

DENTISTS AND COVID-19 ERA: SUFFERING, WORK LIMITATIONS AND ADHERENCE TO PREVENTIVE MEASURES: A CROSS SECTION STUDY.

By

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DOI: 10.21608/ejom.2022.127533.1268

Submit Date: 2022-03-23

Revise Date: 2022-04-17

Accept Date: 2022-04-27

Author's contribution: All authors contributed equally in this work.

Abstract

Introduction: Dental practice has been classified as high risk profession due to the increased possibility of infection transmission between dentists and patients. As a result, strict and necessary infection control guidelines against COVID-19 virus are regarded as a top priority in dental settings. **Aim of Work:** to assess the adherence of dentists to COVID-19 preventive measures, to study the factors which influence this adherence and to clarify the impact of COVID-19 on the dentists' lives in Sharkia governorate. **Materials and Methods:** this cross-sectional study was conducted among (346) dentists. An electronic survey was used, the questionnaire comprised of socio-demographic characteristics, knowledge source about COVID-19 infection prevention, vaccination, impact of COVID-19 on the dentists' lives, quality of life, adherence to COVID-19 preventive measures and factors which interfere with the adherence to these measures. **Results:** About 13% of the studied group were trained about covid-19 infection prevention skills, 56.06% updated their knowledge with current Ministry of Health (MOH) guidelines and 337 (97.39%) were vaccinated against COVID 19. The studied dentists were very worried about their health and their relatives' health. Their income was dramatically decreased and they were moderately worried of being infected. The majority of the participants (93.1%) self-rated their quality of life as adequate. Multivariable linear regression revealed that female gender, older age, and a higher quality of life score were factors that were positively associated with COVID-19 adherence, whereas a lack of PPE was a factor that was negatively associated with it. **Conclusion and Recommendations:** The findings indicated that dental professionals' performance under the conditions of the COVID-19 pandemic was unfavorable. Standardized protocols are required to prevent the spread of infection, government supervision should consider both governmental and private clinics, and the provision of low-cost PPE, disinfectant and mouthwash availability.

Key words: Dentist; Adherence; COVID-19, Infection prevention measures and Quality of life.

Introduction

Every aspect of life has been impacted globally since the emergence of the novel coronavirus disease (COVID-19). The COVID-19 pandemic has spread exponentially (Khurshid et al., 2020 and Neheret al., 2020) affecting millions of people and causing deaths worldwide (WHO, 2020)^a. The virus can transmit from an infected person when they cough, sneeze, speak, or breathe in small liquid particles. These particles range from large respiratory droplets to tiny aerosols (WHO, 2021).

The coronavirus (Covid 19) incubation period was estimated to be from 5 to 6 days on average. The disease's signs and symptoms in early stages are similar to those of any other viral infection. Fever, nonproductive cough, cold, shortness of breath, fatigue, loss of taste and smell sensation are some common signs and symptoms (Meng et al., 2020).

Dentists are at risk of COVID 19 infections due to both the virus's highly transmissible property and the nature of dental profession, which necessitates close proximity to the patient's oro-pharyngeal region as

well as the use of droplet and aerosol producing procedures (Aldahlawi and Afifi, 2020), which put both the dentist and the patient at risk of microbial contamination (Bizzoca et al., 2020).

As the COVID-19 pandemic continues, frontline healthcare workers continue to face numerous physical and mental health challenges (Shaukat et al., 2020 and Mehta et al., 2021). Oral health professionals are included to be at high risk of infection (Bhumireddy et al., 2021). According to research from Asia and the Middle East, dentists experienced anxiety due to fears of contracting SARS-CoV-2 which may lead to infection to family members (Mahdee et al., 2020; Aldhuwayhi et al., 2021 and Kamran et al., 2021).

Because dentists are at high risk due to aerosol transmission, it is critical to understand best methods of practicing dentistry successfully.

Aim of Work

To assess the adherence to COVID-19 preventive measures, factors influencing the adherence and to clarify the impact of COVID-19 on the dentists' lives in Sharkia governorate.

Materials and Methods

Study design: It is a cross-sectional study.

Place and duration of the study: The study was conducted in Sharkia governorate during the period from July to September 2021.

Sample Size and Sampling Technique

The total number of dentists in Sharkia governorate in June 2021 was 3352 (2176 males and 1185 females). As there is no available data on the dental health care adherence to COVID-19 preventive measures; we considered the proportion of adherence to COVID-19 preventive measures among dentists was 50%, with a 95% confidence interval (CI), and 5% margin of error.

The optimal sample size is about (370 dentists). The inclusion criteria are currently working dentists in Sharkia governorate. Four districts of Sharkia governorate were selected randomly by simple random technique and dentists in these districts were invited to participate: Abo Hammad, Zagazig, Belbis and Deyarb Negm districts.

Study methods

The data were collected using **an online questionnaire** designed on Google forms and the link was

shared to dentists via social application (Whats App groups). Dentists Whats App groups were created by Sharkia directorate of health for any notifications or announcements. The total number of dentists on these groups were 518 dentist. The questionnaire was available on line for 2 months to gather the required number. The filled questionnaires was 346 with response rate was 66.79%.

The study questionnaire was in English. It was adapted and modified from previously published surveys (Topp et al., 2015, Dziedzic, 2020, Mahdee et al., 2020, Thakar et al., 2020 and Tysiac-Miśta and Dziedzic 2020). It consists of:

I- Socio-demographic characteristics: including gender, age, residence, duration of work, qualification (general practitioners, specialists or consultant) and type of work (governmental, private or both).

II- Knowledge source and vaccination: trained in covid-19 infection prevention skills, update knowledge with current MOH guidelines, vaccination status and willingness.

III-Impact of COVID-19 on the dentists' lives: five items were measured on a 5-point Likert scale (1= least

suffering to 5= extreme suffering) including: 1) The dentists are worried about their health, 2) the dentists are worried about their relatives' health, 3) the impact on their income 4) change in working time, and 5) being stigmatized with the COVID-19 infection.

IV- Quality of life: assessed by using the WHO 5-questions assessment tool (feeling cheerful and in good spirits, feeling calm and relaxed, feeling active, feeling fresh and rested during work, and lastly, the daily life filled with interested things). Each question was scored from 0 to 5. The total scale of quality of life ranged from 0 to 25 (the higher the score the higher quality of life level). A score below 13 was considered as inadequate quality of life.

V-Adherence to COVID-19 Preventive Measures: Each question was scored on a scale of 0 to 4 (0 = never and 4 = always) after that a total score was computed (maximum score 56 points). Adherence to dental preventive measures was covering the following aspects:

- Patient screening: temperature and symptoms screening (0-8 points)
- Wearing PPE: face masks, gloves, head caps, face shields, disposable gowns, and eye protection or goggles

(0-24 points).

- Regular hand hygiene (0-4 points)
- Disinfection of surfaces during patient care (0-4 points),
- Availability of disinfection dispensers for patients (0-4 points)
- Safe disposal of hazardous waste (0-4 points).
- Preventive procedures to COVID-19 transmission: rinse patients mouths by antibacterial mouth wash before treatment and use of rubber dam (0-8).

VI-Factors which interfere with adherence to preventive measures: Lack of PPE, overcrowded health facilities, lack of patients' cooperation and lack of preventive guidelines in dentistry facilities.

Consent

Responding to questionnaire is considered consent to participate.

Ethical Approval

The study protocol was approved by the Ethical Committee of the Faculty of Medicine, Zagazig University, Egypt.

Data management

Data were entered and statistically

analyzed by using Statistical Package for the Social Sciences (SPSS) version 21.0. Qualitative data were presented as frequency and percentage. Quantitative data were presented as arithmetic mean and standard deviation (Mean±SD). t-

test was used for comparing two means and ANOVA test was used for comparing more than two means. Regression analysis was used to detect the factors affecting the adherence to preventive measures. A p-value less than or equal to 0.05

Results

Table (1): Socio-demographic and work characteristics of the studied dentists.

Characteristics	No (346)	
	Frequency	%
Gender		
• Male	229	66.2
• Female	117	33.8
Age Group (years)		
• < 30	55	15.9
• 30-40	171	49.4
• >40	120	34.7
(Mean ± SD)	37.77±7.92	
(Min-Max)	24-58	
Educational Background		
• General practitioners	293	84.7
• Specialists	53	15.3
working experience (Years)		
• <5	52	15.0
• 5-10	41	11.8
• >10	253	73.1
(Mean ± SD)	13.77±7.92	
(Min-Max)	1-34	
Type of work		
• Governmental	89	25.7
• Private	11	3.2
• Both (Governmental and Private)	246	71.1

Out the 346 studied dentists, 229 (66.2%) were male, with mean age was 37.77 ± 7.92 years and 49.4% were between 30-40 years. Most of them (73.1%) were working more than 10 years with mean working experience of 13.77 ± 7.92 years, 84.7% were general practitioners and 71.1% had both governmental and private work (Table 1).

Table (2): Frequency distribution of Knowledge source about COVID-19 infection prevention, vaccination, impact on the dentists' lives and quality of life.

Items	No (346)
Knowledge source and vaccination	
Trained about covid-19 infection prevention skills (No, %)	43 (12.42%)
Update knowledge with current MOH guidelines (No, %)	194 (56.06%)
Vaccination status (No, %)	337 (97.39%)
Impact of COVID-19 on the dentists' lives	
Worried about their health (Mean \pm SD)	4.11 \pm 0.71
Worried about their relatives' health (Mean \pm SD)	4.03 \pm 0.76
The impact on income (Mean \pm SD)	3.97 \pm 0.97
Change in working time (Mean \pm SD)	2.61 \pm 0.64
Stigmatization of being infected (Mean \pm SD)	3.21 \pm 0.45
Total impact (0-25)	
- (Mean \pm SD)	17.95 \pm 1.63
- (Min-Max)	13-22
Quality of life	
Total quality of life score	
- (Mean \pm SD)	17.67 \pm 2.99
- (Min-Max)	11-24
- Number of dentist with adequate quality of life (No, %)	322 (93.1%)
- Number of dentist with low quality of life (No, %)	24 (6.9%)

MOH: ministry of health

Only 12.42% of our respondents trained about covid-19 infection prevention skills and 56.06% updated their knowledge with current MOH guidelines, 337 (97.39%) were vaccinated against COVID 19. Regarding the impact of COVID-19 on the dentists' lives, the studied dentists were very worried about their health and their relatives' health (4.11 ± 0.71 and 4.03 ± 0.76). Their income was dramatically decreased (3.97 ± 0.97) and they were moderately worried about stigmatization of being infected (3.21 ± 0.45). But change in working time was the least parameter affected. The majority of our participants (93.1%) considered their quality of life to be adequate (Table 2).

Table (3): Adherence to COVID-19 preventive measures and factors which interfere with this adherence among the studied dentists.

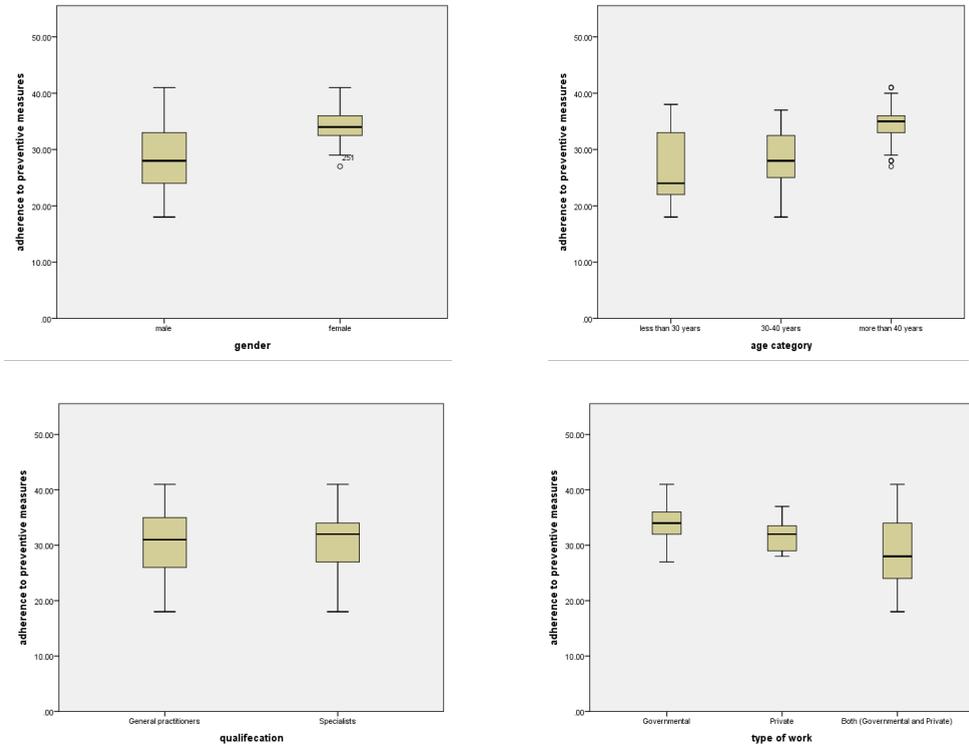
Items	No (346)
Patient screening	
Temp screening	46 (13.29%)
Symptoms screening	24 (6.93%)
Wearing PPE	
Face masks (N95)	52 (15.02%)
Impermeable gloves	346 (100%)
Head caps	18 (5.2%)
Face shields	5 (1.4%)
Disposable gowns	11(3.2%)
Eye protection or goggles	14 (4%)
Availability of disinfection	
Regular hand hygiene	346 (100%)
Disinfection of surfaces during patient care	346 (100%)
Availability of disinfection dispensers for patients	12 (3.2%)
Disposal of waste	

	Safe disposal of waste	332 (96%)
Preventive procedures to COVID-19 transmission		
	Rinse patients mouths by antibacterial mouth wash before treatment	40 (11.6%)
	Use of rubber dam	3 (0.9%)
Adherence total score		
	- (Mean ± SD)	30.31 ± 5.45
	- (Min-Max)	18-41
Factors which interfere with dentists' adherence		
	Lack of PPE	148 (42.8%)
	Overcrowded patients	37 (10.7%)
	Lack of preventive guidelines in dentistry facilities	110 (31.8%)
	Lack of patients cooperation	54 (15.6%)

PPE: Personal protective equipments.

Regarding patient screening, 46 (13.29%) of our participants used to do temperature screening and 24 (6.93%) were screened for symptoms. During patient care, they all used impermeable gloves, practiced regular hand hygiene, and disinfected surfaces. Other personal protective equipments used were face masks (N95), head caps, face shields, disposable gowns and eye protection (15.02%, 5.2%, 1.4%, 3.2%, and 4% respectively). Safe disposal of waste was reported by 332 (96%) and 12 (3.2%) reported availability of disinfection dispensers for patients. Rinse patients mouths by antibacterial mouth wash before treatment and use of rubber dam were reported by (11.6% and 0.9% respectively). Lack of PPE (42.8 %), lack of preventive guidelines in dentistry facilities (31.8 %), lack of patient cooperation (15.6%), and overcrowded patients at health facilities (10.7 %) were factors reported by our studied dentists that interfere with dentists' adherence to COVID 19 preventive measures (Table 3).

Figure (1): association between adherence to COVID-19 preventive measures among dentist and gender, age, qualification and type of work.



Adherence vs gender: t test= 12.04, $p < 0.001$

Adherence vs age category: ANOVA= 85.36, $p < 0.001$

Adherence vs qualification: t test= 0.35, $p = 0.72$

Adherence vs type of work: ANOVA= 28.87 $p < 0.001$

Females reported adherence to COVID-19 preventive measures more than males (34.39 ± 2.69 and 28.15 ± 5.31). Dentists more than 40 years old were more adherent to preventive than younger dentists ($p < 0.001$). Dentists working in governmental hospital were more adherent than those working in private and both (governmental and private) (33.75 ± 2.47 , 31.54 ± 2.91 and 29.02 ± 5.77 respectively). No significant difference was reported between dental general practitioners and specialists regarding adherence to COVID-19 preventive measures (Figure 1).

Table (4): Multivariable linear regression of factors associated with adherence to preventive measures on COVID-19 among the studied dentists.

Independent variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	B (95% CI)	
	B	Std. Error	Beta			LL	UL
Impact on the dentists' lives	0.012	0.10	0.004	0.11	0.91	-0.19	0.21
Sex (female)	7.534	0.58	0.65	12.91	0.00*	6.38	8.68
Age	0.369	0.02	0.53	14.04	0.00*	0.31	0.42
Residence (urban)	0.472	0.52	0.026	0.89	0.36	-0.56	1.50
Qualification (specialist)	0.173	0.43	0.011	0.39	0.69	-0.68	1.02
Type of work	0.096	0.31	0.015	0.30	0.75	-0.51	0.71
Lack of PPE	-0.958	0.44	-0.087	-2.13	0.03*	-1.83	-0.07
Overcrowded health facilities	1.493	0.85	0.085	1.75	0.08	-0.17	3.16
Lack of guidelines	-0.148	0.44	-0.013	-0.33	0.74	-1.02	0.73
Lack of patients cooperation	-1.264	0.72	-0.084	-1.75	0.08	-2.68	0.15
Quality of life	0.254	0.065	0.139	3.90	0.00*	0.12	0.38

Dependent variable: adherence total score to preventive measures on COVID-19

PPE: Personal protective equipments.

LL: lower limit,

UL: upper limit,

*: Statistically significant

Female gender, older age, and a higher score of quality of life were factors that were positively associated with adherence to preventive measures of COVID-19, whereas a lack of PPE at health facilities was a factor that was negatively associated with it (Table 4).

is considered statistically significant.

Discussion

Dentists and their workplaces have been among the most susceptible to both airborne and blood borne infections, and as a result, they are at the frontlines of pandemic-related changes in dentists' ability to organise and deliver dental

care services to patients. Clinicians are finding it difficult to navigate the numerous COVID-19 guidelines issued by various agencies due to the increasing complexity of guidelines (Stangvaltaite-Mouhat et al., 2020).

The "Pandemic-5 Framework for COVID-19 Control in Dentistry" offers a chance for clinical practitioners to

simplify comprehensive decision-making. The Pandemic-5 Framework covers every aspects of adaptation about the pandemic context in a systematic manner, including planning, patient screening, facility preparation, use of PPE and infection prevention, and finally procedures and aerosol control (Benzian et al., 2021).

The current study was done to assess the adherence to COVID-19 preventive measures, factors influencing the adherence and clarify the impact of COVID-19 on the dentists' lives.

Male participants (66.2 %) were more than females (33.8 %) with a mean age of 37.77 ± 7.92 years and half of them between 30-40 years. The majority of them (73.1 %) had worked for more than ten years, with a mean working experience of 13.77 ± 7.92 years. Most of them were general practitioners (84.7%) and worked in both government and the private sector (71.1%) (Table 1).

According to Barbosa-Liz et al. (2021) in their study on dental practice modification of dentists during COVID-19 pandemic in Colombia, revealed that the sample of dentists studied included a 72.22% females which may be contributed to the

higher percentage of female dentists in Colombia. General dentists among respondents were (41.94%) which was lower than the studied group.

Another study in Saudi Arabia reported a higher percentage of participant female dentists that they were 329 females (57.7 %) and 241 males (42.3 percent), 36 % worked at governmental health care facilities, while 64 % worked at a private sector. Most of them (66.5%) were general dental practitioners and 33.5% of participants were specialists/consultants (Imran et al., 2021).

COVID-19 vaccination protects against a potentially fatal disease, while also promoting herd immunity, which is required to control this pandemic (WHO, 2020)^b. About 97% of the studied dentists were vaccinated against COVID-19 (Table 2). An Egyptian study made by Fares et al. (2021) reported that about 21% of Egyptian health care workers agreed to be vaccinated against COVID-19 (the data of this study was collected in 2020). This indicates the great effort done by the Egyptian government to vaccinate HCW who are at the front line and the gained awareness about the importance of vaccine to the health care personnel.

According to Lebanon study in February 2021 among 529 dentists revealed that 86% of dentists were either willing to receive or had previously received a COVID-19 vaccine (Nasr et al., 2021).

Regarding impact of COVID-19 on the dentists' lives, the studied dentists were very worried about their health and their relatives' health. Their income was dramatically decreased and they were moderately worried about stigmatization of being infected (Table 2). In accordance with these findings, Duruk et al. (2020) reported that most of their studied Turkish dentists (95% of female and 88% of male) were worried about being infected with COVID-19 due to the high risk of dental occupation. The pandemic management-related measures that limited the number of treated patients had the greatest financial impact on dentists. In a cross-sectional study on dentists from India, 72.5 percent expressed concern about decreases income during pandemic (Gupta et al., 2020).

The majority of the studied group (93.1%) self-rated their quality of life (QoL) as adequate and (6.9%) with low quality of life (Table 2). According to Pacutova et al. (2021) in their study on

the impact of COVID-19 pandemic on their quality of life, revealed that 45% of Slovak dentists reported a worsening of QoL which was higher than the result of the current study. COVID-19 and management measures could be a source of stress in their lives, causing anxiety or depression (Celmece and Menekay, 2020).

During COVID-19, dental practices have established pre-check triages to routinely measure and record the temperature of both dental staff and patient using a contact-free forehead thermometer. The patients should be checked for possible COVID-19 symptoms as well as use of hand disinfection agents (Peng et al., 2020). Taking a patient's history is critical, because an infected patient with COVID-19 symptoms is a source of infection. Temperature screening was practiced by 46 (13.29%) of the studied group and 24 (6.93%) screened for possible COVID-19 symptoms (Table 3). A higher awareness about patient screening was reported by Kamran et al. (2021) who revealed that 93 percent of Pakistani dentists inquired about the patient's history of COVID-19 symptoms before touching the patient.

Personal protective equipments

(PPE) used by the studied dentists were face masks (N95), head caps, face shields, disposable gowns and eye protection (15.02%, 5.2%, 1.4%, 3.2%, and 4% respectively). This low rate of adherence to these PPE could be attributed to the insufficiency of these PPE as well as their high cost across the country. During the COVID-19 pandemic, oral health personnel faced several new challenges, including a lack of access to PPE and a rapid increase in their prices (Tysi c-Mi sta and Dziejczak 2020).

Similar findings about using N95 reported by Duruk et al. (2020) that wearing an N95 mask was one of the measures taken at least by 12.36%. A higher rate of using PPE was reported by Kamran et al. (2021) that most personal protective equipments used were face shield (82%), protective clothing (73%), eyewear (80%), and N95 (69%). This high percentage could be attributed to Pakistan's status as a third-world country receiving foreign aids during COVID-19 period.

During patient care, all of our participants used impermeable gloves, practiced regular hand hygiene, and disinfected surfaces (Table 3). Khader et al. (2020) indicated that 96.2 percent

of their studied Jordanian dentists cleaned their hands with alcohol-based sanitizers, soap, and water.

Because infected respiratory particles play a key role in the spread of COVID-19 infection, effective strategies to disrupt these viruses' lipid envelop must be developed in order to control COVID-19 infection (Carrouel et al, 2020). Oral rinses, by antibacterial mouth wash, may provide promising results as well as its prophylactic role because it can destroy the lipid envelope of COVID-19 virus (Peng et al., 2020). The Centers for Disease Control and Prevention (CDC) proposed using 1.5% hydrogen peroxide and 0.2% povidone-iodine mouthwashes prior to dental manipulation in April 2020 (Bidra et al., 2020).

Rinse patients mouths by antibacterial mouth wash before treatment was reported by 11.6% of the studied dentists (Table 3). This result was low compared to that detected by Imran et al., 2021 who reported that the degree of awareness about mouthwashes' decontaminating role (as viral membrane disruption) is concerning, 31.5 percent of their studied dentists agreed with the statement, whereas 52.3% acknowledged the viricidal

activity of mouthwashes. However, in a study conducted by Mouhat et al. (2020) on dental health services response to COVID-19 in Norway, they detected that the majority of dental care workers used mouthwashes prior to dental services.

Dental rubber dam was used by 0.9% of the studied dentists (Table 3) which represent a very low percentage although dental rubber dam can efficiently reduce the amount of aerosol established; therefore, it should be used in any procedure that permits it and it was reported that the rubber dam can decrease airborne contaminants by 70% (Passarelli et al. and 2020 Checchi et al., 2021). Also Centers for Disease Control and Prevention (CDC) has advised using dental rubber dams to reduce aerosols and droplet spatter, particularly during the pandemic of COVID-19. This low percentage among the studied dentists could be due to the fact that its use is difficult and time consuming for many dentists. A higher adherence to use rubber dam reported by Kamran et al. (2021) that 28% of dentists in Pakestan use rubber dam in aerosol-generating procedures, compared to 13.84% of Turkish dentists (Duruk et al., 2020). A research was carried out in 30 different countries yielded similar results (14%)

regarding the use of rubber dams (Ahmed et al., 2020).

The prevention of transmission of COVID-19 among dental care workers and health care workers in general depends on a comprehensive approach including vaccination, prevention skill training, and psychosocial support (Le et al., 2021). In the current study, only 12.42 % of our respondents received training on covid-19 infection prevention skills, and 56.06 % updated their knowledge with current MOH guidelines (Table 2). This low percentage of training explained defective adherence of participants to some preventive measures.

Multivariable linear regression revealed that female gender, older dentists, and a higher quality of life score were factors that were positively associated with COVID-19 adherence, whereas a lack of PPE was a factor that was negatively associated with it (Table 4).

In terms of safe and hygienic practice, Chowdhury et al. (2020) reported that female dentists are more likely than male dentists to adhere to safe practice procedures. This is in contrast to the Polish study, in which male dentists did (Tysic-Mita and

Dziedzic 2020). Less experienced Bangladeshi dentists are more likely to maintain safety and hygienic measures in dental settings (Sarfraz et al., 2020).

Conclusion and Recommendations:

The findings indicate that dental professionals' performance under the conditions of the COVID-19 pandemic is unfavorable regarding patient screening, use of mouthwash before dental practice, the use of rubber dam and the use of some personal protective equipments. Standardized protocols are required to prevent the spread of infection, government supervision should consider both governmental and private clinics, and the provision of low-cost PPE, disinfectant and mouthwash availability.

Conflict of interest

No conflict of interest.

Funding

This study did not receive any specific grant from any funding agency in the public, commercial or not –for-profit sectors.

Acknowledgement

To all study participants.

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