

Impact of COVID-19 Pandemic on Dental Practitioners in Saudi Arabia: A Cross-sectional Study

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ABSTRACT

Introduction: The outbreak of the Coronavirus disease-2019 (COVID-19) pandemic has a major impact on health care professionals, especially the dental care professionals, who are operating in close contact with their patients.

Aim: To assess the impact of COVID-19 pandemic on dental practitioners in Saudi Arabia in terms of mental status, dental practice changes and financial status.

Materials and Methods: A cross-sectional analytical study was conducted among dental practitioners working in governmental and private sectors in Saudi Arabia from June to August 2020. The data was collected using a self-administered questionnaire which included demographic data, the participants' mental status with a focus on fear and anxiety, changes that occurred on the dental practice due to the pandemic in addition to its impact on the financial status and income. The data was entered and analysed using Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive statistics was calculated and Chi-square analysis was done.

Results: A total of 156 subjects (95 (60.9%) male and 61 (39.1%) were female) participated in this study. Most of the respondents 122 (78.2%) were concerned about transmitting the infection to people around them, 149 (95.5%) planned to implement face shields in their practice among other practice changes, 104 (66.7%) expressed concern regarding the impact of the pandemic on their future income. Majority of consultants consider that COVID-19 pandemic "negatively affected" their income which was statistically significant ($p=0.028$). Similarly, majority of participants private sector also considered that COVID-19 pandemic "negatively affected/positively affected" their income which was statistically significant ($p=0.001$).

Conclusion: During the COVID-19 pandemic, dental practitioners are more affected than other health providers. This is evident by the fear and anxiety, which they are going through and the negative impact of the pandemic, which included drop in their income and limited clinical practice hours due to the deferral of elective treatment.

Keywords: Coronavirus disease-2019, Contagion, Disease prevention, Economic impact, Infection control, Practice management, Risk perception

INTRODUCTION

According to the World Health Organisation (WHO), diseases of viral origin continue to be a persistent challenge to public health. In the past two decades, many serious viral diseases have manifested. For instance, the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) outbreak was during 2002 to 2003. Also, H1N1 has been documented in 2009, and in the recent past, particularly in 2012, Middle East Respiratory Syndrome Coronavirus (MERS-CoV) first cases were documented in Saudi Arabia [1].

Moreover, in December 2019, an unknown pneumonia-like case started appearing in Wuhan, China. Furthermore, the National Health Commission (NHC) of People's Republic of China then declared that a novel Corona virus, named Coronavirus Disease (COVID-19) by the WHO, is the cause of these new pneumonia-like cases. Even though, the spread started with Huanan Seafoods Market in Wuhan, the animal source has not yet been identified. However, the human-to-human contact is the main cause for most of the new cases especially among family members and health care providers [2]. Close contact with a patient, in addition to being subjected to respiratory droplets or aerosols through coughing or sneezing leads to interhuman transmission of the virus. Hence the virus enters the body via inhalation of these aerosols through nose and mouth [3]. The highly contagious nature of COVID-19 has formed barrier which hinders the patient's ability to get the required treatment. The American College of Surgeons (ACS) recommends that each hospital and health system should cancel, minimise, or reschedule electively scheduled operations [4]. Due to the highly

contagious nature of the virus, it poses a great risk in all healthcare facilities, especially dental clinics where routine dental procedures are performed using hand pieces which favour the spread of aerosols of salivary secretion, blood, and mucosal fluids. Moreover, the oral mucosa has been recognised as a potentially high-risk route of transmission given the direct contact transmission nature of the disease. The reported literature has stated that it is near impossible to diminish the aerosols production completely during dental procedures, which leads to major concerns regarding the spread of the virus via droplets and aerosols [5-7]. In addition, a recent study reported that 87% of dentists were afraid they would get COVID-19 [8]. Furthermore, another study concluded that dental practitioners, dental assistants and dental students are exposed to high risk that ought to be controlled. Therefore, the contribution of the dental practitioners in the prevention and observation of viral infections is now of more crucial importance [9]. According to a study, dental clinics are facing tremendous financial challenges since only emergency treatments are performed [10]. The Irish Dental Association (IDA) published a survey which states that one fifth of its dentists have terminated or suspended their practices. Along with the IDA, the British Dental Association has confirmed the same expectations as well, and tremendous financial damages are expected in dental clinics in the UK as a result of the discontinuation of elective dental treatment [11].

The present study was taken-up with a null hypothesis stating that the outbreak of COVID-19 pandemic did not have an impact on dental practitioners in Saudi Arabia and with a research hypothesis

stating that the outbreak of COVID-19 pandemic had an impact on dental practitioners in Saudi Arabia. Hence, the aim of this study was to assess the impact of COVID-19 pandemic on dental practitioners in Saudi Arabia, in terms of mental status, dental practice changes and financial status.

MATERIALS AND METHODS

A cross-sectional analytical study was conducted among dental practitioners working in governmental and private sectors in Saudi Arabia for a period of three months. The Ethical clearance was obtained from King Abdullah International Medical Research Center before the start of the study (Ref No. IRBC/1020/20, IRB-NCBE Reg. No: H-01-R-005).

Sample size calculation: Stratified random sampling technique was used for enrolling the study participants and that required for this study was estimated based on the results of the study reported in literature [11]. Using 5% relative precision and 95% confidence level, the estimated sample size came up as 315 [12]. The sample size was calculated using the following formula:

$$n = \frac{\left(z_{1-\frac{\alpha}{2}}^2 \right) (1-p)p}{\xi^2 p}$$

P is Expected proportion, ξ is Relative precision, $1-\alpha/2$ is the Desired Confidence level.

Inclusion criteria: Dental practitioners currently working in governmental and private sectors in Saudi Arabia irrespective of their work experience and those willing to participate were included in this study.

Exclusion criteria: Dental hygienist, dental assistants, dental students and dentists practicing outside Saudi Arabia were excluded from this study.

The data required for this study was collected using a self-administered structured electronic questionnaire that was distributed among private and governmental sectors. The questionnaire was distributed physically by visiting both private and governmental dental clinics in Riyadh, Saudi Arabia. These filled questionnaires were collected on the next day. In some cases, the questionnaire was sent to the dental practitioners electronically using social media platform WhatsApp after obtaining their contact details from the dentist or the receptionist. The participants were informed that their privacy and confidentiality will be completely protected and no identifiers or personal information will be collected, following which a written informed consent was obtained from the participants.

Questionnaire

The questionnaire was developed after referring to a similar study reported in the literature [8] in English language, which consisted of 27 questions divided into four sections. First section included a total of four (Q1-Q4) questions related to the participants' demographic data including age, work setting and specialty. The second section comprised a total of seven (Q5-Q11) comprised of questions related to the participants' mental status with a focus on fear and anxiety. The third section comprised a total of 11 (Q12-Q22) questions assessing changes that occurred on the dental practice due to COVID-19 pandemic which includes Personnel Protective Equipment (PPE), certain treatment modification, taking patient's travel history and infection control measures. The final section comprised a total of five (Q23-Q27) questions related to the financial status of the participants and the impact of the pandemic on their income.

The content validity of this study questionnaire was also assessed. This was obtained by distributing the questionnaire among six faculty members of the institution who were experts in the field of

research. The purpose here was identifying the questions that had a greater degree of agreement amongst the faculty members and to quantify the concordance between the faculty members for each question Aiken's V test was applied. A value higher than 0.90 were obtained for the questions included in this questionnaire [13].

The feasibility and the reliability of the questionnaire was assessed by conducting a pilot study among 15 faculty members of the institution. The questionnaire used in the pilot study comprised all the 27 questions that were used in the final version of the questionnaire. The test-retest reliability was estimated from the responses obtained the participants at a gap of two weeks. The test-retest reliability was found to be excellent with a mean values of 0.82 Spearman correlation and 0.88 Kappa value. The response obtained from participants of the pilot study was confined only for the pilot study and their responses were not included in the final data analysis.

STATISTICAL ANALYSIS

The data was entered and analysed using SPSS version 23.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics was calculated, Chi-square analysis were calculated to measure the association of age, gender and work sector on the responses. A value of $p < 0.05$ was considered as statistical significance.

RESULTS

In the present study, only 156 participants responded to the questionnaire, with a total response rate of 49.52%. Distribution of study participants according to demographic data [Table/Fig-1].

Demographic parameters	Sub parameter	Number	Percentage
Age group (years)	20-29	67	42.9
	30-39	60	38.5
	40-49	20	12.8
	50-59	9	5.8
Gender	Female	61	39.1
	Male	95	60.9
Designation	Consultant	32	20.5
	General dentist	99	63.5
	Specialist	25	16
Work setting	Government	106	67.9
	Private	50	32.1

[Table/Fig-1]: Distribution of study participants according to demographic data.

In the present study, 95 (60.9%) participants were male and 61 (39.1%) were female. A 67 (42.9%) participants were in the age group of 20-29 years, 9 (5.8%) were within the age of 50-59, 60 (38.5%) were within the age group of 30-39 years and 20 (12.8%) were within the age group of 40-49 years. A 106 (67.9%) of the participants were general dentist working in government sector and 50 (32.1%) were in private sector.

Distribution of study participants according to income during pandemic [Table/Fig-2]. For the questions regarding their income, 129 (82.7%) of them mentioned that dental practice is their main source of income and 104 (66.7%) of the study participants were concerned about future income., 36 (23.1%) were positively affected and 62 (39.7%) were not affected whereas 58 (37.2%) of the study participants were negatively affected. A 138 (88.5%) participants changed their clinic working hours and 75 (54.3%) were attending only emergency cases. Distribution of study participants according to association between COVID-19 dental practice and demographic data [Table/Fig-3].

Among different age groups, gender, designation and work settings, majority 89-98% of the participants chose "yes" as their option to the question "from now on, will you defer or postpone treatment if the patient shows symptoms similar to those of COVID-19". Moreover,

Questions	No	Yes	
Is your dental practice your main source of income?	27 (17.3)	129 (82.7)	
Are you concerned about your future income due to COVID-19 pandemic?	52 (33.3)	104 (66.7)	
Has there been any change in opening hours or access to your practice during the COVID-19 pandemic?	18 (11.5)	138 (88.5)	
If yes, which best describes these changes?	The practice continued but it was confined to emergency treatment only	The practice was closed permanently	The practice was closed temporarily
	75 (54.3)	13 (9.4)	50 (32.1)
Was your income affected by COVID-19 pandemic?	Negatively affected	Positively affected	Unaffected
	58 (37.2)	36 (23.1)	62 (39.7)

[Table/Fig-2]: Distribution of study participants according to income during pandemic.

among different age groups, gender, designation and work settings, about 60-87% of the participants chose "no" as their option to the question "do you think surgical masks are enough to prevent the infection of COVID-19?", and was statistically significant among private and government practitioners ($p=0.016$). Among different age groups, gender, designation and work settings, 5-87% of the participants chose "yes" as their option to the question "will you modify your treatment when dealing with an asymptomatic patient that has recently been in contact with a COVID-19 case?" and was statistically significant among gender sub-parameter (p -value 0.034). Distribution of study participants according to Association between COVID-19 dental practice Income changes and demographic data [Table/Fig-4].

Among different age groups, gender, designation and work settings, majority of the participants (60-89%) chose "yes" as their option to the question "are you concerned about your future income due to COVID-19 pandemic?" Majority of general dentist and specialists were "unaffected" on their income during COVID-19 pandemic, whereas the consultant displayed "negatively affected" on their income during COVID-19 pandemic and was statistically significant ($p=0.028$). Majority of participants from the government sector were "unaffected" on their income during COVID-19 pandemic, where as those from the private sector displayed "negatively affected/positively affected" on their income during COVID-19 pandemic and was statistically significant ($p=0.001$). Distribution of study participants according to Association between COVID-19 dental practice fear, anxiety and demographic data [Table/Fig-5(a,b,c)].

Majority of consultants (65.6%), general dentists (66.7%) and specialists (60%) strongly agreed that they are concerned when providing care for a patient with symptoms similar to those of COVID-19 and displayed a statistically significant difference ($p=0.03$). In addition, among different age groups, gender, designations, and work settings, majority of the sub-parameters chose agree and strongly agree as their option to the question "I feel anxious when coming in close contact with patients during the pandemic" and it displayed statistically significant difference in designation ($p=0.016$). Additionally, among different age groups, gender, and work settings majority of the sub-parameters chose agree and strongly agree as their option to the question "I will isolate myself from my family during my practice" whereas consultant sub-parameter displayed disagree and strongly disagree as their major option and showing statistically significant difference ($p=0.04$).

DISCUSSION

Since the COVID-19 is mainly transmitted through direct, indirect, and close contact between infected people through bodily secretions such as saliva and respiratory droplets, it constituted a major barrier

to health care professionals including dental health [3]. Furthermore the fluids within the oral cavity are a reservoir for numerous types of microorganisms, and dental procedures done by hand pieces and ultrasonic devices are known to generate a great number of aerosols. Therefore, it is crystal clear that dentists are one of the most groups prone to getting infected by COVID-19 virus [5].

The present study focused on the impact of COVID-19 on the psychological aspect, dental practice modifications, and financial consequences affecting dental practitioners. In the present study the majority participants were general dentists (63%), consultants (20%), and specialists (17%). As for the work setting, the majority were working in governmental sector (66%) while (34%) worked in the private sector. When compared to a study done in Egypt more than half of the participants were general dentists. A notable difference can be seen in the specialists and consultants' numbers as 7.9% were consultants and 39.8% were specialists [14].

Similar to the present study, a study published in northern Italy, reported that the vast majority of dentists were concerned about getting infected or even transmitting the disease to people around them [15]. The reason could be due to the fact that COVID-19 is infectious disease. Moreover, the vast majority of dentists participating in the present study reported that they are anxious about providing dental treatment to patients showing symptoms similar to those of COVID-19. Similarly, the same finding is reported in a study published in Egypt where more than 90% of dentists were afraid of getting infected [14]. The fear is justifiable as COVID-19 has spread and infected millions of people with the number of deaths increasing every day. In addition, the majority of participants of the present study wanted to close their practices until the pandemic subsides. Dentists in Poland have the same view on this matter as 71.2% of the dentists decided to close their practices during this time [16].

This shows the level of anxiety that dentists are going through, which reached the point of cutting the source of their livelihood just to feel safe. Most of the dentists started calling patients on the phone to see if the patients experience any symptoms similar to those of COVID-19 before physically showing up to the clinic [17]. A large proportion of the dentists' responses indicate that they were fearful of carrying the disease to their homes and families. Similarly, the study done in Egypt showed that 98.6% feared transmitting the disease to their families [14]. The COVID-19 virus can last on surfaces for hours and even days. This makes it very difficult to limit its transmission and makes all surfaces touched by dentists a risk for getting infected for them and everyone surrounding them [18].

Since the emergence of COVID-19, the way patients are seen has changed. Naturally, the dentist's practice in their clinics has changed as well. To illustrate, the Alternate Care Site (ACS) recommends that each hospital and health system should cancel, minimise, or reschedule electively scheduled operations [19]. A large proportion of this study participants had decided to ask every patient about their travel history and take their body temperature before the initiation of any dental treatment. These findings were comparable to a study published in Saudi Arabia which states that 92% of dentists check their patients' body temperature before initiating treatment. Also, the study stated that taking travel history has been added to health charting [20]. These are very crucial measure as one of the studies reported that the most common symptom is fever in about 83-98% of the cases [21]. Treating patients showing suspicious symptoms poses a challenge due to the possibility of them being infected with COVID-19. This is a very good reason as to why most of the dentists have decided to defer treating them until their symptoms subsides. This decision is also seen in a Jordanian study which reported that 82.6% of dentists wanted to avoid the treatment of any patients suspected of being infected [22]. In addition, surgical masks are the gold standard in every day dental practice as they are worn in during all procedures. However, most dentists seem to have lost faith in their protective efficiency as proven by their responses

Parameter	Sub-parameter	Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11	
		No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	No N %	Yes N %
Age groups (years)	20-29	15 22.40%	52 77.60%	4 6.00%	63 94.00%	7 10.40%	60 89.60%	47 70.10%	20 29.90%	25 37.30%	42 62.70%	1 1.50%	66 98.50%	14 20.90%	53 79.10%	7 10.40%	60 89.60%	12 17.90%	55 82.10%	28 41.80%	39 58.20%	12 17.90%	55 82.10%
	30-39	16 26.70%	44 73.30%	6 10.00%	54 90.00%	1 1.70%	59 98.30%	50 83.30%	10 16.70%	24 40.00%	36 60.00%	4 6.70%	56 93.30%	17 28.30%	43 71.70%	10 16.70%	50 83.30%	12 20.00%	48 80.00%	13 21.70%	47 78.30%	10 16.70%	50 83.30%
	40-49	9 45.00%	11 55.00%	2 10.00%	18 90.00%	1 5.00%	19 95.00%	16 80.00%	4 20.00%	4 20.00%	16 80.00%	2 10.00%	18 90.00%	4 20.00%	16 80.00%	1 5.00%	19 95.00%	2 10.00%	18 90.00%	7 35.00%	13 65.00%	5 25.00%	15 75.00%
	50-59	2 22.20%	7 77.80%	0 0.00%	9 100.00%	0 0.00%	9 100.00%	6 66.70%	3 33.30%	3 33.30%	6 66.70%	0 0.00%	9 100.00%	3 33.30%	6 66.70%	3 33.30%	6 66.70%	3 33.30%	3 33.30%	6 66.70%	4 44.40%	5 55.60%	2 22.20%
	p-value	p=0.248		p=0.653		p=0.163		p=0.301		p=0.437		p=0.272		p=0.671		p=0.149		p=0.5		p=0.095		p=0.85	
Gender	Female	19 31.10%	42 68.90%	5 8.20%	56 91.80%	1 1.60%	60 98.40%	47 77.00%	14 23.00%	19 31.10%	42 68.90%	2 3.30%	59 96.70%	15 24.60%	46 75.40%	8 13.10%	53 86.90%	13 21.30%	48 78.70%	19 31.10%	42 68.90%	6 9.80%	55 90.20%
	Male	23 24.20%	72 75.80%	7 7.40%	88 92.60%	8 8.40%	87 91.60%	72 75.80%	23 24.20%	37 38.90%	58 61.10%	5 5.30%	90 94.70%	23 24.20%	72 75.80%	13 13.70%	82 86.30%	16 16.80%	79 83.20%	33 34.70%	62 65.30%	23 24.20%	72 75.80%
	p-value	p=0.36		p=0.539		p=0.091		p=0.508		p=0.393		p=0.706		p=0.552		p=0.56		p=0.5		p=0.729		p=0.034	
Designation	Consultant	10 31.20%	22 68.80%	10 31.20%	15 68.80%	0 0.00%	32 100.00%	28 87.50%	4 12.50%	14 43.80%	18 56.20%	1 3.10%	31 96.90%	12 37.50%	20 62.50%	7 21.90%	25 78.10%	5 15.60%	27 84.40%	10 31.20%	22 68.80%	4 12.50%	28 87.50%
	General dentist	22 22.20%	77 77.80%	22 22.20%	77 77.80%	9 9.10%	90 90.90%	71 71.70%	28 28.30%	29 29.30%	70 70.70%	4 4.00%	95 96.00%	22 22.20%	77 77.80%	10 10.10%	89 89.90%	20 20.20%	79 79.80%	35 35.40%	64 64.60%	17 17.20%	82 82.80%
	Specialist	10 40.00%	15 60.00%	10 40.00%	15 60.00%	0 0.00%	25 100.00%	20 80.00%	5 20.00%	13 52.00%	12 48.00%	2 8.00%	23 92.00%	4 16.00%	21 84.00%	4 16.00%	21 84.00%	4 16.00%	21 84.00%	7 28.00%	18 72.00%	8 32.00%	17 68.00%
	'p' Value	p=0.166		p=0.166		p=0.064		p=0.169		p=0.062		p=0.636		p=0.123		p=0.218		p=0.79		p=0.754		p=0.143	
Work setting	Government	29 27.40%	77 72.60%	29 27.40%	77 72.60%	6 5.70%	100 94.30%	87 82.10%	19 17.90%	37 34.90%	69 65.10%	3 2.80%	103 97.20%	27 25.50%	79 74.50%	11 10.40%	95 89.60%	20 18.90%	86 81.10%	36 34.00%	70 66.00%	19 17.90%	87 82.10%
	Private	13 26.00%	37 74.00%	13 26.00%	37 74.00%	3 6.00%	47 94.00%	32 64.00%	18 36.00%	19 38.00%	31 62.00%	4 8.00%	46 92.00%	11 22.00%	39 78.00%	10 20.00%	40 80.00%	9 18.90%	41 82.00%	16 32.00%	34 68.00%	10 20.00%	40 80.00%
	p-value	p=0.51		p=0.51		p=0.595		p=0.016		p=0.724		p=0.149		p=0.694		p=0.131		p=0.54		p=0.857		p=0.826	

[Table/Fig-3]: Distribution of study participants according to association between COVID-19 dental practice and demographic data.

- *Statistically significant p-value <0.05; Chi-square Test
- Q1=From now on, will you ask every patient about their travel history before dental treatment?
- Q2=From now on, will you take every patient's body temperature before treatment?
- Q3=From now on, will you defer or postpone treatment if the patient shows symptoms similar to those of COVID-19?
- Q4=Do you think surgical masks are enough to prevent the infection of COVID-19?
- Q5=Do you think N95 masks should replace simple surgical masks for future dental practice?
- Q6=Are you planning to use face shield more often in your future practice?
- Q7=Are you planning to use rubber dam more often in your future practice?
- Q8=Are you planning to use high volume suction more often in your future practice?
- Q9=Will the treatment and precautions you take for a patient with a history of COVID-19 be the same for other patients?
- Q10=Are you aware if your clinic provides an efficient ventilating system?
- Q11=Will you modify your treatment when dealing with an asymptomatic patient that has recently been in contact with a COVID-19 case?

Parameter	Sub-parameter	Q1		Q2		Q3		Q4			Q5			
		No N %	Yes N %	No N %	Yes N %	No N %	Yes N %	Missing N %	The practice continued but it was confined to emergency treatment only N %	The practice was closed permanently N %	The practice was closed temporarily N %	Negatively affected N %	Positively affected N %	Unaffected N %
Age groups (years)	20-29	11 16.40%	56 83.60%	18 26.90%	49 73.10%	13 19.40%	54 80.60%	6 9%	31 46.30%	5 7.4%	25 37.30%	21 31.30%	15 22.40%	31 46.30%
	30-39	11 18.30%	49 81.70%	20 33.30%	40 66.70%	4 6.70%	56 93.30%	0	36 60%	7 11.70%	17 28.30%	21 35%	17 28.30%	22 36.70%
	40-49	5 25.00%	15 75.00%	12 60.00%	8 40.00%	1 5%	19 95.00%	1 5%	13 65%	0	6 30%	11 55%	2 10%	7 35%
	50-59	0	9 100%	2 22.20%	7 77.80%	0	9 100%	0	6 66.70%	1 11.1%	2 22.2%	5 55.60%	2 22.20%	2 22.20%
	p-value	p=0.425		p=0.043		p=0.058		p=0.236			p=0.311			
Gender	Female	8 13.10%	53 86.90%	18 29.50%	43 70.50%	8 13.10%	53 86.90%	4 6.55%	33 54.10%	4 6.55%	20 32.80%	24 39.34%	19 31.15%	18 29.51%
	Male	19 20%	76 80%	34 35.80%	61 64.20%	10 10.50%	85 89.50%	3 3.20%	53 55.80%	9 5.7%	30 31.60%	34 35.80%	17 17.90%	44 46.30%
	'p' value	p=0.289		p=4.88		p=0.618		p=0.716			p=0.061			
Designation	Consultant	9 28.10%	23 71.90%	20 62.50%	12 37.50%	0	32 100%	0	17 53.10%	3 9.40%	12 37.50%	16 50%	1 3.10%	15 46.90%
	General dentist	14 14.10%	85 85.90%	24 24.20%	75 75.80%	16 16.20%	83 83.80%	6 6.10%	53 53.5%	9 9.10%	31 31.30%	36 36.40%	26 26.30%	37 37.3%
	Specialist	4 16%	21 84%	8 32.00%	17 68.00%	2 8%	23 92%	1 4%	16 64%	1 4%	7 28%	6 24%	9 36%	10 40%
	p-value	p=0.188		p=0.001*		p=0.038*		p=0.739			p=0.028*			
Work setting	Government	24 22.60%	82 77.40%	44 41.50%	62 58.50%	10 9.40%	96 90.60%	5 4.70%	63 59.40%	7 6.60%	31 29.20%	37 34.90%	15 14.20%	54 50.90%
	Private	3 6%	47 94.00%	8 16.00%	42 84.00%	8 16%	42 84%	2 4%	23 46%	6 12%	19 38%	21 42%	21 42%	8 16%
	'p' value	p=0.012		p=0.002*		p=0.284		p=0.689			p=0.001*			

[Table/Fig-4]: Distribution of study participants according to Association between COVID-19 Dental Practice Income changes and demographic data.

*Statistically significant p-value ≤ 0.05 ; Chi-square Test

Q1=Is your dental practice your main source of income?

Q2=Are you concerned about your future income due to COVID-19 pandemic?

Q3=Has there been any changes in opening hours or access to your practice during the COVID-19 pandemic?

Q4=If yes, which best describes these changes?

Q5=Was your income affected by COVID-19 pandemic?

Parameter	Sub-parameter	Q1					Q2					Q3					
		Agree	Dis-agree	Neutral	Strongly agree	Strongly dis-agree	Agree	Dis-agree	Neutral	Strongly agree	Strongly dis-agree	Agree	Dis-agree	Neutral	Strongly agree	Strongly dis-agree	
		N	21	0	10	35	1	16	0	3	47	1	8	23	15	11	10
Age groups (years)	20-29	%	31.30%	0	14.90%	52.20%	1.50%	23.90%	0	4.50%	70.10%	1.50%	11.90%	34.30%	22.40%	16.40%	14.90%
		N	20	2	6	32	0	16	3	3	38	0	11	16	15	2	16
	30-39	%	33.30%	3.30%	10.00%	53.30%	0	26.70%	5.00%	5.00%	63.30%	0	18.30%	26.70%	25.00%	3.30%	26.70%
		N	9	0	0	7	4	8	0	3	9	0	2	6	5	0	7
	40-49	%	45.00%	0	0	35.00%	20.00%	40.00%	0.00%	15.00%	45.00%	0	10.00%	30.00%	25.00%	0	35.00%
		N	3	0	0	6	0	0	0	1	8	0	1	1	2	4	1
	50-59	%	33.30%	0	0	66.70%	0	0	0	11.10%	88.90%	0	11.10%	11.10%	22.20%	44.40%	11.10%
	p-value	0.02*					0.208					0.022*					
Gender		N	18	0	6	32	5	12	0	6	42	1	8	22	14	5	12
	Female	%	29.50%	0	9.80%	52.50%	8.20%	19.70%	0	9.80%	68.90%	1.60%	13.10%	36.10%	23.00%	8.20%	19.70%
		N	35	2	10	48	0	28	3	4	60	0	14	24	23	12	22
	Male	%	36.90%	2.10%	10.50%	50.50%	0	29.50%	3.10%	4.20%	63.20%	0	14.70%	25.30%	24.20%	12.60%	23.20%
	p-value	0.046*					0.142					0.655					
Designation		N	14	0	1	17	0	8	3	0	21	0	5	10	9	4	4
	Consultant	%	43.80%	0	3.10%	53.10%	0	25.00%	9.40%	0	65.60%	0	15.60%	31.20%	28.10%	12.50%	12.50%
		N	31	1	10	53	4	23	0	9	66	1	15	31	24	10	19
	General dentist	%	31.00%	1.00%	10.00%	54.00%	4.00%	23.23%	0	9.10%	66.70%	1.00%	15.20%	31.30%	24.20%	10.10%	19.20%
		N	8	1	5	10	1	9	0	1	15	0	2	5	4	3	11
	Specialist	%	32.00%	4.00%	20.00%	40.00%	4.00%	36.00%	0	4.00%	60.00%	0	8.00%	20.00%	16.00%	12.00%	44.00%
	p-value	0.344					0.03*					0.266					
		N	33	1	12	56	4	25	3	7	71	0	16	29	26	16	19

Work setting	Government	%	31.20%	0.90%	11.30%	52.80%	3.80%	23.60%	2.80%	6.60%	67.00%	0	15.10%	27.40%	24.50%	15.10%	17.90%
		N	20	1	4	24	1	15	0	3	31	1	6	17	11	1	15
	Private	%	40.00%	2.00%	8.00%	48.00%	2.00%	30.00%	0.00%	6.00%	62.00%	2.00%	12.00%	34.00%	22.00%	2.00%	30.00%
	p-value		0.748					0.376					0.076				

[Table/Fig-5a]: (Q1-Q3): Distribution of study participants according to Association between COVID-19 Dental Practice Fear, anxiety and demographic data.

*Statistically significant p-value ≤ 0.05 ; chi-square test; Q1=I am concerned about getting infected by COVID-19 while practicing dentistry; Q2=I am concerned when providing care for a patient with symptoms similar to those of COVID-19; Q3=I want to discontinue my dental practice until the pandemic subsides

Parameter	Sub-parameter	Q4					Q5					Q6				
		Agree	Disagree	Neutral	Strongly agree	Strongly disagree	Agree	Disagree	Neutral	Strongly agree	Strongly disagree	Agree	Disagree	Neutral	Strongly agree	Strongly disagree
Age groups (years)	N	21	12	13	17	4	25	12	16	11	3	9	1	4	51	2
	%	31.30%	17.90%	19.40%	25.40%	6.00%	37.30%	17.90%	23.90%	16.40%	4.50%	13.40%	1.50%	6.00%	76.10%	3.00%
	N	12	8	12	23	5	20	12	15	9	4	5	1	1	50	3
	%	20.00%	13.30%	20.00%	38.30%	8.40%	33.30%	20.00%	25.00%	15.00%	6.70%	8.30%	1.70%	1.70%	83.30%	5.00%
	N	6	6	3	5	0	11	1	3	2	3	2	0	3	15	0
Gender	%	30.00%	30.00%	15.00%	25.00%	0	55.00%	5.00%	15.00%	10.00%	15.00%	10.00%	0.00%	15.00%	75.00%	0.00%
	N	1	0	4	4	0	3	1	2	3	0	3	0	0	6	0
	%	11.20%	0.00%	44.40%	44.40%	0	33.30%	11.10%	22.30%	33.30%	0	33.30%	0.00%	0.00%	66.70%	0.00%
	p-value			0.286					0.587						0.416	
	N	19	8	11	21	2	23	8	12	12	6	10	1	4	46	0
Designation	%	31.10%	13.10%	18.00%	34.50%	3.30%	37.70%	13.10%	19.70%	19.70%	9.80%	16.40%	1.60%	6.60%	75.40%	0.00%
	N	21	18	21	28	7	36	18	24	13	4	9	1	4	76	5
	%	22.10%	18.90%	22.10%	29.50%	7.40%	37.90%	18.90%	25.30%	13.70%	4.20%	9.50%	1.10%	4.20%	80.00%	5.30%
	p-value			0.461					0.416						0.261	
	N	3	2	8	17	2	15	6	6	5	0	3	0	0	26	3
Work setting	%	9.40%	6.25%	25.00%	53.10%	6.25%	46.80%	18.80%	18.80%	15.60%	0	9.40%	0	0	81.20%	9.40%
	N	34	18	19	23	5	39	13	25	16	6	13	1	8	75	2
	%	34.30%	18.20%	19.20%	23.20%	5.10%	39.40%	13.10%	25.30%	16.20%	6.00%	13.10%	1.00%	8.10%	75.80%	2.00%
	N	3	6	5	9	2	5	7	5	4	4	3	1	0	21	0
	%	12.00%	24.00%	20.00%	36.00%	8.00%	20.00%	28.00%	20.00%	16.00%	16.00%	12.00%	4.00%	0.00%	84.00%	0.00%
p-value			0.016*					0.159						0.149		
Work setting	N	25	16	20	41	4	36	19	18	6	8	1	7	85	5	
	%	23.60%	15.10%	18.90%	38.70%	3.70%	34.00%	17.90%	17.00%	5.60%	7.50%	0.90%	6.60%	80.20%	4.70%	
	N	15	10	12	8	5	23	7	9	7	4	11	1	37	0	
	%	30.00%	20.00%	24.00%	16.00%	10.00%	46.00%	14.00%	18.00%	14.00%	8.00%	22.00%	2.00%	74.00%	0	
	p-value			0.054					0.572					0.04*		

[Table/Fig-5 (b)]: Distribution of study participants according to Association between COVID-19 Dental Practice Fear, anxiety and demographic data.

*Statistically significant p-value ≤ 0.05 ; chi-square test
 Q4=I feel anxious when coming in close contact with patients during the pandemic;
 Q5=The morbidity and mortality rate of COVID-19 make me anxious;
 Q6=If I am diagnosed with COVID-19, I am concerned about transmitting the infection to people around me

Parameter	Sub-parameter	Q7				
		Agree	Disagree	Neutral	Strongly agree	Strongly disagree
Age groups (years)	20-29	34.30%	11.90%	29.90%	22.40%	1.50%
	30-39	23.30%	26.70%	13.30%	33.30%	3.30%
	40-49	50.00%	20.00%	15.00%	15.00%	0.00%
	50-59	22.20%	33.30%	22.20%	22.20%	0.00%
	p-value	0.168				
Gender	Female	37.70%	13.10%	23.00%	26.20%	0.00%
	Male	27.40%	24.20%	20.00%	25.30%	3.20%
	p-value	0.226				
Designation	Consultant	9.40%	40.60%	28.10%	18.80%	3.10%
	General dentist	37.40%	14.10%	21.20%	25.30%	2.00%
	Specialist	36.00%	16.00%	12.00%	36.00%	0.00%
	p-value	0.014*				
Work setting	Government	28.30%	21.70%	22.60%	26.40%	0.90%
	Private	38.00%	16.00%	18.00%	24.00%	4.00%
	p-value	0.456				

[Table/Fig-5c]: Association between dental practice fear, anxiety and demographic data. Ques. 7: I will isolate myself from my family during my practice; bold p-values to be significant

in this survey. The majority of dentists in this study believe that N 95 masks, which were proven to be more effective, should replace simple surgical masks for future dental practices. However, during the pandemic, most dentists decided to include them in their everyday practice to guarantee more protection. This decision is agreed upon by most of these participants, as they are planning to use face shields more often in their practice. According to literature, only 14% of dentists use rubber dam for all patients due to its ability to reduce the dentist's exposure to aerosols and oral fluids. Another useful tool available in every dental clinic is the high-volume suction. Dentists should use high volume suction in every procedure now. Especially, the aerosols generating procedures to reduce the chance of getting infected [8]. Dentists agree with our statement, that all patients should be treated as if they are posing a risk of infection. To add another point, having a proper ventilating system is of crucial importance when it comes to dealing with air borne disease just like COVID-19, and most of these participants reported having sufficient knowledge about ventilating systems in their clinics. This is required not only for their own safety but also for the safety of their patients and dental team. This is especially important since the COVID-19 virus can last in the air up to three hours and a proper ventilation system can help [23].

Since most dentists have their practice as their main source of income, financial challenges are to be expected during the pandemic. The reason for that is attributed to many factors such as, the governmentally imposed quarantine, the deferral of elective treatments, and patients' apprehensions and fear of getting infected. This also affected the opening hour of private dental clinics. To give more information, about half of these participants reported that their practice continued, but it was confined to emergency treatment while more than one third closed their practice temporarily. However, a very small percentage closed permanently. In the present study, the negative effect on income was less significant compared to other literature. The reason could be due to the fact that most of the participants worked in the governmental sector, which guarantees a fixed monthly income. Furthermore, due to the pandemic, the Saudi government paid 60% of the monthly salaries of Saudi citizens working in the private sector which includes Saudi dentists [24].

Limitation(s)

In the present study, even though the questionnaire was distributed both in physical and electronic forms, the responses were lower than expected and the original sample size was not reached.

CONCLUSION(S)

Dental health care providers are facing challenging times during the COVID-19 pandemic. Dentists fear not only about their health but also about the health of those surrounding them. Furthermore, the negative impact of the pandemic reached the point of reducing dental professionals' income and clinical opening hours due to the deferral of elective treatment, the governmentally imposed quarantine, and the fear of the patients of getting infected. However, as trained health care professionals, dentists were able to modify their practices in accordance with the recommended guidelines to reach the point of being able to provide treatment for those who need it while maintaining a safe environment for the patients. Dental procedures are considered to have higher risk of transmission of infectious diseases due to the bio-aerosols generated during the dental procedures. Hence to overcome the fear of getting infected and in order to prevent the transmission of infectious diseases, it is very much necessary to adopt strict infection control protocols. During the times of disease outbreaks dental procedures in which there is an increased risk of disease transmission (restorative and endodontic treatments) have to be postponed. Government should consider the financial impact on the dentists' due to the sudden closing of dental clinics during the outbreaks.

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