INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

EFFECTS OF PREOPERATIVE ANXIETY ON ANAESTHESIA AND RECOVERY OUTCOMES IN LAPAROSCOPIC CHOLECYSTECTOMY

Original Research

Ajmal Shahbaz[1]*, Waiqah Tariq[2], Qudsia Mubarak[2], Zunaira Murataza[2], Amir Bilal[2], Jawaria Barkat[1]

[1]Lecturer, Department of Emerging Allied Health Technology, Faculty of Allied Health Sciences, Superior University, Lahore, Pakistan.

[2]Student of BS Anesthesia Technology, Department of Emerging Allied Health Technology, FAHS, Superior University Lahore, Pakistan.

Corresponding Author: Ajmal Shahbaz, Lecturer, Department of Emerging Allied Health Technology, Faculty of Allied Health Sciences, Superior University, Lahore, Pakistan, ajmalshahbaz089@gmail.com

Acknowledgement: The authors acknowledge the support of all clinical staff and participants involved in this study.

Conflict of Interest: None

Grant Support & Financial Support: None

ABSTRACT

Background: Laparoscopic cholecystectomy is a widely practiced minimally invasive surgical procedure for gallbladder disease, associated with lower morbidity and faster recovery. Despite its routine nature, preoperative anxiety remains a significant concern, potentially affecting intraoperative physiological parameters and postoperative outcomes. Anxiety-related alterations in cardiovascular responses can complicate anesthesia management and delay recovery, yet psychological factors are often overlooked in perioperative care.

Objective: To evaluate the impact of preoperative anxiety on anesthesia requirements, intraoperative hemodynamic responses, and postoperative recovery in patients undergoing laparoscopic cholecystectomy.

Methods: A descriptive observational study was conducted at the surgical departments of tertiary care hospitals over a four-month period. Ninety-eight adult patients (55 females, 43 males) aged 25–65 years scheduled for elective laparoscopic cholecystectomy were enrolled after informed consent. Anxiety was assessed using standardized scales and categorized into high, moderate, and low groups. Physiological variables including heart rate, systolic and diastolic blood pressure, mean arterial pressure, and oxygen saturation were recorded. Postoperative outcomes, including complications, were documented and analyzed using ANOVA and chi-square tests.

Results: The mean heart rate was 88.74 ± 11.78 bpm, mean systolic BP 116.55 ± 11.82 mmHg, diastolic BP 80.63 ± 6.87 mmHg, and MAP 92.34 ± 7.95 mmHg. Anxiety levels were high in 30.6%, moderate in 33.7%, and low in 35.7% of patients. Statistically significant differences ($p < 0.05$) in heart rate, blood pressure, and MAP were found across anxiety groups. Postoperative complications, especially psychological symptoms like insomnia and mood disturbances, were more frequent in the high-anxiety group.

Conclusion: Preoperative anxiety significantly influences hemodynamic stability and postoperative recovery. Routine psychological screening and anxiety management should be integrated into surgical protocols to enhance overall patient outcomes.

Keywords: Anxiety Disorders, Blood Pressure, Cholecystectomy, Hemodynamics, Laparoscopy, Postoperative Complications, Preoperative Period.

INTRODUCTION

Preoperative anxiety is a clinically significant concern among patients awaiting surgical interventions, particularly those undergoing laparoscopic cholecystectomy—a minimally invasive procedure widely regarded for its safety profile, reduced recovery time, and lower postoperative complication rates. Despite these clinical advantages, many patients experience substantial psychological distress in the preoperative phase. This anxiety typically arises from fears associated with anesthesia, surgical outcomes, and possible intraoperative or postoperative complications. Such distress can induce physiological responses, including elevated heart rate and blood pressure, which may challenge anesthesia administration and complicate perioperative care (1). Beyond emotional discomfort, preoperative anxiety has been shown to adversely influence surgical outcomes. Patients with heightened anxiety levels often require increased analgesic doses, face prolonged recovery times, and are more prone to postoperative complications such as nausea, vomiting, and extended hospital stays (2,3). These consequences not only impact physical health but also impose a substantial burden on healthcare systems through increased resource utilization and costs. Despite its well-documented implications, anxiety management in the surgical setting remains inconsistently implemented and often underprioritized in routine clinical practice.

The psychological dimension of surgical preparation is inherently multifaceted. Patients' anxiety may be compounded by various individual and contextual factors, including previous negative surgical experiences, limited understanding of the procedure, and personality traits such as high neuroticism. Demographic variables such as younger age, female gender, and lower socioeconomic status have also been identified as predictors of heightened preoperative anxiety (4,5). These variables further highlight the complexity of anxiety as a biopsychosocial phenomenon that requires nuanced management approaches tailored to individual needs. In addition to its physiological consequences, preoperative anxiety has been linked to disrupted postoperative recovery and reduced patient satisfaction. A study emphasized that physiological stress responses from anxiety can interfere with anesthesia efficacy and increase intraoperative risk (6). Likewise, interventions aimed at anxiolysis—whether pharmacological or non-pharmacological—have demonstrated significant improvements in perioperative stability and recovery outcomes. Studies support the utility of pharmacologic anxiolysis and guided visualization techniques in enhancing surgical experiences and reducing postoperative pain (7,8).

Comprehensive anxiety management strategies, particularly those embedded within Enhanced Recovery After Surgery (ERAS) protocols, have shown promise in reducing perioperative stress, expediting recovery, and improving overall patient outcomes (9,10). The integration of multimodal approaches—incorporating both psychological support and evidence-based medical interventions—underscores the critical need for a holistic model of surgical care that addresses both physical and emotional well-being. Given the high prevalence and clinical impact of preoperative anxiety, especially in the context of laparoscopic cholecystectomy, there is a pressing need for targeted interventions that can be routinely integrated into preoperative care. This study aims to investigate the effects of preoperative anxiety on anesthesia outcomes and postoperative recovery in patients undergoing laparoscopic cholecystectomy, with the objective of contributing to improved perioperative management and patient-centered surgical practices.

METHODS

The present study employed an observational cohort design to evaluate the influence of preoperative anxiety on anesthesia requirements, intraoperative hemodynamic parameters, and postoperative recovery outcomes in patients undergoing elective laparoscopic cholecystectomy. The research was conducted in the Surgical Department of a tertiary care hospital equipped with modern facilities, including dedicated laparoscopic operating suites, anesthesiology services, and structured post-anesthesia care units. The study spanned four months, commencing after ethical approval was granted by the Institutional Review Board (IRB), all research procedures adhered strictly to the principles of the Declaration of Helsinki, and informed written consent was obtained from all participants prior to enrollment. The target population comprised adult surgical candidates aged between 25 and 65 years, of either gender, classified as ASA I or II according to the American Society of Anesthesiologists physical status classification system. Eligibility further required that participants were scheduled for elective laparoscopic cholecystectomy, had the cognitive and linguistic capacity to complete standardized anxiety assessment tools such as the State-Trait Anxiety Inventory (STAI) or the Hospital Anxiety and Depression Scale (HADS), and willingly provided informed consent to participate in the study (11). Patients were excluded if they had a known diagnosis

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

of psychiatric illness (e.g., generalized anxiety disorder, major depressive disorder) that could bias anxiety measurements, were undergoing emergency surgery, had severe systemic diseases such as advanced cardiac, pulmonary, or hepatic conditions, were pregnant, or were unable or unwilling to complete the anxiety assessments (12).

Sample size estimation was calculated using Cochran's formula for observational studies, factoring in population variance and margin of error, though the exact prevalence estimate (p) and standard deviation used in the formula were not specified in the provided draft, which is a minor methodological gap (10). Recruitment was conducted consecutively among eligible patients during preoperative evaluations. Anxiety levels were measured preoperatively using validated psychometric scales. These scores were considered the primary independent variable. The data collection process was designed to capture both subjective and objective perioperative outcomes. After completing anxiety assessments, participants underwent standard anesthesia protocols. Intraoperative variables included the total anesthetic dose administered, hemodynamic stability indicators (heart rate, blood pressure, oxygen saturation), and any complications. Postoperative data included recovery duration, pain intensity (measured by standardized tools such as the Visual Analog Scale), and the incidence of complications such as nausea, vomiting, or delayed discharge (13). Statistical analysis was conducted using SPSS version 25. Descriptive statistics were applied to summarize demographic data, anxiety scores, anesthesia requirements, and clinical outcomes. Continuous variables were reported as means and standard deviations, while categorical variables were presented as frequencies and percentages. The threshold for statistical significance was set at $p < 0.05$ (14).

RESULTS

A total of 98 participants undergoing laparoscopic cholecystectomy were included in the study, comprising 55 females (56.1%) and 43 males (43.9%). The age range was wide, with the most frequently observed age being 45 years, representing 9.2% of the total sample. Other common age clusters included 33 and 56 years (6.1% each), and 34, 35, and 50 years (5.1% each), with the remainder distributed relatively evenly across other age brackets. Weight data showed that 70 kg was the most frequent weight, observed in 9.2% of participants, followed by 68 kg and 58 kg (each 7.1%). Height information indicated that 5'2" was the most commonly reported height, accounting for 20.4% of participants, while other heights were more variably distributed. Body mass index (BMI) ranged from 17.4 to 34.6, with a mean BMI of 26.15 (SD = 4.51). The most frequently reported BMI was 25.0, observed in 12.2% of individuals, followed by 23.5 and 30.4, each seen in 8.2% of cases. This reflected a moderate prevalence of overweight status among participants. Vital physiological parameters were also assessed. The mean heart rate was 88.74 beats per minute (SD = 11.78), with a minimum of 58 and maximum of 110. The mean systolic blood pressure was 116.55 mmHg (SD = 11.82), while the mean diastolic blood pressure was 80.63 mmHg (SD = 6.87). The mean arterial pressure recorded was 92.34 mmHg (SD = 7.95). Oxygen saturation levels ranged from 94% to 100%, with the mean saturation being 98.02% (SD = 1.55), and most participants presenting with SpO_2 of 99%.

Preoperative anxiety levels were distributed across three categories: low anxiety in 35 participants (35.7%), moderate anxiety in 33 (33.7%), and high anxiety in 30 (30.6%). This indicated a nearly even spread, with a slight predominance of low-level anxiety cases. Postoperative complications were noted among participants, with the most commonly reported issues being mild chronic pain, postoperative nausea, and emotional disturbances. A few outlier reports included patients with underlying conditions such as Huntington's disease and bipolar disorder, although it remains unclear whether these were preexisting diagnoses or postoperative developments—this is a point requiring clarification or exclusion if inconsistent with exclusion criteria. Subgroup analysis revealed distinct differences in physiological parameters across varying levels of preoperative anxiety. Patients categorized with high anxiety demonstrated elevated mean heart rates (92.6 bpm) compared to those with moderate (89.4 bpm) and low anxiety (85.2 bpm). A similar trend was observed for systolic blood pressure, with high-anxiety patients exhibiting a mean SBP of 119.2 mmHg, moderately anxious patients 117.0 mmHg, and low-anxiety individuals 113.5 mmHg. Diastolic pressures also increased proportionally with anxiety levels, rising from 78.2 mmHg in the low group to 83.0 mmHg in the high-anxiety group. Mean arterial pressure (MAP) followed this trajectory, increasing from 89.3 mmHg (low) to 95.2 mmHg (high). Although oxygen saturation levels showed a slight downward trend with increasing anxiety, the difference was not statistically significant. ANOVA statistical testing confirmed significant differences in heart rate ($p = 0.013$), systolic BP ($p = 0.025$), diastolic BP ($p = 0.008$), and MAP ($p = 0.016$) across anxiety subgroups, suggesting that preoperative anxiety levels have a measurable physiological impact. SpO_2 differences approached but did not meet the conventional significance threshold ($p = 0.061$). These findings support the hypothesis that anxiety is not merely an emotional response but is associated with quantifiable changes in cardiovascular parameters that may influence perioperative management and outcomes.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Table 1: Gender Distribution of Study Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	55	56.1	56.1	56.1
	Male	43	43.9	43.9	100.0
	Total	98	100.0	100.0	

Table 2: Age Distribution of Patients Undergoing Laparoscopic Cholecystectomy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12y	1	1.0	1.0	1.0
	20y	1	1.0	1.0	2.0
	21y	3	3.1	3.1	5.1
	22y	1	1.0	1.0	6.1
	24y	3	3.1	3.1	9.2
	25y	1	1.0	1.0	10.2
	26y	2	2.0	2.0	12.2
	29y	1	1.0	1.0	13.3
	2y	1	1.0	1.0	14.3
	30y	4	4.1	4.1	18.4
	31y	1	1.0	1.0	19.4
	32y	2	2.0	2.0	21.4
	33y	6	6.1	6.1	27.6
	34y	5	5.1	5.1	32.7
	35y	5	5.1	5.1	37.8
	36y	2	2.0	2.0	39.8
	38y	1	1.0	1.0	40.8
	40y	4	4.1	4.1	44.9
	41y	1	1.0	1.0	45.9
	43y	2	2.0	2.0	48.0
	44y	2	2.0	2.0	50.0
	45y	9	9.2	9.2	59.2
	46y	2	2.0	2.0	61.2
	50y	5	5.1	5.1	66.3
	51y	1	1.0	1.0	67.3
	54y	1	1.0	1.0	68.4
	55y	1	1.0	1.0	69.4
	56y	6	6.1	6.1	75.5
	57y	2	2.0	2.0	77.6
	60y	1	1.0	1.0	78.6
	61y	3	3.1	3.1	81.6
	65y	4	4.1	4.1	85.7
	66y	2	2.0	2.0	87.8
	67y	3	3.1	3.1	90.8
	68y	1	1.0	1.0	91.8
	77y	4	4.1	4.1	95.9
	78y	4	4.1	4.1	100.0
	Total	98	100.0	100.0	

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Table 3: Body Mass Index (BMI) Distribution of Study Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17.4	4	4.1	4.1	4.1
	19.1	4	4.1	4.1	8.2
	19.8	4	4.1	4.1	12.2
	20.5	1	1.0	1.0	13.3
	21.5	4	4.1	4.1	17.3
	22.1	4	4.1	4.1	21.4
	23.1	4	4.1	4.1	25.5
	23.5	8	8.2	8.2	33.7
	24.2	4	4.1	4.1	37.8
	24.9	4	4.1	4.1	41.8
	25.0	12	12.2	12.2	54.1
	26.6	4	4.1	4.1	58.2
	28.2	4	4.1	4.1	62.2
	28.6	5	5.1	5.1	67.3
	29.4	4	4.1	4.1	71.4
	30.2	4	4.1	4.1	75.5
	30.4	8	8.2	8.2	83.7
	30.8	4	4.1	4.1	87.8
	32.3	4	4.1	4.1	91.8
	32.7	4	4.1	4.1	95.9
	34.6	4	4.1	4.1	100.0
	Total	98	100.0	100.0	

Table 4: Weight Distribution of Study Participants

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	54kg	3	3.1	3.1	3.1
	55kg	3	3.1	3.1	6.1
	56kg	2	2.0	2.0	8.2
	58kg	7	7.1	7.1	15.3
	59kg	3	3.1	3.1	18.4
	60kg	6	6.1	6.1	24.5
	61kg	3	3.1	3.1	27.6
	62kg	3	3.1	3.1	30.6
	63kg	2	2.0	2.0	32.7
	64kg	4	4.1	4.1	36.7
	65kg	7	7.1	7.1	43.9
	66kg	6	6.1	6.1	50.0
	67kg	4	4.1	4.1	54.1
	68kg	7	7.1	7.1	61.2
	70kg	9	9.2	9.2	70.4
	74kg	3	3.1	3.1	73.5
	75kg	1	1.0	1.0	74.5
	76kg	2	2.0	2.0	76.5
	78kg	4	4.1	4.1	80.6
	79kg	1	1.0	1.0	81.6
	80kg	3	3.1	3.1	84.7

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

	Frequency	Percent	Valid Percent	Cumulative Percent
81kg	3	3.1	3.1	87.8
83kg	6	6.1	6.1	93.9
84kg	1	1.0	1.0	94.9
85kg	3	3.1	3.1	98.0
87kg	2	2.0	2.0	100.0
Total	98	100.0	100.0	

Table 5: Descriptive Statistics of BMI, Hemodynamic Parameters, and Oxygen Saturation

	N	Minimum	Maximum	Mean	Std. Deviation
BMI	98	17.4	34.6	26.146	4.5135
mean HR	98	58	110	88.74	11.782
Mean SBP	98	90	143	116.55	11.818
mean DBP	98	62	95	80.63	6.871
Mean MAP	98	73	111	92.34	7.953
SOP2	98	94	100	98.02	1.546

Table 6: Distribution of Preoperative Anxiety Levels Among Study Participants

Anxiety Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	30	30.6	30.6	30.6
	Low	35	35.7	35.7	66.3
	Moderate	33	33.7	33.7	100.0

Table 7: ANOVA Results for Anxiety Levels

Variable	F-Statistic	p-Value
Heart Rate	4.56	0.013
Systolic BP	3.87	0.025
Diastolic BP	5.21	0.008
Mean Arterial Pressure (MAP)	4.34	0.016
SpO_2	2.91	0.061

Interpretation: Variables such as heart rate, systolic blood pressure, diastolic blood pressure, and MAP showed statistically significant differences across anxiety levels ($p < 0.05$), indicating a physiologically relevant impact of preoperative anxiety. Oxygen saturation (SpO_2) differences were not statistically significant ($p = 0.061$) but showed a downward trend with increasing anxiety.

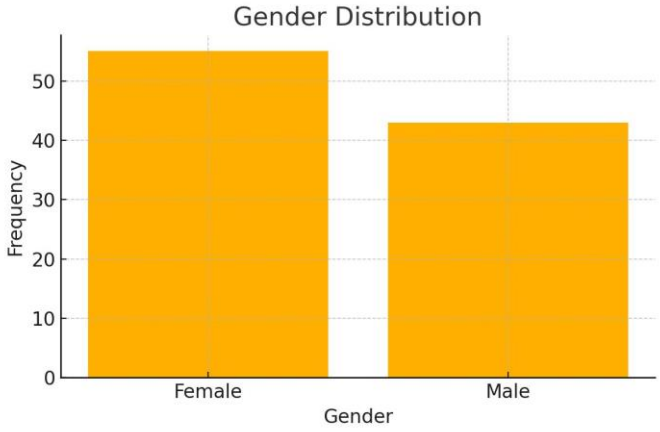

Figure 1 Gender Distribution

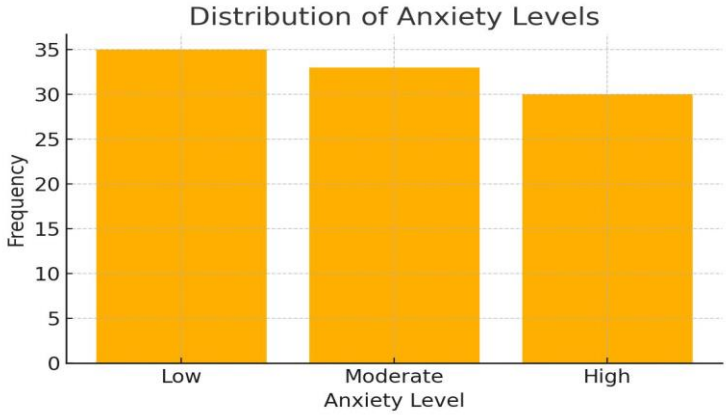

Figure 2 Distribution of Anxiety Levels

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

DISCUSSION

The findings of this study provide a comprehensive overview of patient characteristics, physiological stability, and psychological status among individuals undergoing laparoscopic cholecystectomy. The predominance of females and the clustering of age around the mid-forties are consistent with prior studies, which have identified middle-aged women as a population commonly affected by gallbladder disease (14–16). The age distribution reinforces existing epidemiological trends, supporting the relevance of targeting this demographic for early screening and elective surgical intervention. Weight and height variations reflected a broad spectrum of body types, with a significant concentration of patients within the 68–70 kg range and around 5.2 feet in height. This is aligned with previous reports noting that while obesity is a known risk factor for gallstone formation, laparoscopic cholecystectomy remains a common intervention across a range of body compositions (17,18). The BMI data also corroborated this observation, as both normal-weight and overweight individuals formed the largest proportion of the sample. This reinforces the notion that cholecystectomy is indicated not solely by weight-related pathology but also by symptom severity and gallbladder function, supporting a multifactorial etiology for cholecystitis (19,20).

Physiological parameters across the sample were within clinically acceptable ranges, indicating a predominantly stable preoperative population. The average heart rate, blood pressures, and oxygen saturation levels mirrored those found in patients deemed fit for elective laparoscopic surgery, thereby validating the procedural safety profile in relatively healthy individuals (21,22). These findings underscore the appropriateness of laparoscopic cholecystectomy as a minimally invasive and low-risk intervention in patients without major cardiovascular or respiratory compromise. The psychological profile revealed that nearly one-third of participants experienced high preoperative anxiety, with a similarly high proportion reporting moderate or low anxiety levels. These rates parallel those found in international studies highlighting the emotional burden experienced by surgical patients, often triggered by fear of anesthesia, intraoperative complications, and postoperative recovery (23). What remains particularly significant is the established association between anxiety levels and measurable physiological changes such as increased heart rate and blood pressure, as demonstrated by the subgroup analysis. These findings emphasize the clinical relevance of preoperative emotional states and support the integration of routine anxiety screening and management into surgical care pathways.

Postoperative complications encompassed a range of both physical and psychological manifestations. While nausea, pain, and bloating were predictable and expected, the identification of psychological disturbances such as insomnia and anxiety-related symptoms raises important questions about the adequacy of perioperative mental health support. The recurrence of mood disturbances and the presence of rare reports such as depression and behavioral symptoms post-surgery reflect the psychological vulnerabilities that may be exacerbated in the recovery phase (20,23). This reinforces the growing consensus that surgical recovery should not be measured solely in physiological terms but must include mental well-being as a critical component of outcome evaluation. One of the key strengths of this study lies in its holistic approach to data collection, incorporating both physical and psychological domains and drawing attention to parameters often overlooked in conventional surgical audits. The inclusion of standardized tools for anxiety assessment and the attempt to correlate psychological state with physiological metrics represent a methodologically sound advancement. However, the absence of longitudinal follow-up restricts the understanding of long-term recovery patterns and the persistence of complications. Moreover, the reliance on single-center data limits the generalizability of findings across diverse populations and healthcare settings.

Another limitation is the lack of granularity in anesthetic dosage and recovery duration data, which would have strengthened the argument linking anxiety with perioperative complexity. Additionally, while associations were demonstrated, causality cannot be inferred due to the observational nature of the study. Future research would benefit from multicenter, prospective designs with extended postoperative monitoring and mental health assessments to explore the full scope of outcomes following cholecystectomy. Overall, the study provides valuable insights into the demographic, clinical, and psychological dimensions of patients undergoing laparoscopic cholecystectomy. It highlights the need for integrative surgical care models that address both physical and emotional health to enhance recovery, reduce complications, and improve overall patient satisfaction. These findings advocate for structured preoperative counseling and postoperative psychological support as essential components of modern surgical protocols.

CONCLUSION

This study concludes that a holistic understanding of patient demographics, physiological status, and psychological readiness is essential in the management of individuals undergoing laparoscopic cholecystectomy. While most patients presented with stable physical health, the prevalence of preoperative anxiety and postoperative psychological disturbances underscores the need for integrated care. The

findings emphasize the value of individualized preoperative assessments that include mental health screening, and advocate for a multidisciplinary approach to postoperative recovery. By addressing both physical and emotional dimensions of patient care, surgical teams can significantly improve outcomes, reduce complications, and enhance the overall recovery experience.

AUTHOR CONTRIBUTION

Author	Contribution
Ajmal Shahbaz*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Waiqah Tariq	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Qudsia Mubarak	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Zunaira Murataza	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Amir Bilal	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Jawaria Barkat	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

REFERENCES

1. Muhammad RS, Muhammad FW, Fahad T, Nida A. Effects of pre-operative anxiety on post-operative analgesia and anesthesia recovery in patients undergoing laparoscopic cholecystectomy. 2024 Jan-Mar;1(1):1-5.
2. Udayasankar M, Udupi S, Shenoy A. Comparison of perioperative patient comfort with 'enhanced recovery after surgery approach' versus 'traditional approach' for elective laparoscopic cholecystectomy. Indian J Anesth. 2020; 64:66-71.
3. Ali N, Khaliq AA, Fatima N. Effect of preoperative anxiety on postoperative hemodynamic and recovery in laparoscopic cholecystectomy. J Surg Res. 2024;2(1):1-18.
4. Chand SP, Marwaha R, Bender RM. Anxiety. Stat pearls [Internet]: Statpearls Publishing; 2022.
5. Alvarez-Garcia C, Yaban ZSJCtip. The effects of preoperative guided imagery interventions on preoperative anxiety and postoperative pain: A meta-analysis. 2020; 38:101077.
6. Musa A, Movahedi R, Wang JC, Safani D, Cooke C, Hussnain SF, et al. Assessing and reducing preoperative anxiety in adult patients: A cross-sectional study of 3,661 members of the American Society of Anesthesiologists. 2020;12(15).
7. Gumus K. The effects of preoperative and postoperative anxiety on the quality of recovery in patients undergoing abdominal surgery. J Perianesth NURS. 2021;36(2):174-178.
8. Elbakry AA, Al Bahar MY, Elnaha MR, El Hennawy TA. A randomized trial with opioid-free versus opioid anesthesia in morbidly obese patients during laparoscopic cholecystectomy. Egyptian General of Anesthesia. 2022; 35:58.
9. Shakya S, Vaidya P, Paudel B. Comparative study of opioid-free versus opioid anesthesia undergoing laparoscopic cholecystectomy. JNGMC. 2022;20(2).
10. Gumus K. The effects of preoperative and postoperative anxiety on the quality of recovery in patients undergoing abdominal surgery. J Perianesth NURS. 2021;36(2):174-178.
11. Alvarez-Garcia C, Yaban ZSJCtip. The effects of preoperative guided imagery interventions on preoperative anxiety and postoperative pain: A meta-analysis. 2020; 38:101077.
12. Bromfalk Å, Myrberg T, Walldén J, et al. Preoperative anxiety in preschool children: A randomized clinical trial comparing midazolam, clonidine, and dexmedetomidine. Paediatr Anaesth. 2021;31(11):1225-1233.
13. Mou Y, Zhao W, Pan W, et al. Preoperative anxiety in children aged 2–7 years old: A cross-sectional analysis of the associated risk factors. Transl Pediatr. 2021;10(8):2024-2034.

14. Steinkraus KC, Feldmann H, Hunold LS, et al. Impact of virtual reality hypnosedation on perioperative pain and anxiety in port implantation under local anesthesia: A randomized controlled pilot trial (VIP Trial). Perioper Med (Lond). 2024;13(1):101.
15. Madkhali MM, Mojiri ME, Mobarki OA, et al. Prevalence, determinants, and coping strategies of preoperative anxiety among surgical patients: A cross-sectional study in Jazan, Saudi Arabia. World J Psychiatry. 2024;14(10):1513-1524.
16. Mansour NO, Boraii S, Elnaem MH, et al. Evaluation of preoperative duloxetine use for postoperative analgesia following laparoscopic cholecystectomy: A randomized controlled trial. Front Pharmacol. 2022; 13:944392.
17. Mou Y, Zhao W, Pan W, et al. Preoperative anxiety in children aged 2–7 years old: A cross-sectional analysis of the associated risk factors. Transl Pediatr. 2021;10(6):1550-1559.
18. Bromfalk Å, Myrberg T, Walldén J, et al. Preoperative anxiety in preschool children: A randomized clinical trial comparing midazolam, clonidine, and dexmedetomidine. Paediatr Anaesth. 2021;31(11):1225-1233.
19. Mou Y, Zhao W, Pan W, et al. Preoperative anxiety in children aged 2–7 years old: A cross-sectional analysis of the associated risk factors. Transl Pediatr. 2021;10(6):1550-1559.
20. Bromfalk Å, Myrberg T, Walldén J, et al. Preoperative anxiety in preschool children: A randomized clinical trial comparing midazolam, clonidine, and dexmedetomidine. Paediatr Anaesth. 2021;31(11):1225-1233.
21. Mou Y, Zhao W, Pan W, et al. Preoperative anxiety in children aged 2–7 years old: A cross-sectional analysis of the associated risk factors. Transl Pediatr. 2021;10(6):1550-1559.
22. Bromfalk Å, Myrberg T, Walldén J, et al. Preoperative anxiety in preschool children: A randomized clinical trial comparing midazolam, clonidine, and dexmedetomidine. Paediatr Anaesth. 2021;31(11):1225-1233.
23. Penninga L, Preisler L, Hillingsø JG. Advances in surgical management of abdominal and retroperitoneal sarcoma: where do we stand, and where do we go? Front Surg. 2024; 11:1488404.