

Comparison of COVID-19 Relevant Knowledge and Attitudes of Clinical and Preclinical Dental Students in Turkey

SUMMARY

Background/Aim: Dental care settings invariably carry the risk of Coronavirus Disease 2019 (COVID-19) infection because dental practice involves face-to-face communication with patients and the generation of large amounts of aerosol and droplets mixed with patients' saliva. Since droplet and aerosol transmission are the most important concerns in dental clinics, informing future dentists about pandemic diseases at the undergraduate stage is important. In this context, the aim of this study was to compare the knowledge and attitudes of clinical and preclinical dental students regarding the COVID-19 pandemic. **Material and Methods:** 159 preclinical and 130 clinical dental students were included in this cross sectional study. The researchers developed a closed-ended questionnaire with the help of the existing literature. The questionnaire contained 17 questions about the knowledge and attitudes of dental students regarding the COVID-19 pandemic. **Results:** Clinical students feel significantly more threatened with exposure to COVID-19 infection than preclinical students ($p < 0.05$, chi-square test). The proportion of students who do not want to treat an individual who has had a COVID-19 infection and recovered is statistically higher in clinical students ($p < 0.05$, chi-square test). The proportion of students who think that using protective equipment during dental practice will not protect them against COVID-19 infection is statistically higher in clinical students ($p < 0.05$, chi-square test). **Conclusions:** More education and training courses are need in order to improve students' knowledge and attitudes regarding newly emerging pandemic diseases.

Keywords: COVID-19, Dental Students, Pandemic

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Introduction

The outbreak of Coronavirus Disease 2019 (COVID-19) has become an important public health concern all around the world¹. COVID-19 has spread worldwide and was proclaimed a pandemic by the World Health Organization² on 11 March 2020. The most common symptoms of COVID-19 are fever, fatigue, and dry cough³. Most people (about 80%) recover without the need for special treatment. Rarely, this disease can be severe and even fatal.

However, despite the lower case fatality rate, COVID-19 has so far resulted in more deaths than the outbreak of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS)⁴. COVID-19 can be transmitted from person to person through direct transmission (cough and sneeze) and contact transmission (contact with oral and nasal membranes). Transmission also occurs via coarse or small droplets and saliva^{5,6}. Asymptomatic patients, patients in their incubation periods, and symptomatic patients have all been sources of transmission^{7,8}.

Dentists and dental students are at risk for COVID-19 infection, as they may be in close contact with symptomatic or asymptomatic patients. Face-to-face communication with patients, the generation of large amounts of aerosol and droplets during dental practice, the inhalation of airborne microorganisms, and direct or indirect contact with contaminated instruments make dental care settings invariably risky for COVID-19 infection^{5,9,10}.

Transmission of COVID-19 from patients to healthcare providers has occurred in several countries^{11,12}. Knowledge about the prevention and control of COVID-19 is necessary for dental students, as they are at high risk of newly emerging disease. Informing future dentists about a pandemic disease at the undergraduate stage is important because they can play an active role in the prevention and control of disease during future outbreak. In this context, the aim of this study was to compare the knowledge and attitude of clinical and preclinical dental students regarding the COVID-19 pandemic. The findings of this study may be useful when planning dental education programs about this and future emerging pandemic disease.

Material and Methods

This cross sectional study was carried out in the Faculty of Dentistry, Usak University, Turkey. 159 preclinical and 130 clinical dental students were included in the study. The study was conducted according to the Helsinki Declaration, and ethical permission was obtained from the local ethics committee of Usak University.

Questionnaire

The researchers developed a closed-ended questionnaire with the help of the existing literature^{5,11,13}. The questionnaire consisted of 'yes' - 'no' - 'no idea' and 'true' - 'false' questions and multiple choice format. The questionnaire contained 17 questions and was divided into four parts. The first part captured demographic information (age, gender, and class). The second part measured knowledge about COVID-19 related to clinical manifestations, fatality rate, incubation period, source of transmission, people at high risk of infection, and treatment. The third part identified the source of information about COVID-19 (mass media, social media, and the Ministry of Health). The last part evaluated the attitude of dental students towards COVID-19. The data was collected by sending an online link to students to minimize the risk of transmission.

Sample size calculation

G*Power 3.1 package program was used to determine the sufficient sample size. When calculating the sample volume; Type 1 error (α)= 0.05, effect size= 0.30 and test power (1- β)= 0.80 were taken. As a result of the

calculation, the sample size was determined as a minimum of 160 students in total.

Statistical analyses

Data analysis was performed using the software Statistical Package version 17.0 (SPSS Inc., Chicago, IL, USA), and the statistical significance level was set at 0.05. Test-retest reliability of questionnaire was assessed by calculating intraclass correlation coefficients and Cronbach's alpha was used to ascertain the internal consistency of the questionnaire. Demographic information was evaluated using descriptive statistical analysis. Chi-square tests were used to compare general knowledge levels and attitudes of clinical and preclinical students towards COVID-19.

Internal and external reliability of questionnaire

External reliability (Test-retest reliability) was determined by calculating the measurement error in the repeated answers of the questionnaire to 42 students twice within a 1-week period. Test-retest reliability was found positive, high and statistically significant ($r= 0.814$; $p< 0.01$). The internal reliability of the questionnaire measured using Cronbach's alpha. Cronbach's alpha value was 0.722 which indicates acceptable internal consistency.

Results

The mean age and gender distributions of the students are given in Table 1. The students' general knowledge about COVID-19 was satisfactory. There were no significant differences between groups in terms of knowledge about clinical manifestations, fatality rate, incubation period, source of transmission, or treatment of COVID-19 ($p> 0.05$, chi-square test) (Table 2).

There was a statistically significant difference between the groups in terms of the source of information about COVID-19 ($p<0.05$, chi-square test). Although the preclinical students used social media and mass media, clinical students used the Ministry of Health (Table 3).

Clinical students felt significantly more threatened with exposure to COVID-19 infection than preclinical students ($p< 0.05$, chi-square test). Most of the clinical (80.8%) and preclinical (75.5%) students felt stressed when treating patients who had had the COVID-19 infection and recovered (Table 4).

Table 1. The mean age and gender distributions of the students

Students	Gender				Age	
	Male		Female		n	Mean±sd
	n	%	n	%		
Clinic	58	44.6	72	55.4	130	21.65±0.91
Pre-clinic	67	42.1	92	57.9	159	19.80±1.26

Table 2. Knowledge of students about clinical manifestations, fatality rate, incubation period, source of transmission and treatment of COVID-19 pandemia

Questions	Answer results	n (%)	Students		Chi-Square	p
			Clinic	Preclinic		
What is the rate at which COVID-19 causes death?	Wrong answer	n	41	58	0.775	0.379
		% Row	41.4%	58.6%		
		% Column	31.5%	36.5%		
	True answer	n	89	101		
		% Row	46.8%	53.2%		
		% Column	68.5%	63.5%		
What is the longest incubation period of COVID-19?	Wrong answer	n	39	59	1.612	0.204
		% Row	39.8%	60.2%		
		% Column	30.0%	37.1%		
	True answer	n	91	100		
		% Row	47.6%	52.4%		
		% Column	70.0%	62.9%		
How does COVID-19 spread?	Wrong answer	n	0	1	Monte Carlo	0.999
		% Row	0%	100%		
		% Column	0%	0.6%		
	True answer	n	130	158		
		% Row	45.1%	54.9%		
		% Column	100 %	99.4%		
What is the protection way from COVID-19 infection?	Wrong answer	n	12	15	0.003	0.953
		% Row	44.4%	55.6%		
		% Column	9.2%	9.4%		
	True answer	n	118	144		
		% Row	45.0%	55.0%		
		% Column	90.8%	90.6%		
What are the symptoms of COVID-19?	Wrong answer	n	35	39	0.215	0.643
		% Row	47.3%	52.7%		
		% Column	26.9%	24.5%		
	True answer	n	95	120		
		% Row	44.2%	55.8%		
		% Column	73.1%	75.5%		
Are there any treatment options for COVID-19 infection?	Wrong answer	n	5	11	1.693	0.429
		% Row	31.2%	68.8%		
		% Column	3.8%	6.9%		
	True answer	n	125	148		
		% Row	45.7%	54.3%		
		% Column	96.2%	93.1%		

Table 3. The students' source of information about COVID-19 pandemia

Sources of information		Students		Chi-square	p
		Clinic	Preclinic		
Mass media	n	15	42	9.84	0.043*
	% Row	26.3%	73.7%		
	% Column	11.5%	26.4%		
Social media	n	27	48		
	% Row	36.0%	64.0%		
	% Column	20.7%	30.2%		
Ministry of Health	n	88	69		
	% Row	56.1%	43.9%		
	% Column	67.8%	43.4%		

* p<0.05, Chi-square test

Table 4. Attitude of students towards COVID-19 pandemia

Questions	Answers	n (%)	Groups		Chi-square	p
			Clinic	Pre-clinic		
As a dentistry student, do you feel more threatened with exposure to COVID-19 infection than normal individuals?	Yes	n	127	138	Monte Carlo	0.001*
		% Row	47.9%	52.1%		
		% Column	97.7%	86.8%		
	No	n	1	17		
		% Row	5.6%	94.4%		
		% Column	0.8%	10.7%		
No idea	n	2	4			
	% Row	33.3%	66.7%			
	% Column	1.5%	2.5%			
How do you feel when treating patients who have had the COVID-19 infection and recovered?	Stressful	n	105	120	1.164	0.281
		% Row	46.7%	53.3%		
		% Column	80.8%	75.5%		
	Normal	n	25	39		
		% Row	39.1%	60.9%		
		% Column	19.2%	24.5%		
Do you think using protective equipment such as eyewear, gloves, face shields, and protective outwear during dental practice will protect you against COVID-19 infection?	Yes	n	55	81	10.281	0.006*
		% Row	40.4%	59.6%		
		% Column	42.3%	50.9%		
	No	n	70	60		
		% Row	53.8%	46.2%		
		% Column	53.8%	37.7%		
No idea	n	5	18			
	% Row	21.7%	78.3%			
	% Column	3.8%	11.3%			
Do you want to treat an individual who has had a COVID-19 infection and recovered?	Yes	n	38	70	8.726	0.013*
		% Row	35.2%	64.8%		
		% Column	29.2%	44.0%		
	No	n	66	55		
		% Row	54.5%	45.5%		
		% Column	50.8%	34.6%		
No idea	n	26	34			
	% Row	43.3%	56.7%			
	% Column	20.0%	21.4%			
Do you focus on treatment or on not infecting yourself while treating an individual who has had a COVID-19 infection and recovered?	Treatment	n	29	62	9.231	0.002*
		% Row	31.9%	68.1%		
		% Column	22.3%	39.0%		
	Not infecting myself	n	101	97		
		% Row	51.0%	49.0%		
		% Column	77.7%	61.0%		
How do you think COVID-19 will affect your education?	Positive affects	n	2	7	Monte Carlo	0.537
		% Row	22.2%	77.8%		
		% Column	1.5%	4.4%		
	Negative affects	n	117	141		
		% Row	45.3%	54.7%		
		% Column	90.0%	88.7%		
Not affect	n	4	3			
	% Row	57.1%	42.9%			
	% Column	3.1%	1.9%			
No idea	n	7	8			
	% Row	46.7%	53.3%			
	% Column	5.4%	5.0%			
Do you need education about COVID-19?	Yes	n	85	84	5.645	0.059
		% Row	50.3%	49.7%		
		% Column	65.4%	52.8%		
	No	n	29	55		
		% Row	34.5%	65.5%		
		% Column	22.3%	34.6%		
No idea	n	16	20			
	% Row	44.4%	55.6%			
	% Column	12.3%	12.6%			

* p<0.05, Chi-square test

The proportion of students who thought that using protective equipment such as eyewear, gloves, face shields, and protective outwear during dental practice would not protect them against COVID-19 infection was statistically higher in clinical students ($p < 0.05$, chi-square test) (Table 4).

The proportion of students who did not want to treat an individual who had had a COVID-19 infection and recovered was statistically higher in clinical students ($p < 0.05$, chi-square test). When asked whether they would focus on treatment or on not infecting themselves while treating an individual who had had a COVID-19 infection and recovered, higher proportion clinical students stated that they would focus on not infecting themselves ($p < 0.05$, chi-square test) (Table 4).

Most of the clinical students (90.0%) and preclinical students (88.7%) thought that COVID-19 will negatively affect their education. Most of the clinical (65.4%) and preclinical (52.8%) students think that they need education about COVID-19 infection (Table 4).

Discussion

Currently, the COVID-19 pandemic, which has resulted in many acquired infections among medical care workers in hospital settings, is a topic of daily discussion in the media and among the public¹⁴. Educating dental students, who are future dental professionals, about rapidly spreading pandemic diseases is necessary because students' direct or indirect contact with human fluids, patient materials, and contaminated dental instruments could contribute to the spread of pandemic disease^{13,15}. Knowing how future dentists will behave in the case of pandemic disease can decrease the spread of a future outbreak and may in turn reduce mortality. Determining the concerns, knowledge, and attitude of dental students regarding a pandemic is important in establishing what education is necessary. For this purpose, the knowledge, attitudes, and concerns of clinical and preclinical dental students regarding the COVID-19 pandemic were compared in this study.

Dental students had satisfactory knowledge about COVID-19 related to clinical manifestations, fatality rate, incubation period, source of transmission, people at high risk of infection, and treatment. They were especially knowledgeable about the mode of transmission. Although the knowledge of the clinical students was higher than that of the preclinical students, there were no significant differences in the knowledge levels between the clinical and preclinical students. These results reveal that both clinical and preclinical students are aware of basic information about COVID-19.

32.2% of clinical and 56.6% of preclinical students' source of information about COVID-19 was media. This

finding is in line with studies of previous pandemics^{16,17}. In addition, 67.8% of clinical students relied more heavily on the Ministry of Health. In fact, we expected more attention to science-based information resources among dental students because the media used to learn about various aspects of the pandemic should be carefully chosen to ensure the media is disseminating the least distorted and most accurate information, not creating fear^{18,19}. Compared to the preclinical students, the clinical students used the Ministry of Health significantly more as a source of information. This may explain the difference in students' attitudes and behaviors regarding obtaining information as their education year and clinical experience increase.

97.7% of clinical students and 86.8% of preclinical students felt more threatened with exposure to COVID-19 infection. The concern could be due to the novelty of the infection, a lack of previous experience with pandemic disease, and the following reasons. First, COVID-19 causes fatal infection and spreads faster than two other coronaviruses (SARS and MERS)^{3,20}. Second, many healthcare workers have been infected after contact with infected secretions from patients²¹. Third, transmission can occur through contact with droplets and aerosols produced during clinical dental procedures¹³. Fourth, outbreaks of new cases continue to occur²². Clinical students may feel more threatened with exposure to COVID-19 infection than preclinical students because they are in close contact with their patients and engage in more dental practice that produces aerosols and droplets.

80.8% of clinical students and 75.5% of preclinical students felt stressed when treating patients who have had the COVID-19 infection and recovered, even though dental students generally do not seem to be stressed when caring for patients²³. This may be because some characteristics of the virus remain unknown and individuals can get infected again even if they recover²⁴. In addition, it has been proposed that dental practices be postponed for at least one month after treatment of SARS patients, and it is not known whether the same postponement is recommended for COVID-19 patients²⁵. This uncertainty may cause students to feel stressed.

53.8% of clinical and 37.7% of preclinical students think that using protective equipment such as eyewear, gloves, face shields, and protective outwear during dental practice will not protect them against COVID-19 infection. Since aerosols and droplets are considered to be the main vehicle for COVID-19 spread, dentistry-related quality control centers strongly recommend barrier-protection equipment during the outbreak^{13,15}. However, it was observed that infection-control precautions taken during dental practice were not sufficient for dentistry students to feel safe. To prepare dental students for any future outbreaks, it is necessary to improve their knowledge and skills and to minimize the psychological impact of the perceived risk of infection.

50.8% of clinical students and 34.6% preclinical students do not want to treat an individual who has had a COVID-19 infection and recovered. 77.7% of clinical students and 61.0% of preclinical students said that they focus on not infecting themselves instead of on treatment while treating an individual who has had a COVID-19 infection and recovered. In line with our results, a study conducted in Japan showed that 55% of healthcare professionals had a high fear of SARS infection even in the absence of a pandemic, and 92% of healthcare professionals referred avoiding patients with SARS²⁶. In another study conducted in Greece, more than half of healthcare workers reported high levels of concern about the A/H1N1 influenza pandemic²⁷. Among the reasons the students do not want to treat COVID-19 patients might be fear of contagion, continued outbreak of new cases, ongoing risk of transmission to healthcare workers, and restrictive hygiene and security precautions²⁸. Another important concern is that students were less focused on treatment when conducting dental procedures with COVID-19 patients because they are concerned about endangering their health.

Improvements need to occur in developing positive attitudes and practices among students caring for patients with COVID-19. Such improvements can occur through increasing their knowledge by providing ongoing training in universal infection-control measures. Furthermore, students should be psychologically prepared to treat people with pandemic diseases.

The proportion of students who did not want to treat patients with COVID-19 and who focus on not infecting themselves was statistically higher in clinical students than in preclinical students. According to this study, preclinical students who have little contact with the dental clinic showed less anxious and fearful attitudes regarding the treatment of COVID-19 patients than did clinical students. Although more psychological preparation would be expected in clinical students because of their more practical experience, the reason for this behavior may be the lack of clearly written procedures and guidelines to be used in the treatment of COVID-19-infected individuals during clinical practice²⁹.

90.0% of clinical students and 88.7% of preclinical students thought that COVID-19 pandemic will negatively affect their education. During the outbreak period, online lectures were conducted to prevent students from gathering due to the associated risk of infection. However, this online education method does not allow the development of mechanical hand skills and laboratory practices³⁰. This distance education may have caused most of students to think that their education was negatively impacted, as it does not allow didactic information to be transformed into clinical skills³¹.

65.4% of clinical students and 52.8% of preclinical students reported that they need more education about COVID-19 and other pandemic diseases. Proper education

can play a paramount role in changing their perceptions of and discrimination against COVID-19 patients and can help inculcate proper attitudes regarding the implementation of infection control measures³².

This study has some limitations. First, the cross-sectional nature of the study can only confirm association between predictor variables and dependent variables, not a cause-effect relationship. Second, this study was based on a self-administered questionnaire, so the analyses and interpretations based on it may not be entirely accurate. Third, this study includes a small number of dental students, and further studies with large and different cohorts are required to extrapolate these findings.

It may be concluded that students do not have positive attitudes towards patients with COVID-19. More education and training courses are needed to improve students' knowledge and attitudes regarding future newly emerging pandemic diseases. Information about future infection control measures, possible routes of infection, and possible outbreaks should be provided in dental education.

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