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ORIGINAL ARTICLE

Investigation of the Effect of the COVID-19 Pandemic on Anxiety Levels and Career Satisfaction of Dentistry Students

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ABSTRACT

Objective: This study aimed to investigate the effect of the COVID-19 pandemic on the anxiety levels and career satisfaction of dentistry students. **Methods**: A total of 220 dentistry students were included in the study. A questionnaire was mailed to dentistry students at Trakya University between June 2021 and January 2022. Beck Anxiety Inventory (BAI) was used to evaluate anxiety levels. Data were analyzed, and $p < 0.05$ was considered statistically significant. **Results**: The mean BAI scores of the participants were 14.6 ± 13.6. The anxiety levels of the females were significantly higher than the males ($p = 0.004$). There was a significant relationship between the level of knowledge about COVID-19 and anxiety ($p = 0.032$). More than half of dentistry students were anxious about the pandemic conditions and concerned about being infected during treatment. Moreover, most participants were anxious about infecting their patients and families, yet 86.8% do not regret choosing dentistry as a profession. **Conclusion**: An increase was observed in the anxiety levels caused by the pandemic in dentistry students. The outcomes of the current study revealed that the COVID-19 pandemic affected female dental students more. Although the COVID-19 pandemic negatively affected the psychological health of dental students, most participants were satisfied with their careers.

Key words: anxiety, COVID-19, dental students, distance learning

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INTRODUCTION

In December 2019, an acute respiratory disease of unknown origin was first recorded in the city of Wuhan, China, and quickly spread to many parts of the world.[1] It was soon discovered that the new disease was caused by a new coronavirus, which was termed as coronavirus disease 2019 (COVID-19).[2] In just two months after the World Health Organization officially qualified the outbreak as the "COVID-19 epidemic" on January 30, 2020, COVID-19 had taken the lives of 26,495 people worldwide and infected more than 570,000.[3] Infected individuals experienced many non-specific symptoms such as dry cough, fever, shortness of breath, sore throat, diarrhea, vomiting, fatigue, and muscle pain. To make things worse, mortality rate was strikingly high, especially in people with chronic diseases.[4]

During the long months after its outbreak in early 2020, the COVID-19 pandemic has dramatically changed people's everyday routines. The functioning of educational institutions was hampered by measures such as quarantines, curfews, and social isolation; most academic activities got postponed or delayed.[5] Despite the quick introduction of adaptation measures such as online education systems, digital platforms of universities encountered many problems, such as interruptions students' internet access. Similar difficulties were reported in clinical education in applied sciences. One of the most affected departments was dentistry where the use of high-speed and ultrasonic instruments requires employing aerosols that release fine tissue particles, water, saliva, and/or blood. These aerosols play a major role in the direct transmission of the disease, as well as in eliciting an indirect contact infection caused by the accumulation of these particles on the surfaces.[6] Accordingly, in view of this particular risk to dental students, the COVID-19 pandemic was predicted to complicate the working conditions and increase stress and anxiety among dental students.[7]

While there is robust evidence indicating that dentistry students experience psychological problems during their education and in the profession after graduation,[8] the COVID-19 pandemic considerably complicated this cohort's education process. Typical difficulties included the impossibility to attend offline (i.e., face-to-face) lectures, postponement of clinical/preclinical education, and the lack of live demonstrations, all of which adversely affected students' level of knowledge.[9] Along with the aforementioned negative factors, there were expectations that the increased anxiety caused by ensuring individual safety and preventing the risk of contamination would considerably compromise dental students' psychological health.[10-12] This makes it imperative to evaluate students' mental health and well-being after the COVID-19 and to all necessary measures to improve the situation. In this context, the present study investigates the impact of the COVID-19 pandemic on dentistry students' online education, career satisfaction, anxiety, and stress levels.

METHODS

The data were collected between June 2021 and January 2022, after the necessary approval was obtained from Trakya University Scientific Research Ethics Committee (TU-BAEK 2021/220). The study participants completed a questionnaire and Beck Anxiety Inventory (BAI). Healthy individuals aged over 18 years old and willing to participate were included in the sample. Exclusion criteria were as follows: (1) mental disorder diagnosis; (2) taking sedatives, anxiolytics, or antidepressant medications. The overall sample amounted to a total of 222 dentistry students (158 females).

Since face-to-face interviews were impossible during pandemic conditions, the participants filled in the questionnaire online. A link to the questionnaire was shared via social media and e-mail. All respondents also signed informed consent. The participants' demographic data (gender, age, and dental school year) were also recorded. First, second, and third-year dental students were categorized as preclinical students, while fourth- and fifth-year dental students were grouped as clinical students.

The COVID-19 questionnaire consisted of 20 questions targeting the students' level of knowledge and anxiety about the new coronavirus. The reliability of the questionnaire questions was evaluated using Cronbach alpha. In this study, the Cronbach alpha value amounted to 0.685, suggesting a good reliability. Furthermore, the validity of the questionnaire was assessed using factor analysis. Factor analysis produced a factor matrix of seven factors that jointly explained 65,808% of the total variance.

Beck Anxiety Inventory (BAI)

The BAI is a 21-item Likert-type self-assessment scale used to detect the frequency of anxiety symptoms experienced by individuals.[11] The items capture common symptoms of anxiety (e.g., "wobbliness in legs") to be rated on a 4-point scale ranging from 1 = "not at all" to 4 = "severely." Accordingly, a higher BAI score indicates severe anxiety. In previous research, the validity and reliability of the Turkish translation of the BAI scale, which was used in the present study, were evaluated by Mustafa et al. and the Cronbach alpha internal consistency coefficient was 0.93.[13]

Statistical analysis

G*Power version 3.1 (Franz Faul, Universität Kiel, Germany) was used for sample size calculation. Since the minimum number of participants to be included in the study was 200 (80% power, $\alpha = 0.05$ probability of error), more students were included to ensure adequate statistical power.

Statistical were performed using IBM SPSS Statistics for Windows software, version 23.0 (SPSS Inc., Chicago, IL, USA). Data compliance with normal distribution was analyzed using the Shapiro-Wilk test. Student t-test and Mann-Whitney U tests were used for pairwise comparisons between groups, and one-way analysis of variance (ANOVA) and Kruskal Wallis analysis of variance were used for more than 2 groups. In addition, chi-square tests were run for categorical variables.

Qualitative data are expressed as numbers and percentages, while quantitative data are presented as means ± standard deviation (SD). The value of $p < 0.05$ was assumed to indicate statistical significance.

RESULTS

A total of 222 dentistry students aged 17–27 years old (mean age 21.1 ± 1.7 years) were included in the study, of which 71.8% (n = 158) were female and 28.2% (n = 62) were male. Among the students, almost two-thirds (74.5%) were in the preclinical stage of education. Furthermore, over half of the study participants (55%) reported to have sufficient knowledge about COVID-19. Further detail on the demographic data of the study participants is provided in Table 1.

The mean BAI scores of the participants amounted to 14.6 ± 13.6 (min-max: 0-63). Almost half of the respondents (42.7%; n = 94) had normal anxiety level, followed by 26.8% (n = 59) who had mild anxiety, 14.5% (n = 32) with moderate anxiety, and 15.9% (n = 35) with severe anxiety. The anxiety levels of female students were significantly higher than those of their male counterparts (p = 0.004). A significant inverse

Table 1. Relationship between socio-demographic status and the Beck Anxiety Scores of the participants in the present study.

Variables	n (%)	p	Beck Scores n (%)				p
			Normal (0–9)	Mild (10–18)	Moderate (19–29)	Severe (30–63)	
Gender							
Male	62 (28.2)	0.000*	37 (16.8)	16 (7.3)	5 (2.3)	4 (1.8)	0.004*
Female	158 (71.8)		57 (25.9)	43 (19.5)	27 (12.3)	31 (14.1)	
Grade							
1st year	57 (25.6)	0.000*	25 (11.4)	17 (7.8)	6 (2.7)	8 (3.7)	0.707
2nd year	34 (15.5)		17 (7.8)	5 (2.3)	8 (3.7)	4 (1.8)	
3rd year	69 (31.4)		26 (11.8)	21 (9.6)	9 (4.1)	13 (5.9)	
4th year	40 (18.3)		16 (7.3)	9 (4.1)	7 (3.2)	8 (3.7)	
5th year	20 (9.1)		9 (4.1)	7 (3.2)	2 (0.9)	2 (0.9)	
Level of education							
Preclinic	164 (74.5)	0.000*	68 (30.9)	43 (19.5)	27 (12.3)	26 (11.8)	0.581
Clinic	56 (25.5)		26 (11.8)	16 (7.3)	5 (2.3)	9 (4.1)	
Knowledge about COVID-19							
Sufficient	121 (55.0)	0.000*	58 (26.4)	33 (15.0)	16 (7.3)	14 (6.4)	0.032*
Partially sufficient	96 (43.6)		36 (16.4)	25 (11.4)	16 (7.3)	19 (8.6)	
Insufficient	3 (1.4)		-	1 (0.5)	-	2 (0.9)	

Chi-square tests, *p < 0.05.

relationship was observed between the students' level of knowledge about COVID-19 and their level of anxiety (p = 0.032); that is, with a decrease of knowledge about COVID-19, anxiety increased.

Overall, about one third of the respondents (29.1%) stated that they were well informed about COVID-19 in their faculty. Further analyses revealed that the department with the highest risk for COVID-19 was Oral Surgery (35.5%), followed by Endodontics (38.6%). The overwhelming majority of the participants (90.5%) indicated that their psychological condition was adversely affected by the pandemic. Two thirds of the respondents (66.4%) were unsatisfied with the interruption of education, and half (50%) stated that they experienced difficulties when working from home due to family members and inappropriate work conditions at home. Furthermore, 57.3% worried about losing their skills due to the interruption of education. On the other hand, 64.5% stated that they faced difficulties due to the atrophy of dentistry skills during post-pandemic education. Furthermore, while the participants' BAI scores were not affected by differences in level of education (p = 0.581), clinical students reported higher anxiety levels of contracting COVID-19, since they directly interacted with patients and healthcare personnel and were thus at a higher risk (p < 0.001).

Over half of dentistry students (56.4%) were anxious about the pandemic conditions, and 50% were concerned about being infected during treatment as the dentistry environment was defined as a high risk for transmission (Table 2). Moreover, 68.2% of the respondents stated that they were anxious about infecting their patients, while 77.7% were worried about the possibility of infecting their families. This having been said, the overwhelming majority of the respondents (86.8%) did not regret choosing dentistry as a profession, and 91.4% reported they did not consider changing their career.

DISCUSSION

In this study, we explored the effect of the COVID-19 pandemic on the anxiety levels and career satisfaction of dentistry students.

To date, numerous studies on the psychological effect of the COVID-19 pandemic on individuals reported increased stress, anxiety, and depression levels caused by distressing factors such as being locked down, socially isolated, and constant concerns about getting infected.[14] Previous studies on health workers, who are the group at the highest risk, found even higher levels of anxiety and depression among cohorts of medical professionals. In addition, healthcare professionals working in COVID-19 wards reported higher levels of depressive symptoms and posttraumatic stress symptoms (PTSS) as compared to who work in other healthcare units.[15] Dental clinics are among the environments where disease transmission can easily occur via aerosols that increase potential risks to the dentists, dentistry students, dental care staff, and patients.[11]

Table 2. Relationship between the questionnaire and the Beck Anxiety Scores of the participants in the present study.

Questionnaire	n (%)	p	Beck Scores n (%)				p
			Normal (0–9)	Mild (10–18)	Moderate (19–29)	Severe (30–63)	
How anxious are you about taking care of patients in COVID-19 pandemic conditions?							
Highly anxious	71 (32.3)	0.007*	22 (9.5)	23 (10.5)	12 (5.5)	14 (6.4)	0.229
Anxious	53 (24.1)		23 (10.5)	12 (5.5)	8 (3.6)	10 (4.5)	
Undecided	35 (15.9)		17 (7.7)	8 (3.6)	3 (1.4)	7 (3.2)	
Not anxious	61 (27.7)		32 (14.5)	16 (7.3)	9 (4.1)	4 (1.8)	
How anxious are you about contracting COVID-19 because of your profession?							
Highly anxious	50 (22.7)	0.588	14 (6.4)	12 (5.5)	13 (5.9)	10 (4.5)	0.123
Anxious	60 (27.3)		31 (14.1)	15 (6.8)	6 (2.7)	8 (3.6)	
Undecided	59 (26.8)		26 (11.8)	15 (6.8)	7 (3.2)	11 (5)	
Not anxious	51 (23.2)		23 (10.5)	17 (7.7)	6 (2.7)	5 (2.3)	
How anxious are you about infecting your patients with COVID-19 by dental environment?							
Highly anxious	61 (27.9)	0.000*	20 (9.1)	13 (5.9)	17 (7.7)	11 (5.0)	0.040*
Anxious	89 (40.5)		42 (19.1)	27 (12.3)	6 (2.7)	14 (6.4)	
Undecided	43 (19.5)		19 (8.6)	12 (5.5)	4 (1.8)	8 (3.6)	
Not anxious	27 (12.3)		13 (5.9)	7 (3.2)	5 (2.3)	2 (0.9)	
How anxious are you about infecting your family with COVID-19 because of your profession?							
Highly anxious	104 (47.3)	0.000*	41 (18.2)	24 (10.9)	20 (9.1)	19 (8.6)	0.535
Anxious	67 (30.5)		29 (13.2)	19 (8.6)	8 (3.6)	11 (5.0)	
Undecided	30 (13.6)		13 (5.9)	10 (4.5)	3 (1.4)	4 (1.8)	
Not anxious	19 (8.6)		11 (5.0)	6 (2.7)	1 (0.5)	1 (0.5)	

Chi-square tests, *$p < 0.05$.

The social distancing measures that were implemented during the COVID-19 pandemic caused considerable interruptions in central students' practical training.[16] Although the introduction of online education enabled dental students' participation in distance education events regardless of their location, this type of education has various limitations, such as incompatible electronic equipment and the inability to access high-quality internet networks.[9] Yet, there is evidence indicating that self-learning among medical students improved their ability to use online resources and encouraged independent learning.[17] Concurrently, the failure of online learning to provide medical students with sufficient training of their psychomotor skills caused an increase in stress levels among dentistry students;[18] similarly, most of our study participants reported having encountered difficulties due to inadequacy or atrophy of dental skills during post-pandemic education. This finding is largely in line with the findings previously reported by Kharma et al. who found that most medical students experienced immense anxiety (85%) and stress (63%) related to their return to clinical training.[19] In another relevant study that involved a survey of undergraduate dental students, Amir et al. established that 44.2% of the students preferred distance education over face-to-face education. These results are well aligned with our findings' showing that 64% of the study participants were not satisfied with online education.

Since dentistry involves interactions with bodily fluids and the use of sharp instruments, dental environments are always open to infection risks, such as COVID-19. Available evidence suggests that the students who possess less knowledge and experience about COVID-19 are more susceptible to the risk of COVID-19 infection,[11] which highlights the importance of properly informing students about COVID-19 and its consequences. However, as revealed by our results, less than one third of our respondents (29.1%) were sufficiently informed about COVID-19 by their faculty. Yet, the students mentioned alternative sources of information, such as the Internet, news, and public announcements, all of which enhanced the students' understanding of COVID-19 and associated risks. An important applied finding in this context was a negative correlation between the students' BAI scores and their COVID-19-related knowledge level. This result is consistent with previous findings reported by Liu et al. who showed a decrease in COVID-19-related anxiety with an increase of awareness about this disease.[20]

An interesting nuance highlighted by our findings was that the respondents' BAI scores varied depending on gender, with female dental students' reporting higher BAI scores. This finding is well aligned with several previous studies.[11,21] For instance, Gaş et al. established that the frequency of temporomandibular joint disorders related to COVID-19-related anxiety was higher in female students as compared to their male counterparts.[22] Furthermore, a study on the relationship between emotional intelligence (EI), stress, anxiety, and depression levels showed that dental undergraduates with high EI scores were less likely to report perceived stress, indicating the importance of EI in moderating stress and its ability to serve as a type of coping resource.[23]

Although previous studies reported higher anxiety and stress levels among clinical students,[5,11] in the present study, we failed to find statistical differences in the BAI scores between clinical and preclinical students. Furthermore, in line with Hakami et al.'s study where infecting family members was found to be one of the major concerns of dental students,[5] in our research, clinical students reported feeling anxious about both contracting the COVID-19 virus themselves and passing it on to their family members or their patients. In addition, the BAI scores were correlated with the anxiety levels arising from the risk of infecting patients. Finally, although the COVID-19 pandemic had considerable negative effects on dental students' psychological health, most of our respondents reported being satisfied with their careers.

One of the limitations of the present study is that, although the faculty tried to reduce the students' anxiety levels by providing online psychological counseling during the pandemic, no reassessment of anxiety was made after counseling. Another limitation of the present study is the failure to evaluate changes in the study participants' psychological state at different stages of the COVID-19 pandemic.

CONCLUSION

The COVID-19 pandemic has had dramatic consequences on individuals' quality of life, including but not limited to mood changes such as anxiety, stress, and fear. In this respect, dentistry students are a particular high-risk group. The results of the present study revealed that the COVID-19 pandemic affected female dentistry students more than their male peers. It was also found that anxiety levels of dentistry students increased with the risk of infecting family members and patients. Taken together, the results of the present study suggest that anxiety levels among medical students can be reduced by increasing students' knowledge about the COVID-19 virus and appropriate cross-infection control methods.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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