Evaluation of Dentists' Awareness and Attitudes Towards Infection Control in Turkey: A Survey Study

Türkiye'deki Diş Hekimlerinin Enfeksiyon Kontrolüne Yönelik Farkındalık ve Tutumlarının Değerlendirilmesi: Bir Anket Çalışması

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ABSTRACT

Objectives: The aim of this study was to investigate the knowledge, attitudes and competences of dentists in the Turkish community regarding infection control.

Materials and Methods: This cross-sectional, descriptive, online survey was conducted from July to December 2020, in Turkey. A survey was circulated via e-mail and WhatsApp groups to dentists. The survey consists of thirty questions with two parts. The first part included demographic data about the participants. The second part included questions designed to evaluate dentists' awareness of and attitudes toward infection control. Statistical analysis was performed using the SPSS version 29.0 software. A p value of <0.05 was considered to indicate statistical significance.

Results: A total of 238 people responded to our survey. Among the participants, 127 were female and 111 were male, with a mean age of 38.5 ± 12.5 years. All of them are dentists and studying or working in Turkey. Ninety-five of the participants considered themselves in the risk group related to infectious diseases. It was observed that dentists in universities took more anamnesis about infectious diseases from patients than dentists working in other places (p < .05). Compared with men, women are significantly more likely to be vaccinated against hepatitis B (p < .05).

Conclusions: This study provides data on the level of infection control compliance among dentists in Turkey. The results of the present study revealed that knowledge about infection control was greater than that reported in previous studies.

Keywords: Blood-borne pathogens, dentists, infection control, surveys and questionnaires, infectious disease transmission.

ÖZ

Amaç: Bu çalışmanın amacı, Türk toplumundaki diş hekimlerinin enfeksiyon kontrolüne ilişkin bilgi, tutum ve yeterliliklerini araştırmaktır.

Gereç ve Yöntemler: Bu kesitsel, tanımlayıcı, çevrimiçi anket Temmuz-Aralık 2020 tarihleri arasında Türkiye'de gerçekleştirilmiştir. Anket, e-posta ve WhatsApp grupları aracılığıyla diş hekimleriyle paylaşılmıştır. Anket formu iki bölümden ve otuz sorudan oluşmaktadır. İlk bölümde katılımcılara ilişkin demografik veriler yer almaktadır. İkinci bölümde ise diş hekimlerinin enfeksiyon kontrolü konusundaki farkındalık ve tutumlarını değerlendirmeyi amaçlayan sorular yer almaktadır. İstatistiksel analiz SPSS versiyon 28.0 yazılımı kullanılarak gerçekleştirilmiştir. p değerinin <0.05 olması istatistiksel olarak anlamlı kabul edilmiştir.

Bulgular: Ankete toplam 238 kişi yanıt vermiştir. Katılımcıların 127'si kadın, 111'i erkektir ve yaş ortalamaları 38,5 ± 12,5 yıldır. Katılımcıların tamamı diş hekimidir ve Türkiye'de okumakta ya da çalışmaktadır. Katılımcıların %95'i kendilerini bulaşıcı hastalıklarla ilgili risk grubunda görmektedir. Üniversitelerde çalışan dişhekimlerinin diğer yerlerde çalışan dişhekimlerine göre hastalardan bulaşıcı hastalıklarla ilgili daha fazla anamnez aldıkları görülmüştür (p < .05). Kadınların Hepatit B'ye karşı aşılanma olasılığı erkeklere göre istatistiksel olarak anlamlı derecede daha yüksektir (p < .05).

Sonuç: Bu çalışma, Türkiye'deki diş hekimleri arasında enfeksiyon kontrolüne uyum düzeyi hakkında veri sağlamaktadır. Çalışmanın sonuçları, enfeksiyon kontrolü hakkındaki bilginin önceki çalışmalara göre daha yüksek olduğunu göstermiştir.

Anahtar Kelimeler: Kanla bulaşan patojenler, diş hekimleri, enfeksiyon kontrolü, anketler, bulaşıcı hastalıklar

INTRODUCTION

Dental treatments carry a high risk due to close contact with the patient and exposure to infectious substances, including body fluids such as saliva and blood (Walsh, 2011). This working environment exposes dental health workers to the risk of acquiring hepatitis B, COVID-19, HIV and other potentially serious infectious diseases (Cheng et al., 2012).

Another important issue related to dentistry is aerosols. Aerosols may contain water droplets, saliva, blood, microorganisms and other debris. The practice of dentistry involves the use of rotating instruments such as aeretors, micromotors and ultrasonic scalers, which produce large quantities of aerosols (Harrel & Molinari, 2004; CDC, 2020). The World Health Organization (WHO) declared the coronavirus disease (COVID-19), which developed with the 'severe acute respiratory syndrome coronavirus' (SARS-CoV-2) agent, as a pandemic in 2020 (WHO, 2020). The transmission routes of COVID-19 from person to person are direct transmission (such as coughing, sneezing and droplet inhalation) and contact transmission (contact with mucosal membranes of the mouth, nose and eyes and droplets and aerosols) (Barca et al., 2020; Xu et al., 2020; Peng et al., 2020).

Cross infection can be defined as the transmission of infectious agents between patients and staff in a clinical setting (Mutlu et al., 1996). This transmission may be from the patient to the health personnel or from the health personnel to the patient. Therefore, updating dentists' knowledge and practices of infection control and precautions is of primary importance for the protection of their own health and that of their patients (Morris et al., 1996).

To date, there are many studies have been conducted in many countries investigating infection control practices and the knowledge and attitudes of dentists (Cheng et al., 2012; Agarwal et al., 2015; Haridi et al., 2016). To promote safer dental health services, it is necessary to determine the level of compliance with infection control procedures among dentists working in health centres in Turkey. However, there are no up-to-date, adequate data on infection control practices among dentists in Turkey. Therefore, the aim of this study was to investigate the knowledge, attitudes and competences of dentists in the Turkish community regarding infection control.

MATERIALS AND METHODS

Study Design

A cross-sectional, descriptive, online survey was conducted from July to December 2020 at Marmara University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery. The study protocol was approved by the Institutional Clinical Research Ethics Committee (Date: 01.06.2020, No:2020/38). The survey was shared with all participants who agreed to participate in the study via e-mail and WhatsApp groups via the purposive sampling technique. The questionnaire was written in Turkish and contained multiple-choice and yes/no questions.

Data Collection Methods

The survey form consists of thirty questions with two parts. The first part included demographic data about the participants including age, sex, education, specialization, workplace, number of patients examined and treated daily, and training on sterilization and disinfection. The second part included questions aimed at assessing dentists' awareness and attitudes toward infection control such as contact exposure, precautions taken, vaccination, information on sterilization and disinfection reliability. The questions in the second part of the survey are divided into 3 categories. These categories are named as general overall knowledge, average perception and overall attitude. Questions 9, 10, 11 and 25 in which the knowledge of the participants was questioned, were included in the overall knowledge group; questions 11, 18, 23, 24, 26 and 27, in which their perceptions and thoughts were questioned were included in the average perception group; questions 12, 13, 17, 19, 20, 21, 28, 29 and 30 in which their attitudes and behaviours were questioned were included in the overall attitude group.

The survey was accompanied by a cover letter explaining the aims of the study and the confidential use of information. The data were collected anonymously as they did not contain personal information.

Statistical Analysis

Descriptive data were expressed as the means ± standard deviations (SDs) for numerical data and were calculated as frequencies and percentages for categorical data. The normality of the distribution of the data was evaluated via the Shapiro-Wilk test. The chi-square test was used to compare categorical data if the groups could be combined, and Fisher's exact test was used if the groups could not be combined (specialization branches, etc.). Correlation analysis (Pearson or Spearman) was performed to evaluate the relationships between continuous variables. SPSS version 29.0 software (IBM Corp., Armonk, NY, USA) was used for statistical analysis. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 238 people responded to our survey. Among the participants, 127 were female and 111 were male, with a mean age of 38.5±12.5 (range 23-71) years. All of the participants have graduated or are currently studying at universities in Turkey. The majority of the participants were general dentists (53.3%) and the other participants were dental specialists. The majority of participants worked in private practices (38.2%) and private dental clinics (32.8%), but some of the participants worked in universities (24.4%) or public dental health centres (2.9%). A total of 61.3% of the participants reported

the number of patients they examined daily and 80.3% reported the number of patients they treated daily as 0-10. A total of 55.9% of the participants stated that they did not take any lessons on sterilization and disinfection during their education in their faculties, and 58.8% stated that they did not receive any training on sterilization and disinfection after graduating from the faculty. The demographic characteristics of the respondents are shown in Table 1.

Table 1. Demographic Data (first part of the survey).

Question		n (%)
1. Age	20-30	94 (39.6)
	31-40	47 (19.8)
	41-50	54 (22.7)
	51-60	26 (10.9)
	>60	16 (6.7)
2. Gender	Male	111 (46.6)
	Female	127 (53.4)
3. Education	Istanbul University	76 (31.9)
	Marmara University	43 (18.1)
	Hacettepe University	23 (9.7)
	Ege University	16 (6.7)
	Gazi University	10 (4.2)
	Other	70 (29.4)
4. Specialization	Dentist	107 (53.3)
	Oral and Maxillofacial Surgeon	39 (16.4)
	Periodontologist	19 (8.0)
	Pedodontist	13 (5.5)
	Orthodontist	13 (5.5)
	Restorative Dentistry Specialist	13 (5.5)
	Other	34 (14.2)
5. Workplace	Private Practice	91 (38.2)
	Private Dental Clinic	78 (32.8)
	University	58 (24.4)
	Public Dental Health Center	7 (2.9)
	Other	4 (1.7)
6. Number of patients examined daily	0-10	146 (61.3)
	10-20	69 (29.0)
	20-30	16 (6.7)
	>30	7 (2.9)
7. Number of patients treated daily	0-10	191 (80.3)
	10-20	39 (16.4)
	20-30	6 (2.5)
	>30	2 (0.8)
8. Training on sterilization and disinfection at school	Yes	105 (44.1)
	No	133 (55.9)
9. Training on sterilization and disinfection after school	Yes	98 (41.2)
	No	140 (58.8)

It was determined that 95% of the participants considered themselves in the risk group related to infectious diseases. 190 (the total number of people who answered yes and often) were reported to have taken anamnesis about infectious diseases before the procedure. In terms of anamnesis, 87.4% included hepatitis B, 65.5% hepatitis C, 52.5% HIV, 37.8% M. Tuberculosis, 13.4% herpes simplex type 1 and 2. When the participants were asked whether they had ever been in contact with infected blood or body fluids, 45.8% said no. Almost half of the participants (47.8%) reported the number of contacts with infected material in the last 1 year as 0-10 and the most common cause of injury was contaminated syringes/needle sticks (38.2%). After the injury, 28.2% of the participants did nothing, 8.4% were vaccinated, 12.2% had antigen titer control appropriate for the type of infected material to confirm transmission, 15.1% had serological antibody screening test, 1.7% had disease-specific immunoglobulin control and 0.4% received disease-specific treatment. A total of 43.7% of the participants found it unnecessary to always screen for blood-borne diseases by taking blood from the patient before treatment. While 95% of the participants received hepatitis B vaccination, only 61.3% received 3 doses of vaccine. A total of 84.9% of the participants had their anti-HBs titer checked after vaccination. A total of 55.9% of the participants stated that they did not receive any other vaccines to protect against infectious diseases other than those they received during childhood. A total of 87.4% of the participants stated that they did not trust the sterilization unit and 63.9% stated that they did not trust the solutions used in the disinfection of the units. The participants were asked whether they knew the content of the disinfectant used in the disinfection of the dental unit where they worked, and 55.9% said no, whereas 19.3% said yes. When the participants who answered yes were asked about the content of the disinfectant, 42.4% answered as alcohol and phenolic compounds, 24.4% as chlorine compounds, 10.9% as quaternary ammonium compounds, 10.9% as hydrogen peroxide, and 10.9% as detergent. A total of 70.2% of the participants stated that only wiping rotary instruments such as hand piece or micromotors with disinfectants is not sufficient to prevent cross infection, and 66.8% stated that they should be sterilized after each patient. When asked about the protective equipment used by the participants when treating a patient they knew to be infected, 87.4% answered about surgical masks, 85.7% answered about face shields, 75.2% answered about non-sterile gloves, 76.1% answered about protective goggles, and answered about 65.1% special protective masks (N95, N97, etc.). When the participants were asked which protective equipment they would use even if there was no suspicion of infection after the SARS-CoV-2 pandemic, 81.5% reported that they would use surgical masks, 85.3% would use face shields, 82.4% would use non-sterile gloves, 67.6% protective goggles, and 74.4% would use special protective masks (N95, N97, etc.). A total of 96.6% of the participants indicated that they disposed of sharps and medical equipment in separate waste bins (Table 2).

Table 2. Dentists' awareness of and attitudes toward infection control (second part of the survey).

Question		n (%)
10.Do you think you are in a risk group for infectious diseases?	Yes	228 (95.8)
	No	10 (4.2)
11.Do you take a history of infectious diseases?	Yes	165 (69.3)
	Often	25 (10.5)
	Rarely	40 (16.8)
	No	8 (3.4)
12.Which diseases would you ask as a separate question?	Hepatitis B	208 (87.4)
	Hepatitis C	156 (65.5)
	HIV	124 (52.5)
	M. Tuberculosis	90 (37.8)
	Herpes simplex types 1 and 2	32 (13.4)
	Other	38 (16)
13.Have you ever had contact with infected blood or body fluids?	Yes	90 (37.8)
	No	109 (45.8)
	Not sure	39 (16.4)
14.What is the number of contacts with infected material in the last 1 year?	0-10	114 (47.8)
	11-20	6 (2.5)
	>20	8 (3.3)
15.How were you exposed to infected material?	Infected sharp object puncture wound	73 (30.7)
	Contaminated syringe/needle stick	91 (38.2)
	Mucosal contact	55 (23.1)
	Infected cut	6 (2.5)
	Other	8 (3.4)
16.What precautions did you take after suspicious/infected contact?	Nothing	67 (28.2)
	Vaccinated	20 (8.4)
	Checking the antigen titer (HIV, HCV, HbsAg, etc.)	29 (12.2)
	Serological antibody screening test (anti HBs, anti CMV, etc.)	36 (15.1)
	Checking for disease-specific immunoglobulins	4 (1.7)
	Receive treatment	1 (0.4)
17.Do you think that every patient should be screened for blood-borne diseases by taking blood from them before treatment?	Yes	74 (31.1)
	No	104 (43.7)
	Not sure	53 (22.3)
18.Have you had the hepatitis B vaccine?	Yes	226 (95.0)
	No	10 (4.2)
19.How many doses of Hepatitis B vaccine have you had?	1 dose	8 (3.4)
	2 doses	32 (13.4)
	3 doses	146 (61.3)
	Not sure	40 (16.8)
20.Have you had your Anti-HBs titer checked after vaccination?	Yes	202 (84.9)
	No	20 (8.4)
	Not sure	4 (1.7)

Question		n (%)
21.Have you been vaccinated other than in childhood?	Yes	105 (44.1)
	No	133 (55.9)
22.Do you trust the sterilization unit of the institution where you work?	Yes	187 (78.6)
	No	21 (8.8)
	Undecided	30 (12.6)
23.Do you think the solutions used for disinfection of the units are reliable?	Yes	129 (54.2)
	No	23 (9.7)
	Undecided	86 (36.1)
24.Do you know the content of the disinfectant used in your dental unit?	Yes	46 (19.3)
	No	133 (55.9)
	Not sure	55 (23.1)
25.If your answer is yes, which one(s) do you use?	Alcohol and phenolic compounds	101 (42.4)
	Chlorine compounds	58 (24.4)
	Quaternary ammonium compounds	26 (10.9)
	Hydrogen peroxide	26 (10.9)
	Detergent	26 (10.9)
	Other	65 (27.3)
26.Do you think it is sufficient to wipe rotating instruments such as aerators with disinfectant?	Yes	24 (10.1)
	No	167 (70.2)
	Undecided	47 (19.7)
27.Do you think that rotary instruments such as aerators should be sterilized after each patient?	Yes	159 (66.8)
	No	41 (17.2)
	Undecided	38 (16.0)
28.What protective equipment do you use when treating a patient you know to be infected?	Surgical mask	208 (87.4)
	Face shield	204 (85.7)
	Non-sterile gloves	179 (75.2)
	Protective goggle	181 (76.1)
	Special protective mask (N95, N97, etc.)	155 (65.1)
	Other	8 (3.4)
29.After the SARS-CoV-2 pandemic, what protective equipment do you intend to use even if there is no suspicion of infection?	Surgical mask	194 (81.5)
	Face shield	203 (85.3)
	Non-sterile gloves	196 (82.4)
	Protective goggle	161 (67.6)
	Special protective mask (N95, N97, etc.)	177 (74.4)
	Other	6 (2.5)
30.Do you dispose of the sharps you use in separate waste bins?	Yes	230 (96.6)
	No	8 (3.4)

The relationship between the workplace and taking anamnesis from infectious diseases was analyzed. It was seen that the p value of Fisher's exact test was less than 0.05. In other words, there is a significant difference in terms of taking anamnesis about infectious diseases from patients according to the institution of employment. More anamnesis information about infectious diseases was obtained from patients in universities and other institutions (Table 3).

Table 3. Relationships between the workplace and taking a history of infectious diseases.

		Do you take a history of infectious diseases?			
		Yes	No	Total	p-value
Workplace	Private Practice	7	20	27	.016*
	Private Dental Clinic	7	16	23	
	University	8	3	11	
	Public Dental Health Center	1	1	2	
	Other	2	0	2	
	Total	25	40	65	

*Fisher's exact test

When the relationship between sex and hepatitis B vaccination status was analyzed, it was observed that the p value of Fisher's exact test was less than 0.05, that is, there was a statistically significant difference between sex and hepatitis B vaccination status. Compared with males, females are statistically more likely to be vaccinated against hepatitis B (Table 4).

Table 4. The relationship between sex and hepatitis B vaccination.

		Have you had the hepatitis B vaccine?		Total	Exact Significance (2-sided)	Exact Significance (1-sided)
		Yes	No			
Gender	Female	125	1	126	.007*	.005*
	Male	101	9	110		
Total		226	10	236		

*Fisher's exact test

There was no significant relationship between the age of the participants and the overall knowledge category since the p value was greater than 0.05. However, since the p value < 0.05 and the correlation coefficients are – 0.277 and – 0.133 respectively, there is a weak negative relationship between age and average perception and age and overall attitute. Accordingly, as age increases, average perception and overall attitute scores decrease. (Table 5)

Table 5. Change in overall knowledge, overall attitute and average perception categories according to age.

		Age	Overall Knowledge
Age	Correlation Coefficient	1,000	-,098
	Significance (2-tailed)	.	,131
	n	237	237
Overall Knowledge	Correlation Coefficient	-,098	1,000
	Significance (2-tailed)	,131	.
	n	237	238
		Age	Overall Attitute
Age	Correlation Coefficient	1,000	-,133
	Significance (2-tailed)	.	,041*
	n	237	237
Overall Attitute	Correlation Coefficient	-,133	1,000
	Significance (2-tailed)	,041	.
	n	237	238
		Age	Average Perception
Age	Correlation Coefficient	1,000	-,277
	Significance (2-tailed)	.	,000*
	n	237	237
Average Perception	Correlation Coefficient	-,277	1,000
	Significance (2-tailed)	,000	.
	n	237	238

*Spearman's rho test

DISCUSSION

Dentists face the risk of contracting life-threatening infectious diseases through contact with patients' blood, saliva or aerosol droplets. Therefore, infection control practices such as the use of personal protective clothing, medical waste management, decontamination and sterilization of equipment are vital in preventing cross-infection in dentistry. This study investigated the attitudes of dentists in Turkey toward infection control procedures. Most of the participants reported that they considered themselves at risk for infectious diseases. Most of the surveyed dentists were vaccinated against hepatitis B, but women were much more likely to be vaccinated than men. As the age of the participants increased, their perceptions and attitudes toward infection control procedures decreased.

Adequate training has a significant effect on compliance with sterilization procedures (Abdulraheem et al., 2012; Tada et al., 2014). As reported in previous studies (Yang & Mullan, 2011; Shaghaghian et al., 2014), educational programmes for the prevention of occupational exposure to bloodborne pathogens play an important role in improving the knowledge and safe behaviours of healthcare workers. However, according to the results of our study, 55.9% of the participants stated that they did not receive any training on sterilization and disinfection during their education at the faculty, whereas 58.5% stated that they did not receive any training on this subject after graduation. In addition, in our study, dentists working in universities questioned the presence/absence of infectious diseases more frequently than dentists working in other institutions.

It is known that live blood cells and bacterial and viral particles can survive in hand tools even after thorough disinfection. Therefore, any instrument that comes into contact with blood should be sterilized in an autoclave (Lewis et al., 1992; Kohn et al., 2003). In this study, 70% of the participants said that simply wiping rotary instruments such as high-speed handpiece with disinfectants would not be sufficient. A total of 66.8% said that they should be sterilized after each patient. In a study similar to the results of our study (Miller, 1991), it was shown that 94% of dentists in Kuwait also used autoclaves to sterilize hand instruments. In our study, 10% stated that wiping the rotary instruments with disinfectants was sufficient.

A study by Miller (Lewis et al., 1992) explained the reason for this as the fear of dentists that the autoclave may damage rotary instruments and dental equipment.

Studies in other societies have reported that females are more fearful of infectious diseases than men (Doshi et al., 2021; Wieckiewicz et al., 2021; Formighieri Giordani et al., 2022). The authors of a survey examining psychological distress among Chinese inviduals during the COVID-19 pandemic also reported that women expressed significantly higher levels of psychological distress than men (Qiu et al., 2020). In this study, women were more likely to have received the hepatitis B vaccine than men. This may be explained by women's greater fear of infectious diseases, similar to that reported in the literature. In our study, no relationship was found between age and having knowledge about infection control practices. However, it was found that younger dentists were more likely to comply with infection control practices. This finding is in line with the findings of other researchers who reported that younger healthcare professionals are more inclined to implement clinical practice guidelines than older professionals (Cleveland et al., 2012; Francke et al., 2008).

Many survey studies conducted after the onset of the COVID-19 pandemic have revealed dentists' concerns about their occupational safety and the need for infection control education and training (Bakaeen et al., 2021; Hooshyar et al., 2022; Campus et al., 2023). In our study, the protective equipment used by participants when treating a patient they knew to be infected was similar to the protective equipment used after the SARS-CoV-2 outbreak, even when infection was not suspected. In fact, the use of special protective masks increased even more after the pandemic. These results, similar to those in the literature, revealed changes in the participants' infection protection procedures after the pandemic.

CONCLUSIONS

In conclusion, this study provides data on the level of infection control compliance among dentists in Turkey. The results of our study revealed that dentists in Turkey have incorporated this issue more into their daily practice after the COVID-19 pandemic and their level of knowledge about infection control is higher than that reported in previous studies. It also emphasizes the importance of infection control education in developing knowledge, attitudes and behaviors regarding infection control. However, large-scale observational studies are needed to reach more reliable conclusions on this subject.

Conflicts of interest: The authors declare that they have no conflict of interest.

Ethics Committee Approval: This study was approved by Ethics Committee of Marmara University, Noninvasive Clinic Ethics Committee (Approval date: 01.06.2020; Number: 2020/38)

Author Contributions:

Research idea: G.B.

Design of the study: G.B.

Acquisition of data for the study: G.B.&F.B.&S.B.K.C.

Analysis of data for the study: F.B.&S.B.K.C

Interpretation of data for the study: F.B.

Drafting the manuscript: S.B.K.C.

Revising it critically for important intellectual content: F.B.

Final approval of the version to be published: G.B.&F.B.

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