



Iranian Dental Students' Distress Level and Attitude towards Their Professional Future following the Covid-19 Pandemic (2020)

Maryam Rabiei¹, Mohammad Samami^{2*}, Ali Ramzi³

1. Professor, Dept. of Oral and Maxillofacial Medicine, School of Dentistry, Guilan University of Medical Sciences, Rasht, Iran.
2. Assistant Prof., Dental Sciences Research Center, Dept. of Oral and Maxillofacial Medicine, School of Dentistry, Guilan University of Medical Sciences, Rasht, Iran.
3. General Dentist, Rasht, Iran.




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* **Corresponding author:**
Mohammad Samami,
E-mail:
m_samami@alumnus.tums.ac.ir

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Abstract

Background: The coronavirus disease 2019 (COVID-19) is transmitted through saliva and respiratory aerosols. Concerns among dental clinicians over cross-contamination are among the main challenges currently present in the dental profession. This study aimed to assess dental students' distress level and attitude towards their professional future following the emergence of the COVID-19 pandemic.

Materials & Methods: This descriptive study was carried out recruiting 369 dental students of the Guilan University of Medical Sciences (a census sampling method) using an online questionnaire consisted of the three main topics of students' academic status, distress level, and attitude towards their professional future. The students received the link to the questionnaire via instant messaging applications. The Mann-Whitney U test, the Kruskal-Wallis test, the Spearman's correlation, the chi-squared test, the Fisher's exact test, the binomial test, as well as the backward multiple logistic regression model were used for data analysis.

Results: The dental students had a low level of distress and a negative attitude towards their professional future. Accordingly, the distress level was significantly higher in females ($P < 0.001$) than in males. Besides, it had a positive correlation with the academic level. In addition, the attitude of the females and those attending the Rasht Dental School was more significantly negative than that of the males and those attending the Anzali Private Dental School ($P = 0.01$ and $P = 0.009$, respectively). Furthermore, attitude had a positive correlation with distress.

Conclusion: The subjects showed little distress over the pandemic. However, this level of distress showed a significant correlation with the negative attitude towards the professional future. In fact, this negative attitude stemmed from structural changes in the dental profession as well as the threats posed to financial conditions following the transmission of the disease and concerns over it.

Keywords: Pandemics, Occupational Safety, Attitudes, COVID-19, Distress Level, Dental Students

Introduction

In late 2019, many patients developed a new type of pneumonia of unknown etiology in Wuhan, China. In January 2020, a novel coronavirus, referred to as the SARS-COV-2, was identified as the etiology of this type of pneumonia with possible

transmission from bats, causing a disease named the coronavirus disease-2019 (COVID-19) [1-3]. The World Health Organization (WHO) declared a state of emergency due to the rapidly growing number of COVID-19 cases worldwide. Having started in March 2020, COVID-19 rapidly spread

worldwide, so the WHO declared a global pandemic [2, 4-6]. This virus is transmitted through respiratory droplets and aerosols. Besides, it has a high level of infectivity resulting in high rates of morbidity and mortality in all age groups, particularly in the elderly and individuals with a weakened immune system [2, 7, 8]. According to the WHO, the number of confirmed global cases of COVID-19 has amounted to 146,345,157, with 3,102,323 deaths as of April 24, 2021. COVID-19 has a mean incubation period of 4 to 14 days, with its most commonly reported symptoms being fever, fatigue, dry cough, myalgia, and dyspnea, which usually last for 2 to 14 days [7, 8]. In fact, no specific antiviral medication has been introduced as definite treatment for this virus [9]. The first approved vaccine for COVID-19 was used in the United States in December 2020, with an increasing number of individuals being vaccinated worldwide since then. However, the number of vaccinated cases is still very low in many developing and poorly developed countries due to financial constraints.

Upon the announcement of the COVID-19 pandemic by the WHO, many governments worldwide started to implement unprecedented infection control policies of protecting their people and controlling the spread of COVID-19. These policies included social distancing, self-quarantine, lockdown of public places, such as shopping malls, restaurants, schools, and universities, removal of unnecessary services, and cancellation of travel plans, which led to adverse economic and psychosocial consequences, as well as changes in educational systems. Psychological impacts of the COVID-19 pandemic may include increased levels of fear, anxiety, distress, stress, fatigue, anger, loneliness, and behavioral disorders. In addition, the pandemic can create a negative attitude towards life and hope for the future [4, 7, 10-12]. Several cases of attempted and completed suicide have been reported due to the COVID-19 pandemic as well [12, 13]. In addition to the normal fear caused by the disease itself, discouraging, controversial, and unconfirmed news and rumors in the media bombard the public opinion, medical staff, healthcare workers, and students, causing fear and stress [14, 15].

An occupational hazard is defined as “a risk posed to a person, which usually arises out of employment”. Dental clinicians are exposed to patients’ respiratory droplets and aerosols for a relatively long period of time in the process of providing dental treatments; therefore, dentistry is among professions with the highest risk of COVID-19 contraction and transmission. For these reasons, dental offices and clinics were locked

down for a period of time during the COVID-19 pandemic [2, 7]. Given the existence of occupational hazards and for the protection of dental clinicians, organizations such as the Center for Disease Control, American Dental Association, and Occupational Safety and Health Administration set out guidelines on this issue.

Dental students are at a high risk of COVID-19 both directly and indirectly [9]. Since dental students, as future dentists, are at a high risk of COVID-19, most of them experience severe distress for concerns over safety of themselves, their friends, and their family. In addition, they experience distress for the hardship they experience due to intensified protective measures adopted by protocols and the impact of this pandemic on their education and professional future. In many cases, the friends and family of dental students and healthcare workers keep their distance from them for the fear of disease contraction [3, 16, 17]. Thus, it is required to assess dental students’ distress levels and attitude towards the COVID-19 pandemic to preserve their mental health. To the best of our knowledge, no study has so far investigated this issue. Against this background, this study aims to assess dental students’ distress levels and attitude towards their professional future following the emergence of the COVID-19 pandemic.

Materials and Methods

This descriptive cross-sectional study was conducted in 2020 following the emergence of the COVID-19 pandemic using an online questionnaire. To this end, ethical approval was obtained from the Ethics Committee of the Guilan University of Medical Sciences (IR.GUMS.REC.1399.406). The study was conducted on 369 dental students of the Guilan University of Medical Sciences (237 students of the public dental school and 132 students of the Anzali private dental school) during a 21-day period (from December 20, 2020 to January 10, 2021), when the travel bans were still in place. The inclusion criterion was being a dental student of the Guilan University of Medical Sciences, and the exclusion criterion was the students’ unwillingness to participate in the study. Accordingly, written informed consent forms were sent to the participants through instant messaging applications before sharing the main questionnaire link for participation in the present study.

A census was carried out as the sampling method, with an online questionnaire used for data collection after obtaining the approval from the research Ethics Committee of the university. The

questionnaire was designed using the Porsline website (<https://survey.porsline.ir>), and its link was shared among the students via instant messaging applications (WhatsApp, Telegram, or other instant messaging applications).

The questionnaire included four fields. The first field asked questions about demographic information of the participants, including their age, gender, academic level (educational year meant 1th to 7th academic years), type of the dental school (Rasht public school or Anzali private school), and place of residence (dormitory or household). The second field included five questions adopted from European academic dental institutions about current academic status of the dental students [2]. These questions were about the current status of the country (normal conditions in the country with no changes in daily activities, some restrictions on relocation/or closure of the universities in some areas, closure of schools or universities across the country, nationwide travel restrictions, social distancing, and regulations concerning staying at home for unnecessary business owners). Besides, they revolved around dental school status (normally open, open but with limited/or no access given to undergraduate students, open but with limited/or no access given to undergraduate students and staff, closed with no access given to undergraduate students and staff), treatment procedures currently adopted in the dental clinic of

the university (available as usual, only treatments without aerosol generation, only emergency dental treatments, only urgent dental treatments, dental treatments provided to volunteer patients, no treatments available), individuals qualified for providing treatment to patients (undergraduate students for clinical practices, undergraduate students for non-clinical practices, postgraduate students for clinical practices, employees working in clinical departments), and measures taken to prevent COVID-19 transmission in the university clinic (written instructions, standard local protocols, and national instructions). The third field included 8 questions regarding dental students' distress levels caused by COVID-19. It is worth noting that the questions were direct with dichotomous yes/no answer choices. Accordingly, a "yes" answer scored 1 and a "no" answer scored 0. In addition, higher total scores indicated higher levels of distress (Table 1).

The fourth field included 17 questions regarding the students' attitude towards their professional future. The questions had dichotomous yes/no answer choices, except for one question concerning occupational safety with four answer choices (medical, pharmacological, veterinary, and non-medical). The total score of 16 questions ranged from zero to 16. Besides, higher total attitude scores indicated a more negative attitude towards professional future (Table 2).

Table 1. Frequency distribution of responses to questions regarding the distress caused by the COVID-19 pandemic among dental students of the Guilan University of Medical Sciences in 2020-2021

Distress of dental students caused by the COVID-19 pandemic	Number (percentage)		P-value
	No	Yes	
Do you agree with the statement that 'COVID-19 is an unpredictable disease?'	60 (16.3)	309 (83.7)	< 0.001*
Does thinking about COVID-19 make you feel sad?	152 (41.2)	217 (58.8)	0.001*
Are you scared of COVID-19?	211 (57.2)	158 (42.8)	0.007*
Do you get nervous or anxious when hearing about COVID-19 news?	227 (61.5)	142 (38.5)	< 0.001*
Do you feel that you cannot focus on two different subjects at the same time?	250 (67.8)	119 (32.2)	< 0.001*
Do you have heart palpitations when thinking about COVID-19?	308 (83.5)	61 (16.5)	< 0.001*
Do you have disrupted sleep due to the fear of COVID-19?	338 (91.6)	31 (8.4)	< 0.001*
Do you experience hand numbness when thinking about COVID-19?	343 (93.0)	26 (7.0)	< 0.001*

Binomial test, *P-value < 0.05

Table 2. Frequency distribution of responses to the questions regarding Guilan University of Medical Sciences dental students' attitude towards professional future in 2020-2021

Domain	Attitude questions	Number (percentage)		P-Value
		Yes	No	
Academic future	Do you think that your academic performance has been worsened?	298 (80.8%)	71 (19.2%)	<0.001*
	Are you worried about falling behind in your education due to the lockdown?	283 (76.7%)	86 (23.3%)	<0.001*
	Can the COVID-19 pandemic revolutionize the future of dental education?	277 (75.1%)	92 (24.9%)	<0.001*
Professional future	Is COVID-19 a threat to your financial future?	277 (75.1%)	92 (24.9%)	<0.001*
	Has the COVID-19 pandemic changed the structure of dental practice?	272 (73.7%)	97 (26.3%)	<0.001*
	Do you intend to stop providing dental care services until the number of COVID-19 patients starts descending?	174 (47.2%)	195 (52.8%)	0.298
	Are you afraid of losing your job due to the COVID-19 pandemic?	158 (42.8%)	211 (57.2%)	0.007*
	Do you think that the COVID-19 pandemic indicates the significance of public health?	354 (95.9%)	15 (4.1%)	<0.001*
COVID-19 transmission	Are you worried about contracting COVID-19 from your university/workplace and transmitting it to your family members?	353 (95.7%)	16 (4.3%)	<0.001*
	Does the provision of dental care services to a patient suspected of COVID-19 make you anxious?	324 (87.8%)	45 (12.2%)	<0.001*
	Are you worried about contracting COVID-19 from your patients or colleagues?	288 (78%)	81 (22%)	<0.001*
	Does talking to your patient at a close distance make you anxious?	266 (72.1%)	103 (27.9%)	<0.001*
	Does living in a dormitory make you anxious?	259 (70.2%)	110 (29.8%)	<0.001*
Field of education	Did you choose the dental profession out of your own interest?	327 (88.6%)	42 (11.4%)	<0.001
	Would you blame your parents if they forced you to choose dentistry as your future career?	28 (7.6%)	341 (92.4%)	<0.001*
	Are you interested in changing your field of education in this semester or in the next one?	45 (12.2%)	324 (87.8%)	<0.001*

* Binomial test, *P-value < 0.05

To determine the content validity of the questionnaire, it was administered to 9 experts. Accordingly, the content validity index (based on the Waltz and Basel method) [18] and the content validity ratio (based on the Lawshe's table) [19] were calculated at 0.84 and 0.88, respectively. Given that a content validity index > 0.79 was considered acceptable, and that the minimum acceptable content validity ratio was 0.78 for the 9 experts according to the Lawshe's table, the content validity of the questionnaire was confirmed [19]. Besides, to validate the questionnaire, a pilot study was conducted on 10 students. To assess test-retest reliability, the questionnaire was administered once more to the students after 10 days, and the Pearson's correlation coefficient was calculated. Accordingly, the test-retest reliability of the questionnaire was found to be excellent ($r = 0.895$, a large size effect) [20].

Both convenience and snowball sampling methods were employed for maximum participation. The students received the link to the online questionnaire via the messengers of WhatsApp, Telegram, or other instant messaging applications. In the convenience sampling method, the researcher provided the questionnaire to the participants one by one. On the other side, in the snowball sampling method, the participants sent the questionnaire to each other. Next, the response rate was calculated.

Frequency and percentage values were calculated for the qualitative variables, with the mean and standard deviation values reported for the quantitative variables. In addition, data were expressed in tables and graphs. Normal distribution of the data was analyzed using the Kolmogorov-Smirnov test as well as kurtosis and skewness formulas. Besides, the Mann-Whitney U

and Kruskal-Wallis tests as well as the Spearman's correlation coefficient were employed for the data not distributed normally. Furthermore, the chi-squared test or the Fisher's exact test was used to analyze the correlation between the relation variables. The binomial test was used to compare the frequency distribution of yes and no answers of the dental students to the questions about their distress and attitude towards professional future as affected by the COVID-19 period. The backward multiple logistic regression model was used to examine the relationship between independent predictors and the attitude. In this model, attitude scores higher than the mean equaled 1 and indicated a more negative attitude. In contrast, attitude scores smaller than the mean equaled zero and indicated a more positive attitude. All statistical analyses were performed using SPSS Statistics version 24.0 at a significance level of 0.05.

Results

Out of 405 dental students of the Guilan University of Medical Sciences (attending the Rasht dental school and the Anzali private dental school), 369 filled out the online questionnaire (response rate = 91%). Besides, out of 369 students, 132 were attending the Anzali private dental school, and 237 were attending the Rasht dental school. The mean age of the dental students was 23.3 ± 3.1 (within the range of 18-54 years). In addition, the majority of the dental students were from 20 to 25 years old (71%).

The dental students included 190 females (51.5%) and 179 males (48.5%). Besides, the majority of the participants were 6th year dental students (20.6%), while 3rd year dental students were the minority (13.28%). In addition, most of the students were living in their household (88.9%).

Regarding the country's current status, the majority of the students (66%) complained about bans on traveling between cities and mentioned the lockdown of the university at some specific times (in response to questions about the university's status). Comparison of the frequency distribution of the responses to questions about the the country's current status in the COVID-19 pandemic showed a significant difference in the opinions of the two groups of the students ($P > 0.001$, Table 1). Concerning the university's status, about 90% of the students complained about attendance limitations (red, orange, and yellow flags indicating COVID-19 status). Besides, 38.21% reported that only urgent dental measures had to be adopted for patients. The difference in this respect was significant between the two groups of the dental

students ($P < 0.001$). The majority of the students (58.8%) reported that undergraduate dental students would not participate in clinical procedures. Besides, 67.48% of the students believed that their university followed national guidelines on confronting the COVID-19 pandemic. The majority of the dental students (83.7%) reported that the future of the COVID-19 pandemic would be unknown ($P < 0.001$). Nonetheless, they did not display clinical symptoms of distress caused by the COVID-19 pandemic (anxiety, poor concentration, etc.). The mean score of distress was significantly higher in the female dental students than in the male ones (3.4 ± 2 versus 2.4 ± 1.7 , $P < 0.001$).

According to the dental students' responses to the questions about their attitude towards their professional future, the majority of them had a negative attitude towards contracting COVID-19 and transmitting it to their family members, colleagues, and other patients ($P < 0.001$) (Table 2). Besides, the majority of the students had a negative attitude towards their academic future ($P < 0.001$). The students' attitude towards their professional future was negative due to the adverse economic impacts of COVID-19 and changes in the structure of the dental profession; however, they were not worried about losing their job in the future. In addition, 88% of the students declared that they chose this profession based on their own interest and were not willing to change it despite the emergence of the COVID-19 pandemic. Considering the occupational safety reduced by the COVID-19 pandemic, the dental students of the Rasht Dental School (45.6%) believed that non-medical fields were safer, while the majority (44.7%) of those attending the Anzali Private Dental School considered pharmacology on the top of the list in terms of occupational safety. Besides, the difference in the opinions of the dental students of the two dental schools was significant in this respect ($P = 0.014$).

The mean score of the students' attitude towards professional future was significantly higher in females than in males (11.10 ± 2.52 versus 10.47 ± 2.64 , $P = 0.01$). Besides, the difference in the attitude of the students attending the two dental schools was significant, with negative attitudes having had a higher frequency among the dental students of the Rasht Dental School ($P = 0.009$).

Table 3 shows the measures of central dispersion for distress as well as scores of the dental students' attitude towards their professional future. The Kolmogorov-Smirnov test showed that the data on total distress and attitude scores did not have a normal distribution ($p < 0.001$), with the distribution of distress scores having had positive

skewness. This finding indicates that the majority of the dental students had a low level of distress. The distribution of attitude scores had negative

skewness (-0.855 ± 0.127), indicating that the majority of the dental students had a negative attitude towards their professional future.

Table 3. Measures of central dispersion for scores of distress and attitude of the dental students at the Guilan University of Medical Sciences towards their future profession in 2020-2021

Variables	Mean ± Std. deviation	Median	Lower bound	Upper bound	P-value
Distress (0-8)	2.88 ± 1.92	3.00	2.68	3.08	< 0.001*
Attitude (0-16)	10.79 ± 2.60	11.00	10.53	11.06	< 0.001*

Kolmogorov-Smirnov test; * P-value < 0.05

According to the Spearman’s correlation matrix, the academic level had a significant correlation with the occupational distress score (P = 0.043, r = 0.105). This means that the occupational distress score increased with an increase in the academic level. In addition, a significant correlation was found between the distress score and the score of the attitude towards professional future (P < 0.01, r = 0.574). In other words, with an increase in the occupational distress score, the negative attitude towards professional future increased as well. According to the scatter plot of the data, the regression line indicates that the correlation between the attitude score and the distress level has been ascending so that per one unit of increase in the occupational distress score, the score of attitude towards professional future increased by a 0.72 unit (β = 0.72). Accordingly, 28% of the changes in the attitude towards

professional future could be predicted based on the students’ occupational distress score (R2 = 0.28).

Table 4 shows the relationship between occupational distress and the score of the attitude towards professional future in both unadjusted and adjusted models based on personal and educational variables, using the backward multiple logistic regression model.

The correlation between the occupational distress score and the attitude towards professional future during the COVID-19 pandemic was significant in both adjusted and adjusted models based on personal and educational variables (P < 0.001). In the adjusted model, with an increase in the distress score, the odds of a more negative attitude (scores higher than the mean) increased by 1.96 times (odds ratio: 1.962).

Table 4. The correlation between occupational distress and the attitude score with and without adjustment of the effects of personal and educational variables using the multiple logistic regression model among the dental students of the Guilan University of Medical Sciences in 2020-2021

Variables	B	S.E.	P-value	OR	95% CI		
					Lower	Upper	
Unadjusted model	Distress	0.676	0.090	*<0.001	1.965	1.647	2.346
	Age	-0.007	0.042	0.867	0.993	0.914	1.079
	Gender (male/female ratio)	-0.044	0.257	0.863	0.957	0.578	1.582
	Academic level	0.032	0.081	0.692	1.033	0.881	1.211
	University (Rasht/Anzali)	0.756	0.273	*0.006	2.130	1.246	3.641
	Place of residence	0.734	0.400	0.067	2.084	0.951	4.569
	Constant	-2.352	1.050	*0.025	0.095		
Adjusted model	Distress	0.674	0.088	*<0.001	1.962	1.652	2.331
	University (Rasht/Anzali)	0.775	0.265	*0.003	2.170	1.292	3.646
	Place of residence	0.737	0.401	0.066	2.090	0.953	4.582
	Constant	-2.406	0.511	*<0.001	0.090		

*P-value < 0.05; B = Unstandardized Regression Coefficient; S.E. = Standard Error; OR = Odds Ratio; CI = Confidence Interval

In the adjusted model, in addition to occupational distress, the university and the place of residence were found to be predictors of the attitude towards professional future. As Table 4 shows, the dental students of the Rasht Dental School had a negative attitude by 2.17 times more than that of the dental students of the Anzali Private Dental

School (odds ratio = 2.17, 95% CI: 1.292-3.646). Although the place of residence was found to be a predictor in the adjusted model, its effect was borderline significant (P = 0.06; p-values within the range of 0.05-0.1 were considered borderline significant). In addition, the dental students living in households had a more negative attitude towards

their professional future than those living in dormitories (odds ratio = 2.09, 95% CI: 0.953-4.582).

Discussion

The emergence of the COVID-19 pandemic and its consequent extensive lockdowns adversely affected the lifestyle and mental health of many individuals worldwide. This study assessed the level of distress and the attitude of the dental students of the Guilan University of Medical Sciences towards their professional future, following the COVID-19 pandemic.

Stress is the normal reaction of human beings to internal and external stimuli. However, it occurs in case of severe or continuous pressure [21]. Against this background, the results showed that the majority of the dental students perceived distress and had positive skewness in this respect. However, its long-term consequences had a negative effect on their professional future (negative skewness). Given that COVID-19 mainly targets the elderly or people with a weakened immune system, distress symptoms can be rarely expected in dental students [22].

The dental students considered COVID-19 an unpredictable disease and stated that thinking about it would frustrate them. This finding was expected given the propensity of the students for continuously updating their information using the media and different resources, for a new article is published every 4 seconds regarding COVID-19 and its different aspects [23-25].

A similar study on the Iranian medical students during the COVID-19 pandemic showed relatively high levels of anxiety and depression among them [26]. According to several studies, the prevalence of depression and distress during the COVID-19 pandemic ranged from 12 to 59% [27-29]. During the Middle East respiratory syndrome epidemic, around one-fourth of the people experienced mild to moderate levels of anxiety [30]. Different reported prevalence rates could be attributed to differences in measurement methods and tools as well as socioeconomic status of different individuals [31].

Fear is an adaptive form of response that leads to the accumulation of energy to confront potential threats. Fear of contracting a disease leads to intensifying some hygienic measures, such as washing hands and self-quarantine during a pandemic. Nonetheless, if the magnitude of fear does not match the threat, it will be problematic for both the individual and the society, thereby resulting in the development of psychological

conditions [32]. Around half of the participants in this study expressed high levels of fear of COVID-19. A similar study reported fear and hopelessness among individuals in self-quarantine [33].

The present study revealed a higher level of distress and a more negative attitude among the female students than in the males, which was in agreement with previous findings [30, 34-37]. However, another study found no significant differences in this respect between males and females [38]. The present study, similar to a previous one, showed that the level of stress increased by an increase in the academic level of dental students [39]. Freshman dental students possibly have a higher level of hope for controlling this pandemic and compensating the wasted time, while senior ones feel that their valuable time has been wasted. A previous study, however, found no significant differences in this respect [38].

The current study results revealed that the students' negative attitude was mainly because of their fear of contracting COVID-19 and transmitting it to their family members. Fear of disease transmission has been discussed by some previous studies as well [40-41]. Asymptomatic carriers are the other reason for the negative attitude among the students [42].

In terms of the near and distant future, the dental students had a more negative attitude towards their academic status rather than professional status. As of the announcement of the pandemic until the time this study was conducted, frequent unscheduled lockdowns impaired the process of education and training of dental students at universities, which adversely affected dental offices and clinics [32, 38, 41]. According to the WHO, about 60 vaccines are currently undergoing clinical trials. However, no definite treatment has yet been found for COVID-19. Besides, long-term possible complications and/or side effects of the vaccines with confirmed efficacy have yet to be unveiled. Moreover, vaccines are not available to all nations, and the occurrence of several mutations in the viral genome questions the efficacy of the vaccines [43-45]. All these factors further contributed to the dental students' negative attitude towards their education and profession in the future. The economic burden of the pandemic is another factor responsible for the dental students' negative attitude towards their profession in the future.

In the present study, the distress and attitude scores had a positive correlation so that dental students with higher levels of distress had a more negative attitude towards future. Thus, distress can be considered as a predictor of the negative

attitude.

Despite the dental students' stress and negative attitude towards their education and profession in the future, about 90% of them stated that they chose this profession based on their interest and were still determined to continue their education, being unwilling to change their field of education. Some of the limitations of this study were the lack of access to the internet by some students, problems in opening the link, and unwillingness of some of them to participate in the study. It is recommended that similar studies be conducted on students from different provinces of the country and from different fields of medical sciences to make comparisons among disciplines and regions.

Conclusion

According to the results, the dental students had a low level of distress despite having a negative attitude towards their education and profession in the future. Besides, the results showed that the dental students were mainly concerned about contracting COVID-19 and transmitting it to their family members as well as educational problems. These concerns could be largely obviated through formulating correct strategies by authorities and providing students with personal protective equipment.

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