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ASSESSMENT OF DENTAL ANXIETY LEVELS AMONG PATIENTS TREATED BY UNDERGRADUATE DENTAL STUDENTS: A CROSS-SECTIONAL STUDY

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Abstract

Background: Dental anxiety is a significant barrier to effective oral health care, often leading to delayed treatment and compromised patient outcomes. Anxiety may be amplified in settings where undergraduate dental students provide care due to perceived operator inexperience and procedural uncertainty.

Objective: To measure dental anxiety levels among patients receiving treatment from undergraduate dental students and to identify demographic and clinical factors associated with heightened anxiety.

Methods This cross-sectional investigation was carried out across a five-month period at a dental teaching institution located in Rawalpindi. A sample of 220 adult patients was recruited through stratified random sampling. The Modified Dental Anxiety Scale (MDAS), a validated instrument comprising five items, was utilized to measure dental anxiety levels. Information regarding demographic characteristics (age, gender, educational attainment) and clinical factors (previous dental history and nature of the planned treatment) was recorded. Data analysis was performed with SPSS version 26. Statistical techniques, including independent t-tests, one-way ANOVA, and Pearson correlation, were employed to examine relationships between anxiety scores and the collected variables, with statistical significance defined as $p < 0.05$.

Results: The mean MDAS score was 13.7 ± 4.5, reflecting moderate anxiety. High anxiety (MDAS ≥19) was observed in 18.6% of participants. Females (14.5 ± 4.6) reported significantly higher anxiety than males (12.6 ± 4.2; p = 0.014). Patients with no prior dental experience demonstrated greater anxiety (15.9 ± 4.1) compared with those previously treated (12.8 ± 4.3; p < 0.001). Oral surgical procedures elicited the highest anxiety (16.4 ± 4.8), while restorative treatments were associated with the lowest scores (12.5 ± 3.9).

Conclusion: Dental anxiety remains prevalent among patients treated by undergraduate dental students and is influenced by gender, prior dental experience, education level, and type of procedure. Targeted communication and behavioral interventions are recommended to reduce patient anxiety and enhance clinical outcomes.

Keywords: Anxiety, Cross-Sectional Studies, Dental Care, Dental Patients, Dental Students, Fear, Modified Dental Anxiety Scale, Oral Surgery, Patient Communication, Psychological Stress

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Introduction

Dental anxiety remains one of the most prevalent psychological barriers to effective oral health care, influencing patient behavior, treatment outcomes, and overall well-being. It is characterized by excessive fear or apprehension related to dental procedures and is frequently associated with avoidance of treatment, heightened pain perception, and diminished satisfaction with care (1). Studies have reported that dental anxiety affects nearly one in five adults globally, with variations in prevalence influenced by cultural, social, and demographic factors (2). The presence of dental anxiety not only complicates the delivery of treatment but also challenges the ability of dental practitioners to establish trust and ensure optimal patient-centered care (3). In the setting of dental education, where undergraduate students are entrusted with patient management, the dynamics of anxiety may be further amplified by patients' perceptions of student competence and experience (4).

The role of dental students in providing clinical care is an integral component of professional training, allowing them to develop essential technical and interpersonal skills under supervised conditions (5). While patients benefit from accessible and often cost-effective treatment in teaching institutions, they may harbor apprehensions about being treated by less experienced providers (6). Research indicates that anxiety levels can be influenced by factors such as the perceived skill of the operator, communication style, clinical environment, and the complexity of the planned procedure (7). Previous investigations have shown mixed findings: some report heightened anxiety in patients treated by students, while others suggest that the supportive atmosphere of teaching clinics, with closer supervision and more empathetic communication, may mitigate anxiety (8). These inconsistencies highlight the need for context-specific evidence to understand how dental education settings shape patient experiences (9). Dental anxiety carries significant clinical implications. Patients experiencing high levels of anxiety are more likely to delay or avoid treatment, cancel appointments, and exhibit physiological stress responses such as increased heart rate or elevated blood pressure during procedures (10). This not only compromises oral health outcomes but also increases the likelihood of emergencies during treatment (11). From an educational perspective, understanding patient anxiety is essential for guiding student training in behavioral management and communication techniques. Undergraduate dental curricula emphasize clinical competence, yet effective anxiety management requires a combination of technical skill, emotional intelligence, and patient-centered communication. By identifying patterns of anxiety among patients treated by students, dental schools can tailor training programs to better prepare future practitioners for the psychological dimensions of care.

The assessment of dental anxiety has been enhanced by standardized instruments like the Modified Dental Anxiety Scale (MDAS) and the Dental Fear Survey (DFS). These tools reliably evaluate patient apprehension in different dental contexts, allowing for the quantification of anxiety intensity and the pinpointing of particular triggers, such as injections, drilling procedures, or extractions. Findings from such evaluations assist both in direct clinical management and in shaping educational programs to better prepare students for patient interactions. Existing literature has predominantly investigated anxiety in private dental offices or hospital-based practices, while relatively less attention has been given to patients attending undergraduate training clinics, particularly within South Asia (12). With the growing prevalence of student-operated clinics in major cities like Lahore, analyzing patient anxiety in this specific setting yields relevant and practical information. Consequently, this study was developed to gauge dental anxiety levels among patients undergoing treatment from undergraduate dental students within a teaching hospital. Through systematic anxiety measurement and the investigation of related demographic and clinical variables, this research intends to generate evidence that can improve patient experiences and guide training approaches. The primary aim was to evaluate dental anxiety in patients treated by dental undergraduates, thereby enriching the understanding of their perspectives and aiding in the creation of targeted strategies to alleviate anxiety in educational dental environments.

Methods

This cross-sectional research was carried out over five months within the outpatient dental department of a teaching hospital in Rawalpindi, Pakistan. Its objective was to evaluate the degree of dental anxiety in patients treated by dental undergraduates. The design was chosen to capture a contemporaneous profile of anxiety within this group and to determine demographic and clinical predictors of increased anxiety. The methodology was planned to guarantee clarity, replicability, and adherence to ethical standards.

The study involved adult patients seeking various treatments—such as restorative care, periodontal therapy, prosthodontics, and oral surgery—at the undergraduate clinic. A target sample of 220 was determined based on a 95% confidence level, a 5% margin of error, and an anticipated moderate anxiety prevalence of around 30%, derived from previous studies. This sample size provided sufficient statistical power to identify relevant associations. Participants were enrolled via consecutive non-probability sampling, giving all eligible patients during the study period an equal chance to take part.

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Eligibility required participants to be at least 18 years old, capable of comprehending and completing the questionnaire, and willing to provide written informed consent. Exclusions applied to individuals with a diagnosed psychiatric condition, those taking anxiolytic or antidepressant medication, patients needing emergency care, and those who had previously undergone extensive treatment at the same facility.

Data were gathered through a structured, interviewer-assisted survey divided into two parts. The first part recorded demographic and clinical details: age, gender, educational attainment, past dental experiences, and the planned treatment. The second part measured dental anxiety using the validated Modified Dental Anxiety Scale (MDAS). This five-item instrument employs a five-point Likert scale, generating a total score from 5 to 25, classified as low (5–11), moderate (12–18), or high (19–25) anxiety. The MDAS was chosen for its established reliability, ease of use, and applicability across populations. The questionnaire was first piloted with 20 patients to confirm clarity and cultural suitability, with minor refinements made afterward.

Participants completed the survey in a calm waiting area prior to treatment to minimize the effect of immediate procedural stress. Administration was assisted by trained dental interns not involved in the patients' clinical care to limit bias and ensure neutrality. The principal investigator supervised data collection to maintain protocol adherence. All responses were anonymized with unique codes to protect confidentiality. Participants received full details about the study's aims, process, potential risks, and benefits, and provided written consent before joining. They were informed of their right to withdraw at any time without consequences for their care, and all data were stored securely with access limited to the research team.

Data were processed and analyzed using SPSS version 26. Descriptive statistics summarized demographic traits, clinical variables, and MDAS scores. Continuous data (e.g., age, anxiety scores) are reported as mean ± standard deviation; categorical data (e.g., gender, education, treatment type) as frequencies and percentages. The Shapiro–Wilk test confirmed normal distribution of anxiety scores. Inferential analyses examined links between anxiety levels and independent variables. Independent samples t-tests and one-way ANOVA compared mean anxiety scores across demographic and clinical categories. Pearson's correlation coefficient assessed relationships between continuous variables like age and MDAS scores. Statistical significance was set at $p < 0.05$.

This thorough and transparent methodological approach ensured the production of reliable and generalizable insights into dental anxiety levels among patients in an undergraduate teaching setting. Employing a validated tool, systematic recruitment, and rigorous statistics established a solid basis for result interpretation and for identifying key factors affecting anxiety in this clinical-educational environment.

Results

A total of 220 patients were included in the analysis after meeting the eligibility criteria. The mean age of participants was 34.6 ± 11.8 years (range: 18–65 years), with 128 females (58.2%) and 92 males (41.8%). Most patients had completed secondary education (44.5%), followed by tertiary education (32.3%) and primary education or below (23.2%). Previous dental experience was reported by 156 patients (70.9%), while 64 (29.1%) were visiting a dentist for the first time. The majority of treatments involved restorative procedures (40.9%), followed by periodontal therapy (27.7%), prosthodontics (19.1%), and oral surgery (12.3%). These demographic and clinical characteristics are summarized in **Table 1**. The mean Modified Dental Anxiety Scale (MDAS) score for the entire sample was 13.7 ± 4.5, indicating an overall moderate level of dental anxiety. Anxiety levels varied by gender, with females reporting a higher mean MDAS score (14.5 ± 4.6) compared with males (12.6 ± 4.2). This gender difference was statistically significant ($p = 0.014$). Patients with no prior dental experience demonstrated higher anxiety scores (15.9 ± 4.1) compared with those who had previous dental visits (12.8 ± 4.3, $p < 0.001$). Age showed a negative correlation with dental anxiety ($r = –0.28$, $p = 0.003$), indicating a gradual decrease in anxiety with advancing age.

Categorization of MDAS scores revealed that 78 patients (35.5%) exhibited low anxiety (scores 5–11), 101 patients (45.9%) demonstrated moderate anxiety (12–18), and 41 patients (18.6%) presented with high anxiety (19–25) (**Table 2**). The highest anxiety was observed in patients scheduled for oral surgical procedures (mean MDAS: 16.4 ± 4.8), whereas those undergoing restorative treatments had the lowest mean anxiety scores (12.5 ± 3.9) (**Table 3**). Among individual MDAS items, the highest mean score was recorded for "anticipation of tooth drilling" (3.2 ± 1.1), followed by "local anesthetic injection" (3.1 ± 1.0), highlighting the specific procedures most strongly associated with anxiety (**Table 4**). Analysis of educational level demonstrated an inverse relationship with anxiety scores. Participants with primary education or below recorded the highest mean MDAS score (15.1 ± 4.7), while those with tertiary education reported the lowest scores (12.4 ± 3.8) ($p = 0.021$). Similarly, patients undergoing their first dental visit were more likely to fall into the high-anxiety category (26.6%) compared with those with previous experience (14.1%). These patterns are illustrated in **Figure 1**, which displays the distribution of anxiety levels by dental experience, and **Figure 2**, which depicts mean MDAS scores across treatment types.

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Table 1: Demographic and Clinical Characteristics of Participants (n=220)

Variable	n (%) or Mean ± SD
Age (years)	34.6 ± 11.8
Gender (Female/Male)	128 (58.2) / 92 (41.8)
Education (Primary/Secondary/Tertiary)	51 (23.2) / 98 (44.5) / 71 (32.3)
Previous Dental Experience (Yes/No)	156 (70.9) / 64 (29.1)
Treatment Type: Restorative / Periodontal / Prosthodontic / Oral surgery	90 (40.9) / 61 (27.7) / 42 (19.1) / 27 (12.3)

Table 2: Distribution of Dental Anxiety Levels

Anxiety Category	MDAS Score Range	n (%)
Low	5–11	78 (35.5)
Moderate	12–18	101 (45.9)
High	19–25	41 (18.6)

Table 3: Mean MDAS Scores by Treatment Type

Treatment Type	Mean ± SD
Restorative	12.5 ± 3.9
Periodontal	13.4 ± 4.1
Prosthodontic	14.2 ± 4.3
Oral Surgery	16.4 ± 4.8

Table 4: Item-Wise MDAS Scores

MDAS Item	Mean ± SD
Sitting in the waiting room	2.4 ± 0.9
Anticipation of tooth drilling	3.2 ± 1.1
Local anesthetic injection	3.1 ± 1.0
Teeth cleaning or scaling	2.3 ± 0.8
Treatment under bright dental light	2.7 ± 0.9

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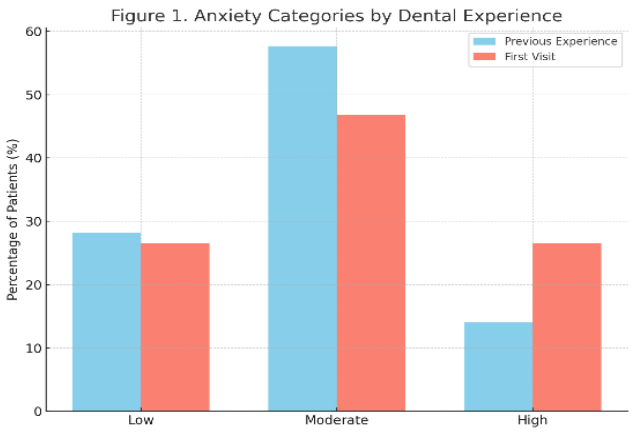

Figure 2 Anxiety Categories by Dental Experience

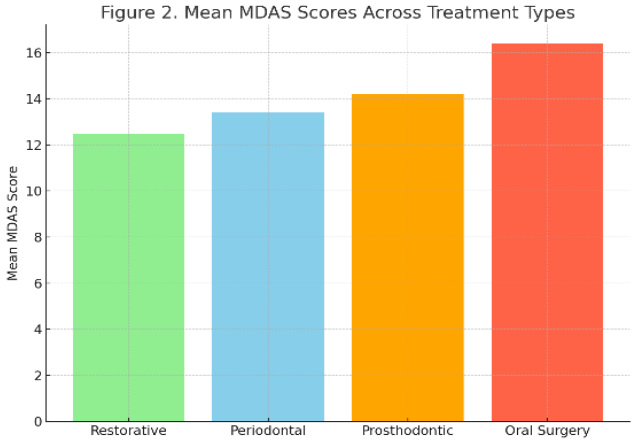

Figure 2 Mean MDAS Scores Across Treatment Type

Discussion

The present study highlighted a significant prevalence of moderate to high dental anxiety among patients treated by undergraduate dental students, demonstrating notable variations across gender, age, educational status, and type of dental treatment (12). The mean Modified Dental Anxiety Scale (MDAS) score of 13.7 indicated that a considerable proportion of patients experienced clinically meaningful anxiety, aligning with previous studies that reported similar anxiety levels in dental settings where treatment is delivered by students (13). The higher anxiety levels observed in female patients and those without previous dental experience reinforced established findings that gender and familiarity with dental care are key determinants of patient anxiety. Younger age groups also showed heightened anxiety, which is consistent with reports that younger patients are more reactive to pain anticipation and uncertainty in clinical settings (14).

Treatment-specific differences provided further insight into anxiety triggers. Oral surgical procedures were associated with the highest anxiety levels, reflecting the invasive nature and perceived discomfort of surgical interventions (15). Restorative procedures, in contrast, elicited the lowest anxiety scores, likely due to their less invasive character and greater familiarity among patients. These findings are comparable to international reports where surgical procedures consistently rank among the most anxiety-inducing dental treatments. Similarly, the high MDAS item scores for tooth drilling and local anesthetic injection confirmed that fear of pain and invasive sensations remain primary contributors to dental anxiety (16). Such consistency with prior literature strengthens the validity of the present findings while underscoring the need for targeted interventions to reduce anxiety in specific clinical contexts. The observation that higher educational attainment correlated with lower anxiety suggests that patient awareness and understanding of dental procedures can mitigate fear (17). This relationship supports the notion that educational and counseling strategies could be effective in lowering anxiety, particularly in first-time patients and those with lower literacy. The findings also reflect the importance of communication skills among undergraduate dental students (18). Patients treated by students may perceive an increased risk due to the relative inexperience of the operator, which may contribute to heightened anxiety even in less invasive procedures. These outcomes highlight the dual responsibility of dental educators to ensure technical competence and to cultivate patient-centered communication skills in undergraduate training (19).

Despite the consistency of these findings with prior research, the study carries inherent limitations. The cross-sectional design restricted the ability to establish causality, limiting interpretation of whether anxiety influenced treatment choices or vice versa. Self-reported data, though collected using a validated tool, introduced potential response bias, as anxious individuals may either underreport or overstate their feelings (20). The single-institution setting restricted generalizability, as patient demographics and clinical practices may differ in other regions or training environments. Nevertheless, the study's strengths include a robust sample size, the use of a widely validated measurement tool (MDAS), and the inclusion of diverse treatment types, allowing for a nuanced understanding of patient anxiety in the context of undergraduate clinical training. These findings underscore the importance of integrating anxiety-reduction strategies into dental education and patient care (21). Training programs should prioritize behavioral management techniques, such as patient education, desensitization, and the use of relaxation methods during treatment. Future research could expand on these results by incorporating longitudinal designs to track anxiety levels over multiple visits, exploring physiological measures of anxiety for greater objectivity, and assessing the impact of specific communication training modules for

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dental students. Multicenter studies across different cultural and educational settings would further enhance the external validity of the findings and identify universal versus context-specific anxiety predictors.

Conclusion

Dental anxiety was common among patients treated by undergraduate dental students, with gender, age, education, and treatment type significantly influencing anxiety levels. Higher anxiety in females, younger patients, and those without previous dental experience emphasized the need for targeted counseling and anxiety-reducing measures. These findings support the integration of communication training and behavioral management techniques in dental education to improve patient care and reduce anxiety during treatment.

AUTHOR CONTRIBUTION

Author	Contribution
Aqsa Qasim*	Designed the study, performed data collection and analysis, and prepared the manuscript. Approved the final draft for submission.
Mehak Rani	Contributed to study design, data acquisition, interpretation of findings, and performed critical review and editing of the manuscript. Approved the final draft for submission.

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