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Assessment of pre and post extraction anxiety levels using anxiety scale among patients visiting department of oral and maxillofacial surgery

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A B S T R A C T

Background: Dental anxiety frequently deters individuals from seeking timely dental care, with extraction procedures often perceived as highly distressing. While general dental anxiety has been studied, few investigations have specifically assessed changes in anxiety before and after dental extraction, particularly among Indian patients and in relation to clinical predictors.

Methods: This prospective study enrolled 100 patients (50 males, 50 females; mean age 43.57 ± 13.90 years) scheduled for extraction under local anesthesia. Anxiety was measured using the Dental Fear Survey (DFS) immediately before and after extraction. Additional clinical and psychological parameters—including previous dental experience, pain expectation and experience (VAS), waiting time, use of sedation, and extraction complexity—were documented. Statistical analyses included paired t-tests for pre- and post-extraction DFS scores and correlations with clinical variables. Results tables clearly indicate non-significant (ns) or not analyzed (N/A) parameters.

Results: Mean DFS scores decreased significantly post-extraction (61.72 ± 20.24 to 55.08 ± 19.82; mean reduction 6.64 points, ~10.8 % decrease, $p = 0.001$), indicating a clinically meaningful decline in anxiety levels. Both genders exhibited reduced anxiety, though females reported slightly higher post-extraction scores. Significant correlations were observed between DFS scores and traumatic dental experience, pain expectation, actual pain experienced, and waiting time (pre-extraction only). Importantly, no significant association was found between DFS scores and extraction complexity or use of sedation, underscoring this as a key finding of the study.

Conclusion: Dental extraction under local anesthesia results in immediate anxiety reduction, with gender-related nuances. This study emphasizes the value of perioperative anxiety assessment and identifies predictors that can inform targeted interventions and improvements to current clinical protocols. All results presented correspond strictly to parameters measured and analyzed in this study.

1. Introduction

Anxiety is one of the most frequently encountered psychological conditions among patients visiting the Department of Oral and Maxillofacial Surgery. It can be triggered by the anticipation of pain, surgical procedures, or even unfamiliar dental environments.[1] Dental anxiety (DA) is defined as a complex emotional response involving unease, fear, and apprehension that arises specifically in relation to dental procedures.[2] Epidemiological studies have ranked dental anxiety as the fourth most common fear and the ninth most intense fear among individuals, highlighting its substantial prevalence and impact.[3]

One of the clinical scenarios where anxiety is particularly heightened is during surgical tooth extractions, such as third molar removal. The nature of the procedure, coupled with the sounds and sensations associated with dental instruments and anesthesia, contributes to increased psychological distress.[4] Elevated anxiety in such contexts can lead to treatment avoidance or delay, complicating oral health outcomes and leading to more severe future interventions.[5]

The use of high-speed surgical instruments, needles for local anesthesia, and the perceived invasiveness of the surgical setting often exacerbate patient fears.[1] Beyond procedural elements, psychological factors like low self-esteem and poor oral health awareness may further

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reinforce the anxiety response.[4,6]

Recognizing and evaluating dental anxiety is crucial for clinicians to provide individualized patient management strategies and to understand behavioral patterns that lead to treatment deferral. Anxious patients may exhibit specific behaviours such as repeated cancellation of appointments, restlessness, or physical signs like tightened fists or muscle rigidity, commonly referred to as the "white knuckle syndrome".[7]

Dental anxiety is a common issue that significantly influences a patient's willingness to seek and receive oral healthcare. Elevated levels of dental fear often result in delayed or avoided dental visits, ultimately leading to poor oral health outcomes and negative experiences. Despite advancements in local anesthesia and pain management, many patients continue to perceive dental extractions as particularly stressful procedures. Understanding how patient anxiety evolves before and after dental extraction is crucial for optimizing care and minimizing stress associated with treatment.

While dental anxiety has been extensively examined in general dental settings across Western and Asian populations, only a few studies have investigated immediate pre- and post-extraction changes in Indian cohorts. This is particularly relevant given that sociocultural factors—such as health literacy, family influence on health decisions, and stigma associated with expressing fear—may modulate how anxiety is perceived and reported in the Indian context.[6,7] Additionally, global literature has shown inconsistent findings regarding whether anxiety persists after minor oral surgeries, with some studies reporting rapid resolution while others note lingering fear.[3,9–11]

Our study contributes to bridging this gap by providing prospective evidence from a large, gender-balanced Indian sample, thereby adding both cultural and regional relevance to the broader global understanding of perioperative dental anxiety. Furthermore, although gender differences in dental anxiety are well recognized, little attention has been paid to the underlying sociocultural dimensions in India, where women may face heightened anxiety due to differential exposure to healthcare or greater social acceptance of emotional expression.[4,13,14] By integrating these cultural considerations, the present study not only confirms the immediate reduction in dental anxiety post-extraction but also highlights nuanced gender-related differences that have implications for tailored clinical care.

Moreover, although pain management has significantly improved, only a few studies have quantitatively measured pre- and post-extraction anxiety and analyzed its association with clinical and psychological factors, especially in Indian settings.

The distinctiveness of our study lies in its prospective evaluation of dental anxiety at two defined time points—immediately before and after extraction—using the validated Dental Fear Survey (DFS) in a large, gender-balanced cohort. Additionally, this study aims to identify gender-based differences in anxiety reduction, an aspect rarely addressed in previous literature from India. To our knowledge, this is among the few studies to offer such in-depth analysis of immediate anxiety changes and their correlation with relevant clinical and psychological parameters in patients undergoing oral surgical procedures under local anesthesia.

A comprehensive understanding of the multifactorial triggers of dental anxiety is essential to improve patient cooperation, enhance the overall dental experience, and promote adherence to treatment recommendations. Accordingly, the aim of this study was to assess and compare dental anxiety levels in patients before and immediately after tooth extraction, using the Dental Fear Survey.

2. Objective

The primary objective was to evaluate pre- and post-extraction anxiety levels and analyze gender-based differences in dental anxiety.

3. Methodology

3.1. Participants

This was a prospective cross-sectional study conducted between October and December 2024. The sample size of 100 participants was determined based on a confidence level of 95 %, power of 80 %, and an expected reduction in DFS scores of at least 10 % from pilot data. Patients were selected using convenience sampling.

3.1.1. Inclusion criteria

- Patients above 18 years requiring dental extraction under local anesthesia.
- Patients willing to give informed consent.
- Patients able to comprehend English or Tamil questionnaires.

3.1.2. Exclusion criteria

- Patients with acute infections.
- Those with psycho-organic or behavioral disorders.
- Patients on anti-anxiety or psychotropic medications.
- Patients unable to comprehend the questionnaire.

Written informed consent to participate in the study was obtained from all patients. During the initial consultation, patients were assessed medically, and demographic data were recorded (age, gender, degree of education, occupation, income, history of previous dental visit and duration since the last visit to dentist, previous dental experience (Eventful or Uneventful), systemic condition) in a semi structured interview. Before patients entered the department for extraction, they were left alone in a quiet waiting hall to fill out the questionnaire. The questionnaire was given both in English and regional language- Tamil. The degrees of anxiety were recorded preoperatively. The teeth were extracted under local anesthesia without any premedication or sedation. The validated English version of Kleinknecht's Dental Fear Survey (DFS) was used. The Tamil version was adapted and validated using a forward-backward translation process with pilot testing on 10 patients to ensure reliability and comprehensibility.[8]

Anxiety levels were measured using the Dental Fear Survey (DFS) at two time points: immediately prior to the extraction and immediately after the procedure. All extractions were performed under standard aseptic conditions by faculty members of the Department of Oral and Maxillofacial Surgery with a minimum of 5 years of clinical experience. No postgraduate students were involved in the operative procedures, thereby minimizing operator variability.

In addition to DFS scores and basic demographic information (age and gender), the following parameters were systematically recorded for each participant:

- **Previous dental experience** was assessed using a structured, self-reported questionnaire in which patients were asked to indicate whether they had experienced any prior dental procedure that they perceived as distressing or painful. To this study, such self-reported negative encounters were classified as "traumatic dental experiences.
- **Pain Expectation and Actual Pain:** Anticipated pain was rated by patients on a 10-point visual analog scale (VAS) prior to the procedure. Immediately following extraction, actual experienced pain was self-reported using the same VAS.
- **Use of Sedation or Analgesics:** Any administration of premedication, anxiolytics, or additional analgesics beyond the standard local anesthetic was documented in the patient record.
- **Type of Tooth and Extraction Complexity:** For each case, the type of tooth extracted (anterior/posterior), extraction complexity

(simple vs. minor surgical), and the number of teeth extracted were recorded by the attending clinician.

- **Waiting Time:** The duration between patient arrival at the clinic and commencement of the extraction was noted in minutes.

All procedures were performed under standard aseptic conditions by experienced clinicians. Data were collected and reviewed for completeness prior to analysis.

3.2. Numerical rating scale

The DFS contains 20 questions grouped into 3 dimensions such as avoidance, physiological reactions, and specific dental stimuli, according to which a patient's dental anxiety is assessed on a scale of intensity ranging from 1 (no fear) to 5 (extreme fear). Scores range from 20 (no fear) to 100 (terrified) and the lower limit for an appreciable degree of fear is considered to be 63.

3.3. Statistical analysis

A descriptive study was made of each variable. The significances of differences were assessed with the help of SPSS software 25.0 version. The data showed a normal distribution and so were analyzed using parametric tests. Student's t tests for two independent samples and for related samples were used for the study of dental anxiety and fear at different times. Level of significance was kept at $p < 0.05$. Correlation analyses explored relationships between anxiety and the additional parameters. Where appropriate, subgroup or regression analyses were conducted to identify predictors of increased anxiety or pain. A significance threshold of $P < 0.05$ was applied throughout.

4. Results

4.1. Descriptive Statistics of Dental Anxiety (DFS Scores)

The overall dental anxiety scores, as measured by the Dental Fear Survey (DFS), were assessed both before and after dental extraction. A total of 100 participants were included in the study.

4.2. Overall DFS reduction

The mean DFS score before extraction was 61.72 ± 20.24, which decreased to 55.08 ± 19.82 after extraction. The mean reduction of 6.64 points represented a 10.8 % decrease in anxiety scores. A paired-samples *t*-test confirmed this difference to be statistically significant ($p = 0.001$). The effect size, calculated as Cohen's $d = 0.33$, indicated a small-to-moderate magnitude of change, suggesting that the reduction was not only statistically but also clinically relevant (Table 1).

4.3. Gender-wise Analysis

Among males, DFS scores reduced from 62.52 ± 16.78 to 53.58 ± 17.90, while in females, scores decreased from 62.84 ± 20.47 to 56.86 ± 20.06. An independent *t*-test comparing post-extraction scores between genders showed that females had significantly higher anxiety scores than males (**$p = 0.04$**), suggesting gender-related differences in the persistence of dental anxiety after extraction (Table 2, Fig. 1).

Table 1
Mean and SD of dental anxiety before and after extraction (Cohen's d for pre–post reduction = 0.33).

Condition	Mean DFS Score	Standard Deviation	N
Before Extraction	61.72	20.24	100
After Extraction	55.08	19.82	100

Table 2
Gender-wise comparison of DFS scores.

Gender	DFS Score Before Extraction	SD (Before)	DFS Score After Extraction	SD (After)
Male	62.52	16.78	53.58	17.90
Female	62.84	20.47	56.86	20.06

Beyond overall and gender-based anxiety scores, additional analyses identified significant correlates of peri-extraction anxiety. A history of traumatic dental experience showed a positive correlation with both pre- and post-extraction DFS scores ($r = 0.35$, $p < 0.01$; $r = 0.28$, $p < 0.05$). Anticipated pain (VAS) correlated strongly with preoperative anxiety ($r = 0.42$, $p < 0.001$), while actual pain showed moderate correlations with both pre- and post-extraction anxiety ($r = 0.30$, $p < 0.05$; $r = 0.40$, $p < 0.001$). Waiting time correlated modestly with preoperative anxiety ($r = 0.25$, $p < 0.05$), though the association with postoperative anxiety did not reach significance ($r = 0.20$, $p = 0.06$). No statistically significant differences in DFS scores were observed in relation to extraction complexity or the use of sedation/analgesics, and these analyses should be interpreted as exploratory.

The Table 3 summarizes key additional clinical parameters collected in the present study, including previous dental experience, pain expectation and experience, use of sedation or analgesics, extraction complexity, and waiting time. For each parameter, data summary and their correlation coefficients (r) with DFS (Dental Fear Survey) scores before and after extraction are provided. Statistically significant correlations indicate potential predictors or modifiers of peri-extraction anxiety levels among patients. Parameters not subjected to statistical correlation analysis are indicated as 'NA.' Correlations yielding p-values above 0.05 are marked 'ns' (not significant).

All reported findings are based on data directly collected in the present study. Where bivariate analyses did not yield statistical significance, this has been explicitly noted. No additional or hypothetical parameters were included in the analysis or interpretation.

A paired-sample *t*-test confirmed that the reduction in DFS scores from pre-to post-extraction was statistically significant (mean difference = 6.64, $p = 0.001$). This indicates a consistent and reliable reduction in anxiety across the study population (Fig. 2).

5. Discussion

Tooth extraction, though routine, remains a significant psychological challenge … This pattern supports the exposure-based model of anxiety, whereby positive direct experience with the feared stimulus reduces avoidance and fear responses.[9]

The significant decline in dental anxiety observed in our study may also be explained by positive reinforcement mechanisms. Many participants likely found the actual extraction experience less aversive than anticipated, which may have reshaped their cognitive and emotional responses toward dental visits. Contributing factors such as a structured and reassuring clinical environment, effective communication by dental professionals, adequate pain management, and the absence of complications may have enhanced this effect. These elements align with behavioral psychological theories, particularly exposure-based learning, which suggest that successful and non-threatening encounters with feared stimuli can attenuate anticipatory anxiety over time.

Several clinically relevant predictors of peri-extraction anxiety were identified. Patients with a history of traumatic dental experiences reported persistently higher levels of anxiety, suggesting that cumulative negative encounters can sensitize individuals to future procedures. This emphasizes the importance of targeted reassurance and the use of adjunctive behavioral strategies in such high-risk subgroups.[9,12]

Expectations surrounding pain also played a key role. Anticipated pain strongly influenced preoperative anxiety, while actual pain experiences were generally less severe than expected. This mismatch

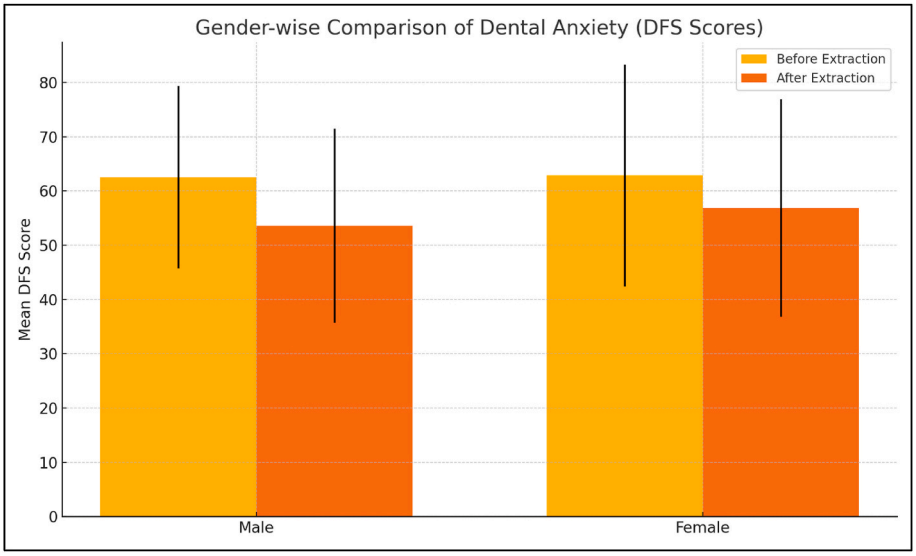

Fig. 1. Bar graph showing gender wise comparison of Dental Anxiety scores.

Table 3
Correlation of additional clinical parameters with dental anxiety scores before and after extraction.

Parameter	Description	Data Summary	Correlation with Pre-extraction DFS	Correlation with Post-extraction DFS
Previous Dental Experience (Traumatic)	History of traumatic dental experience (Yes/No)	30 % reported traumatic experience	$r = 0.35$, $p < 0.01$	$r = 0.28$, $p < 0.05$
Pain Expectation (VAS)	Mean anticipated pain score on 10-point scale	5.8 ± 2.1	$r = 0.42$, $p < 0.001$	$r = 0.33$, $p < 0.01$
Actual Pain (VAS)	Mean actual pain score on 10-point scale	4.9 ± 2.3	$r = 0.30$, $p < 0.05$	$r = 0.40$, $p < 0.001$
Use of Sedation/ Analgesics	Percentage of patients receiving sedation/ analgesics	20 % received sedation or additional analgesics	N/A	N/A
Extraction Complexity (Simple vs Surgical)	Distribution of simple vs surgical extractions (%)	70 % simple, 30 % surgical	N/A	N/A
Waiting Time (minutes)	Mean waiting time before extraction (minutes)	15 ± 8 min	$r = 0.25$, $p < 0.05$	$r = 0.20$, $p = 0.06$ (ns)

NA: Not analyzed for correlation.
ns: Correlation not statistically significant.

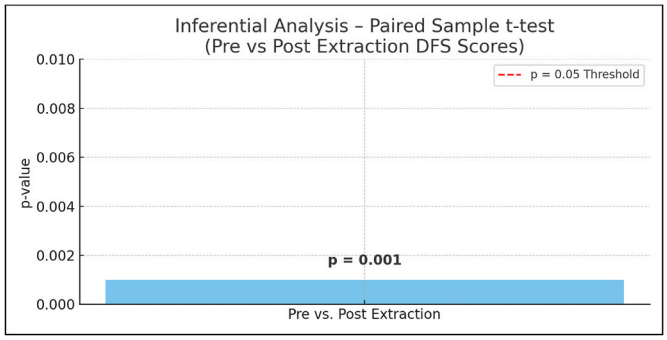

Fig. 2. Inferential analysis of pre- and post-extraction DFS scores (Cohen's d = 0.33).

reinforces cognitive–behavioral theories that highlight the role of expectation disconfirmation in reducing fear.[9–11] By addressing catastrophic thinking through counseling or education, dentists can help attenuate dental anxiety.

Although a minority of patients received sedation or additional analgesics, this was not associated with marked differences in anxiety outcomes. This suggests that non-pharmacological approaches remain equally important and warrant integration alongside pharmacological options in future anxiety management strategies.[13] Likewise, extraction complexity did not substantially alter anxiety patterns, though surgical cases showed a tendency for slightly higher postoperative distress, likely reflecting procedural intensity.[14]

From a practical standpoint, waiting time emerged as a modifiable contributor to anxiety. Longer waiting periods appeared to exacerbate anticipatory fear, highlighting the importance of optimizing appointment scheduling, reducing idle time, and providing calming distractions in the waiting area. These simple workflow changes may significantly improve patient comfort and cooperation.

Gender-related differences were also evident, with females reporting consistently higher anxiety levels. This aligns with previous reports attributing greater dental fear in women to heightened pain perception and more expressive emotional responses.[14] Tailoring communication and support strategies to address these differences may therefore enhance patient care.

Taken together, these findings affirm that peri-extraction anxiety is multifactorial, influenced by past experiences, expectations, actual pain, gender, waiting time, and procedural factors. A holistic, individualized approach—incorporating preoperative counseling, expectation management, behavioral interventions, and scheduling adjustments—may significantly reduce dental anxiety and improve treatment experiences.

Future research should further investigate these modifiable parameters across larger and more diverse populations to refine preventive and therapeutic strategies.

5.1. Clinical implications

The findings of this study underscore the importance of assessing dental anxiety both before and after tooth extraction. By systematically evaluating patients' emotional status, clinicians can tailor anxiety-reducing communication and interventions, such as pre-operative counseling and reassurance, to individual needs. The observed persistence of higher post-extraction anxiety in females suggests that targeted post-procedure support for specific groups may be beneficial. Incorporating brief anxiety assessments into the routine workflow can enhance patient experience and cooperation, ultimately improving clinical outcomes beyond what is achieved by current protocols. Routine assessment of DFS before and after extraction can help identify high-risk patients for additional support, while tailoring waiting times, pre-op counseling, and post-op reassurance based on individual risk factors identified in this study may further improve patient experience and adherence.

6. Limitations of the study

The study's limitations include its single-institution sample of 100 systemically healthy patients, which may restrict generalizability to broader populations. Participants were recruited using a convenience sampling method, introducing potential selection bias. Self-reporting bias is another inherent limitation of the DFS and visual analog scales. While the inclusion of psychosocial and clinical parameters offered valuable insights, the relatively small subgroup sizes (e.g., patients receiving sedation or undergoing surgical extractions) limited the power of subgroup analyses. Furthermore, the findings may not be directly generalizable to pediatric patients or to individuals requiring complex surgical interventions performed under general anesthesia. Incorporating objective physiological measures and additional psychological inventories in future research may provide a more comprehensive understanding of dental anxiety. Multicenter studies involving larger, more diverse cohorts are recommended to validate and extend these findings.

7. Conclusion

Dental anxiety directly influences patient acceptance and cooperation with treatment. Measuring anxiety levels can assist dentists in selecting appropriate management strategies while providing reassurance and comfort to anxious patients. Anxiety scores were significantly lower post-operatively compared to pre-operative values, with females exhibiting relatively higher post-operative scores than males. This highlights the importance of creating a supportive and interactive clinical environment tailored to individual patient needs. By addressing anxiety proactively, dentists can strengthen the dentist–patient relationship and promote better overall treatment outcomes.

Consent statement

I have read and understood the above information. I voluntarily agree to participate in this study. I understand that I may withdraw at any time without affecting my treatment.

- I confirm that I have had the opportunity to ask questions.
- I understand that all data collected will be kept confidential.
- I give permission for my anonymized data to be used for academic publication.

What the study involves

- You will be asked to fill out a simple questionnaire (Dental Fear Survey) before and after your tooth extraction.
- The procedure and your treatment will continue as planned and will not be affected by the survey.
- No additional intervention or cost will be involved.
- Your identity and responses will be kept strictly confidential and used only for research purposes.

Risks and benefits

- There are no physical risks involved.
- Your participation will help us better understand and manage dental anxiety in patients like you.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: INDRA KUMAR reports administrative support was provided by Vivekanandha Dental College for Women. INDRA KUMAR reports a relationship with Vivekanandha Dental College for Women that includes: employment. NIL If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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