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ORIGINAL ARTICLE

Association between Preoperative Anxiety and Postoperative Pain Severity among Surgical Patients

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ABSTRACT

Background: *Preoperative anxiety is a common psychological response to impending surgery, yet its influence on postoperative pain outcomes remains incompletely characterized. Understanding this association may inform targeted perioperative interventions to optimize patient recovery.* ***Objective:*** *To evaluate the association between preoperative anxiety levels and postoperative pain severity among surgical patients.* ***Methods & Materials:*** *This prospective observational cohort study was conducted at Sherpur 250-bed District Sadar Hospital and Private Chamber, Bangladesh, from July to December 2024. Fifty-seven purposively selected adult patients undergoing elective surgery were enrolled. Preoperative anxiety was assessed using the validated Amsterdam Preoperative Anxiety and Information Scale (APAIS). Postoperative pain severity was measured using the Numeric Rating Scale (NRS) at 6, 12, and 24 hours. Data were analyzed using SPSS version 23.0.* ***Results:*** *The mean preoperative anxiety score was 12.4 ± 4.2. Patients with high preoperative anxiety (APAIS ≥13) reported significantly higher postoperative pain scores at all time points compared to those with low anxiety ($p<0.001$). A moderate positive correlation was observed between preoperative anxiety and 24-hour postoperative pain scores ($r=0.52$, $p<0.001$).* ***Conclusion:*** *Preoperative anxiety is significantly associated with increased postoperative pain severity. Routine preoperative anxiety screening may help identify high-risk patients who could benefit from targeted anxiolytic and analgesic strategies to improve postoperative outcomes.*

Keywords: *Association, Postoperative pain, Preoperative anxiety, psychological factors, Surgical patients*

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INTRODUCTION

Preoperative anxiety is a ubiquitous psychological response to the anticipation of surgery, affecting a substantial proportion of patients across all surgical disciplines [1]. This state of heightened apprehension, characterized by feelings of tension, nervousness, and autonomic arousal, arises from the inherent uncertainties surrounding surgical procedures, anesthesia, postoperative recovery, and potential complications [2]. While anxiety is a normal adaptive response to perceived threat, excessive or poorly managed preoperative anxiety can exert deleterious effects on multiple domains of perioperative care, including hemodynamic stability, anesthetic requirements, and recovery trajectories [3]. The prevalence of clinically significant preoperative anxiety varies widely across surgical populations, with estimates ranging from 11% to 80% depending on the patient population, surgical procedure, and assessment tool employed [4]. A prospective cohort study of patients undergoing elective surgery reported that 31.3% had mild, 58.7% had moderate, and 10% had severe preoperative anxiety [5]. This high prevalence underscores the clinical importance of understanding the consequences of preoperative anxiety on postoperative outcomes. The relationship between preoperative anxiety and postoperative pain has been the subject of extensive investigation. A growing body of evidence suggests that preoperative anxiety is a significant predictor of both acute and chronic postoperative pain [6]. A systematic review and meta-analysis examining predictors of pediatric acute postsurgical pain identified preoperative anxiety as one of the factors positively associated with pain severity [7]. Similarly, a large prospective cohort study from the China Surgery and Anaesthesia Cohort found that preoperative anxiety was associated with a 52% increased risk of chronic postsurgical pain (odds ratio 1.52, 95% confidence interval 1.23–1.86) [8]. Several physiological and psychological mechanisms have been proposed to explain this association. Preoperative anxiety activates the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system, leading to increased circulating cortisol and catecholamines, which can heighten pain sensitivity and amplify the inflammatory response to surgical tissue injury [9].

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Additionally, anxiety may lower pain tolerance, increase pain catastrophizing, and alter pain perception through central sensitization mechanisms [10]. A prospective cohort study of patients undergoing laparoscopic cholecystectomy found a statistically significant difference between preoperative anxiety levels and postoperative pain scores ($p < 0.001$), with anxiety affecting the patient's perception of postoperative pain and increasing analgesic consumption [11]. Despite the growing recognition of this association, the evidence is not uniformly consistent. Some studies have failed to demonstrate a significant correlation between preoperative anxiety and postoperative pain, suggesting that the relationship may be moderated by factors such as surgical type, patient demographics, and perioperative management strategies [12]. A systematic review concluded that although inconsistency exists in the literature, most available evidence reveals a positive correlation between preoperative anxiety and postoperative pain [13]. In Bangladesh, as in many low- and middle-income countries, perioperative psychological assessment and management are not routinely integrated into surgical care pathways. The surgical caseload in district-level hospitals continues to increase, yet data on the association between preoperative anxiety and postoperative pain in this setting remain sparse. Understanding this relationship is essential for identifying high-risk patients who may benefit from targeted anxiolytic and analgesic interventions to optimize postoperative outcomes. This prospective observational cohort study was therefore undertaken to evaluate the association between preoperative anxiety levels, assessed using the validated Amsterdam Preoperative Anxiety and Information Scale (APAIS), and postoperative pain severity among surgical patients at a district hospital in Bangladesh. By generating locally relevant evidence, we aim to inform perioperative care protocols and contribute to the growing body of knowledge on the psychological determinants of postoperative recovery.

METHODS & MATERIALS

This prospective observational cohort study was conducted at Sherpur 250-bed District Sadar Hospital and Private Chamber, Bangladesh, from July 2024 to December 2024. Adult patients scheduled for elective surgical procedures were consecutively screened for enrollment.

Inclusion criteria: Patients aged 18 years or older, of either sex, with American Society of Anesthesiologists (ASA) physical status I or II, undergoing elective surgery under general or regional anesthesia were eligible for inclusion.

Exclusion criteria: Patients with pre-existing psychiatric disorders, cognitive impairment preventing accurate questionnaire completion, chronic pain conditions, or those requiring emergency surgery were excluded.

Study procedure: After obtaining written informed consent, demographic and baseline clinical data were recorded. Preoperative anxiety was assessed using the validated Amsterdam Preoperative Anxiety and Information Scale (APAIS), a six-item questionnaire with scores ranging from 6 to 30, where higher scores indicate greater anxiety [14]. Postoperative pain severity was measured using the Numeric Rating Scale (NRS), ranging from 0 (no pain) to 10 (worst possible pain), at 6, 12, and 24 hours postoperatively [15]. All assessments were performed by trained research personnel blinded to the study hypothesis.

Data analysis: Data were entered into a predesigned proforma and analyzed using SPSS version 23.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Pearson correlation coefficient was used to assess the association between preoperative anxiety scores and postoperative pain scores. A p-value <0.05 was considered statistically significant.

RESULT

A total of 57 patients completed the study. The baseline demographic and clinical characteristics of the cohort are summarized in *Table I*. The mean age was 42.3 ± 13.8 years (range 18–70), with male patients comprising 56.1% of the cohort. The majority of patients (61.4%) were classified as ASA physical status I. Hernia repair (31.6%) and orthopedic procedures (28.1%) were the most common surgical types.

Table I: Demographic and clinical characteristics of the study population (*n*=57)

Variable	Category	n (%)
Age group (years)	18–30	12 (21.1)
	31–50	26 (45.6)
	51–70	19 (33.3)
Sex	Male	32 (56.1)
	Female	25 (43.9)
ASA status	I	35 (61.4)
	II	22 (38.6)
Type of surgery	Hernia repair	18 (31.6)
	Orthopedic	16 (28.1)
	Abdominal	12 (21.1)
	Other	11 (19.3)

Preoperative anxiety scores assessed using the APAIS are presented in *Table II*. The mean total APAIS score was 12.4 ± 4.2 (range 6–24). The anxiety subscale mean was 7.8 ± 2.9, while the information subscale mean was 4.6 ± 1.9. Using a cut-off score of ≥13 to define high anxiety, 28 patients (49.1%) were classified as having high preoperative anxiety. The distribution of anxiety categories is further illustrated in *Figure 1*.

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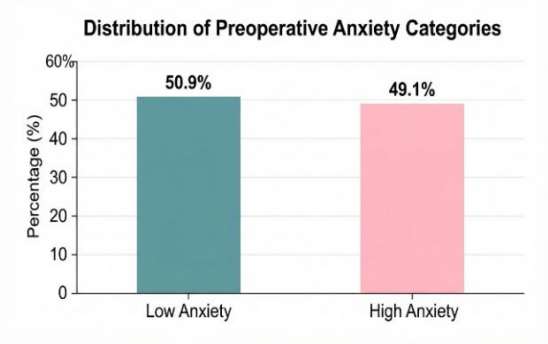

Figure 1: Distribution of preoperative anxiety categories

The bar chart demonstrates that 49.1% of patients (n=28) had high preoperative anxiety (APAIS ≥13), while 50.9% (n=29) had low anxiety (APAIS <13).

Table II: Preoperative anxiety scores (APAIS) (*n*=57)

Parameter	Mean ± SD	Range
Total APAIS score	12.4 ± 4.2	6–24
Anxiety subscale	7.8 ± 2.9	3–15
Information subscale	4.6 ± 1.9	2–9
High anxiety (APAIS ≥13), n (%)	28 (49.1)	—

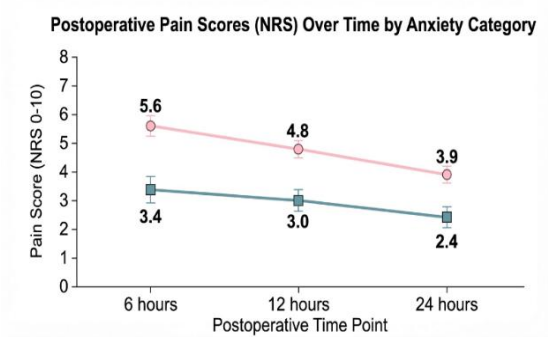

Figure 2: Postoperative pain scores (NRS) over time by anxiety category

The line graph illustrates consistently higher pain scores in patients with high preoperative anxiety compared to those with low anxiety at all postoperative time points (6, 12, and 24 hours), with the widest difference observed at 6 hours. Postoperative pain scores measured using the NRS at 6, 12, and 24 hours are presented in *Table III*. Pain scores were consistently higher in patients with high preoperative anxiety compared to those with low anxiety at all time points. The difference was most pronounced at 6 hours (5.6 ± 1.6 vs. 3.4 ± 1.5, p<0.001). The trend of pain scores over time for both groups is visually represented in *Figure 2*.

Table III: Postoperative pain scores (NRS) by anxiety category (N=57)

Time point	Anxiety		p-value
	High (n=28)	Low (n=29)	
6 hours, mean± SD	5.6 ± 1.6	3.4 ± 1.5	<0.001
12 hours, mean± SD	4.8 ± 1.4	3.0 ± 1.3	<0.001
24 hours, mean± SD	3.9 ± 1.3	2.4 ± 1.2	<0.001

Independent t-tests were used to compare pain scores between high and low anxiety groups.

The correlation between preoperative anxiety and postoperative pain is presented in *Table IV*. A moderate positive correlation was observed between total APAIS score and NRS scores at all time points, with the strongest correlation at 24 hours (r=0.52, p<0.001). The anxiety subscale demonstrated a stronger correlation with postoperative pain than the information subscale across all time points.

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Table IV: Correlation between preoperative anxiety (APAIS) and postoperative pain (NRS)

APAIS Scale	6-hour NRS	12-hour NRS	24-hour NRS
Total APAIS score	r=0.44, p<0.001	r=0.48, p<0.001	r=0.52, p<0.001
Anxiety subscale	r=0.46, p<0.001	r=0.50, p<0.001	r=0.54, p<0.001
Information subscale	r=0.28, p=0.032	r=0.31, p=0.018	r=0.34, p=0.009

Pearson correlation coefficients were used to assess associations between APAIS scores and NRS scores.

DISCUSSION

This prospective observational cohort study of 57 surgical patients demonstrates a significant positive association between preoperative anxiety and postoperative pain severity. Patients with high preoperative anxiety (APAIS ≥13) consistently reported higher pain scores at 6, 12, and 24 hours postoperatively compared to those with low anxiety. The moderate positive correlation between APAIS scores and NRS scores (r=0.52 at 24 hours, p<0.001) underscores the clinical relevance of this relationship and supports the integration of routine preoperative anxiety screening into perioperative care protocols. The prevalence of clinically significant preoperative anxiety in this cohort (49.1%) is consistent with the range of 11% to 80% reported across diverse surgical populations. A prospective cohort study of patients undergoing elective surgery reported that 31.3% had mild, 58.7% had moderate, and 10% had severe preoperative anxiety [14]. The high proportion of patients with elevated anxiety in the present study reflects the universal nature of preoperative psychological distress and highlights the need for systematic identification of at-risk individuals. The finding that patients with high preoperative anxiety experienced significantly higher pain scores at all postoperative time points aligns with a substantial body of evidence. A systematic review and meta-analysis examining predictors of pediatric acute postsurgical pain identified preoperative anxiety as positively associated with pain severity [15]. More recently, a systematic review and meta-analysis of the association between preoperative anxiety and chronic post-surgical pain found moderate-quality evidence indicating a positive association, where an increase in preoperative anxiety correlates with an increased incidence of chronic postsurgical pain [16]. The consistency of these findings across different populations and surgical settings reinforces the robustness of the anxiety-pain relationship. The temporal pattern observed in this study—with the widest difference in pain scores between high and low anxiety groups at 6 hours (5.6 vs. 3.4, p<0.001)—is clinically significant. This early postoperative period represents a critical window during which pain management strategies can profoundly influence subsequent recovery trajectories. A systematic review examining the effect of preoperative anxiety on postoperative pain found that preoperative anxiety is associated with the immediate onset of pain after surgery and is positively associated with the intensity of postoperative pain, especially in the first hours after surgery [17]. These findings suggest that targeted interventions in the immediate perioperative period may be particularly effective in mitigating the adverse effects of preoperative anxiety. The moderate correlation between the APAIS anxiety subscale and pain scores (r=0.54 at 24 hours) compared to the weaker correlation with the information subscale (r=0.34) suggests that the emotional component of anxiety—rather than the desire for information—is the primary driver of heightened pain perception. This distinction has important clinical implications. Interventions aimed at reducing the emotional distress of anxiety, such as cognitive-behavioral therapy, relaxation techniques, or pharmacological anxiolysis, may be more effective than information-based interventions alone in improving postoperative pain outcomes [18]. The physiological mechanisms underlying the anxiety-pain relationship are well-characterized. Preoperative anxiety activates the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system, leading to increased circulating cortisol and catecholamines, which can heighten pain sensitivity and amplify the inflammatory response to surgical tissue injury [19]. Additionally, anxiety may lower pain tolerance, increase pain catastrophizing, and alter pain perception through central sensitization mechanisms [20]. A prospective study on lumbar disc herniation surgeries reported that patients' anxiety levels rise with longer preoperative waiting times, and this has an impact on their postoperative discomfort [21]. The same study found that increased preoperative anxiety is associated with greater postoperative analgesic requirements, whereas reducing preoperative anxiety may enhance patient satisfaction and surgical outcomes [21]. The findings of this study have several clinical implications. First, routine preoperative anxiety screening using validated tools such as the APAIS should be considered standard practice in perioperative care. The APAIS is a brief, six-item questionnaire that can be administered rapidly in clinical settings and provides clinically actionable information [22]. Second, patients identified as having high preoperative anxiety may benefit from targeted interventions, including preoperative counseling, relaxation techniques, or pharmacological anxiolysis, to mitigate the adverse effects on postoperative pain. Third, the association between anxiety and pain underscores the importance of a multidisciplinary approach to perioperative care that addresses both psychological and physiological aspects of recovery. This study demonstrates a significant positive association between preoperative anxiety and postoperative pain severity in surgical patients. The high prevalence of clinically significant anxiety and the moderate correlation with pain scores support routine preoperative anxiety screening using validated tools such as the APAIS. Early identification of at-risk patients may enable targeted interventions to improve postoperative pain outcomes and enhance overall recovery.

LIMITATIONS

The single-center design, purposive sampling, and modest sample size limit generalizability. Lack of blinding and the absence of long-term follow-up beyond 24 hours are additional constraints. Unmeasured confounding variables, including socioeconomic status and social support, may have influenced outcomes.

CONCLUSION

Preoperative anxiety is significantly associated with increased postoperative pain severity, with nearly half of patients experiencing clinically significant anxiety. Routine preoperative screening using validated tools such as the APAIS can identify high-risk patients who may benefit from targeted anxiolytic and analgesic interventions to improve postoperative pain outcomes and enhance overall recovery.

RECOMMENDATION

We recommend routine preoperative anxiety screening using the APAIS for all surgical patients. Larger multicenter studies with extended follow-up are warranted to validate these findings and assess the long-term impact of anxiety on postoperative recovery.

CONFLICT OF INTEREST

The authors declare no conflicts of interest. No funding was received for this study. The corresponding author had full access to all data and final responsibility for the decision to submit for publication.

AI DECLARATION

Artificial intelligence tools contributed marginally to manuscript preparation and development. All core scientific content was human-verified.

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