

Assessing the Knowledge of Iranian Dental Practitioners towards the Protection against COVID-19 in Clinical Treatments in Accordance with ADA Guidelines

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ABSTRACT

Background: The coronavirus disease (COVID-19) pandemic is a state of emergency in public health. Dentists are the first line of exposure to this contagious disease. Despite the suggested infection control protocols in dental offices, many dental practitioners lack the minimum requirements for infection control. Therefore, this study was performed to assess the knowledge of Iranian dentists about the COVID-19 in clinical work environment.

Methods: In this cross-sectional study, an online questionnaire was designed based on the ADA guidelines. The structure of the questionnaire had 6 sections. The questionnaire consisted of 7 questions regarding demographic data and 26 regarding knowledge. The questionnaire was visited by 358 Iranian dentists, 138 of whom were involved in this study. The collected data were analyzed with multiple linear regression.

Results: A total of 138 dentists aged 25 and 67 years old (21% male, 79% female) participated in this study. They had average knowledge (54%) about protection against this disease. It was found that 57.2% of them had less than 10 years of experience, 34% between 10 and 20 years of experience, and 8.7% had more than 20 years of experience. Also, note that 7.2% of them worked for public clinics, 21.7% were university faculty members, and 43.5% had personal office. The data showed that 51.4% of them were general dentists, 37.7% were specialists, and 10.9% were residents in different fields of dentistry. There was a significant relation between the professional experience (year) and their knowledge ($p = 0.034$). However, there was no significant correlation between other demographic variables and the dentists' knowledge (p -value > 0.5).

Conclusion: Knowledge of Iranian dentists about COVID-19 is generally average. They need to be more informed about masks and types of surface disinfectants and their instructions. Generally, the enhancement of prevention programs against COVID-19 is necessary for Iranian dentists.

Keywords: Dentists, Dental professionals, Dental public health, Health promotion, Preventive dentistry, SARS-CoV-2, Sterilization.

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INTRODUCTION

On January 30th, 2020, the World Health Organization (WHO) declared a state of emergency regarding the presence of the disease caused by coronavirus 2019, and immediately after this announcement, the disease became a pandemic.

The disease has flu-like symptoms and was first seen in people living in Wuhan, China.¹

People with the disease, first show early clinical symptoms such as fever, cough, and muscle pain (myalgia) or fatigue, or have abnormal chest CT scans with severe respiratory distress.

Less common symptoms in these patients include sputum, headache, blood vomiting, and diarrhea.²⁻⁴

Initially, it was thought that the virus was transmitted from animal to human, but later it became clear that it could also be transmitted from human to human, and this led to the widespread and rapid transmission of the disease among various human societies.^{3,5} This virus is more likely to affect older men.^{3,5}

Environmental pollution is the primary factor in the transmission of this new virus.^{6,7} Researchers believe that the virus is transmitted in the same way as SARS-CoV-2, but little is known about how it is transmitted and the extent of its environmental contamination.⁸

As always, healthcare professionals are immediately involved. Unfortunately, some of them were infected and some died tragically.

Dentists are often at the first line of diagnosis because they are in close contact with patients.⁹

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On March 15, 2020, the New York Times published an article entitled "Employees at greatest risk for the coronavirus," in a striking schematic figure, described that dentists are employees who are much more at risk of COVID-19 than nurses and general practitioners.¹⁰

Due to the severity of the COVID-19 epidemic and the widespread commitment of several dental associations and the

most reputable dental journals, the preparation of clear and easy guidelines for the management of dental patients and the effective immunization of dentists against any risk has become necessary.⁹

Most guidelines recommend that dentists refrain from scheduling any dental work, or that only dental emergency works can be considered during the outbreaks of COVID-19. This matter severely limits interpersonal contact and the waiting time of patients in dental offices and in general the underlying conditions of the disease.⁹

Because in the dental office, the dentist and the dental equipment are close to the patient, the possibility of transmitting the infection through infected salivary micro particles to the dental staff is very high, as this transition is also reversed.¹¹ Therefore, the dentist can be the first person to be in close contact with the infected patient and can even act as a carrier of the disease without knowing it and infect other people with the virus.¹¹ Dental work was clearly affected by the COVID-19 pandemic and several dental practice considerations have arisen for dental practitioners to protect themselves and their patients against this disease.¹²

An informed dentist can prevent the widespread transmission of the virus and protect a community from contracting the disease.¹¹ In order to deal with the spread of this virus, dentists should be fully aware of the available protective equipment and are required to follow the principles of protection based on ADA guidelines.¹³

Every employee in the dental department needs to be aware of the content of these dental protection protocols.

Recently many studies have discussed dental practice during the outbreak of COVID-19 and some of them addressed the knowledge, attitudes, and practice of dental practitioners regarding

the COVID-19 pandemic and its infection control.¹² However, these studies represent some limited communities and sufficient data from most countries are not available yet.

Despite the suggested infection control protocols in dental offices, many dental practitioners lack the minimum requirements for infection control. Therefore, the present study was performed to determine the information of Iranian dentists on how to protect and control infection against this virus in the clinical work environment.

METHODS

A cross-sectional study was conducted in March 2021 among 138 Iranian dentists; general practitioners, Doctor of Dental Surgery (DDS) and board-certified dental specialists were considered eligible to take part in this study.

Participants were anonymous and no personal information was collected. The study was approved by the University Ethical Committee (Ethical code: IR.TUMS.DENTISTRY.REC.1399.020)

The questionnaire was designed based on the "Return to work Interim Guidance Toolkit"; an ADA guideline, containing 7 demographic questions and 33 questions about the dentists' knowledge with respect to this new disease COVID-19 (Table 1).¹²

The questionnaire was initially designed and then its relevance was assessed by five dental practitioners. A consensus was reached and the final version was used as the questionnaire. The structure of the questionnaire consists of 6 sections: (1) Demographic data (7 questions) (2) Knowledge about masks and their types (8 questions), (3) Disinfection of surfaces (7 questions),

Table 1: The list of questionnaire

- 1) Which of the following provides the routine way of hand hygiene?
 - 1) Rub hands with soap and water
 - 2) Sanitizing hands
 - 3) Rub hands with soap and water + Sanitizing hands
- 2) Which way of hand hygiene is used if there is unknown contamination of hands with COVID-19?
 - 1) Rub hands with soap and water and then sanitize hands with alcohol-based solutions.
 - 2) Only rub hands with soap and water
 - 3) Only sanitizing hands
- 3) Which sanitizing solution is used for hands?
 - 1) 60–95% alcohol-based sanitizing solutions
 - 2) 20–25% alcohol-based sanitizing solutions
 - 3) Quaternary ammonium-based solutions
- 4) Which type of face mask is used in dental offices when there is no clinical practice?
 - 1) Surgical mask
 - 2) Routine cloth masks
 - 3) Filtered masks
- 5) Which face mask should be used when clinical practice on patients?
 - 1) N95 or filtered masks
 - 2) Surgical masks
 - 3) Routine cloth masks
- 6) If you don't have an N95 mask in the dental office, what method do you use to protect yourself while working on the patient?
 - 1) Surgical mask + Face shield
 - 2) Surgical mask + Protecting glasses
 - 3) Using ordinary mask + Face shield

(Contd...)

Table 1: (Contd...)

- 7) At what heat and time should washable cloth gowns be washed?
 - 1) 71°C and 25 min
 - 2) 60°C and 25 min
 - 3) 55°C and 20 min
- 8) What temperature is appropriate when you use 50–150 ppm chlorine detergents for washing clothes?
 - 1) 57/2–62/7°C
 - 2) 60–70°C
 - 3) 40–50°C
- 9) Is it forbidden to use a ring or watch under latex gloves when working on patients?
 - 1) Yes, always
 - 2) No, never
 - 3) Sometimes
- 10) Can N95 mask be disinfected?
 - 1) Yes
 - 2) No
 - 3) I don't now
- 11) If your answer to question 10 is “yes,” which disinfection method causes the least damage to the mask?
 - 1) Moist-heat and steam
 - 2) Alcohol-based antiseptic solutions
 - 3) Using dryheat
- 12) What should be the minimum distance between people in the dental office?
 - 1) 3 feet equals 90 cm
 - 2) 6 feet equals 1/8 m
 - 3) 9 feet equals 2/7 m
- 13) What should be the distance between people and the trash in the dental office?
 - 1) 3 feet equals 90 cm
 - 2) 6 feet equals 1/8 m
 - 3) 9 feet equals 2/7 m
- 14) When the patient enters the dental office, what number should the forehead thermometer be less than?
 - 1) 38°C
 - 2) 37°C
 - 3) 37/5°C
- 15) What are the first coronavirus symptoms that should be asked about from patients?
 - 1) Fever, shortness of breath, cough
 - 2) Fever, digestive problems
 - 3) Digestive problems, muscular pain
- 16) How long does COVID-19 virus persist on surfaces?
 - 1) 2–3 days
 - 2) 4–5 days
 - 3) 6–7 days
- 17) How long does COVID-19 virus persist inside aerosols?
 - 1) 3 hours
 - 2) 6 hours
 - 3) 9 hours
- 18) In which case, you do dental work for patients with Corona disease?
 - 1) If there is emergency or urgent work
 - 2) Any elective work is done
 - 3) Nothing is done
- 19) Which of the following is an emergency work?
 - 1) Diffuse bacterial infection with swelling inside or outside of the mouth
 - 2) Pericoronitis or third molar pain
 - 3) Applying a temporary restoration on endodontic tooth

(Contd...)

Table 1: (Contd...)

- 20) How many levels are FDA-approved surgical masks?
 - 1) One level
 - 2) Two levels
 - 3) Three levels
- 21) Which level of surgical mask is used to protect against high to moderate blood and spray fluids and aerosols?
 - 1) One level
 - 2) Two levels
 - 3) Three levels
- 22) How long should each dental staff be in quarantine if they are infected with COVID-19?
 - 1) 1 week
 - 2) 14 days
 - 3) 20 days
- 23) What is the best thermometer for infection control in a dental office?
 - 1) Forehead thermometer
 - 2) Oral thermometer
 - 3) Axillary thermometer
- 24) If you have decided to do an emergency work on patient with COVID-19, in what situation should it be done?
 - 1) Isolated room under negative pressure
 - 2) Isolated room with normal ventilation
 - 3) Normal room with normal protection
- 25) What should be done if office surfaces are contaminated?
 - 1) Disinfect surfaces
 - 2) Washing with water and soap or detergents and then disinfecting the surfaces
 - 3) Washing with water and soap or detergents
- 26) Can spray-type phenolic disinfectants be able to destroy COVID-19?
 - 1) Yes
 - 2) No
- 27) How long should phenolic disinfectants stay on the surface?
 - 1) 5 mins
 - 2) 10 mins
 - 3) 15 mins
- 28) Are hydrogen chloride disinfectants capable of disinfecting surfaces against COVID-19?
 - 1) Yes
 - 2) No
- 29) How long should hydrogen chloride disinfectants stay on the surface?
 - 1) 5 mins
 - 2) 10 mins
 - 3) 15 mins
- 30) In preparing a questionnaire to examine patients, what should be asked about their systematic disease?
 - 1) Kidney, pulmonary and heart disease
 - 2) History of infection and allergies
- 31) What is the time, temperature, and pressure required to autoclave packaged equipment for routine sterilization?
 - 1) 15–30 min, 121°C, 15 Psi
 - 2) 30–40 min, 130°C, 20 Psi
 - 3) 15–20 min, 126°C, 12 Psi
- 32) Which case is essential to reduce infection during COVID-19 pandemic?
 - 1) Dental unit equipped with central suction
 - 2) Dental unit equipped with water return system
 - 3) Both of them
- 33) How many hours can COVID-19 survive on N95 mask? And what is the interval time for reusing a non-damaged mask?
 - 1) 3–5 days
 - 2) 2–3 days
 - 3) 1–4 days

Table 2: Demographic distribution

Variable	Frequency	Percent
Gender		
Male	29	21
Female	109	79
Age variety		
Less than 30 years old	36	26
30–40 years	63	45
40–50 years	34	25
50 years and more	5	4
Experience		
Less than 5 years	45	32
5–10 years	34	25
10–15 years	27	20
15–20 years	20	15
20–25 years	7	5
25–30 years	4	2
30 years and more	1	1
Position at work		
Private office	60	42
Professor at dental school	30	22
Working in public clinics	10	8
Others	38	28
Degree of education		
Specialized assistant	15	10
General dentist	71	52
Specialist dentist	52	38
History of having COVID-19		
Yes	24	17
No	107	78
Don't know	7	5

Table 3: Observance of hygienic principles and social distancing

Question number	Correct	Incorrect	Don't know
q.1	70 (50.7%)	68 (49.3%)	0
q.2	94 (68.1%)	42 (30.4%)	2 (1.4%)
q.3	131 (94.9%)	6 (4.3%)	1 (0.7%)
q.12	41 (29.7%)	30 (21.7%)	67 (48.6%)
q.13	33 (23.9%)	103 (74.6%)	2 (1.4%)
q.14	131 (94.9%)	6 (4.3%)	1 (0.7%)
q.15	71 (51.4%)	53 (38.4%)	14 (10.1%)

Table 4: Dentists' knowledge about masks and their types

Question number	Correct	Incorrect	Don't know
q.4	13 (9.4%)	125 (90.6%)	1 (0.7%)
q.5	126 (91.3%)	11 (7.9%)	4 (2.9%)
q.6	125 (90.6%)	9 (6.5%)	20 (14.5%)
q.10	54 (39.1%)	64 (46.4%)	39 (28.3%)
q.11	60 (43.5%)	39 (28.3%)	39 (28.3%)
q.20	66 (47.8%)	63 (45.7%)	9 (6.5%)
q.21	42 (30.4%)	77 (55.8%)	19 (13.7%)
q.33	43 (31.2%)	42 (30.4%)	53 (38.4%)

Table 5: Disinfection of surfaces

Question number	Correct	Incorrect	Don't know
q.16	71 (51.4%)	53 (38.4%)	14 (10.1%)
q.17	46 (33.3%)	55 (39.9%)	37 (26.8%)
q.25	56 (40.6%)	78 (36.5%)	4 (2.9%)
q.26	50 (36.2%)	32 (23.2%)	56 (40.6%)
q.27	24 (17.4%)	44 (31.9%)	70 (50.7%)
q.28	86 (62.3%)	16 (11.6%)	36 (26.1%)
q.29	23 (16.7%)	57 (41.3%)	58 (42%)

(4) Sterilization types and methods (4 questions), (5) Dental practice conditions (7 questions), (6) Observance of hygienic principles and social distancing (7 questions).

A total of 358 dentists visited the questionnaire while 138 of them voluntarily participated in this study. It was explained at the beginning of the questionnaire that the purpose of the data collection was for scientific research. The questionnaire was designed in the online form (Porsline) and a link was shared with Iranian dentists.

Statistical analysis was carried out using SPSS 15 software. Descriptive statistics were reported by using means and standard deviation (SD) of continuous variables and percentages for demographic data. The multiple linear regression test was employed. The significance level was set at p -value < 0.05.

RESULTS

The demographic outcomes of the participants are shown in Table 2.

A total of 358 individuals visited the online questionnaire and 138 dentists participated in this study. Of the participants, 21% were male and 79% female, 28.2% were older than 40 years old and 45.7% were 30–40 years old.

It should be noted that 57.2% of them had less than 10 years of experience, 34% between 10 and 20 years of experience, and 8.7% had more than 20 years of experience; 7.2% of them worked

for public clinics and 21.7% were university faculty members, and 43.5% had a personal office. Also, 51.4% of them were general dentists 37.7% were specialists, and 10.9% were residents in different fields of dentistry. About 17.4% of the participants had friends/relatives infected with coronavirus and 77.5% didn't have the infection reported.

Questions number 3 and 14 had the maximum (94.9%) correct answers (131 out of 138 participants) which were about hand sanitizing solutions and the normal forehead temperature for screening the patients (Table 3) while the least correct answers were for questions numbers 4 (9.4%) and 8 (11.6%) which were about the type of mask used in a dental office when there is no clinical practice and the appropriate water temperature used with 50–150 ppm chlorine detergents for washing clothes (Tables 4 and 5).

Overall, more than 50% of the dentists answered correctly to 18 questions from 33. This means more than half of them have answered correctly to 54.5% of the questions.

Using multiple linear regression analysis and according to the obtained results, there was a significant relationship between the experience of the participants and their knowledge ($p = 0.034$). However, there was no significant correlation between other demographic variables and the Dentists' knowledge (p -value > 0.5).

Overall, the participants answered correctly to all questions in Table 6 with a mean rate of 85.18%, which demonstrates that the

Table 6: Dental practice conditions

Question number	Correct	Incorrect	Don't know
q.18	117 (84.8%)	19 (13.8%)	2 (1.4%)
q.19	125 (90.6%)	12 (8.7%)	1 (0.7%)
q.22	117 (84.8%)	19 (13.8%)	2 (1.4%)
q.23	115 (83.3%)	7 (5%)	16 (11.6%)
q.24	119 (86.2%)	11 (7.9%)	8 (5.8%)
q.30	112 (81.1%)	22 (16%)	4 (2.9%)
q.9	118 (85.5%)	16 (11.6%)	4 (2.9%)

Table 7: Sterilization types and methods

Question number	Correct	Incorrect	Don't know
q.7	63 (45.7%)	34 (24.7%)	41 (29.7%)
q.8	16 (11.6%)	39 (28.2%)	83 (60.1%)
q.31	77 (55.8%)	40 (29%)	21 (15.2%)
q.32	113 (81.9%)	14 (10.2%)	11 (8%)

dentists had high knowledge about “dental practice conditions.” The dentists also answered questions in Table 3 with a mean rate of 59% which was about “Observance of hygienic principles and social distancing” while the mean correct answers in Tables 4 and 7 were 47.9 and 48.75%, respectively, which were knowledge about “masks and their types” and “Sterilization types and methods.”

The lowest mean rate of correct answers was seen in Table 5 with a mean average of 36.84% which was about “Disinfection of surfaces.”

DISCUSSION

Dental practitioners are at high risk of contracting COVID-19 due to different high-risk occupational conditions, such as long duration of close contact with patients and aerosol-generating procedures.¹²

The results of this study found that the participating dentists had good knowledge about “Hygienic principles and social distancing” and high knowledge about “Dental practice conditions” (Tables 3 and 6), while less knowledge (36.84%) observed was about “Disinfection of surfaces” (Table 5) and a medium rate of mean correct answers (48%) was about the knowledge of “masks and their types” and “Sterilization types and methods” (Tables 4 and 7)

Overall, more than half of the dentists answered correctly to 18 questions from all 33 questions. This means more than half of the dentists have correctly answered to 54% of the questions, which is generally considered average.

In all of the groups of questions, only the experience factor was significantly effective in answering correctly.

As a result, more experienced dentists had better answers to the questions. But in general, amid the Coronavirus pandemic and the high impact of disease protection methods in preventing the spread of the virus, dentists need to know more about it.¹⁴

Social media and mandatory dental classes for dentists can be helpful.¹⁴

As reported in Nasser et al.'s article, the more knowledgeable the dentist, the better prevention toward COVID-19 in dental practices.¹⁴

In Kamate et al.'s article, the best answers were found among specialists, but in this article, among the community of general and specialist dentists, more experienced practitioners had better results, which may have been due to the higher level of training during their working years.⁹

The results of this article, similar to Sarkarat et al.'s article, show that Iranian dentists have moderate knowledge about COVID-19 and protection against it, and the more specialized the question, the higher the percentage of correct answers to the questions decreased significantly.¹⁵

While in this pandemic, people in most jobs work from home, healthcare workers must deal with people physically, so their level of knowledge must be high to protect themselves and their patients from possible disease.¹⁶

The lowest correct answers were for questions 4 (9.4%) and 8 (11.6%) which were about the type of mask used in a dental office when there is no clinical practice and the appropriate water temperature used with 50–150 ppm chlorine detergents for washing clothes and the most correct answers were about routine questions related to hygienic conditions, hand sanitizing solutions, social distancing, and dental practice conditions as almost same results were recorded from Khader et al.¹⁷

It is essential to have proper knowledge about contagious diseases because proper knowledge can lead to better attitudes and more effective practices toward protection against the disease.¹⁵

However, average answers to questions by Iranian dentists can be due to the period of time when we still had little information about COVID-19, and more investigation from a larger population of dentists is needed.

RECOMMENDATIONS

- It is recommended that dentists take mandatory training classes on COVID-19 and protection against it, which due to current restrictions can be done with mandatory webinars and online classes which are not currently mandatory in Iran or such classes are not plentiful.
- The use of health professionals and mandatory health inspections of offices and clinics and observing how dentists can deal with this issue in practice.
- Carrying out periodic examinations of dentists in this regard and making the renewal of the license of the dentist's work permits, conditioned on raising their awareness in this field.

Limitations

- In this article, the number of participating dentists was small and random so could not represent the whole community of dentists.
- Due to the cross-sectional nature of the study, it can only show the relationship and not the cause-relationship between the variable and the result.

CONCLUSION

Knowledge of Iranian dentists toward COVID-19 is generally average. They need to be more informed about masks and types of surface disinfectants and their instructions. Generally, the enhancement of prevention programs against COVID-19 is necessary for Iranian dentists.

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