61.7 %)
	4-handed technique (with the nurse)	311 (75.5 %)
	Using high vacuum suction	330 (80.1 %)
	Using rubber dam	285 (69.2 %)
	I do nothing	106 (25.7 %)

Table 4. Dentists' Attitude Toward Dental Procedures in Preventing Covid-19 Infection

		Governmental Hospital	Private Hospital	Private Clinic	Governmental University	Private University	P Values
1. Taking the main complaint from the patients via telephone before accepting them in the clinic	Yes	39 (69.6 %)	77 (65.8 %)	118(78.1 %)	37 (100 %)	47 (92.1 %)	0.000*
	No	17 (30.4 %)	40 (34.2 %)	33 (21.9 %)	0 (0.0 %)	4 (7.9 %)	
2. Allow only the patient to enter the clinic without their relatives	Yes	56 (100 %)	95 (81.2 %)	139(92.1 %)	33 (89.2 %)	47 (92.2 %)	0.002*
	No	0 (0.0 %)	22 (18.8 %)	12 (7.9 %)	4 (10.8 %)	4 (7.8 %)	
3. Taking the patient's temperature and asking about any Covid-19 symptoms within 14 days	Yes	44 (78.6 %)	96 (82.1 %)	133 (88 %)	33 (89.2 %)	51 (100 %)	0.015*
	No	12 (21.4 %)	21 (17.9 %)	18 (12 %)	4 (10.8 %)	0 (0.0 %)	
4. Provide the social distance (2 m) between patients in the waiting room	Yes	27 (48.2 %)	60 (51.3 %)	123(81.5 %)	22 (59.5 %)	39 (76.5 %)	0.000*
	No	29 (51.8 %)	57 (48.7 %)	28(18.5 %)	15 (40.5 %)	12 (23.5 %)	
5. Avoid intra-oral x-rays	Yes	40 (71.4 %)	76 (65 %)	109(72.2 %)	29 (78.4 %)	39 (76.5 %)	0.418
	No	16 (28.6 %)	41 (35 %)	42 (27.8 %)	8 (21.6 %)	12 (23.5 %)	
6. Make the patients to rinse their mouth with hydrogen peroxide or povidone before starting the treatment	Yes	24 (42.9 %)	48 (41 %)	73 (48.3 %)	19 (51.4 %)	23 (45.1 %)	0.716
	No	32 (57.1 %)	69 (59 %)	78 (51.7 %)	18 (48.6 %)	28 (54.9 %)	
7. Avoid using devices which produce aerosol as much as possible	Yes	48 (85.7 %)	72 (61.5 %)	119(78.8 %)	33 (89.2 %)	47 (92.2 %)	0.000*
	No	8 (14.3 %)	45 (38.5 %)	32 (21.2 %)	4 (10.8 %)	4 (7.8 %)	
8. Heat sterilisation of the hand piece if used after every patient	Yes	40 (71.4 %)	90 (76.9 %)	142 (94 %)	26 (70.3 %)	43 (84.3 %)	0.000*
	No	16 (28.6 %)	27 (23.1 %)	9 (6 %)	11 (29.7 %)	8 (15.7 %)	
9. Sufficient ventilation after every patient in the clinic	Yes	56 (100 %)	96 (82.1 %)	124(82.1 %)	33 (89.2 %)	43 (84.3 %)	0.014*
	No	0 (0 %)	21 (17.9 %)	27 (17.9 %)	4 (10.8 %)	8 (15.7 %)	
10. Using absorbable sutures in surgical cases	Yes	40 (71.4 %)	54 (46.2 %)	91 (60.3 %)	26 (70.3 %)	43 (84.3 %)	0.000*
	No	16 (28.6 %)	63 (53.8 %)	60 (39.7 %)	11 (29.7 %)	8 (15.7 %)	

Table 5. Comparison of the Results of Infection Control Measures in the Dental Clinic According to the Dentists' Workplaces

DISCUSSION

The current study investigated the attitude and awareness levels of dentists in the Kingdom of Saudi Arabia regarding Covid-19, and it evaluated their approaches in dental procedures both before and during the pandemic. However, healthcare facilities are necessarily required for any society and are rarely closed under such pandemic conditions. Healthcare professionals are exposed to a higher risk of getting infected due to their close contact with potentially-infected patients.²⁰ Dentists, in particular, perform their treatment procedures not only in close contact with patients but they also are exposed to aerosol and droplets from patients' oral cavities.^{8,20} Therefore, dentists have a high risk of getting infected from patients and potentially spreading it to their peers, families and other patients.

This study included a sample of dentists working in the KSA, with male dentists consisting of a greater share of the participants compared to female dentists. This is inconsistent with the results of some previous studies,^{10,21} but in agreement with another previous study.²² In a recent study, it was reported that the long questionnaire could decrease the response rate by the respondents,²³ therefore, we tried to make the survey in this study short and comprehensive about Covid-19 pandemic. The response rate of this cross-sectional study was 52 %.

In the present survey, dentists' awareness about SARS-CoV-2 was demonstrated clearly. Most of them stated that they knew the main symptoms of Covid-19, and half of the respondents knew the other symptoms. Additionally, the transmission modes of Covid-19 were identified by approximately 90 % of the dentists in this survey. These findings are similar to the findings from a previous cross-sectional study carried out with dentists in Jordan.¹⁰ In this questionnaire, 68.4 % of the respondents knew that the incubation period was 2 - 14 days, which was confirmed by the CDC. Gaffar et al.²² reported that < 50 % of dentists of their study in Saudi Arabia knew about the virus incubation period of MERS which did not match with the results of the present study.

A previous study regarding MERS-CoV carried out with dental students in Riyadh, Saudi Arabia, showed that the majority of the respondents knew the correct incubation time of MERS-CoV and this was in agreement with our study.²⁴ Similar to the results of recent surveys carried out in Saudi Arabia regarding MERS,²⁵ and in Jordan regarding Covid-19,¹⁰ the results of the present study showed that the majority of the respondents were aware of the transmission modes of Covid-19.

The results also showed the dentists' awareness of measures to prevent infection transmission in dental clinics, both before and after the outbreak of the SARS-CoV-2 pandemic. Three hundred ninety-four dentists stated using surgical masks before the pandemic. This number decreased during the pandemic, and the use of N95 mask increased (72.3 %). Dentists' use of other protective equipment such as eye protection glasses, disposable lab coats, face shields, dental caps and shoe covers increased after the pandemic outbreak. Approximately 96 % of the dentists stated that they do not

leave the clinic with the same lab coat during the pandemic. Relatedly, Khader et al.¹⁰ stated that personal protective equipment like dental goggles, masks and gloves are used by 92.9 % of the dentists in Jordan during the pandemic, and the use of facemasks by dentists in Jordan has increased since the start of the outbreak. Additionally, the working hours of 300 respondents in this study decreased after the pandemic broke out.

During the outbreak of Covid-19, dentists should evaluate the risk of transmission by measuring the temperature of every staff member twice a day according to the guidelines of WHO and CDC.^{14,15} 46.4 % of the participants measured the temperature once a day and 47.8 % measured temperature twice a day. According to ADA recommendations, only the dental procedures of emergency cases should be performed during Covid-19 pandemic period.

The results of this study showed that most of the dentists (81.1 %) performed procedures only for the emergency cases (pain, swelling or trauma), while 31.6 % stopped all dental procedures during Covid-19. A previous study on emergency dental procedures and Covid-19 shared similar findings to those in this study.²¹ More than 80 % of the participants in the present survey stated that they apply the infection control measures recommended by CDC and WHO like allowing only the patient to enter the clinic (without their relatives), checking the patient's temperature and asking about any Covid-19 symptoms within 14 days, avoiding as much as possible the use of devices that produce aerosol, using heat sterilisation of the handpiece after every patient, and providing sufficient ventilation after every patient in the clinic.

In addition, majority of the dentists followed the preventive measures when using devices that produce aerosol. These measures, recommended by ADA, include using a 4-handed technique, high vacuum suction and a rubber dam. These results were in agreement with the results of previous cross-sectional studies.^{10,22} A 4-handed technique is useful for infection control, and the use of saliva ejectors with low or high volume suction reduces droplets and aerosol production.⁸

The use of a rubber dam is an effective way to control cross-infection by limiting the spread of aerosols, with good patient acceptance for dental procedures.²⁶ The use of high-volume suction is also considered an essential means to control aerosol evacuation during dental procedures and should be used for majority of patients.¹¹ Rinsing with mouthwash containing anti-viral agents (such as povidone-iodine) at the start of any dental procedure has been effective against various respiratory viruses.²⁷

Our study had some limitations. First, the cross-sectional nature of the study can only prove association and not a cause-effect relationship. Second, the study was subjected to selection bias and sampling error, as participants were approached using social media, dedicated mailing lists and forums.

Thirdly, the relatively low response rate resulted in a smaller than expected sample size. This could have been due to the short period of data collection. However, this is considered a moderate sample size.

CONCLUSIONS

Within the limitations of this study, the results showed that the majority of dentists in this survey had high knowledge and awareness of Covid-19. Most of them followed the recommended preventive measures in their clinics. As the KSA still suffers from outbreaks of Covid-19 infection, continuous assessment of healthcare professionals' knowledge and practices especially among dentists is crucial.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jemds.com.

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