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Awareness, Knowledge and Risk Perception of COVID -19 among Dental Health Care Professionals and its Impact on Clinical Dental Practice and Oral Healthcare Delivery in the Western Region of Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. Author SS designed the study, managed the literature searches, wrote the protocol and finalised the manuscript. Authors LSA, JAA, RKA and NSH were responsible for the data collection and wrote the first draft of the manuscript. Author SP performed the statistical analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The outbreak of novel coronavirus disease (COVID-19) has influenced every aspect of life. Healthcare professionals, especially dentists, are exposed to a higher risk of getting infected due to close contact with infected patients primarily through aerosol generated procedures. This study aimed to assess the awareness and risks of getting infected among dentists in the western region of Saudi Arabia, while working during the current novel coronavirus disease (COVID-19) pandemic. In addition, dentists' knowledge about various practice modifications to combat COVID-19 cross infection and spread were evaluated.

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Materials and Methods: A total of 329 participants including 123 males and 196 females responded to an online questionnaire consisting of 30 questions, which was circulated among all kinds of dental healthcare professionals through social media and e-mails after obtaining approval from the institutional ethical committee.
Results: Chi square tests revealed significant differences when comparing the responses of the participants based on qualification with regard to key responses related to awareness and practice perceptions such as HEPA filters, pulse oximeter, wearing an N-95 mask, using a face shield, a High volume suction and rubber dam.($p<0.05$)
Conclusion: Although, there were variations in responses among the various dental professionals, it can be concluded that it is important to ensure increased knowledge and awareness of covid -19 risks and transmission which is absolutely essential in dental practice to ensure optimal oral care during the ongoing pandemic.

Keywords: Dental practice; dental professionals; COVID-19; aerosol; infection control.

1. INTRODUCTION

The corona virus (COVID-19),a virus that belongs to the coronaviridae ; is a large , single and a plus-stranded RNA genome, that started to spread from Wuhan , China by the end of 2019 and by the beginning of 2020, the WHO declared it as an international public health emergency affecting more than 2 million people [1] and announced that this disease is controllable and has the capacity to cause a severe acute respiratory tract infection in relation to the infected individual . It is usually transmitted from one individual to another through infected saliva or nasal droplets, contaminated hands or surfaces. [2,3] The virus has an incubation period ranging from 4 to 14 days and the infected individual usually complains of upper respiratory tract infection in addition to high-grade fever , dry cough and dyspnea (difficulty in breathing) [4].

Covid-19 has a very typical mode of transmission which is a direct transmission by sneezing, coughing, inhalation of airborne particles and any contact that will lead to the virus reaching any part of mucus membrane such as mouth, eye or nose. Even though no eye related symptoms were reported, studies have shown that the eye's mucus membrane can be a pathway for the virus to penetrate [5]. Studies have also shown that the virus can be transmitted via direct or indirect contact with the saliva [6].

Over the past year,there have been various approaches to manage the infected individuals, which ranged from supportive therapy in particular, vitamin A,C and D, chloroquine phosphate and general healthcare until the infected individual's immunity could eliminate the infection by itself [7]. Older individuals with chronic disease who get infected have a poorer prognosis as compared to young people with good health and a stronger immune system. Even though COVID-19 has a low mortality rate, the rate at which it was spreading, was high enough to force many countries to shut down schools, universities, events, offices and work places and governments had even encouraged people to stay home in self-quarantine in an attempt to restrict the massive spread of this infection.

Hospitals and health care units are hardly ever shutdown in such circumstances which puts all workers in healthcare facilities at higher risk of getting the infection as a consequence of their frequent exposure to the infected individuals. One of the greatest challenges are faced by dentists, since their profession puts them in a position where they are at high risk of being exposed to infected individuals repeatedly and then transmitting the infection to their families and the other patients coming into the dental clinics .

Patients having the virus in their systems and showing symptoms (symptomatic patients) are the primary source of infection but recent studies have shown that patient without symptoms (asymptomatic patients) or patients in the incubation period may also act as carriers of the virus as also patients who are recovering may also be a possible source of infection [8].

Studies have also indicated that the virus can become airborne by the production of aerosols during dental treatment , especially in a very humid and closed environment such as the patient's mouth [9]. Aerosol transmission is a potent way of transmission between the dentist or dental assistant and the patient [10].

In March 2020 the ministry of health of Saudi Arabia stated that Saudi Arabia reported the first confirmed case of Covid-19 [11].Since then, the number of positive cases kept climbing up leading to a complete lockdown for 3 months and suspension of most activities. However, healthcare facilities including dental setups continued with their services and based on the guidelines laid down by WHO, CDC and ADA, it was felt that there was a need to assess and evaluate the knowledge and awareness of all individuals practicing dental care about the risks involved and methods of safety protocols to be followed.

The present study aimed to assess awareness of dental practitioners about getting infected with the corona virus. Moreover, the knowledge and risk awareness among dental and para dental practitioners' about perception of clinical practice during COVID 19 crisis was evaluated. The present survey was an attempt to understand this important dogma in dental practice as evidenced in the western region of Saudi Arabia.

2. MATERIALS AND METHODS

Following the approval from the institutional ethical committee (H -03-09062020), the present cross-sectional study was conducted using an online survey questionnaire from 1st of June to 31st of July 2020. A well-developed questionnaire was designed using google.com/forms/about/. Validation of the questionnaire was done using intra class correlation (0.77). The online survey link was spread through social media such as WhatsApp, Instagram and Twitter as well through e-mails. A variety of Dental and paradental professionals were involved in this survey ranging from students, practitioners, specialists, consultants to faculty. The questionnaire comprised of a total of 30 questions, which were divided into four sections. The first section contained only one question was basically a consent to participate in the survey. Participants who clicked “no” were automatically excluded from the study.The second section was designed to gather the demographic data of the participant. The third section focused on the awareness of dental practitioners about getting infected with corona virus and the mode of transmission. The fourth section was designed to gather information about the Knowledge and the risk perception in clinical practice of dentists about COVID 19. A total of 329 participants from the western region in Saudi Arabia were sent the link to participate in this survey based study of which, 319 consented consisting of 123 males and 196 females , ages ranging from 20-60 years.

2.1 Statistical Analysis

The responses obtained following the survey was directly fed into the excel sheets from which the data was processed using SPSSV22 statistical software using Chi-square tests and p value of less than 0.05 was considered significant.

3. RESULTS

The study population consisted of 319 participants, 123 males (38.6%) and 196 females (61.4%), of which 257 were under 30years (80.6%), 32 under 40 years (10%), 26 under 50years (8.2%) and 4 over 50years (1.3%). Majority of the participants were undergraduates (34.8%) followed by interns (31.3%) and general practitioners (18.2%). The remaining participants consisted of postgraduates (2.8%), specialists (4.1%), consultants (3.4%) and faculty (5.3%). Most of the participants worked in private clinics (55.8%) followed by 28.5% that worked in an institute and 15.7% that worked in a hospital. All the participants worked in a private set-up.

94.7% of the participants were aware If the risk of getting infected from a patient or co-worker whereas 3.8% were not and 1.6% had no idea. 70.5% thought it was not at all safe to provide treatment to a patient who is suspected of being infected with Covid -19 and 24.5% thought it was safe whereas the remaining 5% had no idea whether it was safe or not. A good number of patients (57.4%) wanted to stop dental practice until the number of covid-19 cases started declining, however, 33.9% did not want to stop and 8.8% were not sure whether or not they wanted to. 95% of the participants agreed that they may be at risk of carrying the infection from their dental practice back to their families whereas 3.8% were unaware of the risk and 1.3% had no idea about the risk. 90.3% of them were aware that saliva may be a carrier of the virus in asymptomatic covid positive paients, 5% were not and 4.7% had no idea about this. 92.2% were aware of the mode of transmission of the virus and 4.7% were unaware and a further 3.1% had no idea about it.

56.1% were aware of antimicrobial rinses that may be used before starting any aerosol generating procedures. On the other hand, 26% were unaware of this and a further 17.9% had no idea. 73.4% of the participants were aware of

PPE to be adopted for aerosol generating procedures whereas 14.1% were unaware and 12.5% had no idea about PPE. 46.4% were aware of the pulse oximeter and its applications for dental patient management during dental procedures whereas 32.3% were unaware and 21.3% had no idea about pulse oximeter. 47% of the participants were aware of the role of HEPA filters in dental practice set-up and 32.3% were unaware and an additional 20.7% had no idea about HEPA filters.

73% of the study population were updated with the current CDC/WHO guidelines for cross infection control regarding covid 19 whereas 27% were not. 79% of the participants were currently asking every patient's history related to travel and contact with affected persons before performing dental treatment whereas 13.2% were not and 7.8% had no idea about this. 76.2% currently took every patient's body temperature before performing dental treatment with 17.6% not doing so and 6.3% had no idea about this. 75.2% of the participants deferred treatment of patients showing suspicious symptoms or coming from a demographic area endemic to COVID -19 whereas 16.9% did not and 7.8% had no idea about it. 23.5% of the participants thought the surgical mask is enough to prevent cross infection whereas 71.2% did not think so and 5.3% had no idea about it. 83.7% of the study population felt N-95 mask should be routinely worn in dental practice due to the current covid-19 outbreak whereas 11% did not think so and 5.3% had no idea. 36.1% claimed to have worn N 95 masks while treating a patient in their dental practice while 55.5% have never worn it and 8.5% had ni idea. 84% of the participants routinely follow universal precautions of infection control for every patient and 6.6% did not do so while 9.4% had no idea about the same. 43.9% used high volume suction

Table 1. Demographic data

Gender		
	Frequency	Percent
MALE	123	38.6
FEMALE	196	61.4
Total	319	100.0
Age		
	Frequency	Percent
20-29	257	80.6
30-39	32	10.0
40-49	26	8.2
>50	4	1.3
Total	319	100.0
Qualification		
	Frequency	Percent
UG	111	34.8
INTERN	100	31.3
GP	58	18.2
PG	9	2.8
specialist	13	4.1
consultant	11	3.4
faculty	17	5.3
Total	319	100.0
Work Place		
	Frequency	Percent
hospital	50	15.7
clinic	178	55.8
institute	91	28.5
Total	319	100.0
Work Setting		
	Frequency	Percent
Private	319	100.0
Semi private	0	0
Government	0	0

Table 2. Awareness of risk perception

		Yes	No	No idea	Total
1-Are you aware of the risk of getting infected with COVID-19 from a patient and co-worker?	Frequency	302	12	5	319
	Percent	94.7	3.8	1.6	100.0
2-Do you think it is safe to provide treatment to a patient who is coughing or suspected of being infected with COVID-19?	Frequency	78	225	16	319
	Percent	24.5	70.5	5.0	100.0
3-Do you want to stop dental practice/ treating patients until the number of COVID-19 cases starts declining?	Frequency	183	108	28	319
	Percent	57.4	33.9	8.8	100.0
4-Are you aware that you may be at risk to carry the infection from your dental practice back to your family?	Frequency	303	12	4	319
	Percent	95.0	3.8	1.3	100.0
5-Are you aware that saliva may be a carrier of the virus in asymptomatic COVID positive patients?	Frequency	288	16	15	319
	Percent	90.3	5.0	4.7	100.0
6-Are you aware of the mode of transmission of COVID-19?	Frequency	294	15	10	319
	Percent	92.2	4.7	3.1	100.0
7-Are you aware of any antimicrobial rinses that may be used before starting any aerosol-generating procedures?	Frequency	179	83	57	319
	Percent	56.1	26.0	17.9	100.0
8-Are you aware of the PPE to be adopted for aerosol-generating procedures?	Frequency	234	45	40	319
	Percent	73.4	14.1	12.5	100.0
9-Are you aware of the pulse oximeter and its applications for dental patient management?	Frequency	148	103	68	319
	Percent	46.4	32.3	21.3	100.0
10-Are you aware of the role of HEPA filters in dental practice?	Frequency	150	103	66	319
	Percent	47.0	32.3	20.7	100.0

Table 3. Knowledge and practice of COVID -19 protocols in dental clinics

Frequency Table - Perceptions				
		Yes	**No**	
1-Are you updated with the current CDC or WHO guidelines for cross-infection control regarding COVID-19?	Frequency	233	86	
	Percent	73.0	27.0	
		yes	no	No idea
2-Are you currently asking every patient's history related to travel and contact with affected persons before performing dental treatment?	Frequency	252	42	25
	Percent	79.0	13.2	7.8
		yes	no	No idea
3-Are you currently taking every patient's body temperature before performing dental treatment?	Frequency	243	56	20
	Percent	76.2	17.6	6.3
		yes	no	No idea
4-Are you deferring dental treatment of patients showing suspicious symptoms or coming from a demographic area endemic to COVID -19??	Frequency	240	54	25
	Percent	75.2	16.9	7.8
		yes	no	No idea
5-Do you think surgical mask is enough to prevent cross-infection of COVID-19?	Frequency	75	227	17
	Percent	23.5	71.2	5.3
		yes	no	No idea
6-Do you think N-95 mask should be routinely worn in dental practice due to the current outbreak?	Frequency	267	35	17
	Percent	83.7	11.0	5.3
		yes	no	No idea
7-Have you ever worn an N-95 mask while treating a patient in your dental practice?	Frequency	115	177	27
	Percent	36.1	55.5	8.5
		yes	no	No idea
8-Do you routinely follow universal precautions of infection control for every patient?	Frequency	268	21	30
	Percent	84.0	6.6	9.4
		yes	no	No idea
9-Do you use high-volume suction in your practice for every patient?	Frequency	140	147	32
	Percent	43.9	46.1	10.0
		yes	no	No idea
10-Do you use rubber dam isolation for every patient?	Frequency	221	54	44
	Percent	69.3	16.9	13.8
		yes	no	No idea
11-Do you ask every patient to rinse his/her mouth with anti-microbial mouthwash before treatment?	Frequency	103	151	65
	Percent	32.3	47.3	20.4
		yes	no	No idea

Frequency Table - Perceptions				
		Yes	No	
12-Do you use a face shield while performing any dental procedures?	Frequency	219	40	60
	Percent	68.7	12.5	18.8
		yes	no	No idea
13-Do you attend to emergency calls on your mobile phone while performing dental procedures?	Frequency	90	170	59
	Percent	28.2	53.3	18.5
		yes	no	No idea
14-Do you wash hands with soap and water/ use sanitizer before and after treatment of every patient?	Frequency	289	8	22
	Percent	90.6	2.5	6.9

Table 4. Comparison of awareness responses based on designation

Awareness of the Covid infection	Under graduate (111)		Dental Intern (100)		General Dentist (58)		Post Graduate (9)		Specialist (13)		Consultant (11)		Faculty (17)		Total (319)		χ2 /P-value
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
1-Are you aware of the risk of getting infected with COVID-19 from a patient and co-worker? (319)	108	97.3	93	93.0	53	91.4	9	100.0	13	100.0	10	90.9	16	94.1	302	94.7	8.59/0.737
2-Do you think it is safe to provide treatment to a patient who is coughing or suspected of being infected with COVID-19?	44	39.6	18	18.0	6	10.3	3	33.3	3	23.1	2	18.2	2	11.8	78	24.5	33.71/0.001*
3-Do you want to stop dental practice/ treating patients until the number of COVID-19 cases starts declining?	69	62.2	56	56.0	27	46.6	5	55.6	10	76.9	3	27.3	13	76.5	183	57.4	19.92/0.069
4-Are you aware that you may be at risk to carry the infection from your dental practice back to your family?	107	96.4	95	95.0	56	96.6	8	88.9	12	92.3	9	81.8	16	94.1	303	95.0	13.40/0.341
5-Are you aware that saliva may be a carrier of the virus in asymptomatic COVID positive patients?	99	89.2	90	90.0	52	89.7	9	100.0	12	92.3	10	90.9	16	94.1	288	90.3	4.89/0.962
6-Are you aware of the mode of	100	90.1	93	93.0	55	94.8	8	88.9	12	92.3	10	90.9	16	94.1	294	92.2	10.226/ 0.596

Awareness of the Covid infection	Under graduate (111)		Dental Intern (100)		General Dentist (58)		Post Graduate (9)		Specialist (13)		Consultant (11)		Faculty (17)		Total (319)		χ2 /P-value
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
transmission of COVID-19?																	
7-Are you aware of any antimicrobial rinses that may be used before starting any aerosol-generating procedures?	62	55.9	48	48.0	33	56.9	6	66.7	11	84.6	7	63.6	12	70.6	179	56.1	15.342/0.223
8-Are you aware of the PPE to be adopted for aerosol-generating procedures?	71	64.0	74	74.0	47	81.0	9	100.0	11	84.6	8	72.7	14	82.4	234	73.4	13.56/0.330
9-Are you aware of the pulse oximeter and its applications for dental patient management?	50	45.0	55	55.0	16	27.6	6	66.7	6	46.2	4	36.4	11	64.7	148	46.4	27.39/0.007*
10-Are you aware of the role of HEPA filters in dental practice?	40	36.0	43	43.0	28	48.3	9	100.0	10	76.9	8	72.7	12	70.6	150	47.0	31.61/0.002*

in their practice for every patient while 46.1% did not and 10% had no idea. 69.3% of the participants used rubber dam for every patient whereas 16.9% did not and 13.8% had no idea. 32.3% of them asked every patient to rinse their mouth with anti-microbial mouthwash before treatment while 47.3% did not do so and 20.4% had no idea. 68.7% used a face shield while performing dental procedures while 12.5% did not and 18.8% had no idea. 28.82% of the participants admitted to attending emergency calls on their mobile phones while performing dental procedures whereas 53.3% stated otherwise and 18.5% had no idea. 90.6% of them washed their hands with soap and water or used sanitizer before and after treatment of every patient and only 2.5% did not while 6.9% seemed to have no idea.

Chi-square tests revealed significant differences in the responses based on qualification with regard to safety in providing treatment to a patient who was coughing or suspected of being covid positive, awareness of the applications of pulse oximeter and the role of HEPA filters in dental practice. ($p<0.05$).

Chi-square tests showed Significant differences in the responses by the participants based on qualification with regard to being updated with current CDC Or WHO guidelines for cross infection with covid -19, asking about history of travel or contact with affected persons before treating them, wearing an N-95 mask, using a face shield, a High volume suction and rubber dam for every patient or asking every patient to rinse with an antimicrobial mouthwash, including attending to emergency calls on the mobile phones while working. ($p<0.05$)

4. DISCUSSION

The impact of the covid-19 pandemic on clinical dental practice has been tremendous. Although till date, no known cases of transmission have been reported from the dental office, the clinical dental setup comes on the radar of high risk mainly because of the amount of aerosol generated during dental procedures which may harbor large amounts of virus and increase the risk of transmission. However, if adequate precautions are taken, this risk can be minimized or almost avoided. These safety measures should ideally commence from the time the patient enters the clinical setup until the procedures are completed.

Once the outbreak spread across the world, it took a while for the WHO/CDC to understand the transmission and progression of the virus and accordingly formulate guidelines for various healthcare setups; but once they were in place, it was the standard operating protocol to follow. It is worthwhile and every dentist's responsibility to take note of and keep in mind these measures and maintain a safe environment for management of their patients [3].

Therefore, our objective in the present survey, was to try and ascertain how far the dental fraternity in various positions across the country were abreast of the various protocols to be followed in the wake of the pandemic and evaluate the awareness of dental practitioners about covid-19 as well as determine the level of their knowledge about the new protocols that must be followed for better prevention of the disease.

The participants of our survey based study consisted of a majority of undergraduate students and interns followed by general practitioners. Since most of the institutes had suspended all teaching activities, it was the students and interns who were affected the most and their participation and responses were highly valuable as they are the future of dentistry. Most of the participants worked in a clinical setup whereas there were a good number of them who were faculty in institutes and hospitals. All participants worked in a private set up, so unfortunately, we were unable to get any perceptions of dentists from government setups.

With regard to the awareness aspect, our survey observed that most of the participants were aware of the risk of getting infected with covid-19 from patients or co-workers and were consequently worried about treating suspected patients and wanted to stop practice until the cases started to decline as they were also aware of the risk of infecting their family. This kind of fear and apprehension is normal considering the past experiences of healthcare professionals during the earlier epidemics. [12,13]. When comparing the responses of the participants based on their designation, it was noted that there were significant differences among them with most undergraduates(39.6%) and postgraduates(33.3%) feeling so in comparison to a lesser number of dental interns(18%), general dentists(10.3%), specialists(23.1%), consultants(18.2%) and faculty (11.8%).

Table 5. Comparison of perceptions of dental practice based on designation

Knowledge and risk perception in clinical practice of dentists about Covid 19	Under graduate (111)		Dental Intern (100)		General Dentist (58)		Post Graduate (9)		Specialist (13)		Consultant (11)		Faculty (17)		Total (319)		χ2 /P-value
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
1-Are you updated with the current CDC or WHO guidelines for cross-infection control regarding COVID-19?	73	65.8	67	67.0	50	86.2	7	77.8	12	92.3	11	100.0	13	76.5	233	73.0	16.66/0.011*
2-Are you currently asking every patient's history related to travel and contact with affected persons before performing dental treatment?	85	76.6	79	79.0	43	74.1	9	100.0	12	92.3	9	81.8	15	88.2	252	79.0	24.032/0.020*
3-Are you currently taking every patient's body temperature before performing dental treatment?	76	68.5	78	78.0	43	74.1	8	88.9	13	100.0	9	81.8	16	94.1	243	76.2	18.253/0.108
4-Are you deferring dental treatment of patients showing suspicious symptoms or coming from a demographic area endemic to COVID -19?	79	71.2	74	74.0	45	77.6	8	88.9	11	84.6	8	72.7	15	88.2	240	75.2	13.495/ 0.334
5-Do you think surgical mask is enough to prevent cross-infection of COVID-19?	28	25.2	28	28.0	14	24.1	0	0.0	3	23.1	1	9.1	1	5.9	75	23.5	14.949/ 0.244
6-Do you think N-95 mask should be routinely worn in dental practice due to the current outbreak?	96	86.5	82	82.0	50	86.2	8	88.9	9	69.2	7	63.6	15	88.2	267	83.7	11.335/0.500
7-Have you ever worn an N-95 mask while treating a patient in your dental practice?	31	27.9	32	32.0	28	48.3	6	66.7	6	46.2	6	54.5	6	35.3	115	36.1	31.65/0.002*
8-Do you routinely follow universal precautions of	92	82.9	86	86.0	46	79.3	9	100.0	11	84.6	8	72.7	16	94.1	268	84.0	15.065/0.238

Knowledge and risk perception in clinical practice of dentists about Covid 19	Under graduate (111)		Dental Intern (100)		General Dentist (58)		Post Graduate (9)		Specialist (13)		Consultant (11)		Faculty (17)		Total (319)		χ2 /P-value
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
infection control for every patient?																	
9-Do you use high-volume suction in your practice for every patient?	43	38.7	43	43.0	31	53.4	2	22.2	6	46.2	10	90.9	5	29.4	140	43.9	22.843/0.029*
10-Do you use rubber dam isolation for every patient?	90	81.1	72	72.0	28	48.3	5	55.6	5	38.5	8	72.7	13	76.5	221	69.3	35.301/0.000*
11-Do you ask every patient to rinse his/her mouth with anti-microbial mouthwash before treatment?	24	21.6	25	25.0	27	46.6	7	77.8	6	46.2	5	45.5	9	52.9	103	32.3	31.51/0.002*
12-Do you use a face shield while performing any dental procedures?	70	63.1	65	65.0	47	81.0	7	77.8	9	69.2	10	90.9	11	64.7	219	68.7	27.36/0.007*
13-Do you attend to emergency calls on your mobile phone while performing dental procedures?	24	21.6	29	29.0	20	34.5	1	11.1	6	46.2	2	18.2	8	47.1	90	28.2	28.023/0.005*
14-Do you wash hands with soap and water/ use sanitizer before and after treatment of every patient?	101	91.0	90	90.0	52	89.7	9	100.0	11	84.6	10	90.9	16	94.1	289	90.6	9.934/0.622

denotes significance

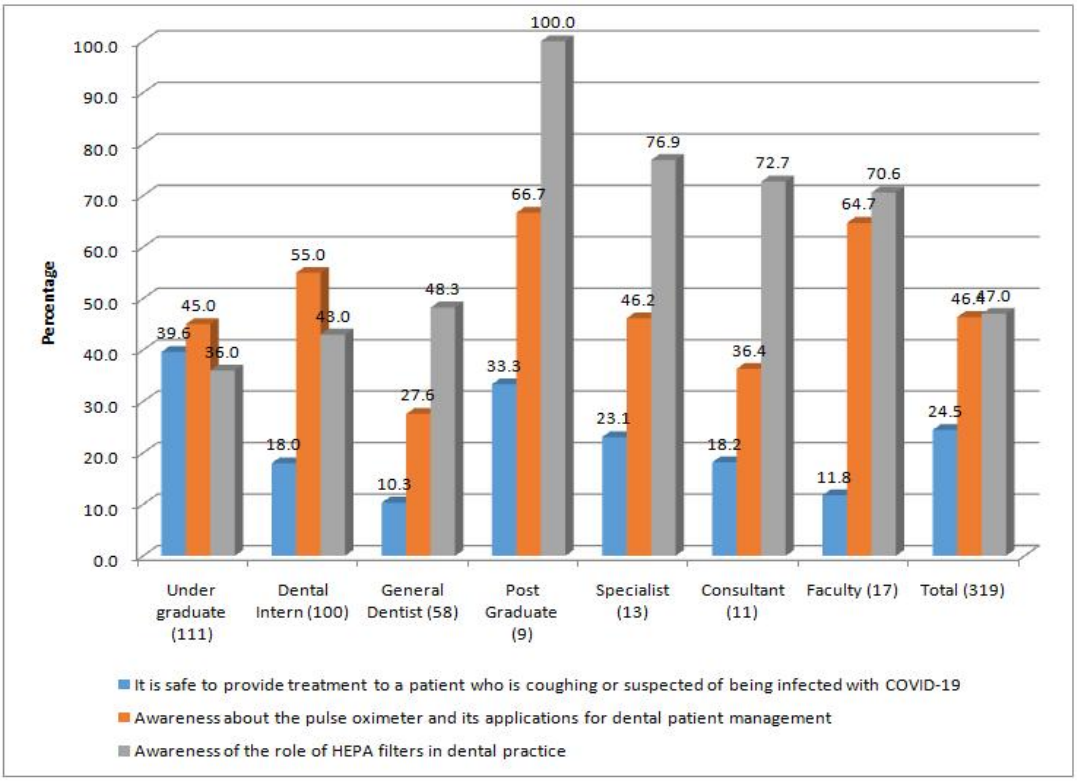

Fig. 1. Awareness responses

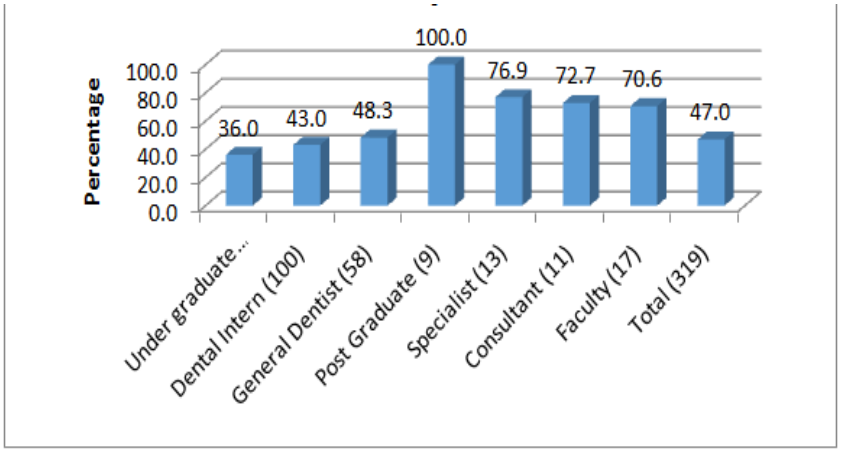

Fig. 2. Awareness of HEPA filters

Most participants were also aware of the mode of transmission of covid-19 and also that saliva may be a carrier of the virus in asymptomatic covid positive patients. This is particularly important for dental practitioners as saliva is a fluid they are constantly exposed to and generation of aerosol is also directly impacted by saliva [6]. Most of the participants were also aware about the precautionary measures to be followed before any aerosol generating procedures such as pre-rinsing with antimicrobial rinses and PPE [14]. Ideally, it would be best if dentists could avoid aerosol procedures such as ultrasonic scaling and replace it with manual methods and using barriers such as rubber dam and high volume suctions to check and minimize the aerosol

production. Moreover, for a long time, dental regulatory authorities such as the ADA have been urging dentists to conduct only emergency dental treatments. Nevertheless, in the current scenario, as the spread of the virus is slowly under control, especially in KSA, dentists can venture into carrying out various procedures, with the SOPs in place.

However, less than half the participants were aware about the pulse oximeter and use of HEPA filters in dental practice management. Although these are not mandatory measures, in the current scenario, its very important that all possible methods in delivering the best oral care to the patient is followed. [15,16]. Interestingly, in terms of designation, there appeared to be statistically significant differences between the participants with regard to this, as most of the interns (55%), postgraduate students(66.7%) and faculty(64.7%) were aware of the application of pulse oximeter and similarly, all of the postgraduate students (100%) and most of the specialists (77%), consultants(73%) and faculty (71%) were aware of the role of HEPA filters in dental practice. It is important to minimize the risk of transmission and safe guard the patients in the dental operatory [17].

With regard to the knowledge and practice of covid-19 protocols in the dental clinics, majority of the participants were updated with the current CDC/WHO guidelines [18]. for infection control and were currently making sure to ask every patients' history related to travel and contact with affected persons and also taking every patients body temperature before performing dental treatment which was again significant across various designations. Majority of the participants also deferred dental treatment of patients showing suspicious symptoms or coming from a demographic area endemic to covid-19. This measure again stems from fear of risk of infection and affecting family.

Most participants also thought that surgical mask is not enough to prevent cross-infection of covid-19 and that N-95 mask should be routinely worn in dental practice due to the current outbreak. The use of a particulate respirator such as the N-95 mask has been recommended

for treating patients suspected of COVID-19. Otherwise, at least a surgical mask must be used while treating all patients when the distance between the dental healthcare worker and the patient is less than 1 meter [19] However, less than 50% of the participants had worn an N-95 mask while treating a patient in their dental practice and this was also significant across the various designations. Majority of them also routinely followed universal precautions of infection control for every patient and also washed their hands with soap and water or used sanitizer before and after treatment of every patient. This practice is extremely important and was emphasized during the recent SARS outbreak. [20,21]. A study by Baseer et al also suggested that dental health professionals showed good knowledge, positive attitude and good practice towards droplet and airborne

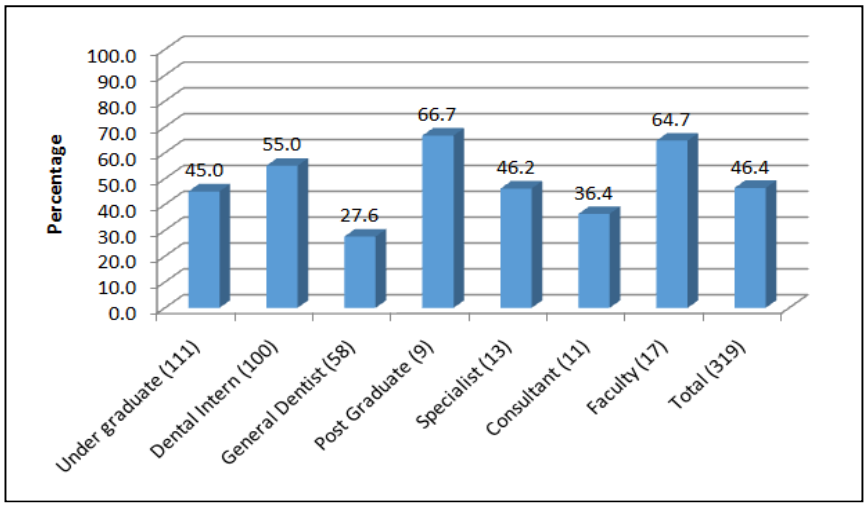

Fig. 3. Awareness of the pulse oximeter

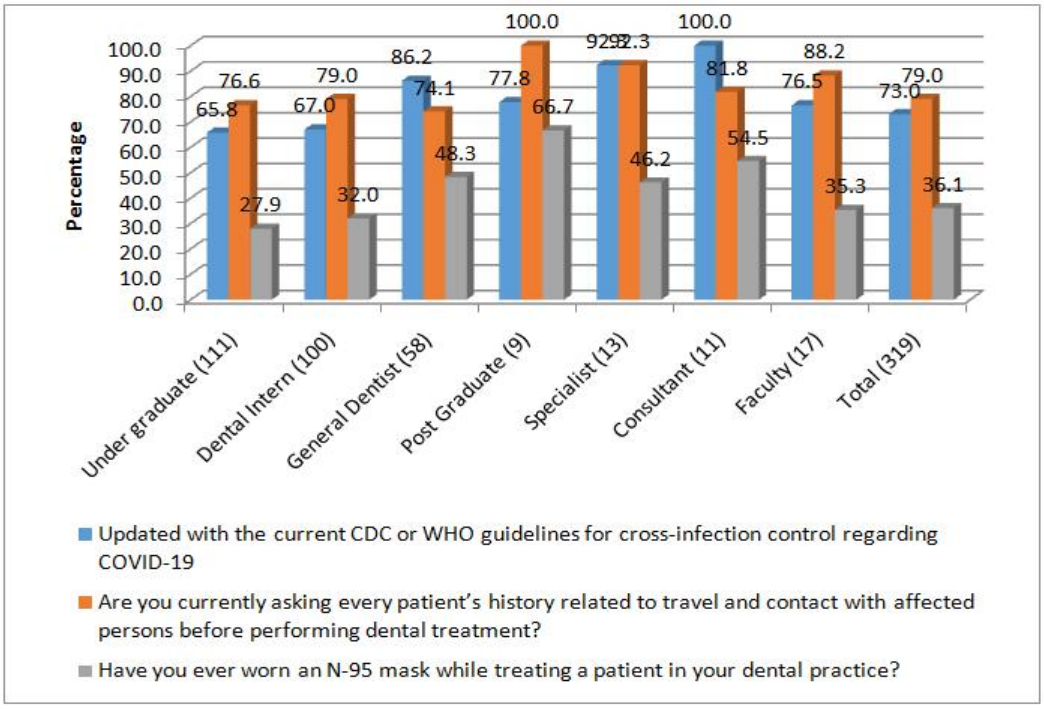

Fig. 4. Awareness of Infection Control protocol(1)

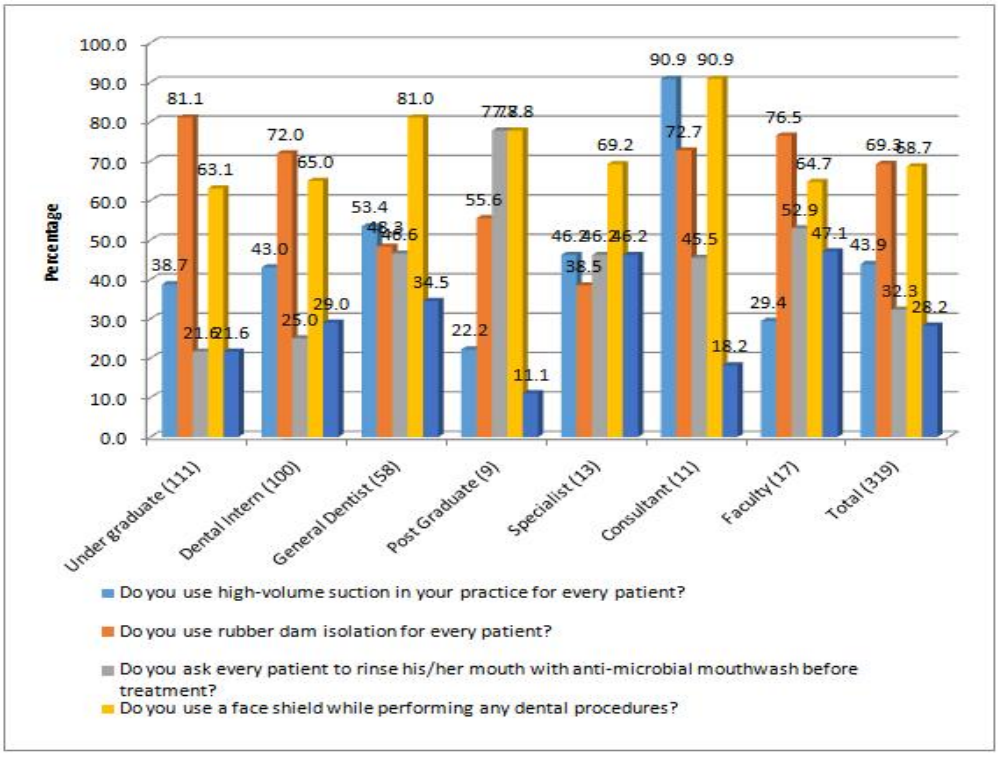

Fig. 5. Awareness of Infection Control protocol(2)

isolation precautions during outbreak of MERS (Middle East Respiratory Syndrome), corona virus infection in Riyadh city, Saudi Arabia. [22]. Therefore, the protocols for infection control were being followed in most parts of the country since then.

On the other hand, less than 50% of them used high-volume suction in their practice [19]. A little over 50% of them used rubber dam isolation [23] and used a face sheild for every patient whereas less than 50% of the participants asked every patient to rinse his/her mouth with anti-microbial mouthwash before treatment. However, these were again statistically significant across the various designations with most of the Postgraduates, specialists and consultants being aware about following them in dental practice.

Although there is no known evidence of effectiveness of antimicrobial rinses on covid -19; but researchers have reported that rinsing with an antimicrobial mouthwash also significantly reduces the microbial load [24,25]. Especially mouthwashes containing povidone-iodine [26,27] and hydrogen peroxide [28] have shown be effective against respiratory viruses which may be related to their ability to remove the oropharyngeal protease and associated viral replication [29].

More than 50% of the participants admitted to attending emergency calls on their mobile phones while performing dental procedures. [30,31] which was also significant across the various designations. A recent review of literature regarding microbial identification on mobile phones in Health Centers and community settings did not directly address the issue of SARS-CoV-2 responsible for COVID-19, but it does expose the possible role of mobile phones as a 'Trojan horse' contributing to the transmission of microbial infections in epidemics and pandemics [32].

In view of the above observations, it is obvious that in the wake of the ongoing pandemic of covid-19 the practice of dentistry has undergone a dramatic makeover and dental professionals who participated in our study seemed to be well abreast of the situation. Although universal infection control measures have always been an integral part of dental practice since decades, thanks to the high risk of transmission of highly infectious microbes such as HIV, hepatitis-B, etc due to aerosol generation during various dental procedures, this pandemic has forced the dental fraternity to revisit protocols in a major way and that is what was the objective of this study.

5. CONCLUSION

It has become impertinent for dental healthcare workers to meticulously follow the relevant recommendations issued by the regulatory authorities. These include the universal cross-infection control protocols along with some additional precautions in cases where patients present with any suspicious symptoms. In the interest and well being of the patients and society at large, this study hoped to bridge the gaps in the awareness and perceptions of the dental professionals with the objective of carrying our efficient dental practice in these difficult times.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical approval has been collected and preserved from the institutional ethical committee (H -03-09062020) by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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