

Awareness of the Protective Measures Against Covid-19 Among Turkish Dentists: A Questionnaire Survey

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ABSTRACT

Objective: The COVID-19 pandemic has deeply affected the entire world. This study aims to evaluate Turkish dentists' awareness of and protective measures against COVID-19 infection.

Methods: A web-based questionnaire consisting of 35 closed-ended and multiple-choice questions was prepared according to Turkish Dental Association guidelines. The questionnaire was divided into three domains: demographic data, precautionary measures, and attitude. Ethical clearance was obtained from the Istanbul University institutional review board. questionnaire was sent to the dentists registered with the Turkish Dental Association. The minimum sample size was calculated as 756 individuals. The Chi-Square test was used to evaluate the difference for categorical variables. Statistical significance was accepted as $p < .05$.

Results: A total of nine hundred and ninety-seven questionnaires was analyzed. Five hundred and sixty-three respondents (56.5%) were general dentists, and 434 (43.5%) were specialists. Seven hundred and thirty-five (73.7%) dentists were found to wear disposable gowns, N95/FFP2 masks, and face shields. About half (48.1%) were confident of avoiding infection. Twenty-one (2.1%) subjects were SARS-Cov-2 positive. A majority of both dentists who had COVID-19 (71.4%) and dentists who did not have it (92.7%) agreed that COVID-19 is an occupational risk ($p < .001$).

Conclusion: Although nearly two-thirds of the respondents reported using personal protective equipment, greater precautionary measures should be taken by dental staff to protect the patients from COVID-19 and other contagious diseases.

Keywords: Awareness, covid-19, dentistry, pandemic, protective measures

1. INTRODUCTION

Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) was officially announced to the world on January 8, 2020, under the name COVID-19. This infectious disease is transmitted from person to person by airborne droplets or by direct contact with affected cases or contaminated surfaces (1). The first case of COVID-19 detected in Turkey was announced by the Ministry of Health on March 11, 2020 and the country's first death due to the virus occurred on March 15, 2020. On April 1, 2020, the Minister of Health announced that COVID-19 cases had spread all over Turkey.

Significant progress has been made in vaccinating against the disease. However, because no definitive method has been presented thus far for its control and treatment, the recommended standard has been to control the source of infection (2).

COVID-19 is transmitted between individuals through close contact and droplets, and it is known that health care service

providers or others who have close contact with infected patients are at high risk of contracting the disease. Dentists and dental staff are considered high-risk due to both their working conditions and the nature of their contact with patients (3).

At the beginning of the pandemic, it was decided to postpone emergency and non-essential dental treatments until a second statement, and lists of these emergency and mandatory services were published. Clinical guidelines prepared by the Turkish Dental Association (TDA)'s scientific committee on April 17, 2020, were delivered to dentists via the TDA website and by SMS (4). Later, elective procedures could be resumed given the necessary infection control measures were taken, although the provision of emergency services was to be prioritized (5).

Personal protective equipment (PPE) refers to special coverings designed to protect dental health care personnel

from exposure to or contact with infectious agents. These include gloves, face masks, protective eyewear, face shields, and protective clothing (e.g., reusable or disposable gowns, jackets, and lab coats). Dental health care personnel should wear N95/FFP2 masks that cover their noses and mouths during procedures that are likely to generate splashes or sprays of blood or bodily fluids during the pandemic (6, 7).

The literature reveals dentists' knowledge, attitudes, and perceptions regarding measures for viral infection control; however, survey results show that the preventive measures Turkish dentists take are not satisfactory (8-12). Our null hypothesis is that dentists do not adequately adhere to COVID-19 prevention measures. This cross-sectional study aimed to evaluate Turkish dentists' awareness of and protective measures against COVID-19 from the nation's first pandemic-related lockdown onward.

2. METHODS

Approval for this cross-sectional online survey was obtained from Istanbul University Faculty of Dentistry's ethics committee (decision date and number: 22.07.2020 – 2020/47). The study protocol was registered on ClinicalTrials (NCT05175820). Informed consent was obtained from the participants prior to their contribution.

2.1. Subjects

The sample consisted of graduated dentists working in Turkish state-affiliated oral and dental health institutions, private clinics, hospitals, or universities who were registered with the TDA until June 2020, and who accepted voluntary participation in the study.

The sample size was calculated with the OpenEpi program (a web-based epidemiologic and statistical calculator) (13). The population (N) consisted of 22,275 dentists who were registered with the TDA. Since there is no information about dentists' working conditions and precautions during the pandemic period in Turkey, the prevalence (p) was determined as 50%. The minimum sample was calculated using the $n = [DEFF * Np(1-p)] / [(d^2 / Z^2_{1-\alpha/2}) * (N-1) + p * (1-p)]$ formula. The sample size was found to be 756 by taking the prevalence of 50% (P), 95% confidence interval, 5% margin of error (d), and taking the design effect (DEFF) as two. This study was carried out in September 2020.

2.2. Questionnaires

The questionnaire consisted of 35 questions compiled from both previous studies (14, 15) and local guidelines (4). In the pilot study, questionnaires were sent to 20 dentists and feedback was received in case of problems with the clarity of the questions and their online answering. The questions were grouped as follows: demographic information (6 items), physical conditions of the clinic (5 items), protective equipment for employees (2 items), regulation of appointments and patient admission (4 items), treatment

procedures and infection protocols (10 items), attitudes towards COVID-19 (8 items).

To measure the participating dentists' knowledge about COVID-19-related procedures, the survey asked multiple-choice questions regarding May 21, 2020 TDA clinical guidelines for protective equipment, sterilization and disinfection, and considerations in arranging appointments (4).

The questionnaires were shared via e-mail. The dentists were informed of the privacy policy regarding data collection and were allowed to participate after having provided voluntary consent.

The Checklist for Reporting Results of Internet E-Surveys (CHERRIS) guidelines were used for data interpretation (16). Questions regarding professional experience, gender, age, region of residence, workplace, and the decision to practice or not to practice during the pandemic were also coded to test whether the COVID-19 measures differed according to various demographic groups.

2.3. Data Collection

Data was collected via Google Forms® (Google LLC, Mountain View, CA, USA). The survey questions were prepared based on TDA guidelines and a compilation of related questions from the literature, and the survey was accessible via a web link delivered to participants by email.

2.4. Statistical Analysis

Data analysis was conducted by means of statistical software (IBM® SPSS® Statistics version 28, Armonk, NY, USA). The Chi-Square test was used to evaluate the difference for categorical variables. Statistical significance was accepted as $p < 0.05$.

Multiple linear regression analysis was performed to estimate the fulfillment of 13 requirements in the clinical setting. The backward method was used while performing multiple linear regression analysis. Durbin Watson statistic was used in the evaluation of autocorrelation. The collinearity limit value was 2.5 (17).

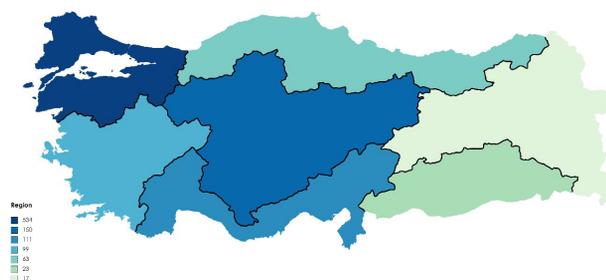


Figure 1. Distribution of participants. The majority of dentists participated from regions including the Marmara, Central Anatolia, Mediterranean and Aegean.

The participants' mean age was 39.9 ± 11.7 (median 38.0). More than half (60.6%) dentists were female, and 43.5% of them were specialists. Most of them work in private clinics (Table 1).

Table 1. Characteristics of the participants.

Characteristic	n	%
Gender		
Male	393	39.4
Female	604	60.6
Total	997	100
Specialty		
DDS	542	54.4
PhD	312	31.3
MSc	143	14.3
Total	997	100
Type of postgraduate education		
No postgraduate education	563	56.5
Pedodontics	183	18.4
Ortodontics	70	7
Prosthetics	53	5.3
Oral & maxillofacial surgery	46	4.6
Periodontology	39	3.9
Endodontics	21	2.1
Conservative dentistry	19	1.9
Oral & maxillofacial radiology	3	0.3
Total	997	100
Working type		
Private	741	74.3
Public	256	25.7
University hospital	0	0
Total	997	100
Experience		
<15 years	501	50.3
≥15 years	496	49.7
Total	997	100
Regions		
Aegean Region	99	9.9
Black Sea Region	63	6.3
Central Anatolia Region	150	15.0
Eastern Anatolia Region	17	1.7
Marmara Region	534	53.6
Mediterranean Region	111	11.1
Southeastern Anatolia Region	23	2.2
Total	997	100

Table 2 shows the participants' responses to the questions regarding COVID-19 prevention in the dental setting, adherence to guidelines, and awareness and attitudes. The use of rubber dams was significantly higher among specialists than among general dental practitioners ($p < .05$). They were also significantly fewer COVID-19 infections among dentists who used rubber dams than those who did not ($p < .05$). Dental specialists were confident in infection control procedures, and they used surgical caps and face shields together with N95/FFP2 masks ($p < .05$). Dentists who were confident in infection prevention measures were significantly less likely to have COVID-19 infection than were dentists in other groups ($p < .05$). Most participants (92.3%) agreed that COVID-19 poses a risk to dentists. The use of PPE was found to be significantly higher among dentists working in private clinics than those working in public clinics ($p = .005$, $p < .001$, $p > .05$ for N95/FFP2 mask, surgical cap, and face shield, respectively) (Table 3).

Table 2. Response of the participants to infection prevention and COVID-19 awareness-related questions.

Questions	n	%
Do you have an isolated examination room?		
Yes	874	87.7
No	123	12.3
Total	997	100
Does examination room contain only one dental unit?		
Yes	850	85.3
No	147	14.7
Total	997	100
Is there a window opening to the outside in the examination room?		
Yes	863	86.6
No	134	13.4
Total	997	100
Is there any objects such as magazines, toys that may affect cross-infection in the waiting room?		
Yes	241	24.2
No	756	75.8
Total	997	100
Do you operate the air conditioner while the patients are in the clinic?		
Yes	394	39.5
No	603	60.5
Total	997	100
Do you have sufficient stock of disposable gowns, N95/FFP2 masks and goggles/face shields for all staff in the clinic?		
Yes	735	73.7
No	262	26.3
Total	997	100
Do you practice with four-hand technique to control cross-infection?		
Yes	675	67.7
No	322	32.3
Total	997	100
Do you evaluate the first dental history of the patients by telephone or video talk before they come to the clinic?		
Yes	342	34.3
No	655	65.7
Total	997	100
Do you inform your patients to come alone or with a maximum of 1 companion, if possible?		
Yes	881	88.4
No	116	11.6
Total	997	100
Do you measure patients' temperature before they enter your clinic?		
Yes	808	81
No	189	19
Total	997	100
Do you give information to your patients to be present at the clinic no more than 5 minutes before the appointment?		
Yes	717	71.9
No	280	28.1
Total	997	100
Do you ensure disinfection and ventilation of the environment for at least 15 minutes after each treatment?		

Yes	795	79.7
No	202	20.3
Total	997	100
Do you keep the door of the clinic room closed during the treatment?		
Yes	657	65.9
No	340	34.1
Total	997	100
Do dentists wear N95/FFP2 mask in your clinic?		
Yes	902	90.5
No	95	9.5
Total	997	100
Do dentists wear surgical cap in your clinic?		
Yes	819	82.1
No	178	17.9
Total	997	100
Do dentists wear face shield in your clinic?		
Yes	947	95
No	50	5
Total	997	100
Do staff wear N95/FFP2 masks in your clinic?		
Yes	646	64.8
No	351	35.2
Total	997	100
Do staff wear surgical cap in your clinic?		
Yes	681	68.3
No	316	31.7
Total	997	100
Do staff wear face shield in your clinic?		
Yes	748	75
No	249	25
Total	997	100
Do you use HEPA filter?		
Yes	265	26.6
No	732	73.4
Total	997	100
Do you use 1.5% hydrogen peroxide, 0.2% povidone iodine, or 0.05-0.25% sodium hypochlorite rinsing before treatment?		
Yes	584	58.6
No	413	41.4
Total	997	100
Do you disinfectate dental impressions/prosthetics/appliances before sending them to the laboratory?		
Yes	760	76.2
No	110	11
Don't work with laboratory	127	12.7
Total	997	100
Do you disinfectate prosthetics/appliances before applying them to the patient?		
Yes	794	79.6
No	84	8.4
Don't apply prosthetics/appliances	119	11.9
Total	997	100
Do you use rubber dam?		

Yes	114	11.4
No	749	75.1
Don't practice with restorative/endodontics		
	134	13.4
Total	997	100
Do you run the compressor-operated instruments empty for 10-15 seconds after the patient leaves to prevent reabsorption?		
Yes	448	44.9
No	549	55.1
Total	997	100
Do you autoclave the handpieces used for each patient?		
Yes	372	37.3
No	625	62.7
Total	997	100
Did you get COVID-19 infection?		
No	976	97.9
Yes, hospitalized due to COVID-19	6	0.6
Yes, quarantined at home due to COVID-19	15	1.5
Total	997	100
Did you suspend to go working during the COVID-19?		
Yes	826	82.8
No	171	17.2
Total	997	100
How is your current pace of work compared to the pre-COVID-19 period?		
Didn't change	271	27.2
Practiced less	592	59.4
Only intervened dental emergencies	104	10.4
Stopped practicing	30	3
Total	997	100
Do you feel confident about the COVID-19 precautions?		
Definitely not confident	48	4.8
Not confident	111	11.1
Undecided	358	35.9
Confident	421	42.2
Definitely confident	59	5.9
Total	997	100
Did you receive any education about COVID-19?		
Yes	417	41.8
No	580	58.2
Total	997	100
Do you consider yourself to have sufficient knowledge about COVID-19?		
Yes	438	43.9
No	74	7.4
Partially	485	48.6
Total	997	100
Do you agree with the following statement?: "I believe the COVID-19 infection poses a risk to dentists."		
Definitely not agree	42	4.2
Neither or nor agree	35	3.5
Agree	269	27
Definitely agree	651	65.3
Total	997	100

Table 3. Comparison of dentists working in private and public dental services in terms of using PPE.

PPE n (%)	Private	Public	p
N95/FFP2	659(73.1)	243(26.9)	.005
Surgical cap	585(71.4)	234(28.6)	< .001
Face shield	698(73.7)	249(26.4)	.052

Chi-squared test, PPE: personal protective equipment.

Compared to before the pandemic significant differences were observed between the working status of the dentists who grouped according to their professional experience ($p < .001$). The majority of dentists with less than 15 years of experience (68.3%) have not changed their working situation after pandemic" (Table 4).

Table 4. Comparison of dentists' experience and the change of working status before the pandemic.

	Professional experience		p
	< 15 years	≥ 15 years	
Working types, n(%)			
No change	185(68.3)	86(31.7)	
Less than before the pandemic	258(43.6)	334(56.4)	< .001
Only emergency	46(44.2)	58(55.8)	
Not working	12(40.0)	18(60.0)	

Chi-squared test

According to the linear regression model, the factors affecting the 13 items were found to be positively related to age, extent of COVID-19 education, and full protection of the dentist and dental staff ($p < .001$) (Table 5).

Table 5. Linear regression model of factors affecting the application of 13 items.

	β (95% CI)	p
Age (ref:<38 years old)	0.84 (0.64-1.04)	< .001
Having education on COVID-19	0.36 (0.15-0.56)	.001
Dentists using full personal protective equipment	1.16 (0.89-1.44)	< .001
Dental staff using full personal protective equipment	2.12 (1.88-2.36)	< .001
(Constant)	5.23 (5.00 – 5.46)	< .001

R²= .462

4. DISCUSSION

COVID-19 appeared at the end of 2019 and spread rapidly around the world, attaining pandemic status and becoming a serious threat to public health. Infected individuals may be asymptomatic or require mild or intensive care, the latter involving airway support and having serious consequences, and, potentially, leading to death. While this and similar central approaches are fundamental to managing the pandemic, it is also important for individuals to comply with the measures. It is necessary to determine the factors affecting social harmony, to ensure society's full participation, to increase awareness by eliminating the lack of information, and to facilitate attitude and behavioral change. In this context, it has been necessary to gather social data in

order to make regulations for disease prevention. This study evaluated Turkish dentists' knowledge about COVID-19, their adherence to guidelines, and their attitudes.

The World Health Organization publishes regularly updated guidelines for infection prevention, control, and management. In Turkey, the TDA created clinical guidelines in line with the recommendations of international and national health institutions (4).

According to these guidelines, the number of patients who visit clinics only to receive information should be reduced by teledentistry. In Menhadji et al.(18), both dentists and patients had positive perceptions of teledentistry. In the present, dentists' use of teledentistry was quite low. It is expected that teledentistry will become a widespread practice, especially during lockdown periods.

If patients' body temperature is $>37.5^{\circ}\text{C}$, they should be isolated at home or hospitalized (19). In a study conducted among Lebanese dentists, 91% of dentists stated that patients' temperatures had been measured (20). The present study found that temperature measurement was performed at a lower rate.

To reduce the risk of contamination, adequate ventilation of the waiting area and examination room is very important. Ideally, patients should be admitted in negative pressure rooms with reduced occupancy, or isolated rooms with good ventilation (60 L/s per patient for natural ventilation) (21, 22). Most of the participants in the present study had isolated examination room and single-unit rooms. Most also had a window opening to the outside. However, the use of HEPA filters during treatment was low.

In addition to the standard precautions (hand hygiene, wearing gloves and surgical masks), dental staff should use PPE, including FFP2/FFP3 filtered masks, disposable caps/gowns, face/eye protectors. Since rotary instruments create atmospheric aerosols, dentists and dental staff should use appropriate goggles or face shields and cover their heads with suitable protective clothing (23) —even if they are using rubber dams—to reduce the risk of infection (24). Hleyhel et al. (20) surveyed 323 Lebanese dentists and reported that 93.2% of the participants and 84.8% of the dental staff members wore PPE. Kamran et al. (25) stated that 69% of Pakistani dentists wear N95 masks, 80% use eye protection, 82% use face shield and 73% use protective clothing. A study conducted in Brazil in May 2020 reported that the use of N95 masks, face shields, and disposable gowns was 71%, 84%, and 66%, respectively (26). The use of PPE was found to be higher in our study than in a study conducted among 1,958 people during Turkey's first lockdown (March 2020). Duruk et al. (27) found that nearly half of dentists (46.37%) had difficulties obtaining PPE. The equipment shortage may have been resolved in the months following the first lockdown. However, dental staff's use of PPE was lower than dentists'. In this regard, dentists should guide their staff and educate them about infection prevention.

Due to the oral spread of aerosols, it is recommended that dental patients use 1.5% hydrogen peroxide, 1% povidone-iodine, or 0.05% hypochlorous acid as a mouthwash before undergoing dental procedures (28). Similar to the results of a previous study (25), nearly half the dentists participating in the present study had their patients rinse their mouths before the procedure.

The use of a rubber dam not only increases the success of dental treatments but also significantly reduces the risk of bacterial atmospheric contamination (29). During the pandemic, the use of rubber dams was reported to be 37.8% (20) among Lebanese dentists and 28% among Pakistani dentists (25). In a study conducted in Turkey (27), it was reported to be 13.84%, and in the present study only 11.4% for restorative procedures.

At the beginning of the pandemic, there was a period when elective dental procedures were postponed. Many dental institutions have been economically affected due to possible COVID-19 infections among dentists or dental staff members, unstable patient flows, and the inevitable cost of PPE. The British Dental Association reported that only 8% of its members were confident of maintaining their financial stability (30). Wolf et al. (31) reported that 1.4% of a total of 1,324 dentists had closed their clinics by the end of 2020 due to the economic situation. Most of the dentists participating in the present study reported that they had to reduce their practice by a minimum of 0-10%. In a study of 875 dentists in Poland, 71.2% of the participants were reported to have postponed or suspended their practice (22). Cheng et al. (32) found that dentists' desire to open a new dental clinic or work in a hospital between had decreased with COVID-19. Some dentists kept their clinics open on average 1.1 days a week during lockdown (20), while some of them (80%) closed their offices until the number of COVID-19 cases had decreased (25). Compared with the results of a study conducted in Turkey (27), dentists' working rates increased slightly, and there was no change in the rate of patient admissions for dentists with less than 15 years of experience. Mutluay et al. (33) found that dentists' working rates were higher in their study conducted in November 2020.

The TDA has provided information and support via clinical guidelines and online courses to help dentists adapt to the conditions of the pandemic. Duruk et al. (27) reported that 26.65% of Turkish dentists received COVID-19 training in the first month of the pandemic. Since the present study covered the first six months of the pandemic, the rate of dentists receiving training about COVID-19 was found to be higher.

One of the present study's limitations is that it was impossible to check for duplicate participation of the same person. Since IP addresses could not be obtained via Google forms, duplication could not be controlled. Additionally, dentists with low computer literacy did not respond to the online questionnaire or consider academic surveys important due to people's concerns in the early days of the pandemic. Another limitation was that 45% of the participants were specialists, which displays a volunteer bias. The fact that the researchers

who conducted the study are pediatric dentists may also have contributed to the higher response rate of dentists with the same specialization.

The study's strengths lie in its inclusion of dentists living in seven regions of Turkey, the ability to reach many dentists by sharing the questionnaires online, and the fact that the participants could express their opinions more easily without an interviewer present. Furthermore, this study's predate the availability of vaccines, when dental health care workers' occupational risks were very high.

For the safety of the public, the reasons for dentists do not comply with infection prevention practices should be examined, and strategies targeting the obstacles they encounter should be developed.

5. CONCLUSION

The COVID-19 is expected to be on our agenda for years to come, and society's dental and oral treatment needs must be met. This study's null hypothesis is accepted: dentists do not take adequate COVID-19 or infectious disease-prevention measures. Awareness of both COVID-19 and future infectious threats must be raised in dentistry practices, and dental health care workers must take the necessary precautions against infection.

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