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Evaluation of knowledge, attitude and practice of dental patients attending Oman Dental College towards cross-infection control during the pandemic: A cross-sectional survey

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ABSTRACT

Cross-contamination within a dental clinic can occur when the disinfection and sterilisation protocols are not impeccably followed. Aerosol plays an important role in the transmission of COVID-19. These facts essentiate the need to educate patients on cross-infection control procedures, for which assessing their knowledge attitude and practice is essential. A cross-sectional survey was conducted using the Microsoft platform among patients attending Oman Dental College using an internally validated e-questionnaire containing 17 closed-ended questions. Statistical analysis of the collected data was performed using SPSS 19.0 software. Tables were generated using Microsoft Word and Excel. The means of different variables across groups were compared using ANOVA and independent t-tests. In the case of continuous measurements, we presented the mean and standard deviation. Categorical measurements were presented as numbers and percentages. Statistical significance was determined using 5% level. A total of 387 responses were analysed, which showcased that 78.6% were familiar with the COVID-19 protocol issued by the Ministry of Health Oman. However, only 59.12% exhibited ideal knowledge. In all, 36.4% displayed optimal practice characteristics and 86.8% of the population felt safe (at varying degrees) attending a dental clinic during the pandemic. Gender, nationality, occupation, age and educational qualification were the variables that significantly influenced the knowledge, attitude and practice of dental patients. Based on the results, it is evident that the patients have a good understanding of both preventive and cross-infection control protocols to be followed during the COVID-19 Pandemic, but there are still a few areas to be addressed to enhance patient awareness.

Keywords: *COVID-19, cross infection, dental environment, patient awareness and practice*

INTRODUCTION

Hospitalisation-related infections that were neither present nor incubated prior to the visit to any hospital or healthcare centre are attributed to cross-infections. The transmission could be either via inhalation as in airborne diseases or inoculation facilitated by sharps accidents or through pre-existing cuts and wounds. Inadequately disinfected surfaces and poorly sterilised instruments contribute to cross-contamination and promote cross-infections. Considering the fact that the oral cavity harbours a considerable number of pathogens,1,2 the risk of cross-infections is relatively high in a dental clinic.3 The spread of cytomegalovirus, HIV, hepatitis B and C virus, Ebola virus, herpes simplex virus, coronavirus,4 streptococci, tuberculosis and staphylococci5–7 in the dental environment is expedited due to poor cross-infection control measures. Hence cross infection control in a dental clinic is of paramount importance.

With the inception of COVID-19, cross-infection control has been brought into spotlight like never before. The ever-mutating virus coerced the dental fraternity to put stringent cross-infection measures in place to curb its spread. The third wave of the pandemic led by Omicron with its multiple sub-lineages has overtaken Delta form and has spread its wings over the globe. Though initially it was regarded to produce mild symptoms in the infected patients, its transmissibility has always been alarming. The spread of this virus is facilitated by direct or indirect contact. Direct contact is transpired via droplets, aerosol, gastrointestinal and other bodily secretions, intrapartum and sexual transmission. Indirect contact is eventuated by contaminated surfaces.8 The study by Raymond Tellier et al, indicated that the mode of transmission influenced the severity of the disease.9

Transmission through aerosol and contaminated surfaces surmount other modes of transmission in the dental clinic. Aerosols are nothing but suspended solid or liquid particles in the air. They measure around 100 microns or less and are generally formed when talking, coughing, sneezing and during aerosol-generating dental procedures. The above facts authenticate that the dental office is a high-risk environment where multiple factors expedite the spread of the virus. Though the

Compared with the rest of the world, Oman reported a low number of COVID-19 cases and deaths during the deadly outbreak.10 Oman's Ministry of Health issued multiple regulations at various stages of the pandemic in accordance with the WHO's recommendations to control the spread of COVID-19 in dental clinics. Though there was a staggered start, now the dental clinics are fully functional with strict regulations in place. The regulations include admission to staff and patients who have received two doses of vaccination with no active symptoms, performing only emergency procedures on high-risk patients, temperature screening at the entry, wearing face mask and following immaculate hand hygiene, social distancing and fomite-free waiting areas, plastic barriers at the reception desks, proper disposal of contaminated items, following proper cough etiquettes, sufficient spacing between dental chairs, dentist and dental assistants to wear surgical scrubs, disposable gowns, gloves, surgical masks and protective eyewear in a structured donning sequence and removal of the same in methodical doffing sequence, use of rubber dam and high volume suction, use of povidone-iodine mouth rinse before dental treatments, surface disinfection and instrument sterilisation after every patient and proper ventilation system.

Within a dental office, there exists a shared responsibility between the dentist and the patient to prevent cross-infection. Multiple studies have been conducted in the past to evaluate the understanding of cross-infection among dentists but there are a limited number of data regarding the patient's understanding of cross-infection.11–13 Evaluating the patient's understanding of cross-infection and protocols in place to prevent it is essential to minimise the spread of COVID-19 within a dental office. Hence, the primary aim of the study was to assess the knowledge and attitude of dental patients towards cross-infection control measures adopted in light of COVID-19. The study also aimed to derive a correlation between the knowledge and practice of the protocols.

METHODS

This research was conducted after obtaining ethical clearance from the Research Ethics Committee (REC), Oman Dental College, Muscat (REC number: ODC Research 2022-151).

The study was designed to be a cross-sectional survey facilitated by e- questionnaires. The questionnaire included 17 closed-ended questions out of which 10 were devised based on the information gathered through published scientific works, the WHO website and MOH Oman guidelines relating to the occurrence, control and prevention of COVID-19. The questions were carefully devised to assess the patient's knowledge of COVID-19, dental cross-infection and its prevention; their attitude concerning cross-infection control and the measures that they practice to prevent cross-infection. The other questions were demographic and profile related. The questionnaire was assessed internally by experts to validate its reliability.

The questions were initially prepared in English and then translated to Arabic by a team of Arabic dentists to include non-English speaking participants. Both the English and Arabic questionnaires were uploaded to Micro-Soft Teams online platform designed for surveys. A short preface of the survey, stating the aim and objectives of the study preceded the questions in the e-questionnaire. It also emphasized the fact that participation was completely voluntary. The sample population included only patients who visited Oman Dental College between 25 Jan 2021 and 25 Jan 2022. Participants who were aged above 18 and could read English or Arabic were included in the study. Patients with mental disorders were excluded from the study. The sample size was calculated to be 384 using the formula: $n = z2 \times p \times (1 - p)/e2$, where z is 1.96 to obtain a confidence level (α) of 95% while p indicates proportion (expressed as a decimal) and e indicates the margin of error.14

A pilot study was then conducted by sending text messages containing two links to the questionnaires in English and Arabic to 10 participants. A Shortcoming relating to the lack of word space in the text message, which ended up splitting the link was identified and rectified through the pilot study. In addition, following the pilot study, the survey settings were altered to receive only completed questionnaires. The participants included in the pilot study were excluded from the main survey.

Descriptive and Inferential statistical analyses were carried out in this study. The Statistical software SPSS 19.0 was used for analysing the data. Microsoft Word and Excel were used to generate graphs and tables. ANOVA and Independent t-tests were used to compare the means of different variables across the groups.

Results on continuous measurements were presented on Mean ± SD. The results of categorical measurements were presented in numbers and percentages. Significance was assessed at 5% level of significance.

RESULTS

The link to the e-questionnaires was sent out to the sample population in two phases, that is, one on 3/2/2022 and the next on 10/2/20222. A total of 387 responses were received in 3 weeks and then the answered questionnaires were subjected to statistical analysis.

Distribution of the study participants based on demographic variables:

From Table 1, it is elicited that, 53.2% of the response were from female participants while 45.5% were that of the male. The remaining 1.3% preferred not to reveal their gender orientation. A total of 85.8% of the responders were between the age group of 18 and 45. Omani nationals predominated in their participation and accounted for 83.5%. Non-healthcare accounted for 321 out of 387 participants, while healthcare workers accounted for 17.1%. When classified according to educational qualification, graduates followed by postgraduates topped in their participation and constituted 42.9% and 29.2% while students were limited to 27.9%.

TABLE 1. Distribution of Study Participants based on the demographics.

Demographics	Variables	n	%
Gender	Male	176	45.5
	Female	206	53.2
	Prefer not to say	5	1.3
Age	18 to 30 years	211	54.5
	31 to 45 years	121	31.3
	46 and above	55	14.2
Nationality	Omani	323	83.5
	Non- Omani	64	16.5
Occupation	Health care worker	66	17.1
	Non-Health care worker	321	82.9
Educational Qualification	Student	108	27.9
	Graduate	166	42.9
	Post Graduate and above	113	29.2

Collective data regarding the source from which the participants had obtained the information regarding COVID-19 prevention protocols indicated that social media played a vital role in educating the public about COVID-19. Furthermore, 187 out of 387 educated themselves on COVID-19 through social media. This constitutes to a total of 48.3%. The others obtained their information through television (4.4%), hoardings, pamphlets and billboards (2.3%), magazines and News Papers (1.8%) and a combination of the above (43.2%).

In all, 7.2% did not know the protocols and guidelines issued by the Ministry of Health for healthcare professionals to be followed in the dental clinic during the pandemic, whereas 78.6% participants were familiar while 14.2% were unsure of the protocols.

Furthermore, 89.1% agreed that social distancing will help control the spread of COVID-19. However, 5.7% disagreed with it and 5.2% were not sure if social distancing will help in controlling the spread.

Comparatively, 64.2% participants agreed that checking body temperature in public places will control the spread of COVID-19, whereas 22.7% of participants disagreed and 5.2% were not sure.

A total of 35% of the research recruits knew that using disposable hand gloves, surgical masks, gowns, head caps, face shields, oral suction and rubber dam minimised the risk of cross-contamination in the dental clinic. Furthermore, 65% of the participants were not aware of the absolute cross-infection control methods employed in the dental clinic.

It was observed that 33.85% of the participants acknowledged that dentists should change their disposable hand gloves between patients while 24% agreed that the suction tip needs to be changed for every patient. Only 1 out of 387 research participants agreed that the dentist should change the entire personal protective equipment and suction tip for every patient.

More than half of the study participants were aware of the term aerosol and that COVID-19 cross-infection could be facilitated by aerosol. It was noted that 58.9% had heard about aerosol and 57.4% agreed that COVID-19 transmission could happen through aerosol while 21.7% did not know the term and 24% did not know that COVID-19 transmission could happen through aerosols whereas 18.6% were not sure about the connection between aerosol and COVID-19 and 21.1% had not heard of aerosols.

It was observed that 48.6% of the participants did not know about the ventilation status of the dental clinic and its relevance in the control of the pandemic whereas 25.6% knew about the above and 25.8% were not sure.

A comparison of the mean knowledge score with the demographic variables confirmed that the knowledge score was higher in males in relation to gender, expatriates in relation to nationality, health care workers in relation to occupation and postgraduates in relation to educational qualification. The difference in each category was statistically significant, which is evident from Table 2. Though a difference in knowledge score was observed among participants of different age groups, the difference was not statistically significant.

TABLE 2. Comparison of Mean Knowledge Score with demographic variables.

Demographics	Variables	MEAN	SD	P
Gender	Male	3.92	1.38	0.05*
	Female	3.58	1.35	
	Prefer not to say	3.60	1.67	
Age	18 to 30 years	3.67	1.36	0.5
	31 to 45 years	3.79	1.40	
	46 and above	3.87	1.37	
Nationality	Omani	3.67	1.38	0.03*
	Non- Omani	4.06	1.33	
Occupation	Health care worker	4.22	1.29	0.01*
	Non-Health care worker	3.64	1.37	
Educational Qualification	Student	3.47	1.37	0.05*
	Graduate	3.83	1.43	
	Post Graduate and above	3.85	1.28	

Descriptive analysis of questions designed to elicit the attitude of participants towards dental health highlighted that most of the participants visited the dental clinic only when they had a concern. A total of 74.4% of the participants visited the dental clinic only for symptomatic treatments and 25.6% visited for general dental check-ups. It was observed that 92.2% visited the clinic only with an appointment while 7.8% walked in without appointments. About 50.6% of participants felt safe being treated in a dental clinic during the pandemic whereas 36.2% felt it was somewhat safe and 3.6% felt it was somewhat unsafe while7.8% felt neutral and only 1.8% felt extremely unsafe. Slightly more than half of the participants (51.4%) did not prefer the application of a rubber dam as a measure of cross-infection control during caries management.

It was noted that 45.7% acknowledged it as a cross-infection control measure and preferred its application while 2.8% were not sure about its application as a cross-infection control measure. Furthermore, 91.5% displayed a positive attitude towards wearing a mask and 87.9% agreed that they will follow social distancing protocols during their visit to the dental clinic.

A comparison of the mean attitude scores with demographic variables revealed that occupation, educational qualification and Nationality significantly affected the attitude of the patients. The difference between the variables in the above-mentioned categories was statistically significant (Table 3).

TABLE 3. Comparison of mean attitude scores with demographic variables.

Demographics	Variables	MEAN	SD	P
Gender	Male	2.28	.84	0.6
	Female	2.21	.70	
	Prefer not to say	2.20	.83	
Age	18 to 30 years	2.24	.77	0.1
	31 to 45 years	2.18	.82	
	46 and above	2.41	.56	
Nationality	Omani	2.21	.80	0.003*
	Non- Omani	2.45	.53	
Occupation	Health care worker	2.46	.66	0.05*
	Non-Health care worker	2.20	.78	
Educational Qualification	Student	2.08	.81	0.02*
	Graduate	2.31	.75	
	Post Graduate and above	2.30	.73	

It was observed that 71.8% of the patients agreed that they would follow a hand sanitation routine twice in the dental clinic, once when they arrive and once when they leave whereas 2.8% never sanitised their hands in the dental office and 8.5% of participants sanitised their hands only once while arriving and the same percentage accounted for the percentage of participants who sanitised their hands while leaving the dental clinic.

Comparatively, 93.3% removed their mask only when instructed by the dentist and 6.7% removed the mask whenever they felt like it. About 30.7% of the patients agreed that they practiced asking the dentist about the sterilisation of the instruments while 44.4% trusted the dentist blindly and 24.8% were not sure about the sterilisation of the instruments and yet did not clarify it with the dentist (Table 4).

TABLE 4. Questions related to practice.

Questions related to the practice	Responses	N	%
When do you remove your mask in the dental clinic	Whenever I want	361	93.3
	Only when my dentist instructs	26	6.7
How many times do you sanitise your hands in the dental office	Never sanitise my hand in the dental office	32	8.3
	Never sanitise my hands in the dental office	11	2.8
	Once only on arriving	33	8.5
	once only while leaving the dental office	33	8.5
	Twice, once when I arrive and once when I leave	278	71.8
How do you assess if your dentist is using sterilised instruments for your dental treatments	Check with the dentist by asking	119	30.7
	Trust the dentist blindly	172	44.4
	Not sure about sterilisation but still do not ask the dentist	96	24.8

Cross tabulating the results of practice-based questions with gender and occupation indicated a significant association between gender and positive practice. Female participants adopted positive practice routines when compared to male participants.

DISCUSSION

With the ongoing pandemic, it is a clearly understood fact that both the dentist and the patients should possess good knowledge about cross-infection control measures and practices. In order to evaluate the same in the population residing in Oman, a study in the form of a survey was conducted at Oman dental college by asking the patients to fill in a survey link sent to them. This is the first study in Oman to evaluate dental patients' knowledge, attitude and practice in cross-infection control measures.

Evaluating the patient's knowledge and attitude in this area is important so as to have a clear picture of their understanding and to identify areas where they lack knowledge. This evidently would help us to design a plan that helps in patient awareness and education to limit the rate of spread of COVID-19 infection.

In this study, female participants outnumber male participants. It was interesting to note that the male participants dominated the level of attitude against cross-infection control over females. This is dissimilar to a previous study done on cross-infection control measures.6 It is self-explanatory on why the health care workers and the postgraduates showed better knowledge and understanding of the cross-infection control measure. No similar previous studies comparing healthcare workers to non-healthcare workers were identified. Age also has a significant correlation to knowledge.

Patients who were in the student category and between the age group 18 and 30 years showed poor knowledge and attitude towards cross-infection control and precautionary measures. This provides us a hint that teaching and awareness about cross-infection control should be included in the basic teaching curriculum from secondary school onwards.

This study was performed on the population living in Oman, which included both Omanis and residential expatriates. It is evident from the study that the awareness of cross-infection control protocols has to be advocated more to reach every sector of the population. With the boom in digital technology and social media6,15 being the most accessed and preferred platform for infotainment even for non-technical commoners, information on cross-infection control measures can be circulated as videos or role play that could be well understood by all categories of people

Droplet infections being the commonest route of viral spread, dental aerosols play a vital role in the spread of COVID-19. Hence, appropriate measures are to be taken to avoid this. Rubber dam usage and the use of high-volume suctions play a major role in controlling the aerosol. According to the current study, a majority of the patients have stated that they are aware of aerosol and its role in COVID-19 spread, which contradicts the finding of Ahmed et al.15 If not for the pandemic, it may be less likely for the patients to be aware of the facts about aerosol. Although the patients are aware of aerosols, the knowledge regarding the measures that control aerosols seems to be lacking. This is established from the results of the current study where the patients are unaware of the advantages of rubber dam usage as a mode of cross-infection control measure.

Another important aspect of controlling COVID-19 transmission is proper ventilation of dental offices. The majority of participants were unaware of the ventilation status of the dental clinic they are visiting. Furthermore, patients were not completely aware of the sterilisation of instruments. Display boards or pamphlets that carry information on sterilisation and ventilation can be made available to the patients in the waiting area to facilitate patient education. This will elevate patients' confidence and trust in the dental clinic.

Increased awareness of personnel safety measures among the public due to the sudden emergence of COVID-19 and the understanding of 'when one can' and cannot remove the mask and the use of hand sanitiser has vastly reduced COVID-19 spread in the waiting areas of the clinic. This fact is again re-evident from the results of the study.

Certain other findings from the current study such as preferring to visit the dental clinic with an appointment, willing to maintain social distancing, getting body temperature check and being aware of the safety guidelines released by the ministry showed the increased awareness among patients about the precautionary measures of COVID-19 spread. As a result, dental clinics in Oman are not seen as a threat to facilitating the transmission of COVID-19. Thus, patients confidently attend dental clinics seeking emergency and routine dental care in Oman.

CONCLUSION

This study evaluated the patient's knowledge, attitude and practice towards cross-infection control. From the study, it is evident that the patients possess a good range of knowledge in both preventive and cross-infection protocols to follow during the COVID-19 pandemic.

However, there are areas that still require addressing to further enhance patient awareness in cross-infection protocol. This helps in controlling the risk of transmission of not just COVID-19 but any transmissible diseases in a dental set-up and at the same time may prepare the patient adequately to meet yet another unforeseen pandemic.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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