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The impact of pre-operative anxiety on post-operative recovery outcomes in abdominal surgery patients

Abstract

Background: Pre-operative anxiety is a common psychological state among patients undergoing high-risk surgeries, particularly abdominal surgeries. It is known to impact post-operative recovery outcomes significantly. It is associated with a higher risk of complications such as bleeding, infections and haemodynamic disturbances, while also affecting sleep quality and mental health.

Aim: This study aimed to evaluate the levels of pre-operative anxiety in patients undergoing abdominal surgery and its impact on post-operative recovery and sleep quality.

Methods and materials: A cross-sectional descriptive study was conducted in the Department of Gastrointestinal Surgery at a hospital in Vietnam, from September 2023 to August 2024. A sample of 150 patients was selected, and data were collected using standardised tools, including the Hospital anxiety and depression scale – anxiety subscale (HADS-A), the 15-item Quality of recovery scale (QoR-15) and the Verran and Snyder-Halpern (VSH) sleep scale.

Results: Results indicated that 92 per cent of patients experienced varying degrees of anxiety before surgery, with a mean anxiety score of 7.0 ± 3.9. Pre-operative anxiety showed a significant negative correlation with both post-operative recovery quality ($r = -0.896$, $p < 0.001$) and sleep quality ($r = -0.880$, $p < 0.001$). The findings suggest that high levels of pre-operative anxiety negatively affect both recovery and sleep quality after abdominal surgery.

Conclusion: This study emphasises the need for pre-operative psychological interventions to reduce anxiety and improve recovery. It highlights the vital role of perioperative nursing in routine anxiety screening and targeted counselling to support at-risk patients. Incorporating these practices can lessen anxiety and enhance post-operative recovery and sleep quality. Future research should assess the effectiveness of specific interventions and the long-term impact of anxiety on recovery.

Keywords: pre-operative anxiety, abdominal surgery, recovery, sleep quality, psychological interventions

Introduction

Pre-operative anxiety is a prevalent psychological condition that affects patients as they prepare for surgical interventions, particularly for highly invasive procedures like abdominal surgery. This anxiety, often triggered by anticipation of the unknown and the potential risks associated with surgery, can have profound consequences on a patient's recovery. Friedrich et al.[1] explain that while anxiety is a natural physiological response to perceived threats, if left unmanaged, it can interfere with the healing process and contribute to post-operative complications. Notably, it has been associated with increased risks of blood loss, hemodynamic instability, impaired sleep quality, pain, nausea, vomiting and neurocognitive dysfunctions[2,3].

In addition, Zemła et al.[4] emphasise that high pre-operative anxiety levels are linked to both psychological and somatic consequences, which can affect anaesthesia management, surgical outcomes and post-operative care. Shebl et al.[5] found that pre-operative

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anxiety is associated with greater anaesthetic and analgesic requirements, increased propofol usage, extended recovery times and an elevated risk of delirium in adults. Specifically, in the context of abdominal surgery, Ali et al.[6] reported that anxiety not only hinders recovery but also intensifies pain and delays the restoration of digestive function post-operatively.

These findings demonstrate the critical need for effective management of pre-operative anxiety to optimise recovery outcomes, particularly in abdominal surgeries. Global statistical results strongly underscore the importance of implementing routine screening for pre-operative anxiety, alongside the creation of tailored interventions to effectively manage it[5,7]. Furthermore, studies by Agüero-Millan et al.[8] and Xing et al.[9] underscore the significance of psychological interventions, such as therapy and pre-operative health education, in mitigating anxiety and enhancing post-operative recovery.

In Vietnam, preliminary research has begun to explore the impact of pre-operative anxiety in hospital settings. A study by Tran and Nguyen[10] identified a negative correlation between anxiety levels and speed of recovery following surgery. Additionally, a study conducted by Nguyen et al.[11] at Pham Ngoc Thach Hospital in 2023 demonstrated that patients experiencing higher anxiety levels tended to have prolonged hospital stays. However, evidence from previous studies on the effect of pre-operative anxiety on post-operative recovery remains unclear in Vietnam, especially among patients undergoing abdominal surgery.

Given these insights, this study seeks to achieve two main objectives:

1. to assess the level of pre-operative anxiety in patients undergoing abdominal surgery
2. to examine how this anxiety affects recovery outcomes in the Department of Gastrointestinal Surgery at a hospital in Vietnam.

The expected results will provide valuable evidence for improving psychological care and overall treatment quality.

Research method

Research design

This study was conducted using a descriptive cross-sectional approach. The STrengthening the Reporting of OBservational Studies in Epidemiology (STROBE) checklist was used to report this study.

Sample

The study included patients who underwent scheduled abdominal surgery in the Department of Gastrointestinal Surgery at a hospital in Vietnam from September 2023 to August 2024.

Inclusion and exclusion criteria

Patients aged 18 years and older, who were scheduled for abdominal surgery, voluntarily agreed to participate in the study, and could read and write in Vietnamese were included in the study.

Patients with a prior history of anxiety disorders or depression were excluded from the study.

Sample size

The sample size in this study was calculated using the following formula for estimating a proportion in the population, where n = minimum required sample size, α = significance level set at 0.05 for a 95 per cent confidence level, p = proportion of patients with pre-operative anxiety from previous studies and d = desired margin of error (d = 0.08 for an accuracy of 92%).

$$n = Z^2_{1-\frac{\alpha}{2}} \times \frac{p(1-p)}{d^2}$$

Previous studies on pre-operative anxiety have reported different anxiety rates. For instance, Phi et al.[12] found that 88.3 per cent of patients experienced pre-operative anxiety, while Do et al.[13] reported a higher rate of 98.9 per cent in patients undergoing abdominal surgery. In another study, Nguyen et al.[14] found that all patients undergoing colorectal cancer surgery experienced anxiety. In contrast, Nguyen et al.[11] reported that 64.94 per cent of patients had pre-operative anxiety.

Our study adopted the anxiety rate of 64.94 per cent (p = 0.649) reported by Nguyen et al.[11] for the sample size calculation. This choice reflects a balance between practical feasibility and scientific rigor by selecting a realistic proportion grounded in existing evidence. Applying this to the formula, the required sample size was 136. After rounding and accounting for a ten per cent dropout rate, we determined the final sample size to be 150 patients scheduled for abdominal surgery. Statistical significance was set at $p < 0.05$ with a 95% confidence interval.

Sampling method

A simple random sampling method was used in this study. On average, four to nine abdominal surgeries were performed each day at the study hospital. We randomly selected two to five patient records from all cases that met the inclusion criteria until the desired sample size of 150 patients was reached.

Data collection

Data collection tools

Five collection tools were used to collect data about demographic characteristics, pre-operative anxiety, causes of pre-operative anxiety and post-operative recovery outcomes, which included both recovery quality and sleep quality. Since sleep quality was recognised as a crucial aspect of post-operative recovery, it was included as a key outcome measure in this study's evaluation.

Demographic characteristics questionnaire: Demographic characteristics were collected using a questionnaire and from medical records. Characteristics included age, gender, religion, education level, residence, marital status, occupation, health insurance information, caregiver details and medical information such as type of surgery, previous surgeries and comorbidities.

Hospital anxiety and depression scale – anxiety subscale (HADS-A): Data about pre-operative anxiety was collected using the HADS-A, developed by Zigmond and Snaith[15]. The Vietnamese version of the HADS-A has been used in studies by Long[16] and Do[13], with Cronbach's alpha coefficients of 0.89 and 0.81, respectively. To assess anxiety levels, participants were asked to answer seven questions on the scale. Each item was scored from 0

to 3, and the total anxiety score was the sum of all seven questions, ranging from 0 to 21 points. Higher scores indicated greater anxiety. The scoring system was as follows: 0 = no anxiety, 1–7 = mild anxiety, 8–14 = moderate anxiety and 15–21 = severe anxiety.

Pre-operative anxiety question: Data about causes of pre-operative anxiety in patients was collected using one question with 12 responses addressing common concerns – not waking up after anaesthesia/surgery, death due to anaesthesia, pain after surgery, surgery being postponed, ineffective anaesthesia, adverse effects of surgical errors, failed surgery, death due to surgery, uncomfortable hospital environment, long waiting times for surgery, inability to pay hospital fees and loss of income due to hospitalisation.

Quality of recovery scale (QoR-15): The QoR-15 was developed by Paul S. Myles and colleagues[17] and is a shortened version of the QoR-40 scale[18]. It has 15 questions across five domains: pain (2 questions), physical comfort (5 questions), physical independence (2 questions), psychological support (2 questions) and emotional state (4 questions). Each question uses a 10-point Likert scale, from 0 = 'never' to 10 = 'most of the time' with reverse scoring for negative questions. The total post-operative recovery score is the sum of the individual scores, with a maximum possible score of 150. A higher score indicates better recovery.

Verran and Snyder-Halpern (VSH) sleep scale: The VSH sleep scale was developed by Verran and Snyder-Halpern[19]. This scale consists of 15 questions divided into three parts: sleep disturbances (assessing the patient's perception of sleep disruption), sleep effectiveness (evaluating the patient's perception of the effectiveness of their sleep) and sleep supplementation (assessing the patient's perception of how their sleep improves with additional sleep time). The scale is scored from 0 to 10, with descriptions at the lowest and highest points. Higher scores indicate better sleep quality after coding the scores in the same direction. The total score, ranging from 0 to 150 points, is the sum of all questions.

The scoring system is as follows:

- 0 to 50 points = poor sleep quality
- 51 to 100 points = average sleep quality
- 101 to 150 points = good sleep quality.

The three scales, HADS-A, QoR-15 and the VSH sleep scale, were authorised for use and translated into Vietnamese following the World Health Organization's standardised translation procedures, ensuring cultural adaptation[20]. They were pilot tested on 15 participants to assess reliability, yielding Cronbach's alpha coefficients of 0.89, 0.88 and 0.86, respectively.

Data collection procedure

After obtaining approval from the study hospital, data were collected through interviews and referencing patient medical records. The researchers worked with the coordinating personnel to gather the data; explain the study objectives, research tools, inclusion and exclusion criteria and the timing of the interviews and ensure compliance with ethical standards during the study. Based on the surgery schedule approved by the Department of Gastrointestinal Surgery, every Tuesday and Friday morning, participants who met the inclusion criteria were selected for the study. The participants were informed about the study's purpose and, upon providing consent, the research team conducted face-to-face interviews.

Each participant was assigned a unique identifier, with the first participant labeled as 001, the second as 002, and so on, until the required sample size was achieved. Demographic data (from A1 to A4) and medical information, including pre-operative diagnosis, surgical method, anaesthesia type, surgery duration and comorbidities, were collected from the patients' medical records to ensure the accuracy of the information. In this study, all participants were interviewed both before and after surgery, and all survey questionnaires were reviewed before concluding the interviews, resulting in no sample loss. All participants were surveyed under health conditions that ensured their ability to participate in the interviews.

The questionnaire regarding the demographic characteristics of participants, the HADS-A and pre-operative anxiety question were administered within 24 hours before the scheduled surgery, specifically in the afternoon on the day before the surgery. The QoR-15 and VSH sleep scale were administered 24 to 36 hours after the participants had completed their surgery, specifically in the afternoon following the surgery.

Data analysis

After the participants completed the questionnaires, the research team reviewed all responses to ensure they met the study's inclusion criteria. The validated data were then coded and entered into SPSS version 20.0 for analysis. Descriptive statistics, including frequency, percentage, mean and standard deviation, were used to summarise the data, with results presented in tables and charts. The normality of the quantitative variables was assessed using skewness and kurtosis tests, confirming that the data were normally distributed.

Pearson's correlation coefficient was employed to examine relationships between normally distributed variables. Simple linear regression analysis was conducted to explore the linear associations between pre-operative anxiety (independent variable) and both post-operative recovery quality and sleep quality (dependent variables).

Ethical considerations

The study was conducted after the research proposal was reviewed and approved by the Ethics Committee in Biomedical Research at Hue University of Medicine and Pharmacy, as documented in the approval letter H2023/115 dated 20 May 2023. All collected data were kept confidential and any personal information was protected, being used solely for research purposes and not for any other purpose. All participants were provided with a clear and detailed explanation of the study's objectives and content. Participation was voluntary, and participants had the right to withdraw from the study at any time during the research process.

Table 1: Characteristics of the study population (N=150)

Variables		Frequency (%)
Gender	female	75 (50.0)
	male	75 (50.0)
Age (mean ± SD)	54.9 ± 15.3	
Religion	not religious	98 (65.3)
	Buddhism	35 (23.3)
	Christianity	17 (11.3)
Living area	rural	81 (54.0)
	urban	57 (38.0)
	mountain area	9 (6.0)
	other	3 (2.0)
Educational level	did not attend school	6 (4.0)
	attended primary/secondary school	103 (68.7)
	vocational/college education	25 (16.7)
	university/postgraduate education	16 (10.7)
Marital status	single	20 (13.3)
	widowed	13 (8.7)
	married	117 (78.0)
Health insurance	no	2 (1.3)
	yes	148 (98.7)
Family caregiver	no	3 (2.0)
	yes	147 (98.0)
Comorbidities	no	73 (48.7)
	yes	77 (51.3)
Surgery method	open surgery	21 (14.0)
	laparoscopic surgery	129 (86.0)
History of surgery	no	102 (68.0)
	yes	48 (32.0)

SD = standard deviation

Table 2: Anxiety levels in study participants (N=150)

Classification of anxiety	Frequency (%)
No anxiety	12 (8.0)
Mild anxiety	66 (44.0)
Moderate anxiety	69 (46.0)
Severe anxiety	3 (2.0)
Mean	7.0 ± 3.9

Results

Demographic characteristics of the study participants

The study involved 150 participants with a mean age of 54.9 ± 15.3 years and balanced gender distribution. The majority of participants were not religious (65.3%) and had a high school education (68.7%), and around half lived in rural areas (54%). Most were married (78%) and nearly all had a family caregiver (98%). Nearly all had health insurance (98.7%) and nearly half had no comorbidities (48.7%). Most underwent laparoscopic surgery (86%) and had no prior history of surgery (68%). The distribution of participant characteristics is shown in Table 1.

Participant pre-operative anxiety

Table 2 summarises the anxiety levels found among participants. Nearly all participants experienced some degree of anxiety (92.0%), with moderate anxiety being the most common (46.0%). Severe anxiety was rare (2.0%) and few participants showed no anxiety (8.0%). The overall mean anxiety score was 7.0 (± 3.9), indicating a moderate level of pre-operative anxiety in the study population.

Causes of participant pre-operative anxiety

Figure 1 illustrates the range of causes of pre-operative anxiety among study participants. The most prevalent concern was post-operative pain (69.3%), followed by ineffective anaesthesia (44.0%) and potential surgery delays (30.0%). Less commonly reported worries included death due to anaesthesia (5.3%) and uncomfortable hospital environments (8.0%). Other notable concerns involved surgical failure, adverse effects from surgical errors and financial burdens related to medical bills and hospitalisation.

Participant post-operative outcomes

The quality of post-operative recovery of participants was generally favorable, with overall QoR-15 scores indicating satisfactory recovery (mean = 96.6 ± 16.3). Among the subdomains, psychological

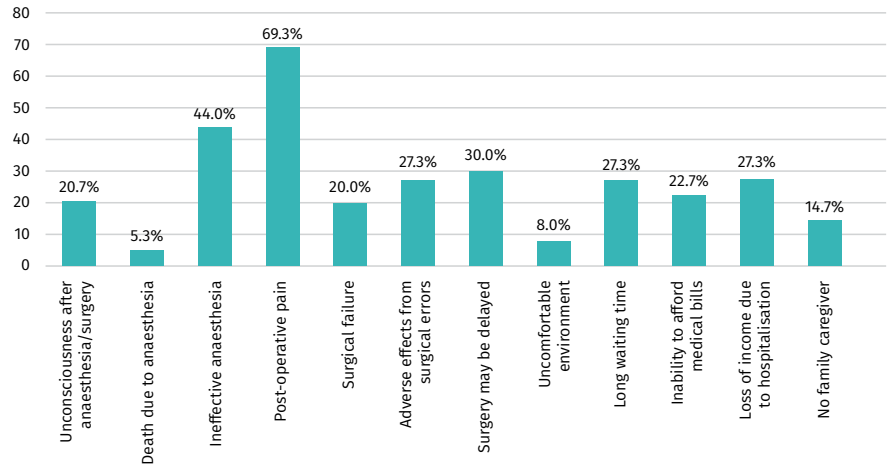

Figure 1: Pre-operative anxiety concerns of study participants

Table 3: Post-operative recovery and sleep quality of study participants (N=150)

	Scale/domain (possible score range)	Participant score range	Mean ± SD
Post-operative recovery	**QoR-15 (0–150)**	**59–125**	**96.6 ± 16.3**
	pain (0–20)	6–18	12.4 ± 2.9
	physical comfort (0–50)	19–41	30.4 ± 5.5
	physical independence (0–20)	2–13	7.9 ± 2.6
	psychological support (0–20)	12–20	17.9 ± 1.9
	emotional state (0–40)	14–37	28.0 ± 5.2
Sleep	**VSH sleep scale (0–150)**	**50–123**	**89.8 ± 18.6**
	sleep disturbance (0–70)	20–54	38.7 ± 8.8
	sleep effectiveness (0–40)	10–34	22.0 ± 6.2
	sleep supplementation (0–40)	19–37	29.1 ± 0.8

QoR-15 = 15-item Quality of recovery scale, VSH = Verran Snyder-Halpern, SD = standard deviation

Table 4: Correlation between pre-operative anxiety and quality of post-operative recovery and sleep in study participants (N=150)

Variables	Pre-operative anxiety	Quality of post-operative recovery	Quality of sleep
Pre-operative anxiety	–		
Quality of post-operative recovery	- 0.896*	–	
Quality of sleep	- 0.880*	0.902	–

*statistically significant result (Pearson correlation, p<0.001)

support and physical comfort received higher scores compared to pain, physical independence and emotional state.

Regarding quality of post-operative sleep, participants reported a moderate overall sleep quality (mean = 89.8 ± 18.6), with sleep disturbances being the most prevalent concern. These findings highlight key areas impacting patients' recovery and rest after surgery. Table 3 summarises participant post-operative recovery and sleep quality.

Correlation between pre-operative anxiety and post-operative recovery outcomes in study participants

Significant negative correlations were observed between pre-operative anxiety and the quality of both post-operative recovery and sleep ($r = -0.896$, $p<0.001$; $r = -0.880$, $p<0.001$, respectively), indicating that increased anxiety levels before surgery are associated with poorer recovery and diminished sleep quality. The correlation between quality of post-operative recovery and quality of post-operative sleep was not statistically significant (see Table 4).

Linear regression analyses (figures 2 and 3) demonstrated a strong negative association between pre-operative anxiety and post-operative outcomes, including recovery quality and sleep quality. Specifically, the post-operative recovery quality equation ($Y = 122.6 - 3.7X$, $r^2 = 0.80$) indicates that for each one-point increase in pre-operative anxiety, the QoR-15 score decreases by 3.7 points. Clinically, this decline may translate into delayed mobilisation, greater need for analgesics and potentially prolonged hospital stays, which can adversely affect patient recovery and healthcare resources. Similarly, the sleep quality equation ($Y = 118.9 - 4.2X$, $r^2 = 0.77$) suggests that pre-operative anxiety leads to a 4.2-point reduction in post-operative sleep quality per unit increase in anxiety, potentially contributing to poor rest and slower healing.

Discussion

This study aimed to evaluate the prevalence of pre-operative anxiety among patients undergoing abdominal surgery and to examine its relationship

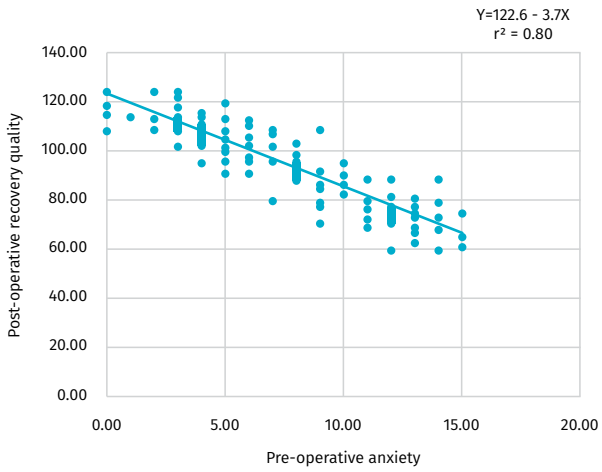

Figure 2: Linear regression analysis of pre-operative anxiety and post-operative recovery quality

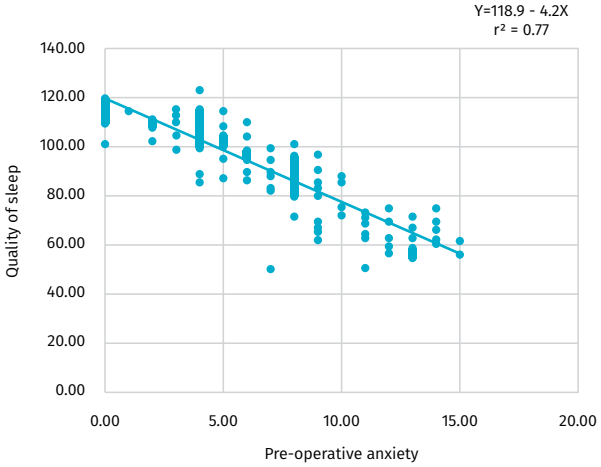

Figure 2: Linear regression analysis of pre-operative anxiety and post-operative sleep quality

with post-operative recovery and sleep quality. The findings showed that 92 per cent of participants experienced pre-operative anxiety, with the mean score of 7.0 ± 3.9 corresponding to mild anxiety, reflecting the emotional stress patients face before major surgical interventions.

These results are consistent with previous Vietnamese studies, including Long[16] who reported anxiety prevalence as 97.3 per cent with similar mean score and distribution, and Do et al.[13] who reported 98.9 per cent anxiety with a slightly higher mean score. A study of colorectal cancer patients by Nguyen et al.[14] indicated even higher anxiety levels, with all patients reporting anxiety and a mean score of 12.27 ± 5.2. Conversely, Nguyen et al.[11] observed a lower anxiety prevalence of 64.94 per cent, while Phi et al.[12] reported 88.3 per cent anxiety prevalence, predominantly mild anxiety. Variations in anxiety levels may be influenced by patient demographics, surgery types and cultural or socioeconomic factors[12,21].

Regarding specific anxiety concerns, post-operative pain was reported most often (69.3%), followed by anaesthesia effectiveness (44%) and surgical errors (27.3%). Other concerns included surgery delays, long waiting times and income loss due to hospitalisation. Notably, fear of death from anaesthesia or surgery was relatively low (5.3%).

The prominence of post-operative pain as a source of anxiety aligns with literature demonstrating its negative impact on both mental and physical health, prolonging recovery and perpetuating a cycle of pain and anxiety[22,23]. Similar concerns were documented in studies by Li et al.[24] and Nguyen et al.[14], highlighting concern about pain and surgical impact as major factors contributing to anxiety. Cultural and economic factors further shape anxiety profiles, as seen in international comparisons such as a South Korean study by Oh et al.[25] where fear of not waking from anaesthesia was prevalent. These differences underscore the importance of tailoring anxiety management to specific populations and healthcare settings.

The current study found that the average score for quality of post-operative recovery at 24 hours post-surgery was 96.6 ± 16.3. This is consistent with typical early post-operative recovery phases that are prone to complications, like respiratory failure and acute pain, where analgesics and sedatives are usually used[26].

Importantly, pre-operative anxiety showed a strong negative correlation with post-operative recovery quality ($r = -0.896$, $p < 0.05$) and sleep quality ($r = -0.880$, $p < 0.05$). Regression analysis indicated that each one-point increase in anxiety corresponded to a 3.7-point decrease in recovery quality. These findings support previous research linking higher pre-operative anxiety to poorer recovery outcomes[27,28]. Gumus[27] emphasised patient education about intra-operative and post-operative experiences should be used as a strategy to reduce anxiety and enhance recovery. Similarly, Ali et al.[6] reported that patients with elevated pre-operative anxiety often faced prolonged recoveries and increased post-operative complications.

From a nursing perspective, these results highlight the critical need for targeted interventions to reduce anxiety. Implementing comprehensive, understandable patient education and fostering open, patient-centered communication can create a sense of safety and comfort, thereby mitigating anxiety. Evidence-based approaches such as pre-operative counseling, transparent information delivery[6] and relaxation techniques[29] should be integrated into perioperative care protocols to optimise recovery.

The average score for post-operative sleep quality was 89.8 ± 18.6, with declines noted in sleep onset, sleep depth and feeling of being rested. Pre-operative anxiety was strongly negatively correlated with sleep quality ($r = -0.880$, $p < 0.05$), with each additional point in anxiety decreasing sleep quality by 4.2 points. Patients with poor sleep had anxiety scores three times higher than those with good sleep quality.

This is consistent with findings by Gu et al.[30] and Hai[31], who demonstrated that anxiety elevates cortisol, disrupts slow-wave sleep and fragments sleep, contributing to increased analgesic requirements and worsened sleep disturbances. Nursing interventions

focusing on anxiety reduction through education, psychological counselling and relaxation techniques before surgery are therefore essential to improve sleep and overall recovery.

Despite this study's valuable contributions, several limitations should be acknowledged. Its single-setting design and reliance on self-reported measures may introduce bias and limit generalisability. The exclusion of patients with prior mental health conditions restricts applicability to more vulnerable populations. Furthermore, the cross-sectional study design prevents causal inferences, and associations should be interpreted cautiously. Future research should expand to multicenter, longitudinal or randomised controlled studies to better clarify causal relationships and evaluate the effectiveness of interventions. Exploring culturally adapted anxiety reduction strategies across diverse patient populations would also enhance the relevance and impact of such interventions internationally.

Conclusion

This study confirms the high prevalence of pre-operative anxiety and its significant negative impact on post-operative recovery and sleep quality among abdominal surgery patients. Integrating targeted nursing interventions to manage anxiety is vital for improving perioperative outcomes and patient wellbeing.

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References

1. Friedrich S, Reis S, Meybohm P, Kranke P. Preoperative anxiety [Internet]. Curr Opin Anaesthesiol. 2022[cited 2025 Aug 18];35(6):674–8. DOI: 10.1097/ACO.0000000000001186
2. Bayrak A, Sagiroglu G, Copuroglu E. Effects of preoperative anxiety on intraoperative hemodynamics and postoperative pain [Internet]. J Coll Physicians Surg Pak. 2019[cited 2025 Aug 18];29(9):868–73. DOI: 10.29271/jcpsp.2019.09.868
3. Ni K, Zhu J, Ma Z. Preoperative anxiety and postoperative adverse events: A narrative overview [Internet]. Anesthesiol Perioper Sci. 2023[cited 2025 Aug 18];1(23):1–8, DOI: 10.1007/s44254-023-00019-1
4. Zemła AJ, Nowicka-Sauer K, Jarmoszewicz K, Wera K, Batkiewicz S, Pietrzykowska M. Measures of preoperative anxiety [Internet]. Anaesthesiol Intensive Ther. 2019[cited 2025 Aug 18];51(1):64–9. DOI:10.5603/AIT.2019.0013
5. Shebl MA, Toraih E, Shebl M, Tolba AM, Ahmed P, Banga HS et al. Preoperative anxiety and its impact on surgical outcomes: A systematic review and meta-analysis [Internet]. J Clin Transl Sci. 2025[cited 2025 Aug 18];9(1):e33. DOI: 10.1017/cts.2025.6
6. Ali A, Altun D, Oguz BH, Ilhan M, Demircan F, Koltka K. The effect of preoperative anxiety on postoperative analgesia and anesthesia recovery in patients undergoing laparoscopic cholecystectomy [Internet]. J Anesth. 2014[cited 2025 Aug 18];28(2):222–7, DOI: 10.1007/s00540-013-1712-7
7. Abate SM, Chekol YA, Basu B. Global prevalence and determinants of preoperative anxiety among surgical patients: A systematic review and meta-analysis [Internet]. Int J Surg Open. 2020[cited 2025 Aug 18];25:6–16. DOI: 10.1016/j.ijso.2020.05.010
8. Agüero-Millan B, Abajas-Bustillo R, Ortego-Maté C. Efficacy of nonpharmacologic interventions in preoperative anxiety: A systematic review of systematic reviews [Internet]. J Clin Nurs. 2023[cited 2025 Aug 18];32(17–18):6229–42. DOI: 10.1111/jocn.16755
9. Xing J, Gong C, Wu B, Li Y, Liu L, Yang P et al. Effect of an educational video about ERAS on reducing preoperative anxiety and promoting recovery [Internet]. Heliyon. 2023[cited 2025 Aug 18];9(10):e20536. DOI: 10.1016/j.heliyon.2023.e20536
10. Tran AV, Nguyen TS. The impact of preoperative anxiety on the recovery of patients after abdominal surgery at Thai Nguyen Central Hospital [Internet]. TNU J Sci Technol. 2019[cited 2025 Aug 18];194(01):115–20. Available from: https://jst.tnu.edu.vn/jst/article/view/28
11. Nguyen DL, Nguyen AT, Truong TT, Nguyen TH, Tong TT, Nguyen MK. Lo âu của người bệnh trước phẫu thuật lồng ngực tại bệnh viện phạm ngọc thạch, năm 2023 [Preoperative anxiety of patients undergoing thoracic surgery at Pham Ngoc Thach Hospital 2023] [Internet]. Tạp chí Nghiên cứu Y học [Journal of Medical Research]. 2023[cited 2025 Aug 18];172(11):244–52. DOI: 10.52852/tcncyh.v172i11.2081
12. Phi TTH, Huong PTT, Tuyet TT. Thực trạng lo âu và nhu cầu hỗ trợ tâm lý ở người bệnh trước phẫu thuật tuyến giáp tại Bệnh viện Nội tiết Trung ương [The current status of anxiety and the need for psychological support in patients undergoing thyroid surgery at the Central Endocrinology Hospital] [Internet]. Tạp chí Y học Thảm họa và Bỏng [Journal of Disaster Medicine and Burn Injuries]. 2023[cited 2025 Aug 18];3:79-88. DOI: 10.54804/yhthvb.3.2023.237
13. Do CC, Duangpaeng S, Hengudomsub P. Factors related to preoperative anxiety among patients undergoing abdominal surgery in Phu Tho Province General Hospital, Vietnam [Internet]. ไทยเภสัชศาสตร์และวิทยาการสุขภาพ [Thai Pharmaceutical and Health Science Journal]. 2013[cited 2025 Aug 18];8(4):155–62. Available from: https://ejournals.swu.ac.th/index.php/pharm/article/view/3968
14. Nguyen HT, Le DH, Tran NT, Ho MT, Dang HUT, Le NH, Huynh N. Mức độ lo âu của người bệnh trước phẫu thuật ung thư đại trực tràng và các yếu tố liên quan [The level of anxiety in patients undergoing colorectal cancer surgery and its related factors] [Internet]. [Tạp chí Y Dược học Cần Thơ] Can Tho Journal of Medicine and Science. 2022;45:8–13. Available from: https://tapchi.ctump.edu.vn/index.php/ctump/article/view/983
15. Zigmond AS, Snaith RP. The hospital anxiety and depression scale [Internet]. Acta Psychiatr Scand. 1983[cited 2025 Aug 18];67(6):361–70. DOI: 10.1111/j.1600-0447.1983.tb09716.x
16. Long NH. Factors related to postoperative symptoms among patients undergoing abdominal surgery [Internet]. Master's thesis. Faculty of Nursing, Graduate School, Burapha University, Thailand. 2010 cited 2025 Aug 18]. Available from: https://digital_collect.lib.buu.ac.th/dcms/files//51913163/title.pdf
17. Myles PS, Shulman MA, Reilly J, Kasza J, Romero L. Measurement of quality of recovery after surgery using the 15-item quality of recovery scale: A systematic review and meta-analysis [Internet]. Br J Anaesth. 2022[cited 2025 Aug 18];128(6):1029–39. DOI: 10.1016/j.bja.2022.03.009

18. Myles PS, Weitkamp B, Jones K, Melick J, Hensen S. Validity and reliability of a postoperative quality of recovery score: The QoR-40 [Internet]. Br J Anaesth. 2000[cited 2025 Aug 18];84(1):11–5. DOI: 10.1093/oxfordjournals.bja.a013366
19. Snyder-Halpern R, Verran JA. Instrumentation to describe subjective sleep characteristics in healthy subjects [Internet]. Res Nurs Health. 1987[cited 2025 Aug 18];10(3):155–63. DOI: 10.1002/nur.4770100307
20. World Health Organization (WHO). Process of translation and adaptation of instruments. Geneva: WHO; 2016.
21. Pham NM, Dao XT, Nguyen VH. Preoperative anxiety status of patients with hip and knee replacement surgery [Internet]. Tạp chí học Việt Nam [Vietnam Medical Journal]. 2023[cited 2025 Aug 18];532(2). DOI: 10.51298/vmj.v532i2.7382
22. Kehlet H, Macrae W, Stubhaug A. Persistent postoperative pain: Pathogenic mechanisms and preventive strategies. In: Mogil JS, editor. Pain 2010 – an updated review: Refresher course syllabus. Seattle: IASP Press. 2010 pp. 181–92.
23. Woolf CJ. Central sensitization: Implications for the diagnosis and treatment of pain [Internet]. Pain. 2011[cited 2025 Aug 18];152(3 Suppl):S2–S15. DOI: 10.1016/j.pain.2010.09.030
24. Li XR, Zhang WH, Williams JP, Li T, Yuan JH, Du Y et al. A multicenter survey of perioperative anxiety in China: Pre- and post-operative associations [Internet]. J Psychosom Res. 2021[cited 2025 Aug 18];147:110528. DOI: 10.1016/j.jpsychores.2021.110528
25. Oh J, Lee W, Ki S, Suh J, Hwang S, Lee J. Assessment of preoperative anxiety and influencing factors in patients undergoing elective surgery: An observational cross-sectional study [Internet]. Medicina. 2024[cited 2025 Aug 18];60(3):403. DOI: 10.3390/medicina60030403
26. Taylor S, Kirton OC, Staff I, Kozol RA. Postoperative day one: A high-risk period for respiratory events [Internet]. Am J Surg. 2005;190(5):752–6. DOI: 10.1016/j.amjsurg.2005.07.015
27. Gümüs K. The effects of preoperative and postoperative anxiety on the quality of recovery in patients undergoing abdominal surgery [Internet]. J Perianesth Nurs. 2021[cited 2025 Aug 18];36(2):174–8. DOI: 10.1016/j.jopan.2020.08.016
28. Rahman AARA, Mahdy NE, Kamaly AM. Predictive factors affecting postoperative quality of recovery for patients undergoing surgery [Internet]. IOSR J Nurs Health Sci. 2017[cited 2025 Aug 18];6(3):50–60. DOI: 10.9790/1959-0603085060
29. Balta MG, Karaman S, Karaman T, Tapar H, Dogru S, Suren M. The effect of preoperative anxiety and depression on postoperative recovery quality [Internet]. Medicine Science. 2022[cited 2025 Aug 18];11:1227–33. DOI: 10.5455/medscience.2022.04.099
30. Gu X, Zhang Y, Wei W, Zhu J. Effects of preoperative anxiety on postoperative outcomes and sleep quality in patients undergoing laparoscopic gynecological surgery [Internet]. J Clin Med. 2023[cited 2025 Aug 18];12(5):1835. DOI: 10.3390/jcm12051835
31. Hai MB. Factors predicting sleep quality in patients after receiving major orthopaedic surgery at Hue University Hospital, Vietnam [Internet]. Unpublished thesis. Burapha University, Chonburi, Thailand. 2018 [cited 2025 Aug 18]. Available from: https://scholar.google.com/citations?view_op=view_citation&hl=en&user=W5fM91EAAAAJ&citation_for_view=W5fM91EAAAAJ:u-x6o8ySG0sC