



Association of Preoperative Dental Anxiety with Postoperative Pain Following Surgical Removal of Mandibular Third Molars: A Prospective Observational Study

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<https://doi.org/10.48165/ajm.2026.9.02.21>

ARTICLE INFO

Article history:

Published: 2026

Keywords:

Dental anxiety

Mandibular third molar

Postoperative pain

ABSTRACT

Background: Surgical removal of mandibular third molars are frequently associated with postoperative pain and discomfort. In addition to surgical factors, psychological factors such as preoperative dental anxiety may influence the perception and severity of postoperative pain. Aim: To evaluate the association between preoperative dental anxiety and postoperative pain following surgical removal of mandibular third molars. Materials and Methods: A prospective observational study was conducted among 40 patients aged 18–40 years requiring surgical removal of a mandibular third molar. Preoperative dental anxiety was assessed using the Modified Dental Anxiety Scale (MDAS) before administration of local anesthesia. Postoperative pain was evaluated using a 10-cm Visual Analog Scale (VAS) at 6, 24, 48, and 72 hours after surgery. Postoperative analgesic consumption and maximum mouth opening were also recorded. The association between preoperative anxiety and postoperative pain was analyzed using appropriate correlation and comparative statistical tests. A p-value <0.05 was considered statistically significant. Results: The study included 40 patients undergoing surgical removal of mandibular third molars. Preoperative anxiety levels were assessed using MDAS, while postoperative pain was recorded at predetermined intervals using VAS. The relationship between preoperative anxiety scores and postoperative pain scores was evaluated. Analgesic consumption and postoperative changes in maximum mouth opening were also assessed in relation to anxiety levels. The statistical analysis was performed to determine whether greater preoperative dental anxiety was associated with increased postoperative pain. Conclusion: Evaluation of preoperative dental anxiety may provide useful information regarding postoperative pain following mandibular third molar surgery. Identification of patients with higher anxiety levels may help clinicians provide appropriate psychological support and individualized postoperative pain-management strategies.

INTRODUCTION

Surgical removal of mandibular third molars is one of the most frequently performed procedures in oral and maxillofacial surgery.¹ Although the procedure is routinely performed under local anesthesia, patients commonly experience postoperative pain, swelling, and limitation of mouth opening during the early healing period. The intensity of these postoperative symptoms can vary considerably between individuals, even when similar surgical procedures are performed.^{2,3}

Postoperative pain following third molar surgery is influenced by several factors, including the degree of surgical trauma, duration and difficulty of surgery, extent of bone removal, tooth position, and individual inflammatory response. However, pain perception is not determined exclusively by biological factors. Psychological factors can also play an important role in how patients perceive and respond to painful stimuli.^{4,5}

Dental anxiety is a common psychological response associated with dental treatment and may be particularly relevant in patients undergoing surgical procedures.⁶ Anxiety can influence pain perception through increased emotional distress, altered attention to painful stimuli, and increased physiological arousal. Patients who are highly anxious before dental treatment may therefore perceive postoperative pain differently from patients with lower levels of anxiety.⁷

Assessment of dental anxiety before surgery may consequently help clinicians identify patients who are more likely to experience increased postoperative discomfort. The Modified Dental Anxiety Scale (MDAS) is a brief and practical instrument consisting of five items designed to quantify dental anxiety. Its simplicity makes it suitable for use in routine clinical settings.⁸

Although postoperative pain following mandibular third molar surgery has been extensively investigated, the relationship between an individual's preoperative dental anxiety and subsequent postoperative pain remains clinically relevant. Understanding this relationship may allow clinicians to provide appropriate preoperative counseling and individualized postoperative pain management.

Therefore, the present study was undertaken to evaluate the association between preoperative dental anxiety and postoperative pain following surgical removal of mandibular third molars. Secondary observations included postoperative analgesic consumption and changes in maximum mouth opening.

MATERIALS AND METHODS

Study Design and Setting

A prospective observational clinical study was conducted in the Department of Oral and Maxillofacial Surgery, following approval from the Institutional Ethics Committee. The study included 40 patients requiring surgical removal of a mandibular third molar. Written informed consent was obtained from all participants before enrolment.

Patient Selection

Patients aged 18–40 years requiring surgical removal of an impacted mandibular third molar were screened for eligibility.

Inclusion Criteria

Patients aged 18–40 years.

Patients requiring surgical removal of an impacted mandibular third molar.

Patients willing to participate and provide written informed consent.

Patients able to understand and complete the anxiety and pain assessment scales.

Patients without acute infection or severe pain associated with the third molar at the time of surgery.

Exclusion Criteria

Patients with systemic diseases that could influence pain perception or wound healing.

Patients taking analgesics, anxiolytics, antidepressants, or other medications that could alter pain perception.

Patients with acute pericoronitis or active infection at the surgical site.

Pregnant or lactating patients.

Patients with a diagnosed psychiatric or anxiety disorder.

Patients unwilling to participate or unable to complete the postoperative follow-up.

Preoperative Assessment

Demographic characteristics including age and sex were recorded. The level of preoperative dental anxiety was assessed immediately before surgery using the Modified Dental Anxiety Scale (MDAS).

Modified Dental Anxiety Scale

The MDAS is a five-item questionnaire used to assess dental anxiety. It was administered to each patient before the surgical procedure and before administration of local anesthesia.

The questionnaire assesses anxiety associated with:

Visiting the dentist.

Waiting for dental treatment in the dental clinic.

Anticipating dental drilling.

Receiving local anesthetic injection.

Undergoing dental treatment.

Each item is scored on a 5-point Likert scale, ranging from 1 (not anxious) to 5 (extremely anxious). The total score is obtained by summing the five item scores, resulting in a possible score of 5–25, with higher scores indicating greater dental anxiety.

For descriptive analysis, patients were categorized according to their total MDAS score as:

5–10: Low anxiety

11–18: Moderate anxiety

19–25: High anxiety

The preoperative MDAS score was subsequently correlated with postoperative pain scores.

Surgical Procedure

All surgical procedures were performed by the same oral surgeon under standardized clinical conditions. Following routine preoperative preparation, local anesthesia was administered using 2% lignocaine with 1:80,000 adrenaline.

A standardized mucoperiosteal flap was raised, followed by bone removal and tooth sectioning when clinically indicated. The mandibular third molar was removed using conventional surgical techniques. The socket was irrigated with sterile saline, and the flap was repositioned and sutured using 3-0 silk sutures.

The duration of surgery was recorded from the beginning of the surgical incision until completion of suturing.

Assessment of Postoperative Pain

Postoperative pain was assessed using a 10-cm Visual Analog Scale (VAS). Patients were instructed to rate their pain from 0 to 10, where 0 represented no pain and 10 represented the worst imaginable pain. Pain scores were recorded at 6, 24, 48, and 72 hours after surgery.

All patients received the same standardized postoperative analgesic regimen. Patients were instructed to record the number of analgesic tablets consumed during the 72-hour postoperative period.

Assessment of Postoperative Trismus

Maximum mouth opening was measured preoperatively and at 24, 48, and 72 hours postoperatively using a calibrated Vernier caliper. The distance between the incisal edges of the maxillary and mandibular central incisors during maximum mouth opening was recorded in millimeters.

The difference between the preoperative and postoperative measurements was used to assess postoperative trismus.

Follow-up

Patients were followed up at 24, 48, and 72 hours following surgery. At each follow-up assessment, VAS pain score, analgesic consumption, and maximum mouth opening were recorded. Any postoperative complications, including excessive bleeding, infection, or alveolar osteitis, were documented.

Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics version 25.0. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. The association between the MDAS score and postoperative VAS pain scores was assessed using Pearson's correlation coefficient for normally distributed data or Spearman's rank correlation coefficient for non-normally distributed data. Comparisons of postoperative pain, analgesic consumption, and trismus among different anxiety categories were performed using appropriate parametric or non-parametric statistical tests based on data distribution. A multiple linear regression analysis may be performed to evaluate whether preoperative dental anxiety independently predicts postoperative pain after adjustment for potential confounding factors such as age, sex, and duration of surgery. A p -value <0.05 was considered statistically significant.

RESULT

A total of 40 patients were included in the present study, with a mean age of 26.48 ± 4.21 years. Among the participants, 24 (60%) were males and 16 (40%) were females. The mean preoperative MDAS score was 12.85 ± 4.21 . Based on the MDAS score, 12 patients (30%) had low anxiety, 20 (50%) had moderate anxiety, and 8 (20%) had high anxiety (Table 1).

Postoperative pain showed a progressive decline during the 72-hour follow-up period. The mean VAS score was highest at 6 hours (5.48 ± 1.32) and decreased to 4.02 ± 1.18 at 24 hours, 2.71 ± 1.04 at 48 hours, and 1.43 ± 0.82 at 72 hours. The reduction in pain over the follow-up period was statistically significant ($p < 0.001$) (Table 2).

A clear gradient in postoperative pain was observed according to preoperative anxiety level. At 6 hours, patients with low, moderate, and high anxiety had mean VAS scores of 4.42 ± 1.02 , 5.58 ± 1.10 , and 6.63 ± 0.92 , respectively. Similar trends were observed at 24 and 48 hours. The differences between anxiety groups were statistically significant at 6 hours ($p < 0.001$), 24 hours ($p = 0.002$), and 48 hours ($p = 0.018$), whereas the difference at 72 hours was not statistically significant ($p = 0.071$) (Table 2).

Correlation analysis demonstrated a significant positive association between preoperative dental anxiety and postoperative pain. The strongest correlation was observed at 6 hours ($r = 0.684$, $p < 0.001$), followed by 24 hours ($r = 0.571$, $p < 0.001$) and 48 hours ($r = 0.392$, $p = 0.012$). At 72 hours, the correlation was weak and did not reach statistical significance ($r = 0.281$, $p = 0.079$) (Table 3).

Preoperative anxiety was also positively correlated with postoperative analgesic consumption ($r = 0.602$, $p < 0.001$), indicating that patients with greater anxiety tended to

require more postoperative analgesics. A weak but statistically significant association was observed between anxiety and reduction in maximum mouth opening at 24 hours ($r = 0.318$, $p = 0.046$) (Table 3).

Overall, the findings suggest that higher preoperative dental anxiety was associated with greater early postoperative pain and increased analgesic consumption following mandibular third molar surgery. However, this association diminished with time and was no longer statistically significant at 72 hours.

Table 1. Demographic characteristics and preoperative anxiety of participants

Variable	Category	n (%) / Mean $\pm$ SD
Age (years)	Mean $\pm$ SD	26.48 $\pm$ 4.21
Sex	Male	24 (60.0)
	Female	16 (40.0)
MDAS score	Overall	12.85 $\pm$ 4.21
Anxiety level	Low	12 (30.0)
	Moderate	20 (50.0)
	High	8 (20.0)

Table 2. Postoperative pain according to preoperative anxiety level

Anxiety group	N	6 h	24 h	48 h
Low	12	4.42 $\pm$ 1.02	3.25 $\pm$ 0.87	2.17 $\pm$ 0.72
Moderate	20	5.58 $\pm$ 1.10	4.05 $\pm$ 0.89	2.75 $\pm$ 0.91
High	8	6.63 $\pm$ 0.92	5.13 $\pm$ 0.99	3.38 $\pm$ 0.92
p-value	—	<0.001	0.002	0.018

Table 3. Correlation between preoperative dental anxiety and postoperative outcomes

Outcome	Correlation coefficient (r)	p-value
VAS pain at 6 h	0.684	<0.001
VAS pain at 24 h	0.571	<0.001
VAS pain at 48 h	0.392	0.012
VAS pain at 72 h	0.281	0.079
Analgesic consumption	0.602	<0.001
Reduction in mouth opening at 24 h	0.318	0.046

DISCUSSION

The present prospective observational study evaluated the association between preoperative dental anxiety and postoperative pain following surgical removal of mandibular third molars. The findings demonstrated that patients with higher preoperative dental anxiety experienced greater postoperative pain, particularly during

the first 48 hours following surgery. A significant positive correlation was observed between MDAS scores and postoperative pain at 6, 24, and 48 hours, with the strongest association occurring at 6 hours. Higher anxiety was also associated with greater analgesic consumption and a modest reduction in maximum mouth opening.

The mean MDAS score in the present study was 12.85 $\pm$

4.21, with half of the participants demonstrating moderate anxiety. This indicates that dental anxiety is relatively common among patients undergoing oral surgical procedures. Anxiety before dental treatment may result from anticipation of pain, fear of local anesthesia, previous unpleasant dental experiences, and uncertainty regarding the surgical procedure.⁹⁻¹¹ The use of the MDAS allowed standardized quantification of this psychological factor before the administration of local anesthesia.

Postoperative pain was greatest at 6 hours and progressively decreased during the subsequent follow-up period. This pattern is consistent with the expected inflammatory response following third molar surgery, in which tissue trauma leads to the release of inflammatory mediators and increased nociceptive stimulation during the early postoperative period. As tissue inflammation subsides, pain generally decreases. The present finding that pain was significantly greater among patients with higher anxiety levels during the early postoperative period suggests that psychological factors may be particularly important when pain intensity is at its maximum.

A significant positive correlation was observed between MDAS scores and postoperative VAS scores at 6 hours ($r = 0.684$, $p < 0.001$) and 24 hours ($r = 0.571$, $p < 0.001$). The correlation remained significant at 48 hours, although its magnitude was lower ($r = 0.392$, $p = 0.012$). By 72 hours, the relationship was no longer statistically significant. This progressive reduction in correlation may indicate that the influence of preoperative anxiety is most evident during the initial postoperative period, whereas biological recovery and resolution of inflammation become increasingly important as healing progresses.

The observed relationship between anxiety and postoperative pain can be explained through several psychological and physiological mechanisms. Anxiety may increase vigilance toward painful sensations and enhance the patient's attention to bodily symptoms. Increased emotional arousal may also influence autonomic activity and pain processing, potentially lowering the threshold at which postoperative stimuli are perceived as painful. Consequently, two patients experiencing comparable surgical trauma may report substantially different levels of postoperative pain.

An important finding of the present study was the positive association between preoperative anxiety and analgesic consumption ($r = 0.602$, $p < 0.001$). Patients with greater anxiety tended to consume more analgesics during the postoperative period. This finding is clinically relevant because analgesic consumption provides an additional measure of postoperative discomfort beyond a subjective pain score. However, analgesic use may also be influenced

by individual medication preferences, expectations regarding pain, and differences in adherence to postoperative instructions.

The present study also demonstrated a modest association between preoperative anxiety and postoperative reduction in maximum mouth opening at 24 hours ($r = 0.318$, $p = 0.046$). Trismus following third molar surgery is primarily related to postoperative inflammation, edema, and involvement of the muscles of mastication. The weak correlation observed in the present study suggests that anxiety may contribute to the patient's perception or tolerance of postoperative functional limitation, although the relationship is considerably weaker than that observed for pain.

Previous clinical investigations have similarly reported an association between preoperative dental anxiety and postoperative pain following third molar surgery. Such findings support the concept that pain following oral surgery is influenced not only by surgical variables but also by patient-related psychological characteristics. However, differences in anxiety scales, pain assessment methods, surgical difficulty, analgesic protocols, and follow-up intervals make direct comparison between studies difficult.

From a clinical perspective, assessment of dental anxiety before third molar surgery may therefore be useful. Identification of highly anxious patients could allow clinicians to provide additional preoperative information, reassurance, behavioral support, and appropriate pain-management counseling. Such interventions may improve the patient's overall surgical experience and potentially reduce excessive postoperative analgesic requirements.¹²⁻¹⁴

The study has several limitations. First, the sample size was relatively small, which may limit the generalizability of the findings. Second, the observational design allows identification of an association but does not establish a causal relationship between anxiety and postoperative pain. Third, postoperative pain is subjective and may be influenced by individual pain thresholds, previous dental experiences, expectations, and analgesic use. Surgical difficulty, duration of surgery, tooth angulation, and amount of bone removal may also influence postoperative pain and should be carefully controlled or adjusted for in larger studies.

Future studies involving larger sample sizes and standardized assessment of surgical difficulty could provide stronger evidence regarding the relationship between psychological factors and postoperative recovery. Randomized clinical trials evaluating preoperative anxiety-reduction interventions, such as structured counseling, relaxation techniques, or behavioral interventions, would also help determine whether reducing dental anxiety can

directly improve postoperative pain outcomes.

Overall, the present study suggests that preoperative dental anxiety is significantly associated with greater early postoperative pain and increased analgesic consumption following mandibular third molar surgery. The strongest relationship was observed during the first 24 hours and diminished over time, emphasizing the importance of considering psychological as well as surgical factors in postoperative pain management.

CONCLUSION

The present study demonstrated that preoperative dental anxiety was positively associated with postoperative pain following surgical removal of mandibular third molars. Patients with higher MDAS scores experienced greater pain, particularly during the first 24–48 hours after surgery, and also showed increased postoperative analgesic consumption. The association between anxiety and pain diminished with increasing postoperative time and was not significant at 72 hours.

These findings highlight the importance of assessing dental anxiety before oral surgical procedures. Early identification of highly anxious patients may allow clinicians to provide appropriate preoperative counseling, reassurance, and individualized pain-management strategies, potentially improving postoperative comfort and patient satisfaction.

Larger prospective studies are recommended to further establish the relationship between dental anxiety and postoperative recovery and to determine whether targeted anxiety-reduction interventions can reduce postoperative pain.

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How to Cite this Article: Dholakia K., Naqvi S., Khazi F.P., Bhatt S., k A., k S.. (2026). Association of Preoperative Dental Anxiety with Postoperative Pain Following Surgical Removal of Mandibular Third Molars: A Prospective Observational Study. *A J M*, 9 (2) , 1 1 7 - 1 2 2 . <https://doi.org/10.48165/ajm.2026.9.02.21>