



## RESEARCH ARTICLE

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# Knowledge of coronavirus 2019 and stress with oral health-care personnel of the Faculty of dentistry in Sarajevo: A cross-sectional study

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## ABSTRACT

**Introduction:** Dentists and generally dental personnel work under the risk of being infected by patients suffering from coronavirus 2019 (COVID-19), who are unaware that they are infected. The reason lies in the fact that during dental procedures, aerosol is formed with droplets that may contain the virus. Thus, it is extremely important that dental personnel comply with adequate protective measures and equipment during clinical work. The aim of this investigation was to evaluate the knowledge of COVID-19 and to determine the amount of stress with dental personnel of the Faculty of Dentistry in Sarajevo, Bosnia and Herzegovina.

**Methods:** Health-care personnel of the Faculty of Dentistry with Clinics of the University in Sarajevo has been included in the research: teaching staff, clinical doctors, dental nurses, and dental technicians. The research was conducted in April 2020. It was conducted by an anonymous survey that participant's filled-in. Out of 157 distributed questionnaires in paper form, 134 participants responded. The questionnaire was divided into three parts: (1) personal data; (2) knowledge of infection COVID-19 (diagnostic methods, transmission pathways, and prevention measures); and (3) the amount of stress (feelings and thoughts) during epidemic COVID-19 with personnel.

**Results:** The largest number of participants (61.97%) considers that COVID-19 may be transmitted from infected to a healthy person by inhalation of droplets generated through coughing of an infected person and by direct contact with aerosol dispersed from the mouth of the infected patient during dental treatment. The largest number of participants, 80 of them (59.7%) considers that the method of nucleic acid test is used in diagnosing COVID-19. COVID – 19 had a significantly larger influence on females; they showed higher extent of concern for the claim „I hardly fall asleep because of thinking about it," „I try not to talk on this topic" and „In my mind appear pictures in relation to this" ( $p < 0.05$ ).

**Conclusion:** Knowledge of COVID-19 and measures of protection of health-care personnel at the Faculty of dentistry with Clinics in Sarajevo is satisfactory. The largest fear of participants was fear of unconsciously transmitting the infection on people close to them and that members of their families become infected with COVID-19.

**Keywords:** Coronavirus 2019; infection; oral health personnel

## INTRODUCTION

Pandemic coronavirus 2019 (COVID-19) in many aspects influenced lifestyle, economy, and health-care around the world (1). March 2020 is considered to be the start of pandemic COVID-19 in Europe and in the world (2). In that period, various measures were suggested to prevent the spread of the disease, such as isolation of the infected, school closures, social distancing, and wearing masks (3,4,5).

Given that pandemic COVID-19 is still ongoing, and healthcare workers are exposed the most, they need to be healthy and safe (6). With access to patients, whether it is a suggestive or a confirmed case, health-care personnel must abide by recommended measures of precaution and prevention from infection (7,8,9). Raising awareness of personal protection, availability of personal protective equipment, compliance with prevention measures of infection, and proper readiness would continue to play a significant role in reducing the risk of infection in healthcare (10).

Dentists and generally dental personnel work under the risk of being infected by patients suffering from COVID-19, who are unaware that they are infected (9). The reason lies in the fact that during dental procedures, aerosol is

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formed with droplets that may contain the virus. Thus, it is extremely important that dental personnel comply with adequate protective measures and equipment during clinical work. Using or nasal masks are highly recommended, where respirators as filtering face pieces (FFP) show a protective superiority compared to surgical masks (11). Furthermore, it is recommended an adequate air change after each dental procedure by opening the windows in dental office and safe distances between patients in the waiting room (8).

The aim of this investigation was to evaluate the knowledge of COVID-19 and determine the amount of stress with dental personnel of the Faculty of Dentistry in Sarajevo, Bosnia and Herzegovina.

## METHODS

Health-care personnel of the Faculty of Dentistry with Clinics of the University in Sarajevo has been included in research: teaching staff, clinical doctors, dental nurses, and dental technicians.

The research was conducted from April 6–10, 2020. According to the type of research, this concerned a cross-sectional study. It was conducted by an anonymous survey that participant's filled-in. Out of 157 distributed questionnaires in paper form, 134 participants responded. All participants voluntarily agreed to take part. The participants did not state their identity nor was their identity known to researchers. The age of participants ranged from 20 to 66 years. Participants were divided in five groups aged 20-35 years, 36-45 years, 46-55 years, 56-65 years, and those 65 years of age and over. Taking into consideration that only one participant in the group who was 65 years of age and over, to conduct the test, that participant was included in the group of participants aged 56-65 years.

The questionnaire was divided in three parts: (1) Personal data: Sex, age, nature of work (teaching staff, clinical doctor, dental nurse, or dental technician), the number of years spent in employment relationship, the number of patients in contact during a week, the number of students in contact during the semester for teaching staff; (2) knowledge of infection COVID-19; and (3) the amount of stress (feelings and thoughts) during epidemic COVID-19 with personnel of the Faculty of dentistry with Clinics in Sarajevo.

In the second part of the survey that referred to the participant's knowledge of infection of COVID-19 (diagnostic methods, transmission pathways, prevention measures), the participants were given the possibility to choose several responses.

In the third part of the survey, wherein questions were related to the impact of epidemic COVID-19 on participant's feelings and thoughts, the participants were offered with the following responses to the first question: Generally no, rarely, sometimes, and often. In the remainder of this part of the survey, the participants assessed their experiences on Likert scale from 1 (I am not worried at all) to 10 (I am extremely worried).

## Statistical analysis

The package IBM SPSS Statistics 23 and Microsoft Excel 2013 was used for statistical analysis of results. In the

procedure of statistical processing was also used the descriptive statistics and procedures of inferential statistics  $\chi^2$  test, Kruskal–Wallis test and Mann–Whitney U-test.

## RESULTS

Out of 134 participants, that filled-in the survey, 29 (21.6%) were men and 105 (78.4%) were women. Out of total number, 30 participants were aged 20-35 years, 47 participants were aged 36-45 years, 38 were aged 46-55 years, 18 were aged 56-65 years, and one participant was 65 years of age and over.

With regard to the occupation of participants, 35 teachers/assistants (26.1%) were in the sample, 27 clinical doctors (20.1%), 47 dental nurses (35.1%), and 25 dental technicians (18.7%).

Regarding the number of years spent in employment relationship at the Faculty of Dentistry with Clinics, 26 participants (19.4%) have been employed less than 5 years, 16 participants (11.9%) have been employed 5-10 years, and 47 participants (35.1%) have been employed 11-20 years, while 45 participants (33.6%) have been employed over 20 years.

The largest number of participants were in contact with 1-5 patients (30%) during a week, while 30 participants were in contact with more than 20 patients during a week (22.4%). Twenty-five participants were in contact with 6-10 patients (18.7%), 20 participants had no contact with a single patient (14.9%), and 16 participants had contacts with 11-20 patients (11.9), while two participants were abstained.

## Knowledge of participants of infection COVID-19

The largest number of participants (61.97 %) considers that COVID-19 may be transmitted from infected to a healthy person by inhalation of droplets generated through coughing of an infected person and by direct contact with aerosol dispersed from mouth of the infected patient during dental treatment. Chi-square test indicated statistically significant differences in the selection of responses "*By inhalation of droplets generated through coughing of infected person*" as well as response "*Direct contact with aerosol dispersed from mouth of infected patient during dental treatment*" in relation to work experience of participants (Table 1).

Results of survey show that the largest number of participants know that breathing difficulty or shortness of breath is one of main signal warnings present with patients infected with COVID-19, specifically 122 of them (91.044 %). A large number of participants, 80 of them (59.7 %), consider that it is also the persistent pain or pressure in the chest, 56 participants (41.79 %) consider coughing and sneezing to be one of signal warnings too, while only 41 participants (30.59 %) considers that bluish lips or face is a warning signal.

The largest number of participants, 80 of them (59.7 %) considers that the method of nucleic acid test is used in diagnosing of COVID-19. Sixty-six participants (49.25%) consider that C-reactive protein test is used and other indicators of inflammatory response. Nineteen of them (14.17%) consider that it is the complete blood count,

**TABLE 1.** The number of selected responses by profession

Profession	What are the ways of transmitting the coronavirus 2019 virus from an infected person to a healthy person?				
	By inhalation of air in direct vicinity of the infected person	By inhalation of droplets generated through coughing by the infected person	Direct contact with aerosol dispersed from mouth of infected patient during dental treatment	Through injured skin by touching bodily liquids of infected patient	Through injured skin by touching objects that were touched by infected person
Teacher/assistant	18	34	35	11	9
Clinical doctor	13	24	26	10	11
Dental nurse	19	44	31	16	14
Dental technician	8	24	15 <sup>a</sup>	4	10
All combined	58	126	107	41	44

<sup>a</sup> $p < 0.05$ ; Chi-square test

while only four participants (2.98 %) consider that urine culture is used in diagnosing of COVID-19.

The largest number of participants considers that spit and samples of respiratory pathways indicate the largest rate of detection of nucleic acid, 128 of them (95.52%). Only nine participants (6.71%) consider that it is the secretion from conjunctiva, while four participants consider it is urine (2.98%). Not a single participant considers that stool indicates the highest degree of detection of nucleic acid.

Results of survey showed that frequent washing of hands with water and soap, and use of hands sanitizers, as well as social distancing, represent two the best methods against infection COVID-19 (76.46% participants). A smaller number of participants, 52 of them (38.8%), consider that it is avoiding to touch our face with hands. Only 15 participants (11.19%) consider that it is practicing of respiratory hygiene, while only ten participants (7.46%) consider that it is rinsing our mouth with saline solution.

To the question “According to the recommendation of the World Health Organization, what is recommended to do during dental treatment of infected patient with COVID-19? The largest number of participants, 131 of them (40.43%) consider that it is recommended necessary wearing of a mask N95, FFP2 standard or equivalent during dental treatment of a patient infected with COVID-19. 72 participants consider (22.22%) that it is recommended to use a saliva ejector or powerful high-volume suction, 64 participants (19.75%) consider that it is recommended preoperative antiseptic rinsing of mouth, and 36 of them (11.11%) consider that it is recommended extraoral X-ray instead of intraoral, whereas the smallest number of participants, 21 of them consider (6.48%) that it is recommended to use soap and water as means to clean working surfaces.

**Amount of Stress with personnel of the faculty of dentistry with clinics in sarajevo during pandemic COVID-19**

Graphs 1 and 2 represent the frequency of responses to questions from survey of impact of pandemic on thoughts and feelings of participants.

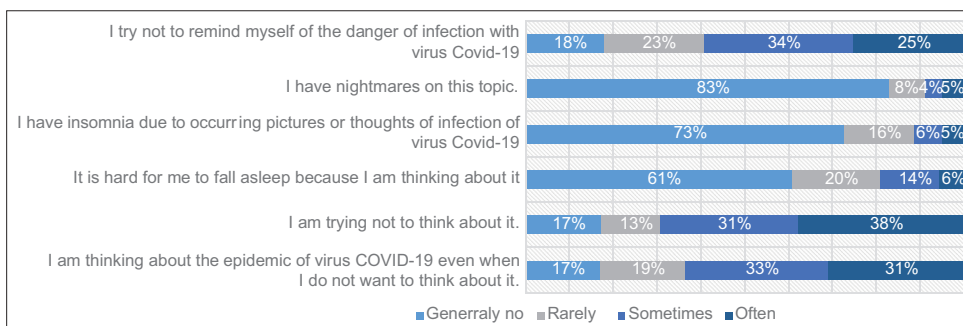
During the implementation of tests, we coded possible responses of participants where “generally no” is marked as 1, “rarely” as 2, “sometimes” as 3, and “often” as 4, based on average values of coded responses of participants that are presented in Table 2, females more frequently encountered the mentioned situations. Based on average values, dental nurses had larger values of these responses, that is, they

showed larger extent of concern for the mentioned claims in relation to teachers/assistants, as well as in relation to clinical doctors and dental technicians (Table 2).

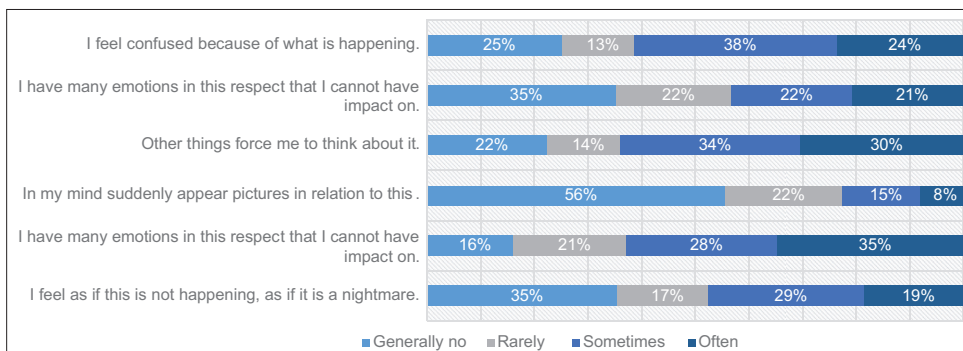
Kruskal–Wallis test showed that there exists statistically significant difference among five age groups for the claim “I am worried because of limited entry and exit at border crossings of my country due to pandemic COVID – 19“ ( $p = 0.021$ ). Mann–Whitney U-test showed that there exists statistically significant difference among age groups 36-45 and 46-55 years ( $p = 0.040$ ), and 36-45 and 56 years of age and over ( $p = 0.005$ ). If average values of responses for the mentioned groups are compared, participants aged 36-45 years had smaller average values of responses in relation to participants aged 46-55 years, that is, they expressed smaller concern regarding the mentioned claim in relation to participants aged 46-55 years, but also for participants 56 years of age and over.

Kruskal–Wallis test showed that there exists statistically significant difference between participants of different occupations for the concern of getting infected with COVID-19 from a student ( $p = 0.002$ ) and somebody else, apart from work ( $p = 0.004$ ), then for the concern of unconsciously transmitting the disease on people close to them ( $p = 0.008$ ), concern that family members might get infected with virus COVID-19 ( $p = 0.002$ ), concern of how due to COVID-19 classes in the summer semester will end ( $p = 0.001$ ), concern of how students will comprehend the planned curriculum ( $p < 0.0001$ ), concern whether additional overload will be managed that is necessary to enable online learning due to epidemic COVID-19 ( $p = 0.001$ ), concern whether they will manage to complete necessary reports/tasks before important deadlines COVID-19 ( $p = 0.029$ ), concern due to limitation of free movement from one place to another in the country due to epidemic COVID -19 ( $p = 0.004$ ), concern due to limited entry and exit of persons at border crossings of my country due to epidemic COVID – 19 ( $p = 0.001$ ), concern that they will not have sufficient groceries, and things necessary for personal hygiene due to epidemic COVID-19 ( $p = 0.044$ ), and concern due to possible economic crisis caused by epidemic COVID-19 ( $p = 0.022$ ).

Clinical doctors had larger values of responses, that is, that they showed higher extent of concern for the claim “I am worried of becoming infected with virus COVID-19 from a student” in relation to teachers/assistants, dental nurses showed a larger extent of concern for the mentioned claim in relation to teachers/assistants, as well as in relation to dental technicians. Dental nurses showed higher extent of concern for the claim “I am worried of becoming infected



GRAPH 1. Responses of participants regarding the impact of pandemic coronavirus 2019.



GRAPH 2. Responses of participants regarding the impact of pandemic coronavirus 2019.

TABLE 2. Average value of coded responses according to sex and profession (brackets contain standard deviation)

Sex	I hardly fall asleep because of thinking about it	I try not to talk on this topic	In my mind appear pictures in relation to this.	Other things make me think about it	I feel confused about what is happening
Male	2.15 (1.167)	2.22 (1.013)	1.78 (0.847)	2.48 (1.051)	2.44 (1.086)
Female	2.72 (1.064) <sup>a</sup>	2.79 (1.025) <sup>a</sup>	2.45 (1.173) <sup>a</sup>	2.91 (1.081)	2.80 (1.130)
Profession					
Teacher/assistant	2.54 (1.010)	2.59 (1.019)	2.09 (1.173)	2.26 (1.010)	2.74 (1.094)
Clinical doctor	2.04 (1.010)	2.50 (1.103)	1.92 (1.038)	2.63 (1.135)	2.69 (1.192)
Dental nurse	2.95 (0.925) <sup>b</sup>	3.05 (0.962) <sup>b</sup>	2.78 (1.084) <sup>b</sup>	3.29 (0.918) <sup>b</sup>	3.00 (1.095) <sup>b</sup>
Dental technician	2.65 (1.265)	2.26 (1.010)	2.22 (1.085)	3.00 (1.044)	2.22 (1.043)
All combined	2.60 (1.107)	2.67 (1.045)	2.31 (1.142)	2.81 (1.085)	2.72 (1.126)

<sup>a</sup>p<0.05; Mann-Whitney U test, <sup>b</sup>p<0.05; Kruskal-Wallis test

with virus COVID-19 from someone else, apart from work” in relation to teachers/assistants as well as in relation to clinical doctors (Table 3).

**DISCUSSION**

Dental personnel of the Faculty of Dentistry showed that they have satisfactory knowledge of COVID-19, and thus the largest number of participants knew that the method of nucleic acid test was used in diagnosing of COVID-19 and that the spit and samples of respiratory pathways show the highest rate of detection of nucleic acid. The biofluid saliva is proving to be a promising noninvasive sample specimen for the diagnosis of COVID-19, because of high viral loads of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA found in salivary gland and saliva (12). Implementation of an effective and rapid plan of diagnosis and screening will help to reduce and prevent further transmission of COVID-19 (13).

The largest number of participants (76.46%) mentioned frequent washing of hands with soap and water, and use of hands sanitizers, as well as social distancing are the best methods of prevention from infection. This finding is in

TABLE 3. Average value of coded responses according to sex and profession (brackets contain standard deviation)

	I'm afraid I will get infected with COVID-19 virus from a student	I'm afraid of getting the COVID-19 virus from someone else, outside of work
Sex		
Male	2.70 (2.866)	5.96 (3.013)
Female	4.02 (3.666)	6.84 (2.925)
Profession		
Teacher/assistant	2.26 (2.513)	5.74 (2.571)
Clinical doctor	4.42 (3.550)	6.12 (2.984)
Dental nurse	5.16 (3.946) <sup>b</sup>	7.86 (2.833) <sup>b</sup>
Dental technician	2.61 (2.950)	6.42 (3.120)
All combined	3.74 (3.540)	6.66 (2.955)

<sup>a</sup>p<0.05; Mann-Whitney U-test, <sup>b</sup>p<0.05; Kruskal-Wallis test; COVID-19: Coronavirus 2019

agreement with the study of Ahmed *et al.*, who conducted a cross-sectional study in March 2020 and included 669 participants from 30 different countries. They reported that 94% of participants practiced washing hands with soap and water or sanitizer before and after treatment of

patients (14). Sarfaraz *et al.* evaluated the level of knowledge and the attitude of 385 dental practitioners (from 23 different countries across the world) related to disinfection. About 54.5% of the participants strongly agreed that there is a high risk of contracting the SARS-CoV-2 in dental practice. Authors concluded that these dental health professionals had insufficient knowledge in fundamental aspects of disinfection protocols. Only 33.8% of the participants were aware of the protocols for cleaning visibly soiled hands with the use of soap and water for 20 s and then disinfection with alcohol-based hand rub (15).

It is interesting that by frequency of responses to the question how COVID-19 can be transmitted from infected to a healthy person, immediately after the response by “inhaling droplets generated by cough by infected person,” the second by order of frequency (107 out of total of 134 participants) was the response “by direct contact with aerosol dispersed by mouth of infected patient during the dental treatment.” Dental treatments generated aerosols using different devices such as turbines, micromotors, and ultrasounds. Oral cavity, nostrils, and eye conjunctiva are the access routes of SARS-CoV-2 (16). The infected droplets and aerosols can remain on the working and other surfaces of the dental office. SARS-CoV-2 virus is capable to stay active at room temperature several days. Therefore, it is important to properly clean and disinfect surfaces in the dental office (17).

This study indicates to us that majority of participants is familiarized with the fact that their job position represents extremely risky place regarding the transmission of COVID-19 if a patient in the dental chair is the carrier of this disease. Meng *et al.* claim that the risk of cross infection may be high between a patient and the dentist, and that strict and efficient protocols are necessary for the control of infection in hospitals and dental practices in areas that are (potentially) affected by COVID-19 (18). Azim *et al.* recommend several modifications of emergency dental care and emphasize the importance of stabilizing patient's dental condition and protecting dental staff from repeated visits by the same patient (19).

Dental staff should protect themselves using appropriate personal protective equipment (mask, eye protection, gown, and gloves). One of recommendations is wearing of surgical masks N95, FFP2 standard, or equivalent during dental treatment of a patient infected with COVID-19 (8,11,20,21). In our research, this information is known to 131 out of 134 participants. The results of Ahmed's study showed that although the majority of dentists favored the use of N-95 masks for routine dental procedures during the current outbreak, 90% reported not wearing an N-95 mask while treating a patient (14). As for other recommendations of WHO, for example, use of a saliva ejector or powerful high-volume suction, preparative antiseptic rinsing of mouth, recommended extraoral X-ray instead of intraoral, participants showed smaller extent of knowledge.

Findings of this research have shown differences in anxiety of male and female participants, which is in accordance with research conducted by Hadžić, who examined the impact of COVID-19 on dentists in Bosnia and Herzegovina. In this research, author came to the finding that there exist different levels of anxiety with dentists in public and private sector. Thus, dentists employed in private sector were

mostly worried that they will have patients infected with COVID-19 and that their practice would become a place of spreading of disease, while dentists in public sector were more worried about the insecurity during the pandemic. Both were worried about of transmitting the disease to their family members (22).

One part of the survey that our participants filled-in was also related to feelings and thoughts related to COVID-19. In our research, the largest number of participants showed exceptional worry about unconsciously transmitting the infection to people close to them and that members of their families might get infected by COVID-19. Ahmed *et al.* found that 92% of participants were afraid of carrying the infection from dental practice to their families. Also they found 87% of participants were afraid of getting infected with COVID-19 from either a patient or a co-worker and 90% were anxious while treating a coughing or a patient suspected to be infected with COVID-19 (14).

The current study found that differences exist in expressing the worry between different occupations of participants (teaching staff, clinical doctors, dental nurses, and dental technicians). Dental nurses showed larger worry of getting infected with COVID-19 by students and somebody else, apart from work in relation to other participants. In addition, dental nurses in relation to teaching staff, clinical doctors and dental technicians had larger values of responses for claims: “I try not to talk on this topic” “In my mind suddenly appear pictures related to that”, “Other things force me to think about that,” “I feel confused because of what is happening.”

Evaluating anxiety and fear during COVID-19 pandemic have been also performed among dental practitioners in other studies (6,14,23) Belini *et al.* investigated dental practitioners' behavior and analyze their reactions in relation to SARS-CoV-2 pandemic professional restrictive measures during lockdown in Italy, using an online survey. They divided respondents into two groups according to the number of confirmed cases of COVID-19 in their work area (more or less 15,000 cases). Most of respondents (71.1%) have answered that COVID-19 pandemic condition was having an extremely negative impact on their professional activity. About 39% respondents were moderately concerned and 24.3% were highly concerned of contracting COVID-19. The fear of contagion among dental practitioners was high; only 3.4% were not at all concerned of contracting COVID-19. Aside from fear, anxiety, concern, sadness, and anger were also emotions experienced by dental practitioners. About 45.2% of respondents showed minimally anxiety, 34.5% mild anxiety, and 13.9% showed moderate anxiety, while 6.4% showed severe level of anxiety (23). Consolo *et al.* also found feelings of concern in 70.2%, anxiety in 46.4%, and fear in 42.4% of the sample (6). Ahmed *et al.* emphasize that the fear and anxiety by dental community regarding getting infected from COVID-19 could be reduced if dental practitioners precisely follow the relevant recommendations (14).

In this research, the only difference in responses in relation to questions of feelings and thoughts related to COVID-19 between age groups was for worry due to limited entry and exit of people at border crossings of my country due to epidemic. Participants aged 36-45 years showed less worry

regarding the mentioned claim in relation to the older participants (aged 46-55 years, and 56 years of age and over). This surprised us to some extent, because we expected that younger participants would be more worried about travelling to other countries.

Limitation of this study is collecting data in first period of lockdown in Bosnia and Herzegovina and since then knowledge about COVID-19 prevention measures in the dental offices has generally improved.

## CONCLUSION

During the outbreak of COVID-19 in Bosnia and Herzegovina, dental treatments on Faculty of dentistry with Clinics in Sarajevo continued under strict protocols. Dental health professionals found themselves in a situation where they had to learn how to stay safe and provide adequate service. This study indicates that they have satisfying knowledge regarding prevention during COVID-19 pandemic. As new information regarding the safety procedures is constantly emerging, dental health professionals should learn and follow recommended measures. Despite all prevention measures were taken, the largest fear of participants was fear of unconsciously transmitting the infection on people close to them and that members of their families become infected with COVID-19.

## CONFLICTS OF INTEREST

No conflict of interest.

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