

Original article

Prevalence and Determinants of Dental Anxiety among Medical and Dental Students at Sirte University: A Cross-Sectional Study

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Abstract

Dental anxiety is a common psychological condition that negatively affects dental attendance and oral health outcomes. It is particularly relevant among healthcare students, as their perceptions may influence future patient care. The Objective of this study is to assess the prevalence of dental anxiety and identify associated factors among medical and dental students at Sirte University. A cross-sectional study was conducted among 182 undergraduate students (88 medical and 94 dental students). Data were collected using a structured questionnaire incorporating the Modified Dental Anxiety Scale (MDAS). Anxiety levels were categorized as low (5–11), moderate (12–18), and high (≥ 19). Statistical analysis was performed using SPSS version 25, and associations between variables were assessed using the Chi-square test, with a significance level set at $p < 0.05$. Overall, 47.3% of students reported moderate anxiety, 39.0% low anxiety, and 13.7% high anxiety. Female students exhibited significantly higher levels of anxiety compared to males ($p = 0.005$). This trend was consistent among both medical ($p = 0.041$) and dental students ($p = 0.024$). No significant difference in anxiety levels was observed between medical and dental students overall ($p = 0.700$), nor across academic stages. Invasive procedures, particularly tooth drilling (42.3%) and local anesthetic injection (56.1%), were identified as the most anxiety-provoking, whereas scaling and polishing elicited the lowest anxiety levels. Dental anxiety is prevalent among students, with gender emerging as a significant associated factor. The type of dental procedure strongly influences anxiety levels, with invasive interventions generating the highest anxiety. These findings highlight the importance of targeted behavioral strategies and anxiety management approaches to improve dental care acceptance and outcomes.

Keywords. Dental Anxiety, Modified Dental Anxiety Scale, Medical Students, Dental Students, Cross-sectional Study.

Introduction

Dental anxiety, also referred to as dental phobia, is defined as an excessive and persistent fear associated with dental settings and procedures. It is a common problem encountered in clinical practice and represents a significant challenge for both patients and dental professionals. Managing anxious patients is often considered one of the most stressful aspects of dental care due to difficulties in cooperation and increased treatment complexity [1]. The etiology of dental anxiety is multifactorial. Common contributing factors include fear of pain, fear of blood, and fear of dental instruments such as needles and local anesthetic injections, as well as the sound and vibration of dental drills. Additionally, previous negative or traumatic dental experiences and the influence of misinformation or negative perceptions within the community may further exacerbate this fear [2]. As a result, many individuals avoid or delay dental visits, leading to poor oral hygiene, progression of dental caries, periodontal disease, and ultimately tooth loss [3,9].

Dental anxiety is not only a psychological concern but also manifests through physiological responses. Patients with dental phobia often exhibit increased heart rate and blood pressure, along with symptoms such as sweating, rapid breathing, and generalized discomfort during dental procedures [4]. Despite its clinical importance, the identification of dental anxiety often relies on the clinician's subjective judgment. However, several validated assessment tools, such as the Dental Anxiety Scale and the Modified Dental Anxiety Scale (MDAS), have been developed to improve the accuracy and consistency of their evaluation [5,6]. Management of dental anxiety involves both non-pharmacological and pharmacological approaches. Behavioral strategies, including effective communication, patient education, and reassurance, play a key role in reducing anxiety and improving patient cooperation. These approaches help build trust and allow clinicians to tailor treatment plans according to patient needs. Pharmacological methods, such as the use of benzodiazepines or antidepressants, may be indicated in more severe cases; however, many patients prefer non-pharmacological interventions due to concerns about side effects [7,8].

Dental anxiety is widely recognized as a major barrier to seeking dental care and is associated with delayed attendance and deterioration of oral health [10,11]. This issue is particularly relevant in periodontal care, where successful management depends heavily on patient compliance with preventive and therapeutic procedures such as scaling and root planning. Although these procedures are generally minimally invasive, they may still provoke anxiety, negatively affecting patient acceptance and adherence to long-term maintenance.

Therefore, understanding the prevalence and determinants of dental anxiety—particularly among healthcare students—is essential. Evaluating differences in anxiety levels between medical and dental students, as well as the influence of factors such as gender and academic discipline, may provide valuable insights for improving educational strategies and patient management approaches [12]. Ultimately, addressing dental anxiety can contribute to improved oral health outcomes and more effective delivery of dental care.

Methods

Study Design and Setting

A cross-sectional descriptive study was conducted among undergraduate students at Sirte University, Libya. The study aimed to assess the prevalence and determinants of dental anxiety among medical and dental students. Prior to data collection, the study protocol was reviewed and approved by the Research Review Committee of Sirte University (04.S.U.2026).

Study Population

A total of 182 students participated in the study ($n = 182$), including 88 medical students and 94 dental students. Participants were further categorized by gender (35 males and 147 females) and academic level (first-year and fourth-year students). Informed consent was obtained from all participants prior to their inclusion in the study. Students were informed about the objectives of the study before the questionnaire was administered. The questionnaire was distributed, and participants were given sufficient time to complete it. Only those who provided written informed consent were included in the study.

Data Collection Tool

Data were collected using a structured, self-administered questionnaire incorporating the Modified Dental Anxiety Scale (MDAS), a validated instrument widely used to assess dental anxiety. The MDAS consists of five items evaluating anxiety related to:

1. Anticipation of dental treatment
2. Waiting in the dental clinic
3. Tooth drilling
4. Scaling and polishing
5. Local anesthetic injection

Each item is scored on a 5-point Likert scale ranging from 1 (not anxious) to 5 (extremely anxious), yielding a total score between 5 and 25. Anxiety levels were categorized as:

- Low anxiety: 5–11
- Moderate anxiety: 12–18
- High anxiety: ≥ 19

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Categorical variables were summarized as frequencies and percentages. The Chi-square test (χ^2) was used to assess associations between dental anxiety levels and categorical variables, including gender, academic discipline, and academic stage. A p-value of less than 0.05 was considered statistically significant.

Results

Overall Distribution of Dental Anxiety

The distribution of dental anxiety levels among all participants ($n = 182$) is presented in (Table 1). Overall, 39.0% of students demonstrated low anxiety, 47.3% moderate anxiety, and 13.7% high anxiety. A statistically significant association was observed between gender and anxiety levels (χ^2 test, $p = 0.005$). Male students were more likely to exhibit low anxiety (62.9%), whereas female students showed higher proportions of moderate (51.0%) and high anxiety (15.6%). Among medical students, 42.0% exhibited low anxiety, 44.3% moderate anxiety, and 13.6% high anxiety. Male medical students demonstrated a higher prevalence of low anxiety (59.1%), while female students more frequently reported moderate (47.0%) and high anxiety (16.7%), with a statistically significant association (χ^2 test, $p = 0.041$).

Similarly, among dental students, 36.2% reported low anxiety, 50.0% moderate anxiety, and 13.8% high anxiety. Low anxiety was more common among male dental students (69.2%), whereas female students exhibited higher levels of moderate (54.3%) and high anxiety (14.8%). This difference was also statistically significant (χ^2 test, $p = 0.024$) (Table 1, Figure 1).

Table 1. Distribution of dental anxiety levels by gender and academic discipline

Student Group	Anxiety Level	Male	Female	Total	P-value
		(n, %)	(n, %)	(n, %)	
Total	Low	22 (62.9)	49 (33.3)	71 (39.0)	0.005 ^c
	Moderate	11 (31.4)	75 (51.0)	86 (47.3)	
	High	2 (5.7)	23 (15.6)	25 (13.7)	
Medical	Low	13 (59.1)	24 (36.4)	37 (42.0)	0.041 ^c
	Moderate	8 (36.4)	31 (47.0)	39 (44.3)	
	High	1 (4.5)	11 (16.7)	12 (13.6)	
Dental	Low	9 (69.2)	25 (30.9)	34 (36.2)	0.024 ^c
	Moderate	3 (23.1)	44 (54.3)	47 (50.0)	
	High	1 (7.7)	12 (14.8)	13 (13.8)	

C: Chi square test. P < 0.05 is statistically significant.

Comparison of Anxiety Levels by Faculty

The overall distribution of dental anxiety levels according to academic discipline is summarized in (Table 2). No statistically significant difference was observed between medical and dental students (χ^2 test, $p = 0.700$). Among students reporting high anxiety, 48.0% were medical students and 52.0% were dental students. Moderate anxiety was slightly more prevalent among dental students (54.7%) compared to medical students (45.3%), whereas low anxiety was marginally higher among medical students (52.1%) than dental students (47.9%). However, these differences did not reach statistical significance.

Table 2. Distribution of dental anxiety levels by faculty

Anxiety Level	Medical n (%)	Dental n (%)	Total n (%)	p-value
High	12 (48.0)	13 (52.0)	25 (13.7)	0.700 ^c
Moderate	39 (45.3)	47 (54.7)	86 (47.3)	
Low	37 (52.1)	34 (47.9)	71 (39.0)	

^c Chi-square test; $p < 0.05$ considered statistically significant.

Comparison by Academic Stage (Year of Study)

The comparison of dental anxiety levels according to academic stage (first-year vs. fourth-year students) is presented in (Table 3). No statistically significant differences were observed between stages within either faculty. Among medical students, high anxiety was reported in 10.3% of first-year students and 16.3% of fourth-year students. Moderate anxiety levels were comparable between the two groups (43.6% vs. 44.9%), while low anxiety was slightly higher among first-year students (46.2%) compared to fourth-year students (38.8%) (χ^2 test, $p = 0.645$). Similarly, among dental students, anxiety levels were comparable between first-year and fourth-year groups. High anxiety was reported in 14.0% of first-year students and 13.5% of fourth-year students. Moderate anxiety accounted for 49.1% and 51.4%, respectively, while low anxiety was observed in 36.8% of first-year students and 35.1% of fourth-year students (χ^2 test, $p = 0.978$).

Table 3. Comparison of Dental Anxiety Levels by Academic Stage (Year of Study) and Faculty

Faculty	Anxiety Level	First-Year (n, %)	Fourth-Year (n, %)	P value
Medical	High	4 (10.3%)	8 (16.3%)	0.645
	Moderate	17 (43.6%)	22 (44.9%)	
	Low	18 (46.2%)	19 (38.8%)	
Dental	High	8 (14.0%)	5 (13.5%)	0.978
	Moderate	28 (49.1%)	19 (51.4%)	
	Low	21 (36.8%)	13 (35.1%)	

*C = Chi-square test; $p < 0.05$ considered statistically significant.

Procedure-Specific Dental Anxiety

The distribution of dental anxiety responses across specific dental procedures is presented in (Table 4) and (Figure 2). Anxiety levels varied notably depending on the nature of the procedure. Anticipatory situations were associated with the lowest levels of anxiety. Approximately 42.9% of participants reported no anxiety before dental treatment, and only 6.6% reported very high or extreme anxiety. Similarly, 31.3% of participants reported no anxiety while waiting in the dental clinic. In contrast, invasive procedures elicited substantially higher anxiety levels. Tooth drilling was identified as the most anxiety-provoking procedure, with 42.3% of participants reporting very high or extreme anxiety and only 14.3% reporting no anxiety. Local anesthetic injection also generated considerable anxiety, with 56.1% of participants reporting very high or extreme anxiety. Conversely, scaling and polishing were associated with comparatively lower anxiety levels, with 40.7% of participants reporting no anxiety and only 16.5% experiencing high or extreme anxiety.

Table 4. Distribution of dental anxiety responses across five dental procedures

Procedure	Not Anxious n (%)	Slightly Anxious n (%)	Fairly Anxious n (%)	Very Anxious n (%)	Extremely Anxious n (%)
Q1–Anticipation of treatment next day	78 (42.9)	61 (33.5)	31 (17.0)	8 (4.4)	4 (2.2)
Q2 – Sitting in the waiting room	57 (31.3)	55 (30.2)	35 (19.2)	20 (11.0)	15 (8.2)
Q3 – Tooth drilling	26 (14.3)	29 (15.9)	50 (27.5)	33 (18.1)	44 (24.2)
Q4 – Scaling and polishing	74 (40.7)	42 (23.1)	36 (19.8)	22 (12.1)	8 (4.4)
Q5 – Injection with local anesthesia	30 (16.5)	26 (14.3)	24 (13.2)	40 (22.0)	62 (34.1)

Discussion

The present study evaluated the prevalence and determinants of dental anxiety among medical and dental students at Sirte University using the Modified Dental Anxiety Scale (MDAS). The findings demonstrated that dental anxiety is a common phenomenon within this population, with nearly half of the participants reporting moderate anxiety (47.3%) and a notable proportion exhibiting high anxiety (13.7%). These results are consistent with previous studies reporting moderate-to-high levels of dental anxiety among university students and healthcare trainees [13,14].

A key finding of this study is the significant association between gender and dental anxiety levels. Female students exhibited higher levels of moderate and high anxiety compared to males, a pattern that has been consistently reported in the literature [15,16]. This difference may be attributed to a combination of biological, psychological, and sociocultural factors, including greater emotional expressiveness and heightened perception of pain among females [17]. Similar gender-based disparities have been observed across different populations, including dental patients and healthcare-related groups, reinforcing the generalizability of this finding [18]. In contrast, no statistically significant difference was observed between medical and dental students regarding overall anxiety levels. This finding aligns with several studies suggesting that academic discipline alone may not be a strong determinant of dental anxiety [19]. Although dental students are expected to have greater exposure to dental procedures and clinical environments, this familiarity does not necessarily translate into reduced anxiety levels, as anxiety has been shown to persist even in individuals undergoing clinical dental procedures [20]. Furthermore, the present study found no significant differences in dental anxiety between first-year and fourth-year students. This suggests that progression through academic training, as reflected by year of study, does not significantly influence anxiety levels. Similar findings have been reported in previous research, where increased knowledge and clinical exposure did not consistently correlate with reduced anxiety [21]. This may indicate that dental anxiety is influenced more by individual psychological traits and prior experiences than by educational exposure alone [22].

An important contribution of this study is the evaluation of anxiety across specific dental procedures. The results demonstrated that invasive procedures, particularly tooth drilling and local anesthetic injection, were the most anxiety-provoking. More than half of the participants reported high or extreme anxiety toward injections, while tooth drilling also elicited substantial fear. These findings are consistent with existing literature identifying needles and drilling as primary triggers of dental anxiety [23,24]. The sensory stimuli associated with these procedures, including pain anticipation, sound, and vibration, are well-documented contributors to patient discomfort and fear. Conversely, non-invasive procedures such as scaling and polishing were associated with lower levels of anxiety, which is in agreement with previous studies [25,27]. Anticipatory situations, including waiting for treatment, also generated relatively lower anxiety compared to invasive procedures. These observations highlight the importance of procedure-specific approaches in managing dental anxiety. The findings of this study emphasize that dental anxiety among students is multifactorial, influenced by gender, procedural factors, and individual psychological responses rather than academic background alone. These results underscore the need for targeted interventions, including behavioral management techniques, improved communication strategies, and anxiety-reduction protocols within both educational and clinical settings [26,28].

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the cross-sectional design limits the ability to establish causal relationships between variables. Second, the study was conducted at a single institution, which may affect the generalizability of the results to other populations. Third, the use of self-reported questionnaires may introduce response bias, as participants may underreport or overestimate their anxiety levels. Additionally, the sample was predominantly female, which may have

influenced the observed gender differences. Future studies with more balanced samples and multi-center designs are recommended to validate and expand upon these findings.

Conclusion

Dental anxiety is prevalent among medical and dental students at Sirte University, with the majority of participants experiencing moderate levels of anxiety. Gender was identified as a significant determinant, with female students exhibiting higher anxiety levels than males. In contrast, academic discipline and stage of study were not significantly associated with anxiety levels. Procedure-specific analysis revealed that invasive interventions, particularly tooth drilling and local anesthetic injection, are the primary triggers of dental anxiety, whereas non-invasive procedures such as scaling and polishing are associated with lower anxiety levels. The relatively low anxiety levels associated with periodontal cleaning procedures may positively influence patient participation in periodontal maintenance programs and Supportive Periodontal Therapy (SPT). Enhancing patient acceptance of these essential preventive measures could play a key role in improving long-term periodontal health outcomes. These findings highlight the importance of implementing targeted behavioral and educational strategies to reduce dental anxiety, improve patient cooperation, and enhance the overall quality of dental care.

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Conflict of interest. Nil

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