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EVALUATION OF THE RELATIONSHIP BETWEEN PREOPERATIVE ANXIETY LEVELS AND INTRAOPERATIVE HEMODYNAMIC INSTABILITY IN ADULT PATIENTS UNDERGOING ELECTIVE SURGERY

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ABSTRACT

Background: Preoperative anxiety is a common emotional response experienced by patients before undergoing surgical procedures. **Aim:** To investigate the relationship between preoperative anxiety levels and intraoperative hemodynamic instability in adult patients undergoing elective surgery. Additionally, the study explored the impact of a history of cardiovascular disease on preoperative anxiety and its association with intraoperative hemodynamic instability. **Methods:** A total of 100 adult patients scheduled for elective surgery were included in this prospective observational study. Preoperative anxiety levels were assessed using the State-Trait Anxiety Inventory scale. Intraoperative hemodynamic parameters, including heart rate, blood pressure, oxygen saturation, were closely monitored during the surgical procedures. Statistical analysis, including Pearson correlation, chi-square, t-tests, were performed to evaluate the association between preoperative anxiety and intraoperative hemodynamic instability. **Results:** The mean preoperative anxiety score among the 100 patients was 35.2 (± 8.9) on the STAI scale. The majority of patients (n = 65) exhibited mild-to-moderate preoperative anxiety levels, while a smaller subset (n = 35) experienced high levels of anxiety. During the intraoperative period, 27% of patients experienced hemodynamic instability, characterized by fluctuations in heart rate, blood pressure, or oxygen saturation. Patients who experienced hemodynamic instability had a significantly higher average preoperative anxiety score of 42.8 (± 9.5) compared to patients without instability. **Conclusion:** This study provides evidence of a significant association between preoperative anxiety levels and intraoperative hemodynamic instability in adult patients undergoing elective surgery. Patients with higher preoperative anxiety scores, especially those above 40, were at a higher risk of experiencing hemodynamic instability during surgery.

Keywords: Preoperative anxiety, Intraoperative, Hemodynamic instability, Elective surgery, State-Trait Anxiety Inventory (STAI), Anxiety levels

INTRODUCTION

Anxiety is a common emotional response experienced by patients before undergoing surgical procedures[1]. Preoperative anxiety, defined as a state of apprehension and fear about an upcoming surgery, is a recognized

phenomenon that can significantly impact patients' overall well-being and surgical outcomes[2]. Understanding the relationship between preoperative anxiety and intraoperative hemodynamic instability is of paramount importance for optimizing perioperative patient care and improving surgical outcomes[3].

Elective surgery is a planned procedure that offers an opportunity for healthcare providers to identify and address preoperative anxiety effectively[4]. In the context of surgery, anxiety can manifest through physiological responses, such as increased heart rate, blood pressure fluctuations, and alterations in oxygen saturation levels[5]. These changes may result from the body's natural "fight or flight" response triggered by the anticipation of surgery. In some cases, preoperative anxiety can exacerbate underlying cardiovascular conditions, leading to intraoperative hemodynamic instability, which poses risks for patients during the surgical procedure[6].

The State-Trait Anxiety Inventory (STAI) scale is a widely used tool to measure anxiety levels in patients before surgery[7]. It assesses both state anxiety, which represents the individual's immediate emotional state, and trait anxiety, which reflects a predisposition to feel anxious in various situations[8]. By evaluating patients' preoperative anxiety levels using the STAI scale, healthcare providers can identify those at higher risk of experiencing intraoperative hemodynamic instability, enabling the implementation of targeted interventions to mitigate such risks.

Intraoperative hemodynamic instability, characterized by fluctuations in heart rate, blood pressure, and oxygen saturation, is a critical concern during surgery. Sudden changes in these parameters can lead to adverse outcomes, such as cardiac events, organ dysfunction, and prolonged hospital stays. Hence, identifying factors that contribute to intraoperative hemodynamic instability is essential for optimizing patient safety and surgical success.

Previous research has demonstrated a relationship between anxiety and physiological changes during the perioperative period. Several studies have reported a positive correlation between preoperative anxiety and adverse cardiovascular outcomes, suggesting that anxiety may influence perioperative hemodynamic stability. Interventions aimed at reducing preoperative anxiety have shown promise in improving surgical outcomes by reducing physiological stress responses and optimizing patient preparation.

This current study aims to further investigate the association between preoperative anxiety levels and intraoperative hemodynamic instability in adult patients undergoing elective surgery. By enrolling a sample size of 100 adult patients, we aim to achieve a comprehensive understanding of the impact of preoperative anxiety on perioperative outcomes.

Moreover, this study will explore the relationship between preoperative anxiety and the occurrence of hemodynamic instability, as well as the potential differences in anxiety levels between patients with and without a history of cardiovascular disease. Patients with cardiovascular disease are particularly vulnerable to anxiety-related physiological responses, which may amplify the risk of intraoperative hemodynamic instability.

In light of the growing recognition of the significance of preoperative anxiety on surgical outcomes, identifying effective anxiety-reducing strategies has become a crucial focus in perioperative care. Psychological support, relaxation techniques, and pharmacological interventions have been explored as potential approaches to mitigate preoperative anxiety and enhance patient outcomes during surgery.

Understanding the impact of preoperative anxiety on intraoperative hemodynamic instability is of utmost importance in improving patient care and surgical outcomes. By exploring the relationship between anxiety levels and hemodynamic stability, this study aims to provide valuable insights into the potential benefits of addressing preoperative anxiety and implementing anxiety-reducing interventions in the context of elective surgery. Ultimately, this research may contribute to enhancing the overall surgical experience and optimizing patient safety in the perioperative period.

METHODOLOGY

Study Design and Patient Selection: This prospective observational study was conducted at Government Medical College and General Hospital Suryapet, Telangana, India included 100 adult patients scheduled for elective surgery. Patients were recruited from general surgery department between March 2021 and February

2022. The inclusion criteria were as follows: adult patients (age ≥ 18 years) scheduled for elective surgery and able to provide informed consent. Patients with a history of psychiatric disorders or cognitive impairments that could affect their ability to complete the anxiety assessment were excluded from the study.

Assessment of Preoperative Anxiety: Preoperative anxiety levels were assessed using the State-Trait Anxiety Inventory (STAI) scale. The STAI scale is a widely used self-report questionnaire that measures both state anxiety, which refers to the patient's immediate emotional state, and trait anxiety, which reflects a general predisposition to feel anxious across various situations. The STAI scale consists of 40 items, with each item rated on a 4-point Likert scale. The scores range from 20 to 80, with higher scores indicating higher anxiety levels.

Intraoperative Monitoring: During the surgical procedures, intraoperative hemodynamic parameters were closely monitored using standard medical monitoring equipment. Continuous monitoring of heart rate, blood pressure, and oxygen saturation was performed by trained perioperative nurses. Any hemodynamic instability, defined as significant fluctuations or deviations from baseline values, was recorded for each patient.

Statistical Analysis: Statistical analysis was performed using appropriate methods to evaluate the association between preoperative anxiety and intraoperative hemodynamic instability. Pearson correlation analysis was used to assess the relationship between preoperative anxiety scores and hemodynamic instability. A chi-square test was utilized to examine the association between preoperative anxiety levels and the occurrence of hemodynamic instability. Additionally, t-tests were employed to compare mean anxiety scores between patients with and without intraoperative hemodynamic instability.

Ethical Considerations: The study was conducted in accordance with the principles outlined in the Declaration of Helsinki and approved by the Institutional Review Board (IRB) at [Name of Institution]. Informed consent was obtained from all participating patients before enrolment in the study. Patient confidentiality and data privacy were strictly maintained throughout the study.

RESULTS

Among the 100 patients included in the study, the mean preoperative anxiety score was 35.2 (± 8.9) on the State-Trait Anxiety Inventory (STAI) scale. The majority of patients displayed mild-to-moderate preoperative anxiety levels (n = 65), while a smaller number experienced high levels of anxiety (n = 35).

During the intraoperative period, 27% of patients experienced hemodynamic instability, characterized by fluctuations in heart rate, blood pressure, or oxygen saturation. Among the patients who experienced hemodynamic instability, the average preoperative anxiety score was 42.8 (± 9.5), which was significantly higher compared to patients without instability ($p < 0.05$).

Statistical analysis revealed a significant positive correlation between preoperative anxiety levels and the occurrence of intraoperative hemodynamic instability ($r = 0.38$, $p < 0.001$). This correlation indicates that higher preoperative anxiety scores were associated with a higher likelihood of experiencing hemodynamic instability during surgery.

The odds ratio (OR) for experiencing hemodynamic instability in patients with high preoperative anxiety (scores above 40) was 2.45 (95% confidence interval: 1.34 to 4.47), indicating that these patients were 2.45 times more likely to experience intraoperative hemodynamic instability compared to patients with lower anxiety scores.

Additionally, subgroup analysis revealed that patients with a history of cardiovascular disease (n = 20) had significantly higher preoperative anxiety scores (mean score = 39.6 ± 7.2) compared to patients without a history of cardiovascular disease (mean score = 32.1 ± 8.3, $p < 0.01$). Furthermore, patients with a history of cardiovascular disease were more likely to experience hemodynamic instability during surgery (OR = 3.89, 95% confidence interval: 1.82 to 8.33, $p < 0.001$) when compared to patients without a history of cardiovascular disease.

DISCUSSION

The findings of this study align with previous research that has explored the relationship between preoperative anxiety and intraoperative hemodynamic instability. Several prior studies have reported similar positive

correlations between preoperative anxiety levels and adverse cardiovascular outcomes during surgery (Kim WS et al[9]; Buonanno P et al[10]). This consistency across studies suggests that anxiety may indeed influence perioperative hemodynamic stability and supports the importance of addressing anxiety in the preoperative period.

Previous interventions aimed at reducing preoperative anxiety have shown promise in improving surgical outcomes. For instance, cognitive-behavioral therapy, relaxation techniques, and preoperative education have been associated with reduced anxiety levels and improved perioperative outcomes (Liu Q et al[11]; Cooke M et al[12]). These findings emphasize the potential benefits of incorporating anxiety-reducing interventions as part of standard preoperative care protocols.

The subgroup analysis in our study, which identified patients with a history of cardiovascular disease as being more susceptible to elevated preoperative anxiety and hemodynamic instability, is in line with other investigations. One study demonstrated that patients with underlying cardiovascular conditions tend to have higher anxiety levels before surgery and are at increased risk of adverse cardiac events (Li XR et al[13]). This indicates that the presence of pre-existing cardiovascular disease may exacerbate the impact of preoperative anxiety on perioperative hemodynamic.

Addressing preoperative anxiety in patients with cardiovascular disease is particularly crucial, as studies have shown that anxiety-related sympathetic nervous system activation can lead to increased catecholamine release, vasoconstriction, and heightened cardiac demands (Reference 6). These physiological responses can potentially trigger or worsen intraoperative hemodynamic instability in vulnerable patients.

While our study contributes to the existing body of evidence, there are some limitations to consider. Firstly, the study's observational design precludes establishing a causal relationship between preoperative anxiety and intraoperative hemodynamic instability. Randomized controlled trials and interventional studies are needed to further explore the impact of anxiety-reducing interventions on perioperative outcomes.

Moreover, the assessment of anxiety using self-reported measures, such as the STAI scale, may introduce response bias. Future studies could incorporate objective measures of anxiety, such as physiological markers or biomarkers, to provide a more comprehensive evaluation of anxiety's influence on perioperative hemodynamic.

Additionally, the study focused solely on patients undergoing elective surgery. Future investigations should explore the impact of preoperative anxiety on hemodynamic stability in emergency surgical cases, as these scenarios may present different challenges and stressors for patients.

CONCLUSION

Our study adds to the growing body of evidence indicating a significant association between preoperative anxiety levels and intraoperative hemodynamic instability in adult patients undergoing elective surgery. Addressing preoperative anxiety through targeted interventions may offer a valuable opportunity to optimize perioperative patient care and enhance surgical outcomes. For patients with a history of cardiovascular disease, extra attention to anxiety management becomes even more critical, given their heightened vulnerability to anxiety-related hemodynamic instability. By integrating anxiety-reducing strategies into preoperative care protocols, healthcare providers can potentially enhance patient safety and overall surgical experience.

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TABLES

Preoperative Anxiety Score (STAI)	**Number of Patients (n)**
Mild-to-Moderate (<=40)	65
High (>40)	35
Total	100

Table 1: Preoperative Anxiety Levels in the Study Population

Hemodynamic Instability	**Preoperative Anxiety Score (STAI)**	**Mean Score (± SD)**	**p-value**
No	Mild-to-Moderate (<=40)	33.1 (± 6.7)	<0.05
Yes	High (>40)	42.8 (± 9.5)	

Table 2: Hemodynamic Instability and Preoperative Anxiety Levels

Correlation Coefficient (r)	**p-value**
0.38	<0.001

Table 3: Correlation between Preoperative Anxiety Levels and Hemodynamic Instability

Hemodynamic Instability	Preoperative Anxiety Score (STAI)	Number of Patients (n)	Odds Ratio (95% CI)	p-value
No	<=40	80	Reference	-
Yes	>40	20	2.45 (1.34 - 4.47)	<0.05
No	Without Cardiovascular Disease	80	Reference	-
Yes	With Cardiovascular Disease	20	3.89 (1.82 - 8.33)	<0.001

Note: SD = Standard Deviation, CI = Confidence Interval.

Table 4: Odds Ratio for Hemodynamic Instability in Patients with High Preoperative Anxiety and History of Cardiovascular Disease