

Awareness and Attitudes of Dental Students to Wear a Mask during COVID-19 Pandemic: A cross-Sectional Study

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ABSTRACT

Introduction: The World Health Organization has declared that the transmission rate of COVID-19 will increase due to inappropriate use and disposal of masks. Dental students have previously shown inadequate knowledge and inappropriate attitudes towards infection control measures.

Aim: This study aimed to investigate the dental students' awareness and attitude in the appropriate use of face masks during the COVID-19 pandemic in Saudi Arabia.

Methods: A cross-sectional study was conducted among dental students from different Saudi universities using an online self-administered questionnaire containing 23 questions.

Results: This study included 251 Saudi dental students of which 118 (47%) were females and 113 (52.9%) were males. The survey responses were provided by 139 students (55.3%) from Umm Al-Qura University, 19 students (7.5%) from Imam Abdulrahman bin Faisal University, and 93 (37%) from other universities. Some of the findings were; 224 (89.2%) participants were found to place the white side of the mask facing out, while 27 (10.7%) participants placed the white side facing in, In response to the question, if wearing a surgical mask would protect oneself from COVID-19, 192 (76.4%) participants agreed, while 59 (23.5%) thought the opposite, About 204 (81.2%) students changed their mask with change in each patient, 47 (18.7%) students did not follow the same, In total, 42 (16.7%) students removed their masks by holding their outer surfaces but 209 (83.2%) students removed them by holding their strips.

Conclusion: The study participants had a clear understanding of COVID-19. However, few students needed training on the proper usage of face masks.

Key words: COVID-19, Knowledge, Practice, Attitude, Infection control, Dental students

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The first disease outbreak occurred in China in December 2019 and, after that, has spread worldwide, resulting in a pandemic in 2019-2020 [1]. There are 346047 COVID-19 cases in Saudi Arabia, with 5,348 deaths according to the Ministry of Health of Saudi Arabia, 2018 [2]. The virus spreads mainly through respiratory droplets (coughs or sneezes), from infected persons, or through touching infected surfaces or items followed by touching the mouth, nose, or possibly eyes. There is a high risk of COVID-19 infection during routine dental work due to the characteristics of the dental setting,

such as the aerosols emitted in several procedures, the handling of sharps, and the dentist's close contact with the patient's oral cavity. Lack of proper precautions in the dental setting can potentially result in cross-contamination [3]. A recent clinical study revealed that 29% of 138 COVID-19 patients hospitalized in Wuhan, China, were healthcare professionals [4].

According to the latest recommendations of the Centres for Disease Control and Prevention (CDC), standard Personal Protective Equipment (PPE) is no longer efficient for air-borne infections such as COVID-19 [5]. The updated infection control guidelines state the use of unique masks, face shields, gowns, head covers, and rubber boots [6]. Dental staff on duty must wear a surgical mask before entering the dental clinic and then throw the mask in a special closed bag [7]. A heavily filtered non-valvular respirator (EU FFP2/NIOSH N95 or EU FFP3/NIOSH N99) is worn in the dental clinic to ensure that the face remains covered. Commonly used surgical masks do not offer maximum protection from inhalation of less than 1 μm of respiratory infectious agents [8]. In the case of emergency

care of a COVID-19 confirmed or suspected patient, the use of the Filtering Face Piece 3 (FFP3) respirator is mandatory [7].

In the pandemic control plans, several nations currently use face masks. The appropriate use of these masks is essential as they are preventive; however, improper use and disposal can increase the transmission rates [9]. The World Health Organization (WHO) has announced an increase in the transmission rate of the disease due to inappropriate use and improper disposal of the masks. If someone wears a mask, they need to know how to use it and discard it correctly [10]. Dental students with insufficient clinical experience are more likely to be exposed to infectious diseases. Thus, dental students and practitioners need to be cautious and show high compliance with the preventive strategies to minimize the spread of COVID-19. Previous studies have shown that dental practitioners, including students, show inadequate knowledge and inappropriate attitudes toward infection control measures [11]. Therefore, this study aimed to investigate the awareness and attitude of dental students for the appropriate use of face masks during the COVID-19 pandemic in Saudi Arabia.

MATERIALS AND METHODS

A cross-sectional descriptive study was conducted to assess the awareness and attitudes of dental students regarding the use of a mask during the COVID-19 pandemic. Dental students studying in the western region of Saudi Arabia and who reached their clinical years and dental interns were included. We excluded dental students in preclinical years and dentists. The minimum number of participants required for this study was 271 participants, using the estimated prevalence of usage by 50%, precision level of 5%, and confidence interval of 90%. However, 380 invitations were sent for an expected 40% dropout. A web-based, self-administered questionnaire was distributed using Google form. The participants were selected using convenience sampling and snowball sampling techniques. The researchers asked the students individually to participate in the study. Then, the participating students were asked to send the questionnaire to their colleagues to ensure a maximum number of participants. The research team distributed the questionnaire through various social media platforms, including Twitter and Whatsapp. The questionnaires were anonymous to ensure the privacy of the participants, and their participation was completely voluntary. It took approximately 5 min to complete the questionnaire. Informed consent was obtained from all

Table 1: Demographic data.

Questions	Options	N	%
Gender	Male	133	52.9
	Female	118	47
Educational level	4 th year	59	23.5
	5 th year	62	24.7
	6 th year	74	29.4
University name	Intern	56	22.3
	Umm Al-Qura university	139	55.3
	Imam Abdulrahman bin Faisal university	19	7.5
	Others	93	37

participants by clicking "Next" at the beginning of the questionnaire.

The questionnaire was in English and adapted from a previous study [9]. Experts from infection control unit at Umm Al Qura University, Faculty of dentistry revised the questionnaire to ensure its comprehensibility and relevance. It was divided into three sections consisting of 23 questions. The first section contained three questions about the socio-demographic and general characteristics (gender, educational level, and university name) of the participants. The second section had nine questions to assess students' awareness of wearing a mask during the COVID-19 pandemic. The third part comprised 11 questions that assessed students' attitudes regarding wearing a mask during the pandemic. We conducted a pilot study with a convenience sample of 15 dental students from Umm Al Qura University before starting the study to test the questionnaire's validity and reliability. The questionnaire was further modified according to the participants' responses. The reliability of the questionnaire was assessed using Cronbach's alpha and it was 0.87. Ethical approval was obtained from the research ethical committee for the Faculty of Dentistry, Umm Al Qura University.

Data were collected, tabulated, and statistically analyzed using Statistical Package for Social Sciences (SPSS) software (version 22.0; IBM Corp). Data with $P < 0.05$ were considered statistically significant. Descriptive statistical analyses, such as mean and Standard Deviation (SD) and percentages were used to describe the continuous variables and categorical data respectively.

RESULTS

This study included 251 Saudi dental students from different Saudi universities. Out of the total participants, 118 (47%) participants were females, and 133 (52.9%) were males. Based on the educational level, there were students from fourth, fifth, sixth, and intern year dental students with their respective numbers as 23.5%, 24.7%, 29.4%, and 22.3%, respectively (Table 1). The survey responses were mostly submitted by 139 students (55.3%) from Umm Al-Qura University, followed by 19 students (7.5%) from Imam Abdulrahman bin Faisal University, and 93 students (37%) from other universities (Table 1). The highest response rate was from Umm Al-Qura University due to ease of contact and quick communication facility *via* WhatsApp groups for sending the survey.

The awareness of dental students regarding the proper use of a mask during the COVID-19 pandemic was inquired by a survey question and in response, 224 (89.2%) participants were found to place the white side of the mask facing out, while 27(10.7%) participants placed the white side facing in. Concerning the layers of the surgical mask, 20 (7.9% participants answered that it had two layers, 216 (86%) said three layers and 15 (5.9%) responded four layers. In response to the question, if wearing a surgical mask would protect oneself from COVID-19, 192 (76.4%) participants agreed, while 59 (23.5%) thought the opposite. When questioned about the layer that acted as a filter media barrier, 59 (23.5%) participants responded to the first layer, 180 (71.7%) to the second layer, and 12 (4.7%), the last layer. When asked about the type of mask that would be considered best to prevent COVID-19 infiltration, a total of 238 (94.8%) students agreed to N95 mask, 13 (5.1%) to surgical mask, and none of the students responded to cloth facial mask. The duration of wearing a surgical mask should be 8 h as per 105 (41.8%) students, 4 h as

per 111 (44.2%) students, and 2 h as per the rest 35 (13.9%) students. A total of 208 (82.8%) believed that the surgical mask should cover the nose, mouth, and chin, 43 (17.1%) believed it should cover the nose and mouth, while none of the students believed in just the mouth.

The purpose of the metal strip on a surgical mask was correctly answered by 241 (96%) participants as fitting on the nose, while 5 (1.9%) students believed that they were supposed to fit on the chin and the rest 5 (1.9%) answered that it was of no purpose.

The last question in this section was if the cloth facial mask was as effective as a regular surgical face mask and 58 (23.1%) participants were in agreement, while 193 (76.8%) did not agree. The difference between different answers regarding the previous questions was highly significant ($P<0.01$), with the highest percentage of answers reflecting knowledge and attitude. These data are listed in Table 2.

Table 2: Assess students' awareness regarding wearing a mask during the COVID-19 pandemic.

Questions	Options	N	%	p-value
Which is the correct way of using surgical face mask to protect against COVID-19?	White side facing out	27	10.8	p<0.001
	White side facing in	224	89.2	
How many layers are there in a surgical mask?	Two	20	8	p<0.001
	Three	216	86	
	Four	15	6	
Can wearing a surgical mask protect you from COVID-19?	Yes	192	76.5	p<0.001
	No	59	23.5	
Which layer acts as a filter media barrier?	First layer	59	23.5	p<0.001
	Middle layer	180	71.7	
	Last layer	12	4.7	
Which type of masks consider best to prevent COVID-19 infiltration?	N95 mask	238	94.8	p<0.001
	Surgical mask	13	5.1	
	Cloth facial mask	0	0	
How long can you wear a surgical mask?	8 hours	105	41.8	p<0.001
	4 hours	111	44.2	
	2 hours	35	13.9	
For proper wearing, to which extent the surgical mask should cover?	Nose only	0	0	p<0.001
	Nose and mouth	43	17.1	
	Nose, mouth, and chin	208	82.8	
What is the purpose of the metal strip on a surgical mask?	No purpose	5	1.9	p<0.001
	To fit on the nose	241	96	
	To fit on the chin	5	1.9	
Is the cloth facial mask as effective as a regular surgical facial mask?	Yes	58	23.1	p<0.001
	No	193	76.8	

Further, the attitude of dental students regarding wearing a mask during the COVID-19 pandemic was surveyed through the question if they wore a mask in the hospital premises for protection against COVID-19. A total of 238 (94.8%) students answered yes and only 13 (5.1%) students answered no. They were further asked if they would remove their mask if they needed to talk to their patient while providing dental treatment and 229 (91.2%) students practiced it, while 22 (8.7%) students did not agree to this. About 204 (81.2%) students changed their mask with change in each patient, 47 (18.7%) students did not follow the same. Moreover, 68 (27%) students would store their used surgical masks in a bag for later use if they were not sick. However, 183 (72.9%) students did not practice this. When they were asked about the decontamination of used surgical masks for safe reuse, 71 (28.2%) students replied yes, while 180 (71.7%) students replied no. Furthermore, 61 (24.3%) participants believed in using a face shield instead of a surgical mask in a dental clinic, (and 190 (75.6%) of them did not agree to this. Concerning the waste containers they should dispose of their masks after treating their patients, 89 (35.4%) students stated

regular waste containers, and 162 (64.5%) students answered clinical biohazard waste containers.

They were asked whether about the type of mask they should wear in the case of providing treatment to a suspected COVID-19 patient and 225 (89.6%) students responded N95 mask, while 26 (10.3%) students) responded surgical mask. When they were asked if they used the N95 mask while performing the aerosol-generating procedure during the COVID-19 pandemic, 199 (79.2%) students said yes, while 52 (20.7%) said no. In total, 222 (88.4%) participants ensured that the edges of N95 masks fitted against their faces before use, whereas 29 (11.5%) students did not. In total, 42 (16.7%) students removed their masks by holding their outer surfaces but 209 (83.2%) students removed them by holding their strips. The difference between different answers regarding the previous questions was highly significant ($P < 0.01$), with the highest percentage of answers reflecting knowledge and attitude. The data are presented in Table 3.

Table 3: Assess students' attitude regarding wearing a mask during the COVID-19 pandemic.

Questions	Options	N	%	p-value
	Yes	238	94.8	p<0.001
	No	13	5.1	
While providing dental treatment, if there is a need to talk to the patient, will you remove your mask?	Yes	229	91.2	p<0.001
	No	22	8.7	
Do you change the mask between the patients?	Yes	204	81.2	p<0.001
	No	47	18.7	
If you are not sick, do you store the used surgical mask in a bag for later use?	Yes	68	2.7	p<0.001
	No	183	72.9	
Do you decontaminate used surgical mask for safe reuse?	Yes	71	28.2	p<0.001
	No	180	71.7	
Do you use face shield instead of surgical mask in dental clinic?	Yes	61	24.3	p<0.001
	No	190	75.6	
In which waste container you should dispose your mask after treating your patient?	Regular waste container	89	35.4	p<0.001
	Clinical biohazard waste container	162	64.5	
While providing treatment to suspected COVID-19 patient, which type of mask you wear?	N95 mask	225	89.6	p<0.001
	Surgical mask	26	10.3	
Do you use N95 mask while performing aerosol generating procedure, during COVID-19 pandemic?	Yes	199	79.2	p<0.001
	No	52	20.7	
Do you ensure that the edges of N95 masks fit against your face before use?	Yes	222	88.4	p<0.001
	No	29	11.5	
How do you remove the mask?	By catching its outer surface	42	16.7	p<0.001
	From its strips	209	83.2	

DISCUSSION

This study focuses on Saudi dental students' knowledge of wearing a mask during the COVID-19 pandemic and their attitudes about dealing with the mask when treating patients. In our study population, knowledge levels were acceptable. This outcome could be explained by the fact that students in dental schools of Saudi Arabia had provided infection control training sessions in their curriculum, and they were familiar with infection control measures regarding wearing a mask during COVID-19. These outcomes are comparable to those reported in a similar study among medical students in Jordan [12]. This awareness would help dental students in recognizing the possible hazardous activities and urge them to follow preventive measures against the virus while performing dental procedures; however, only a few students in the current study (23.5%) reported that wearing a surgical mask would not protect them from COVID-19, probably because they believed that wearing masks alone without following the proper infection control measures would not be enough to prevent the pandemic.

In this study, 71.7% of the participants considered the middle layer as the one that acted as a filter, which is true according to COVID-19 Airway Protection PPE Overview (2020) [13]. This further reflects that Saudi dental student have good knowledge on masks during the COVID-19 pandemic, because of sufficient time (more than a year) since the beginning of the pandemic and the awareness being widely distributed among the population. According to recent systematic review, the N95 masks provided sufficient protection for health professional workers [14]. This type of mask protects the wearer from small particles, especially when the practitioner is working in a field where aerosols and water splatters are present, such as dental clinics. Based on the present study results, 94.8% of the students believed that N95 would provide the best protection against COVID-19. The present study further showed that 41.8% of health workers correctly knew the maximum duration for the use of the surgical mask as 8 hours. Chugtai et al. have reported that prolonged use of surgical mask could increase the risk of contamination and other factors such as clinical contact should be taken into consideration [15].

Around 82.8% of participants stated that the mask should cover the nose, mouth, and chin, and 96% of participants believed that the purpose of the metal strip on the surgical mask was to fit it on the nose. This follows the CDC general principles of wearing a mask that claims that masks must completely cover the nose and mouth and secure under the chin [16]. The majority of the participants (76.8%) agreed that cloth masks were not as effective as surgical masks. In a previous study, the authors have approved the efficacy of surgical masks compared to ordinary cloth masks; their results revealed that the standard surgical masks were able to remove 75% of the particles, while cloth masks removed less than 60% of particles [17]. The current study showed that maximum participants had good knowledge

regarding wearing masks during the COVID-19 pandemic. Among the findings, most of the participants exhibited adequate attitudes regarding the use of a mask during the COVID-19 pandemic. The majority (94.8%) of the participants believed wearing a mask in hospital premises to safeguard them against COVID-19, implying that students were more careful in their standard infection control measures thereby, indicating that COVID-19 has increased the awareness of students of the risks of infectious diseases.

However, 94.8% of participants believed that while providing dental treatment, there is a need to talk to the patient, by removing the mask. This might put them at an increased risk of COVID-19 and infection transmission, indicating an urgent need to inform students of the risk of COVID-19 and infection transmission. Dental students have increasing patient contact during their clinical years, which can put them at an enhanced risk for cross-infections [18]. Around 81.2% of participants changed their mask with change in patients, while 18.7% did not follow the practice, possibly because they had forgotten to change it or due to laziness. COVID-19 transmission routes involve direct contact and *via* airborne droplets, including aerosol delivery. Therefore, the participants need to ensure that the mask must be changed between patients to decrease the risk of COVID-19 and infection transmission. Around 27% of participants agreed that they would store the used surgical mask and decontaminate them for later and safe reuse if they were not sick. We speculated that they used an N95 mask and a regular surgical mask above it with a face shield; hence, there was no direct contact and airborne droplets could not reach to N 95 mask. Thus, the participants reused their N95 masks. The extended use and reuse of N95 respirators have become the last resort because it is crucial to maintain healthcare workers' protection during the COVID-19 pandemic.

Three-quarters (75.6%) of participants in the study responded "no" to the question of whether they used face shields instead of surgical masks in dental clinics. The face shield is a PPE device that is used by many workers to protect the facial area and associated mucous membranes from splashes, sprays, and spatter of body fluids. Face shields are generally not used alone, but along with other protective equipment, and are therefore classified as adjunctive PPE. Thus, efforts must be made to encourage the routine use of these measures among students. With COVID-19, there is increased use of face masks and production of medical waste. A study confirmed that medical waste related to COVID-19 resulted in confirmed cases. In addition, waste collectors can also get infected with COVID-19 due to improper medical waste management. In this study, 64.5% of the participants knew to dispose of their masks after the hospital duty in the clinical biohazard waste container. With proper disposal, this will decrease contamination. The majority (89.6%) of the participants in this study wore an N95 mask if provided treatment to a suspected COVID-19 patient. This was a good indicator of awareness on the type of mask used for suspected

patients with the disease. It has been demonstrated that COVID-19 can be detected in infected patients' saliva; thus, it can be an alert for all dental and healthcare professionals to be cautious in defending themselves against infectious disease. With the increasing COVID-19 infectious vulnerability risk for dentists *via* aerosolized saliva and respiratory droplets, it is advisable to take precautions against the disease and suspected COVID-19 patients and wears an N95 mask. In this study, 79.2% of the participants wore an N95 mask while performing aerosol-generating procedures during the COVID-19 pandemic.

N95 respirators are designed to minimize facial seal leakage because of a tight fit and prevent inhalation of small airborne particles. In this study, 88.4% of the participants were aware and ensured that the edges of N95 masks fit against their faces before use. This would prevent the chances of inhalation of airborne particles that prevent infection with SARS-CoV-2. The N95 mask should be placed and removed correctly to reduce the risk of self-contamination. Some of the limitations to this study included the cross-sectional nature of the study design limited to dental students from the western region of Saudi Arabia; hence, the findings of the study could not be generalized to the total population of dental students in the country. Further studies should be carried out on larger sample size, and more regions should be included before the results could be generalized.

CONCLUSION

The majority of the study participants had a thorough understanding of the appropriate COVID-19 behaviours to be followed by health workers with regard to the proper use of masks. A limited portion of the study population needed training on appropriate dealing with face masks.

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