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Determination of dental anxiety levels in dental faculty students

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Abstract

Aim: Dental education is considered a highly stressful time consisting of a series of courses and practical programs aimed at developing interpersonal skills, learning the theoretical foundations of professional practices, and acquiring clinical skills. The aim of this study was to determine and comparatively examine preclinical and clinical students' dental anxiety levels.

Methodology: The study included third- and fourth-year students in the Dicle University Faculty of Dentistry. The students were asked to complete questionnaire forms, including the Spielberger State-Trait Anxiety Inventory (STAI) and Corah's Dental Anxiety Scale (C-DAS), to determine their anxiety levels. Gender, age, and academic year were recorded. The significance level was set at $p < 0.050$.

Results: No statistically significant differences were found in the median STAI-S, STAI-T, and C-DAS values between classes. A statistically significant correlation was found between the STAI-S, STAI-T, and C-DAS values. The C-DAS values of third-year female students were higher than those of male students. No difference was observed between the genders among fourth-year students.

Conclusion: Neither preclinical nor clinical students exhibited high dental anxiety, and no differences were detected between classes. We believe that this result is associated with increases in education and acquired experience.

Keywords: Corah's Dental Anxiety Scale, State-Trait Anxiety Inventory, dental anxiety, dentistry students, gender

Introduction

Dentistry is considered a stressful profession because of the close contact dentists have with patients (1). Dental education requires not only an understanding of the biology, physiology, and pathology of oral structures but also the development of manual dexterity skills. The application of theoretical knowledge and behavioral skills, as well as the ability to conduct examinations, make diagnoses, and create treatment plans, are developed during dental education. Most dental students do not struggle with the didactic parts of dental education; however, the clinical component of patient care is often a new experience (2). Dental schools are reportedly highly demanding and stressful learning environments, and dental students often exhibit significant stress symptoms during their education (3-6). Additionally, dental students reportedly experience higher levels of stress, depression, obsessive-compulsive disorders, and interpersonal sensitivity than the general population. Stress reportedly contributes to various mental and physical problems, including fatigue and decreases learning efficiency. Some stressors are inherent to professional education, and it has been suggested that modern dental schools should effectively manage potential sources of stress to support dental undergraduate students' educational and professional well-being (5,6).

Fear and anxiety both have psychological and physiological parameters (7,8). Fear is a subjective emotion defined as a response to a known threat. Conversely, anxiety is a more general and unknown form of fear that arises in any condition in which an individual's integrity is threatened (9). Anxiety encompasses both psychological and physiological parameters and is considered an expression of a person's overall struggle against stress. Psychological symptoms include worry, fear, anticipation of something bad happening, panic, a sense of impending doom, fatigue, exhaustion, insomnia, and difficulty concentrating. Physiological anxiety symptoms include headaches, dizziness, palpitations, chest pain, shortness of breath, restlessness, paresthesia, and dry mouth. Clinical manifestations include sweating, cold and clammy skin, tachycardia, arrhythmia, facial flushing or pallor, and trembling (8). Dental anxiety refers to strong negative feelings associated with dental procedures. Sanikop and et al. defined dental anxiety as the concern that something bad will happen during dental treatment (10).

Dental anxiety and fear are highly prevalent problems in almost all societies. Despite pain control and patient management advancements, dental fear continues to be a serious issue for both patients and dental clinicians. Individuals with dental anxiety often experience a deteriorated quality of professional and social life and sleep disorders due to negative thoughts, emotions, and fears. These individuals may also experience oral health problems because they are unwilling to seek dental treatment (11, 12). The literature includes several tests for detecting anxiety. However, one of the most used tests for anxiety measurement in medicine is the State-Trait Anxiety Inventory (STAI). This measurement tool, which was translated and adapted into Turkish by Oner and Le Compte, has also been widely preferred in various clinical applications in dentistry (13). The State Anxiety Inventory (STAI-S) measures how an individual feels at a specific moment, while the Trait Anxiety Inventory (STAI-T) measures how an individual generally feels using statements (2,13-16).

The Corah's Dental Anxiety Scale (C-DAS) is a five-point Likert-type scale consisting of four items Corah developed to measure how anxious and worried individuals feel about dental interventions. The highest possible score on the scale is 20, and the lowest score is 4. A high score indicates high anxiety. The total dental anxiety score is evaluated by combining the scores of each of the four questions. In general, scores of 12 and above indicate anxiety, and scores of 15 and above indicate high anxiety (17).

Few studies in the literature valuate anxiety and dental anxiety factors in preclinical and clinical dental students. Our study aims to determine and compare the dental anxiety levels of third- and fourth-year students.

Materials and Methods

This study, which was approved by the Dicle University Clinical Research Ethics Committee (Decision no: 2023-20), was conducted in accordance with ethical principles.

Our study included third- and fourth-year students from the Faculty of Dentistry at Dicle University. Prior to the survey, students were provided with information about the study, and informed consent forms were obtained.

Subsequently, students were asked to complete survey forms that included the Spielberger State-Trait Anxiety Inventory and Corah's Dental Anxiety Scale to determine their anxiety levels. Gender, age, and academic year were recorded.

The survey form consisted of two sections:

1- **Spielberger State-Trait Anxiety Inventory:** It comprises two separate scales consisting of a total of 40 items. The State Anxiety Inventory (STAI-S) assesses how an individual feels at a specific moment, while the Trait Anxiety Inventory (STAI-T) assesses how an individual generally feels (Table 1 and 2).

   For the State Anxiety scale, response options are: (1) Not at all, (2) A Little, (3) Somewhat, and (4) Very much so.

   For the Trait Anxiety scale, response options are: (1) Almost never, (2) Sometimes, (3) Often, and (4) Almost always.

The scores obtained from both scales theoretically range from 20 to 80. For State Anxiety, a constant of 50 is added to the total score. For Trait Anxiety scores, a constant of 35 is added to calculate the final score. A higher score indicates a higher level of anxiety, while a lower score indicates a lower level of anxiety. The scores are interpreted based on percentile ranks, where a low percentile indicates low anxiety, and a high percentile indicates high anxiety.

2- **Corah's Dental Anxiety Scale:** Corah's dental anxiety scale (C-DAS), which has demonstrated reliability and validity in determining the level of dental anxiety in students, was used. A scoring method ranging from 1 to 5 points was employed for each response option. The minimum possible total score across the entire questionnaire was 4, while the maximum score was 20 (Table 3).

Table 1. STAI-S questions

		Not at all	A Little	Somewhat	Very much so
1.	I feel calm	(1)	(2)	(3)	(4)
2.	I feel secure	(1)	(2)	(3)	(4)
3.	I am tense	(1)	(2)	(3)	(4)
4.	I feel strained	(1)	(2)	(3)	(4)
5.	I feel at ease	(1)	(2)	(3)	(4)
6.	I feel upset	(1)	(2)	(3)	(4)
7.	I am presently worrying over possible misfortunes	(1)	(2)	(3)	(4)
8.	I feel satisfied	(1)	(2)	(3)	(4)
9.	I feel frightened	(1)	(2)	(3)	(4)
10.	I feel comfortable	(1)	(2)	(3)	(4)
11.	I feel self-confident	(1)	(2)	(3)	(4)
12.	I feel nervous	(1)	(2)	(3)	(4)
13.	I am jittery	(1)	(2)	(3)	(4)
14.	I feel indecisive	(1)	(2)	(3)	(4)
15.	I am relaxed	(1)	(2)	(3)	(4)
16.	I feel content	(1)	(2)	(3)	(4)
17.	I am worried	(1)	(2)	(3)	(4)
18.	I feel confused	(1)	(2)	(3)	(4)
19.	I feel steady	(1)	(2)	(3)	(4)
20.	I feel pleasant	(1)	(2)	(3)	(4)

Table 2. STAI-T questions

		Almost never	Sometimes	Often	Almost Always
21.	I feel pleasant	(1)	(2)	(3)	(4)
22.	I am tired nervous and restless	(1)	(2)	(3)	(4)
23.	I usually cry easily	(1)	(2)	(3)	(4)
24.	I want to be as happy as others	(1)	(2)	(3)	(4)
25.	I miss opportunities because I cannot decide quickly	(1)	(2)	(3)	(4)
26.	I feel rested	(1)	(2)	(3)	(4)
27.	I am calm, cool, and collected	(1)	(2)	(3)	(4)
28.	I feel like the difficulties are piling up too much for me to overcome	(1)	(2)	(3)	(4)
29.	I worry about unimportant things	(1)	(2)	(3)	(4)
30.	I'm usually happy	(1)	(2)	(3)	(4)
31.	I take everything seriously and worry	(1)	(2)	(3)	(4)
32.	I often lack self-confidence	(1)	(2)	(3)	(4)
33.	I usually feel safe	(1)	(2)	(3)	(4)
34.	I avoid encountering troublesome and difficult situations	(1)	(2)	(3)	(4)
35.	I often feel sad	(1)	(2)	(3)	(4)
36.	I am generally satisfied with my life	(1)	(2)	(3)	(4)
37.	Irrelevant thoughts bother me	(1)	(2)	(3)	(4)
38.	I take disappointments so seriously that I never forget	(1)	(2)	(3)	(4)
39.	I am a sane and determined person.	(1)	(2)	(3)	(4)
40.	The issues that have been on my mind lately have been making me anxious.	(1)	(2)	(3)	(4)

Table 3. Corah's Dental Anxiety Scale questions

Corah's Dental Anxiety Scale
1) How would you feel if you were to go to the dentist tomorrow?
a) I think it will be a fun experience.
b) I don't care about this situation, and I don't worry at all.
c) I feel very little uneasiness.
d) I am afraid because I think it will be an unpleasant and painful event.
e) I am afraid of what the dentist will do.
2) You are at the dentist's office and waiting for your turn. How do you feel?
a) I feel comfortable.
b) I feel a little uneasy.
c) I feel nervous.
d) I feel anxious and distressed.
e) So anxious that I sometimes break out in a sweat or almost feel physically sick.
3) You sit in the dentist's chair and wait for your doctor to prepare his instruments for treatment. How do you feel?
(Same alternatives as Q.2)
4) You sat in the dentist's chair, and how would you feel while your doctor was cleaning your teeth?
(Same alternatives as Q.2)

Statistical analysis

After the survey forms were filled out, the data were analyzed using IBM SPSS v23 (IBM Corp., Armonk, NY, USA). The suitability of the data for normal distribution was assessed using the Shapiro-Wilk and Kolmogorov-Smirnov tests. The Pearson chi-squared test was used to analyze the categorical data. The Mann-Whitney U test was used to compare non-normally distributed data between two groups. Spearman's rho correlation coefficient was used to examine the relationships between non-normally distributed variables. The analysis results were presented as frequencies (percentages) for categorical variables and mean ± standard deviation and median (minimum - maximum) for quantitative variables. The significance level was set at $p < 0.05$.

Results

This study included 157 participants from the 3rd year (49 males, 57%; 37 females, 43%) and 4th year (39 males, 54.9%; 32 females, 45.1%) classes of the Faculty of Dentistry at Dicle University during the 2022-2023 academic year. There was no statistically significant difference in the distribution of the participants' genders between the classes ($p = 0.797$). In the 3rd grade, the proportion of males was 57% and the proportion of females was 43%. In the 4th grade, the proportion of males was 54.9% and the proportion of females was 45.1% (Table 4).

There was a statistically significant difference in the median ages of the participants according to their classes ($p < 0.001$). The median age was 22 years in both the 3rd and 4th grades. The difference arises from the rank means. In the 3rd grade, the rank mean was 64.44, while it was 96.63 in the 4th grade. There was no statistically significant difference in the median STAI-S, STAI-T, and C-DAS scores between classes ($p > 0.05$) (Table 5).

Table 4. Distribution of the participants' genders by grade.

Gender	Grades		Total	Test coeff.	p[o]
	3rd Grade	4th Grade			
Male	49 (57)	39 (54.9)	88 (56.1)	0.066	0.797
Female	37 (43)	32 (45.1)	69 (43.9)		

[o] Pearson chi-squared test; Frequency (percent)

Table 5. Comparison of age, STAI-S, STAI-T, and C-DAS values of the participants by grade.

	Grades		Total	Test coeff.	p[o]
	3rd Grade	4th Grade			
Age, years	21.92 ± 1.51	22.66 ± 1.07	22.25 ± 1.38	1801	**<0.001***
	22 (20 - 30)	22 (21 - 26)	22 (20 - 30)		
STAI-S	36.34 ± 4.07	35.89 ± 5.75	36.13 ± 4.89	3021.5	0.911
	37 (22 - 45)	37 (20 - 45)	37 (20 - 45)		
STAI-T	38.08 ± 3.3	38.66 ± 4.67	38.34 ± 3.98	2676.5	0.182
	39 (28 - 44)	39 (23 - 47)	39 (23 - 47)		
C-DAS	7.21 ± 2.55	7.38 ± 2.37	7.29 ± 2.47	2882.5	0.543
	7 (4 - 13)	7 (4 - 14)	7 (4 - 14)		

[o] Mann-Whitney U test; Mean ± standard deviation; Median (minimum - maximum)

Among 3rd- and 4th-grade students, the most common answer to the first question was option "B" at 40.7% and 50.7%, respectively.

The most common answer to the second question was option "A," at 54.7% among 3rd-grade students. Option "B" at 38% was most common among 4th-grade students.

The most common answer to the third question was option "A" at 55.8% for the 3rd grade and 50.7% for the 4th grade.

The most common answer to the fourth question was option "A," which was chosen by 50% of 3rd grade students and 50.7% of 4th-grade students (Table 6).

There was a strong, statistically significant positive correlation between STAI-S and STAI-T values (r = 0.705; $p < 0.001$). There was a weak but statistically significant positive correlation between STAI-S and C-DAS values (r = 0.291; $p < 0.001$). There was a weak but statistically significant positive correlation between STAI-T and C-DAS values (r = 0.31; $p < 0.001$) (Table 7).

Table 6. Distribution of the answers given to the questions by 3rd- and 4th-grade students

	3rd Grade		4th Grade	
	Frequency	Percentage	Frequency	Percentage
1st Question				
A	21	24.4	6	8.5
B	**35***	**40.7***	**36***	**50.7***
C	26	30.2	24	33.8
D	1	1.2	5	7
E	3	3.5	0	0
2nd Question				
A	**47***	**54.7***	**27***	**38***
B	23	26.7	25	35.2
C	14	16.3	18	25.4
D	2	2.3	0	0
E	0	0	1	1.4
3rd Question				
A	**48***	**55.8***	**36***	**50.7***
B	22	25.6	24	33.8
C	14	16.3	8	11.3
D	2	2.3	3	4.2
4th Question				
A	**43***	**50***	**36***	**50.7***
B	23	26.7	23	32.4
C	18	20.9	9	12.7
D	2	2.3	3	4.2

Table 7. Examining the relationship between STAI-S, STAI-T, and C-DAS values

		STAI-S	STAI-T
STAI-T	r	0.705	
	p	**<0.001***	
C-DAS	r	0.291	0.310
	p	**<0.001***	**<0.001***

r: Spearman's rho correlation coefficient

A statistically significant difference was found between the median C-DAS values in 3rd-grade students according to gender ($p = 0.005$). The median C-DAS value in men (6) was lower than in women (8). There was no statistically significant difference between the median values of STAI-S and STAI-T by gender ($p > 0.05$) (Table 8).

There was no statistically significant difference between the median values of STAI-S, STAI-T, and C-DAS in 4th grades by gender ($p > 0.05$) (Table 9).

Table 8. Comparison of STAI-S, STAI-T, and C-DAS values in 3rd-grade students by gender

	Gender		Total	Test coeff.	p °
	Male	Male			
STAI-S	36.39 ± 4.64	36.27 ± 3.22	36.34 ± 4.07	822.5	0.461
	37 (22 - 45)	37 (30 - 41)	37 (22 - 45)		
STAI-T	37.73 ± 3.75	38.54 ± 2.57	38.08 ± 3.3	827.5	0.486
	39 (28 - 44)	39 (32 - 42)	39 (28 - 44)		
C-DAS	6.53 ± 2.29	8.11 ± 2.63	7.21 ± 2.55	587.5	**0.005***
	6 (4 - 13)	8 (4 - 13)	7 (4 - 13)		

° Mann Whitney U Test; Mean ± standard deviation; Median (minimum – maximum)

Table 9. Comparison of STAI-S, STAI-T, and C-DAS values in 4th-grade students by gender

	Gender		Total	Test coeff.	p*
	Male	Female			
STAI-S	35.56 ± 5.99	36.28 ± 5.51	35.89 ± 5.75	588.500	0.680
	36 (20 - 44)	37 (20 - 45)	37 (20 - 45)		
STAI-T	37.62 ± 5.31	39.94 ± 3.43	38.66 ± 4.67	478.000	0.090
	39 (23 - 45)	40.5 (33 - 47)	39 (23 - 47)		
C-DAS	7.28 ± 2.47	7.5 ± 2.27	7.38 ± 2.37	574.500	0.562
	7 (4 - 14)	7 (5 - 13)	7 (4 - 14)		

*Mann Whitney U Test; Mean ± standard deviation; Median (minimum – maximum)

Discussion

Students are defined as a group exposed to high-risk stress due to high workloads, pressure for high achievement, expectations of good performance, high competition, limited free time, and limited sleep (11). Dental students, in particular, can experience excessive stress, depression, and anxiety because of their challenging academic and clinical curriculum (3, 19).

The aim of our study was to compare the level of dental anxiety between third-year dental students who have not yet started clinical practice and fourth-year students who have started performing dental treatments.

The period of university education is characterized by specific problems, such as separation from home and family, accommodation, adaptation to a new environment, choosing friends and groups, and uncertainties regarding career choices and job opportunities, in addition to the general chaos of adolescence (20).

Studies on dental anxiety among dental students in the literature have reported higher anxiety levels in first-year students compared to final-year students (7, 13, 21-23). It has been reported that the unfamiliarity with the environment and the city is minimized in third-year students but inexplicably increases again in fourth- and fifth-year students, and dissatisfaction with social life increases with class level (23). Therefore, our study was designed to include third- and fourth-year students who have become more accustomed to the environment and have lower levels of concern about work and the future.

In dental practice, it is common for dentists to experience fear and anxiety reactions (8). Due to the

frequent occurrence of this situation, dental anxiety is a subject of great interest. Different scales are used to measure dental anxiety levels (24). Spielberger's State-Trait Anxiety Inventory (STAI) is a questionnaire used to investigate anxiety. It enables the evaluation of a person's current worry, tension, irritability, anxiety, and activation of the autonomic nervous system. It has also been reported to measure a person's overall calmness in daily life, self-confidence, feeling of safety, and relative predisposition to anxiety (8, 25).

Corah's Dental Anxiety Scale (C-DAS) is also widely used to determine dental anxiety (26, 27). The C-DAS is a reliable, short, concise, easy-to-use, and accepted scale (26, 28).

Based on this information, we aimed to determine the level of dental anxiety in students using Spielberger's "State-Trait Anxiety Inventory" and Corah's Dental Anxiety Scale in our study.

Some studies have reported that anxiety levels decrease as the class size of dental students increases, while others have reported the opposite or no difference between classes (4, 20, 21, 23, 26, 29, 30). The diverse results of such studies have led us to conduct research in this field.

According to the findings of our study, there was no statistically significant difference in the median values of STAI-S, STAI-T, and C-DAS between the classes ($p>0.05$). In addition, a statistically significant correlation was found among these three scales.

In a study conducted by Uskun et al., it was found that the psychological problems of dental students increased as their classes progressed. This study also emphasized the importance of providing psychological counseling services to students at higher education institutions and ensuring the continuity of these services. They stated that dissatisfaction with social life, which affects all psychological scales, is an important concern factor, and organizing social life positively affects the psychological well-being of students (20). We believe that the difference between our results and theirs is due to the study design differences.

Yıldırım et al. compared the anxiety levels of 1st- and 2nd-grade students and found that 1st-grade students had higher STAI-S scores. They also found a positive correlation between these students' STAI-S, STAI-T, and Beck Depression Inventory scores, which is consistent with our findings (13).

In another study conducted by Ayata et al., which used the Modified Dental Anxiety Scale (M-DAS) to assess dental students' anxiety, they reported that there were no significant differences between the classes and that there was not a decrease in dental anxiety amongst dental students as they advanced in their class years (30).

In a different study, it was reported that there was no significant difference in dental anxiety levels between clinical and preclinical students, but anxiety levels were higher in preclinical classes. This could be attributed to the fact that preclinical students have less dentistry knowledge and practice (26).

Jowkar et al. also reported no significant difference in depression and anxiety scores among 3rd-, 4th-, and 5th-grade students (4). These findings are consistent with our results.

In our study, no students in either grade had high levels of anxiety (DAS score ≥15). In a study by Kızılcı et al. (26), 35 preclinical students and 3 clinical students were found to have high levels of anxiety (DAS score ≥15). We believe that this difference is due to the inclusion of students from all grades in their study.

When examining 3rd- and 4th-grade students' responses to C-DAS questions, it was observed that their answers to all four questions were similar. For students in both grades, option B was the most selected choice for the first question, and option A was the most selected choice for the other three questions.

In our study, STAI-S and STAI-T values did not differ between the male and female 3rd-grade students. However, the female students' C-DAS scores were significantly higher. In 4th-grade students, there were no statistically significant differences in the STAI-S, STAI-T, and C-DAS median values in terms of gender ($p>0.050$).

Similar to our findings, many studies have shown that women exhibit higher levels of anxiety related to dental treatment, regardless of the anxiety scale used (15, 31, 32). This could be attributed to the fact that women are more comfortable expressing their fears and anxieties compared to men, regardless of cultural differences (15).

Another study suggested that this could be partially explained by research indicating that negative emotional states affect women more and that women experience higher dental anxiety than men due to reported differences in pain thresholds between men and women. It was also noted that men might fear expressing their anxieties openly, which could be another contributing factor (11, 33).

Similarly, in a study by Peretz et al., C-DAS scores were significantly higher in female students than in male students in the 3rd grade. However, DAS scores decreased significantly for both genders from the 3rd to the 6th grade, with male anxiety levels remaining relatively constant over the years. The reported changes in dental anxiety were attributed to the increased professional education and clinical experience acquired by students throughout their school years (21).

Some studies also report no difference in dental anxiety between genders (23, 34, 35). In our study, no significant difference in dental anxiety was observed between genders in 4th-grade students.

A systematic review emphasized that depression is a prevalent mental health issue among university students. While female students are at higher risk of dealing with depression, it is concerning that male students often have high rates of depression because they are less willing to seek support. According to the findings of this review, there is a need for increased emphasis on identifying and managing depression in university environments. It has also been reported that, without effective interventions for managing depression in students, vulnerability can further increase (36).

In a study conducted by Kumar et al. at a private dental school in India, the primary sources of perceived stress among approximately 275 students were reported to be exams and grades, followed by a full day of study, and receiving criticism from superiors regarding academic or clinical work. This study reported the need for student counselors and advisors, along with a faculty counseling system, in addition to student-centered programs (37).

Depression, anxiety, and stress are recognized as common emotional problems nowadays. Therefore, it is inevitable that individuals experience these three emotional states in some way or another in their daily lives. Rather than trying to avoid experiencing these emotions, individuals should know how to cope with them if and when they occur (34).

Conclusion

Although we did not find very high levels of anxiety in the students we observed in our study, we believe that, with the necessary support during stressful periods, such as student life, this situation can be overcome. Furthermore, we are of the opinion that increasing students' awareness and enhancing the importance of professional experiences and guidance services can reduce stress and anxiety.

Disclosures

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Ethical Approval: Ethics committee approval was received for this study from Dicle University, Faculty of Dentistry, Research Ethics Committee, in accordance with the World Medical Association Declaration of Helsinki, with the approval number: 2023/20.

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