ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE

DEPARTMENT OF ANESTHESIOLOGY, CRITICAL CARE AND PAIN MEDICINE

PREOPERATIVE ANXIETY AND ITS HEMODYNAMIC EFFECT AMONG ELECTIVE SURGICAL PATIENT AT TIKUR ANBESSA SPECIALIZED HOSPITAL IN 2024/2025 G.C

BY AYANTU HORDOFA (MD, ACCPM FINAL YEAR RESIDENT)

ADVISORS: NURA KEDIR (MD, ASSISTANT PROFESSOR OF ACCPM)

YONATHAN ABEBE (MD, ASSISTANT PROFESSOR OF ACCPM)

RESEARCH THESIS SUBMITTED TO DEPARTMENT OF ANESTHESIOLOGY, SCHOOL OF MEDICINE, ADDIS ABABA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE SPECIALITY CERTIFICATE IN ANESTHESIOLOGY, CRITICAL CARE AND PAIN MEDICINE

APRIL 2024, G.C

Declaration of Investigator

I, the undersigned Resident of Anesthesiology, critical care and pain medicine (ACCPM) specialty, declare that this research thesis is my original work in partial fulfillment of the requirement for Anesthesiology, critical care and pain medicine specialty to the best of my knowledge.

Name of investigator: _____

Signature: _____ Date: _____

Advisor's Declaration

I hereby confirm that the thesis entitled "Preoperative Anxiety and Its Hemodynamic Effect Among Elective Surgical Patients at Tikur Anbessa Specialized Hospital", prepared and submitted by Dr. Ayantu Hordofa, has been carried out under our supervision and guidance. To the best of our knowledge, this work is original and has not been submitted, either in part or in full, to any other academic institution. We believe that the thesis meets the required standards and is suitable for submission in partial fulfillment of the requirements for the certificate of specialty in ACCPM.

Date of Submission: _____

Name of primary Advisor:	Signature	Date
_____	_____	_____
Name of secondary Advisor:	Signature	Date
_____	_____	_____

Acknowledgment

I wish to acknowledge the help provided to me by all staff in the department of Anesthesiology, critical care and pain medicine, Addis Ababa University. I am sincerely grateful to my advisors, Dr. Nura Kedir and Dr. Yonathan Abebe, for their invaluable support and guidance throughout the completion of this research thesis.

Acronym and Abbreviation

ACCPM	Anesthesiology, critical care and pain medicine
APAIS	Amsterdam Preoperative Anxiety and information Score
BP	Blood pressure
CI	Confidence Interval
DBP	Diastolic Blood Pressure
HR	Heart rate
HADS	Hospital Anxiety and Depression Scale
GYN	Gynecology
GI	Gastrointestinal
MAP	Mean Arterial Pressure
OR	Operation Room
STAI	State Trait Anxiety Inventory Scale
SBP	Systolic Blood Pressure
SD	Standard Deviation
TASH	Tikur Anbessa Specialized Hospital
VAS	Visual Analog anxiety Scale

Table of Contents

Acknowledgment ii
Acronym and Abbreviation iii
List of Tables vi
List of Figures vii
1. Introduction 2
1.1 Background of the study 2
1.2 Statement of the problem 3
1.3 Justification of the study 3
2. Literature review 4
2.1 Preoperative anxiety among surgical patient 4
2.2 Hemodynamic effect of preoperative anxiety 5
2.2.1 Effect of preoperative Anxiety on Heart Rate 5
2.2.2 Effect of preoperative anxiety on Blood pressure 6
2.3 Factors affecting perioperative hemodynamics 7
2.4 Conceptual frame work 8
3. Objective 9
3.1 General objective 9
3.2 Specific objectives 9
4. Methods and Materials 9
4.1 Study area and period 9
4.2 Study Design 9
4.3 Source and study population 10
4.3.1 Source population 10
4.3.2 Study population 10
4.4 Eligibility Criteria 10
4.4.1 Inclusion Criteria 10
4.4.2 Exclusion criteria 10
4.5 Sample size and Sampling technique 11
4.5.1 Sample Size determination 11
4.5.2 Sampling Procedure 13

4.6 Variables of the study 15
4.6.1 Dependent variables 15
4.6.2 Independent variables 15
4.7 Operational Definition 15
4.7 Data collection procedure 16
4.8 Data processing and Analysis 16
4.9 Data Quality Assurance 17
4.10 Ethical Consideration 17
4.11 Dissemination of the result 17
5. Result 18
5.1 Sociodemographic characteristics of study participants 18
5.2 Prevalence of preoperative anxiety 19
5.3. Comparison of clinical profiles of patients with and without preoperative anxiety 20
5.4 Comparison of heart rate at different time between patient with or without anxiety 22
5.5. Comparison of systolic blood pressure at different time points 23
5.6 Comparison of diastolic blood pressure at different time ponits 25
5.7 Comparison of mean arterial pressure at different time points 27
6. Discussion 29
7. Strength and limitation of the study 32
8. Conclusion and Recommendation 33
8.1 Conclusion 33
8.2 Recommendation 33
7. Reference 34
8. Annexes 36

List of Tables

Table 1: The proportional allocation of sample to each stratum and sampling intervals for each stratum..... 14
Table 2: Contrasting clinical profiles of patients with and without preoperative anxiety..... 21
Table 3: Comparison of systolic blood pressure between patient with and without anxiety at different observation time..... 25
Table 4: Comparison of diastolic blood pressure between patient with and without preoperative anxiety at different observation time..... 27
Table 5: Comparison of mean arterial pressure between patients with and without preoperative anxiety at different observation time..... 28

List of Figures

Figure 1: sociodemographic characteristic of study participants,Sex 18
Figure 2: sociodemographic characteristic of study participants, Age 19
Figure 3:Prevalence of preoperative anxiety 20
Figure 4: Comparison of median heart rate between anxiety and no anxiety group at different observation time 23

Abstract.

Background:
Preoperative anxiety is a common but often under recognized condition. Despite its prevalence ,it is frequently neglected which can negatively affect hemodynamic stability during perioperative period. Understanding its prevalence and physiological consequences is essential for improving perioperative care.

Objective:
To assess preoperative anxiety and its hemodynamic effects among adult elective surgical patients at Tikur Anbessa Specialized Hospital from November 25, 2024 to February 14, 2025 G.C

Methods:
A hospital-based prospective observational study was conducted among adult elective surgical patients at TASH from November 25, 2024 to February 14, 2025. The required sample size (n=446) was calculated using both single population proportion formula (to assess anxiety as secondary outcome) and a two-mean comparison formula (for hemodynamic change), with 95% confidence level, 80% power, and 10% non-response compensation. A stratified sampling technique was employed based on surgical subspecialties, followed by systematic random sampling within each stratum. Preoperative anxiety was assessed using the validated Amharic version of APAIS tool. Hemodynamic parameters were measured at defined perioperative time points. Data was collected using a structured, checklist, entered into Epi 7.2, utilized SPSS version 29.0 for data analysis. Statistical analysis included non-parametric Mann-Whitney U tests due to non-normality, multivariable linear regression to adjust for cofounders, and descriptive statistics (frequency, mean and percentage) was used to summarize the outcome. P value < 0.05 was considered statistically significant.

Results:

Out of 446 participants approached, complete data were available for 419 patients, yielding a response rate of 93.9%. A total of 53% of the study participants was found to have preoperative anxiety as assessed by APAIS tool. Participants with anxiety exhibited significantly higher HR, SBP, DBP, and MAP at multiple perioperative time points compared to those without anxiety. If we look at these changes ,mean HR before induction was 83.61 with SD of 12.16 bpm in the anxiety group versus 82.44 with SD 10.393 bpm in the non-anxious group ($p < 0.001$, regression coefficient: 10.7 bpm, 95% CI: 8.2–13.2). Similarly, MAP in the operating room before induction was 96.43 with SD of 10.82 mmHg in the anxiety group compared to 88.89 with SD of 8.42 mmHg in the non-anxious group ($p < 0.001$, regression coefficient: 9.9 mmHg, 95% CI: 7.1–12.7). These findings suggest a consistent pattern of elevated hemodynamic parameters among anxious patients.

Conclusion:
Preoperative anxiety is highly prevalent among elective surgical patients and is significantly associated with elevated HR, SBP, DBP, and MAP during perioperative periods. The findings of this study highlights the measurable hemodynamic effects of preoperative anxiety and the importance of recognizing it as part of preoperative assessment.

1. Introduction

1.1 Background of the study

Receiving medical diagnosis, treatments and navigating the complexities of healthcare can be a daunting and stressful experience for many patients (1). The combination of the unknown, potential complications and the impact on quality of life can initiate significant anxiety in individual. This anxiety can be further exacerbated by the settings in which healthcare services are provided, with limited privacy and constant foot traffic contributing to a perceived sense of danger (2).

Preoperative anxiety is a common reaction experienced by patients who admitted to a hospital for surgery (1). It can be described by an unpleasant state of tension or uneasiness that results from a patient's doubts or fears before an operation (3). It is a vague, uneasy feeling, the source of which is often nonspecific and unknown to the individual (4).

Preoperative anxiety is a common issue faced by patients undergoing surgical procedures, with significant regional variations in its prevalence. A meta-analysis of studies from developing countries has reported a pooled prevalence of preoperative anxiety ranging from 48% to 55.7% (5). A study conducted at TASH five years ago revealed a concerning prevalence of preoperative anxiety among patients, with a staggering 58.9% of the study population experiencing this condition (4). However, the recent extent and its specific hemodynamic effects on patients undergoing elective surgery remains inadequately explored. While there is validated Amharic version of standardized screening tool, Amsterdam preoperative anxiety and information scale, there is limited data on its application in this context (4).APAIS is a widely used tool for assessing preoperative anxiety and need for information in surgical patients. The screening tool consists of six items designed to measure general anxiety about surgery and anesthesia and the patient`s need for information about the surgery and anesthesia (9).

Many patient commonly experience anxiety before undergoing a surgical procedures and research has shown that it can have profound impacts on an individual's physical and psychological well-being (6). Specifically, studies have demonstrated that preoperative anxiety can lead to abnormal hemodynamics, expressed as change in HR and BP, because of sympathetic, parasympathetic, and endocrine stimulation (1, 7).

1.2 Statement of the problem

Preoperative anxiety is a common and significant issue among patients scheduled for elective surgery, often leading to adverse psychological and physiological outcomes (1). Despite its prevalence, this condition is frequently neglected and underrated (5). That can negatively affect hemodynamic stability during perioperative period (8).

This study aims to assess the prevalence of preoperative anxiety among elective surgical patients TASH and to evaluate its impact on hemodynamic parameters .By using the Amharic version of APAIS screening tool, this research seeks to provide prevalence of preoperative anxiety among adult elective surgical patient at TASH. Furthermore, by using a structured questionnaire this study seek valuable insight into the relationship between anxiety levels and intraoperative hemodynamic changes, ultimately contributing to improved perioperative care and patient outcomes.

1.3 Justification of the study

Preoperative anxiety is a prevalent and often overlooked phenomenon that can have a significant impact on patient outcomes. Understanding the prevalence and impact of preoperative anxiety, particularly its hemodynamic effects, is crucial for improving patient care in the preoperative setting. In addition to this, the application of Amharic version of APAIS in this study will highlights the importance of standardized screening tools in assessing preoperative anxiety and the finding will encourage the routine use of Amharic version APAIS in the hospital ,leading to more personalized and effective preoperative care. The insights gained from this study will also influence hospital policies and protocols regarding the preoperative assessment and management of anxiety. Implementing strategies to address preoperative anxiety will improve the quality of care and patient satisfaction. Overall, this study aims to fill a gap in the understanding of preoperative anxiety and its hemodynamic effects, ultimately contributing to better patient care at TASH and similar Hospitals in the country.

2. Literature review

2.1 Preoperative anxiety among surgical patient

According American Psychological Association (APA),"Anxiety is feelings of tension, apprehension, nervousness, fear, discomfort and high autonomic activity with varying degrees of intensity resulting from anticipation of danger or a threatening event or something unknown"(5). When this happen in preoperative period, it get the term preoperative anxiety (10).

Occurrence of preoperative anxiety varies across countries, type of surgery, gender and previous surgical history (5).A cross sectional study done in United States of America showed 20.2% of preoperative anxiety among patients scheduled for surgery (11). While prospective cohort study done in London showed extent of preoperative anxiety to be 34 % (12).when we look at Asia, a cross sectional study done in Pakistan revealed 72.7 % of patients scheduled for surgery had preoperative anxiety (12).

Preoperative anxiety is a significant concern in Africa, with rate of occurrence fluctuating dramatically between countries, from as low as 11.8% to as high as 76.6%(1,13,14).A prospective descriptive and analytical study performed at Muhimbili National Hospital Tanzania; using Amsterdam preoperative anxiety and information scale screening tool, documented 11.8% of elective surgical patient had preoperative anxiety(1). While a cross sectional study performed in two tertiary care hospitals of Sousse, Tunisia; using similar screening tool, evidenced 67.5% (13).On another hand, descriptive study in Nigeria using APAIS screening showed the proportion of 76.6% (14).

Preoperative anxiety among surgical patients in Ethiopia is also frequent , which varies from 47% to 70.3%(15,16).A prospective survey done in Yirgalem Zonal Hospital in 2018 revealed 47% of patient scheduled for elective surgery to be anxious(15). However, institution based cross-sectional study conducted in Debre Markos and Felege Hiwot referral hospitals from February 01 to April 30, 2017 documented 61% occurrence of preoperative anxiety among elective surgical patient (16). The highest preoperative anxiety in Ethiopia, 70.3%, come from a facility based cross sectional study conducted in Jimma University specialized Hospital from February 13 to April 13 2017(17).

In Tikur Anbessa Specialized Hospital, translation and validation of the Amharic version of APAIS tool was performed through Institution based prospective cross-sectional study. Concomitantly, the occurrence of preoperative anxiety assessed from July 1 to August 30, 2019(4). According to this study 58.9% of the study participant had preoperative anxiety (4).

2.2 Hemodynamic effect of preoperative anxiety

2.2.1 Effect of preoperative Anxiety on Heart Rate

One of the fundamental parameters used to evaluate a patient´s hemodynamic status is their heart rate, which reflects the frequency of cardiac contraction. A limited number of studies have demonstrated a correlation between preoperative anxiety and alterations in heart rate (1, 18). To observe them a prospective observational study done from April 1, 2012 to January 31, 2012 in Japan documented statistically significant variation in heart rate among patient having preoperative anxiety (18). In this study, baseline heart rate and level of anxiety was measured at the time of admission. Then after, heart rate measure on the day of the surgery, 5 minutes after entering the OR. . Heart rate values after entering the operating theatre were significantly higher than the baseline values (18).

Similarly, a prospective descriptive and analytical study done in Tanzania from June 2021 to February 2022 detected significant changes in heart rate. In the study baseline heart rate was taken during preoperative preparation and pre induction of anesthesia. The mean pulse rate preoperatively being 80.9 ± 10.9 bpm and 88.7 ± 16.5 bpm at pre-induction time(1).

On the other hand, an institution based prospective cohort study performed in Ethiopia from November 1, 2019 to October 30, 2020 documented, heart rate of 93.37 ± 12.13 in high anxiety level group and 88.72 ± 12.78 in low anxiety level group at arrival to operation room; which was statistically significant. However, the study showed, there was no statistically significant difference in baseline pulse rate and at the time after induction of anesthesia (19).

2.2.2 Effect of preoperative anxiety on Blood pressure

Building on the previous section's exploration of heart rate, let's delve into the impact of preoperative anxiety on another key hemodynamic parameter: blood pressure**.** All Studies investigating the hemodynamic effect of preoperative anxiety examined both heart rate and blood pressure changes. I will now specifically focus on how anxiety affects blood pressure as mentioned in those studies (18, 19).

The prospective observational study carried out in Japan demonstrated a significant rise in both systolic and diastolic blood pressure measurements following patient entry into the operating room, as compared to pre-operative baseline values. Furthermore, a positive correlation was observed between these blood pressure elevations and the degree of preoperative anxiety (18).

Meanwhile, the prospective observational and analytical study done in Tanzania looked at patient´s systolic, diastolic and mean arterial blood pressure during preoperative preparations and pre-induction of anesthesia. There was no significant changes detected in diastolic and mean arterial pressure. However, there was a significant change in systolic BP during preoperative preparation and pre-anesthetic induction with mean systolic BP being 125.5 ± 12.9 mmHg preoperatively and 132.7 ± 20.0 mmHg at pre-induction time(1).

Likewise, the institution based prospective cohort study performed in Ethiopia documented statistically significant difference in preoperative systolic blood pressure, at arrival to OR, after induction of anesthesia and at 15 minutes after induction of anesthesia between patients with high and low preoperative anxiety (19).

2.3 Factors affecting perioperative hemodynamics

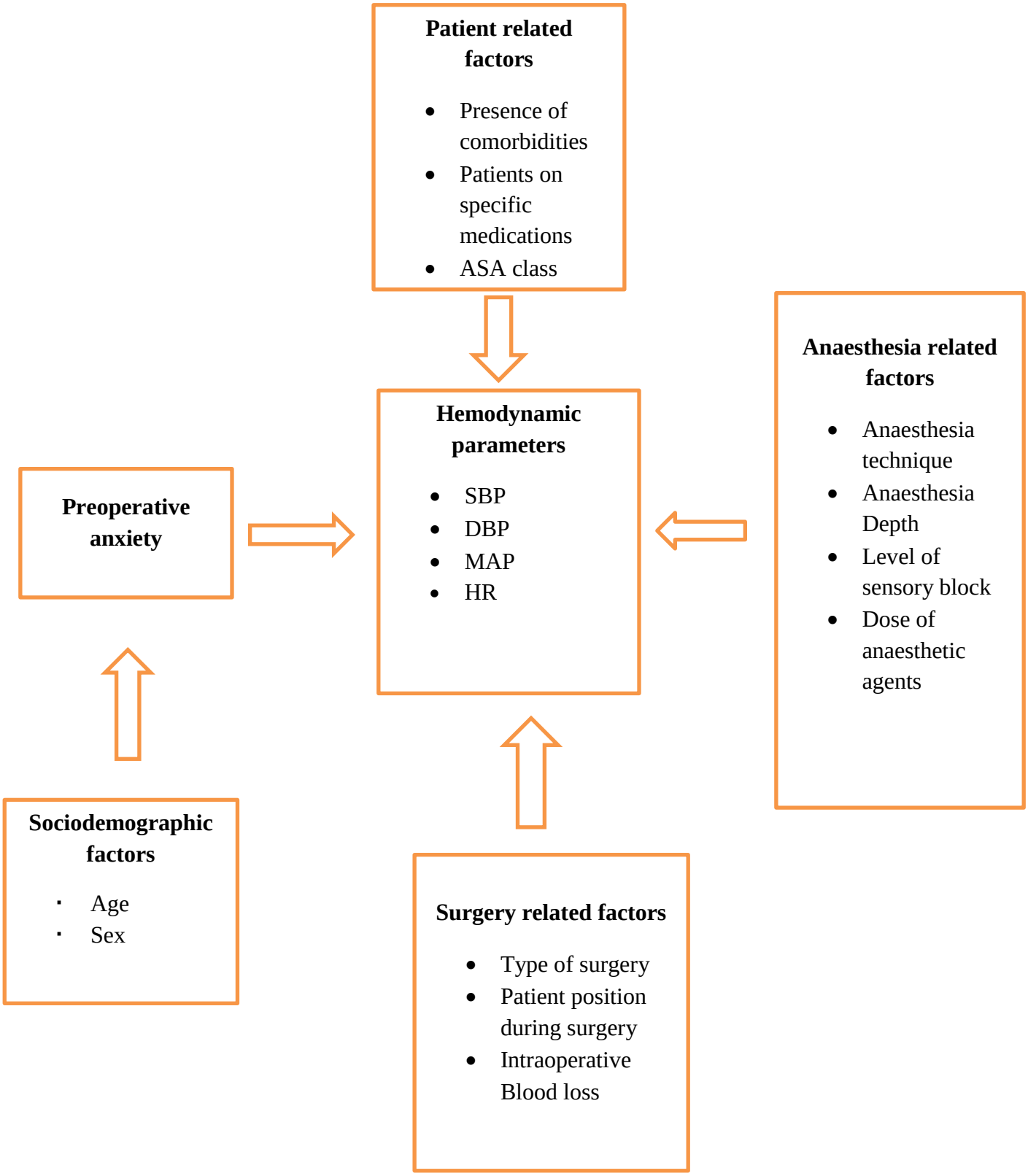
Perioperative hemodynamic changes are influenced by a variety of factors including but not limited to preoperative anxiety (20) . One of these factor is patient related. Elderly patients often have decreased cardiovascular reserve making them prone to hemodynamic changes (21). Presence of comorbidities like anemia, hypertension, heart failure, diabetes mellitus and chronic kidney disease can also affect cardiovascular stability. Medications like beta blockers and antihypertensive agents are other determinants of hemodynamics of patients (22).

Major surgeries like cardiac and vascular tend to cause more significant hemodynamic changes due to their complexity and invasiveness (23, 24). Likewise surgical position also play a role in determining these changes. Prolonged duration of surgery and intraoperative bleeding are other surgery related factors known to influence perioperative hemodynamics (22).

Anesthesia related factors are also key contributors of perioperative hemodynamic changes. General, regional or local anesthesia can all have different hemodynamic effect. These changes varies with depth of general anesthesia and level of sensory block in regional anesthesia. Anesthetic agent type and dose also influence their effect on patient´s hemodynamics. Besides, the amount of fluid administrated and ventilation strategy are variables influencing perioperative hemodynamic responses (22). Furthermore, the use of vasoactive drugs such as vasopressors or inotropes to manage intraoperative blood pressure and cardiac output can modulate hemodynamic parameters (21)

Despite valuable insights into the relationship between preoperative anxiety and hemodynamic changes, effects of confounding factors that influence the results of those studies should be considered. Majority of the studies tried to control for these factors at analysis level using multivariate regression statistical analysis model by statistically adjusting for these variable.

2.4 Conceptual frame work



3. Objective

3.1 General objective

To assess preoperative anxiety and its hemodynamic effect among elective surgical patients in TASH during the period of November 25, 2024 to February 14, 2025 G.C.

3.2 Specific objectives

Primary outcome.

- To assess the effect of preoperative anxiety on heart rate among elective surgical patients in TASH during the period of November 25, 2024 to February 14, 2025 G.C.
- To assess the effect of preoperative anxiety on blood pressure among elective surgical patients in TASH during the period of November 25, 2024 to February 14, 2025 G.C.

Secondary outcome

- To assess prevalence of preoperative anxiety among elective surgical patients in TASH during the period of November 25,2024 to February 14,2025 G.C

4. Methods and Materials

4.1 Study area and period

The study was conducted from November 25, 2024 to February 14, 2025 in TASH, Addis Ababa. Established in 1972, TASH has grown to become the leading teaching hospital affiliated with Addis Ababa University's College of Health Sciences. The hospital plays a pivotal role in providing specialized medical care to a vast population, offering services across various medical disciplines including surgery. The surgical department at TASH is particularly noteworthy, handling a wide range of elective and emergency surgeries. .Highly skilled surgeons, Anesthesiologists and other support staffs are the backbones of this service.

4.2 Study Design

An institution based prospective observational study was carried out using Amharic version APAIS questionnaires at the time of preanesthetic evaluation and intraoperative observation of heart rate,systolic,diastolic and mean arterial blood pressure.

4.3 Source and study population

4.3.1 Source population

All adult patients who were waiting for elective surgery in TASH

4.3.2 Study population

All adult patients Scheduled for elective surgery in TASH and fit the inclusion criteria

4.4 Eligibility Criteria

4.4.1 Inclusion Criteria

Those patients who were 18 years and older were included in the study.

Patients those able to verbalize and gave consent to participate in the study were included in the study.

Patients those scheduled for elective surgery at TASH were included in the study.

4.4.2 Exclusion criteria

Patients with previous diagnosis and/or on medication for generalized anxiety disorder were excluded from the study.

Known hypertensive patients, both controlled and uncontrolled were excluded from study.

Patients known to have any cardiac disease were not included in the study.

Patient previously diagnosed with cognitive impairment were not included in the study.

Patients taking antihypertensive drugs, beta-blockers and Lasix were not included.

4.5 Sample size and Sampling technique

4.5.1 Sample Size determination

To assess the hemodynamic effect of preoperative anxiety, the difference between systolic blood pressure at preoperative time and at the pre induction time among patient identified to have preoperative anxiety was used from previous study(1).

The reason was , study recently done using APAIS tool at Muhimbili National Hospital showed statistically significant difference in SBP; preoperative SBP 125.5 ± 12.9 mmHg and pre induction 132.7 ± 20.0mmHg(1). By using 95 % confidence interval and 80% power, the sample size will be calculated as follow:

$$n = \frac{2 \cdot \left(Z_{\alpha/2} + Z_{\beta}\right)^2 \cdot \sigma^2}{\Delta^2}$$

$$n = \frac{2 \cdot (1.96 + 0.84)^2 \cdot (16.8)^2}{(7.2)^2}$$

$$n = \frac{2 \cdot (2.8)^2 \cdot 282.24}{51.84}$$

$$n = \frac{2 \cdot 7.84 \cdot 282.24}{51.84} = \frac{4424.3}{51.84} \approx 85.3$$

Where n is required sample size, *Z α*/2 is Z value for desired confidence interval ,Z β is Z value corresponding to the desired power ,Ϭ2 is pooled standard deviation and ▲2 is the minimum detectable difference .calculation performed for this objective using this formula give required sample size of 86.

To determine prevalence of preoperative anxiety, the sample size was determined using a single population proportion formula, with the input p which was the prevalence of preoperative anxiety from previous study in TASH (58.9%) (4) , precision level (5%) and 95% confidence interval. The sample size will be 372.

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

$$n = \frac{(1.96)^2 \cdot 0.589 \cdot (1 - 0.589)}{(0.05)^2}$$

$$n = \frac{3.8416 \cdot 0.589 \cdot 0.411}{0.0025}$$

$$n = \frac{3.8416 \cdot 0.242}{0.0025} = \frac{0.9304}{0.0025} = 372.2$$

Where *n* is the sample size, *p* is the prevalence of preoperative anxiety, d is the margin of error (precision level), and *Z* α/2 is the reliability coefficient (confidence coefficient).]

Since the secondary outcome gave the largest sample size, 372 was taken as the sample size for this study. After accounting for a 10% non-response rate, the final calculated sample size was 446

4.5.2 Sampling Procedure

The sampling procedure for the study employed a stratified sampling approach, followed by systematic random sampling within each stratum, to ensure that all surgical subspecialty were adequately represented in the sample. Final sample size, 446, distributed proportionally across following nine tables responsible for adult elective cases: Chest, Endo urology, ENT, Gynecology, GI, Neurosurgery, Vascular, Open urology, orthopedic and obstetric tables.

In the first stage of sampling procedure, the total sample size was allocated proportionally across the nine strata based on case flow data collected over the past 2 month period, 43 working days. Since the plan was to collect data from November 25, 2024 to February 14, 2025; the number of cases in each stratum over 43 days used to estimate cases over the 60 working days targeted for data collection.

Once the sample size was determined for each stratum, systematic random system was employed with in each stratum to select individual cases. A random starting point was selected for each stratum between 1 and the sampling interval.

Stratum	Cases in 43 days	Proportion of total cases	Sample size (proportion of each stratum multiplied by total sample size ,446)	Expected cases in 60 days	Sampling interval
Chest	59	59/711=0.08	37	82	2
Endourology	117	117/711=0.16	74	163	2
ENT	50	50/711=0.07	32	70	2
Gynaecology	74	74/711=0.10	46	103	2
GI	70	70/711=0.098	44	98	2
Neurosurgery	42	42/711=0.059	25	59	2
Vascular	57	57/711=0.08	35	80	2
Open urology	59	59/711=0.08	37	82	2
Orthopaedic	119	119/711=0.167	76	166	2
Obstetric	64	64/711=0.09	40	89	2

Table 1: The proportional allocation of sample to each stratum and sampling intervals for each stratum

4.6 Variables of the study

4.6.1 Dependent variables

- Hemodynamic parameters: Systolic blood pressure, diastolic blood pressure, mean arterial pressure and heart rate

4.6.2 Independent variables

Socio demographic characteristics of the participants: Age, Sex

Preoperative anxiety: measured by using Amharic version of Amsterdam preoperative anxiety and information scale.

Patient related: presence of comorbidities, medications like antihypertensive and beta blockers, ASA class

Anesthesia related: type of anesthesia, depth of anesthesia, level of sensory block, dose of anesthetic drug, mode of anesthesia induction, premedication use

Surgery related: type of surgery, patient position during surgery, intraoperative blood loss.

4.7 Operational Definition

- ❖ Hemodynamic Effect:
  The hemodynamic effect of preoperative anxiety was evaluated by assessing changes in heart rate and blood pressure**.**

- Heart rate was measured during pre-anesthetic evaluation and continuously monitored intraoperatively using electrocardiography (ECG).
- Blood pressure was measured noninvasively using a cuff at six predefined time points: during pre-anesthetic evaluation, immediately before induction, and at 5, 10, 15, and 30 minutes after induction of anesthesia.

- ❖ Preoperative Anxiety**:**
  Preoperative anxiety was assessed using Amharic version of APAIS. A total APAIS score of ≥11 was used to define the presence of clinically significant preoperative anxiety.

4.7 Data collection tool

Data were gathered using a structured and pre-tested checklist tool. The tool was developed after a comprehensive review of relevant literature (4, 32, 1).

Validated Amharic version of APAIS preoperative anxiety-screening tool was employed to assess prevalence of preoperative anxiety at single time point, which is during preanesthetic evaluation at ward The Pre-tested checklist adopted from previous studies was used to evaluate hemodynamic impact of preoperative anxiety.

The questionnaire that used to assess hemodynamic effect of preoperative anxiety was used as English version since data collectors understand it.

4.8 Data processing and Analysis

The filled questionnaires was checked for completeness, entered into EPI data statistical software version 7.2, and exported to SPSS 29.0 for analysis.. Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 29.0. Following data cleaning and organization, frequencies and percentages were computed for all variables relevant to the study objectives Moreover, to describe hemodynamic change, mean change in MAP, SBP, DBP and HR was compared between study participants with and without anxiety via mann-whitney U test after statistical analysis showed non normal distribution. Variables with p-value less than 0.25 in linear logistic regression analysis were entered into the multivariable logistic regression analysis to control confounders. Regression coefficient with 95% confidence interval were used to examine associations between dependent and independent variables. P-value less than 0.05 was considered significant. Finally, the result was presented by using tables and narrative forms

4.9 Data Quality Assurance

To ensure the quality of data collected from study participants, different techniques was used to tackle major areas of bias. Prior to the actual data collection, pre-testing was employed on 5% of the total study participants at TASH which was not included in the actual study, and based on the findings necessary amendments were planned to be made.However,a major amendment was not required at all. Data collectors were trained for one day intensively on data collection procedure that included the objective of the study, confidentiality of the information, informed consent and interview technique. The data collectors worked under close supervision of a supervisor to ensure adherence to correct data collection procedures.

A supervisor reviewed the filled questionnaires at the end of data collection every day for completeness. Moreover, the data carefully entered in to EPI version 7.2, exported to SPSS version 29 and cleaned before the analysis.

4.10 Ethical Consideration

Before the data collection process was started, ethical clearance obtained from AAU, CHS Department of ACCPM. Informed, written and signed consent obtained from every study participant after the purpose and benefits of the study were explained. Participants were informed about the minimal risks involved in participating in the study, their voluntary participation, and their right to withdraw from the interview at any time. Confidentiality of their information was fully maintained throughout the study.

4.11 Dissemination of the result

After research completion and finalizing report and defense with the department of ACCPM, it will be submitted to graduate programs coordinating office and School of Medicine, College of Health Science, AAU and other concerned institutions and stakeholders for possible application and publication of the study. Plans are in place to disseminate the findings through publication in reputable peer-reviewed journals, both nationally and internationally.

5. Result

5.1 Sociodemographic characteristics of study participants

The calculated sample size for the study was **446**. However, complete data was available for only **419 participants**, resulting in a response rate of **93.9%.**A total of 27 cases (6.1%) were excluded due to incomplete data. Fifty point six percent (50.6%) of the study participants were female. The mean age of participants were 41.2 year with standard deviation of 13.5.

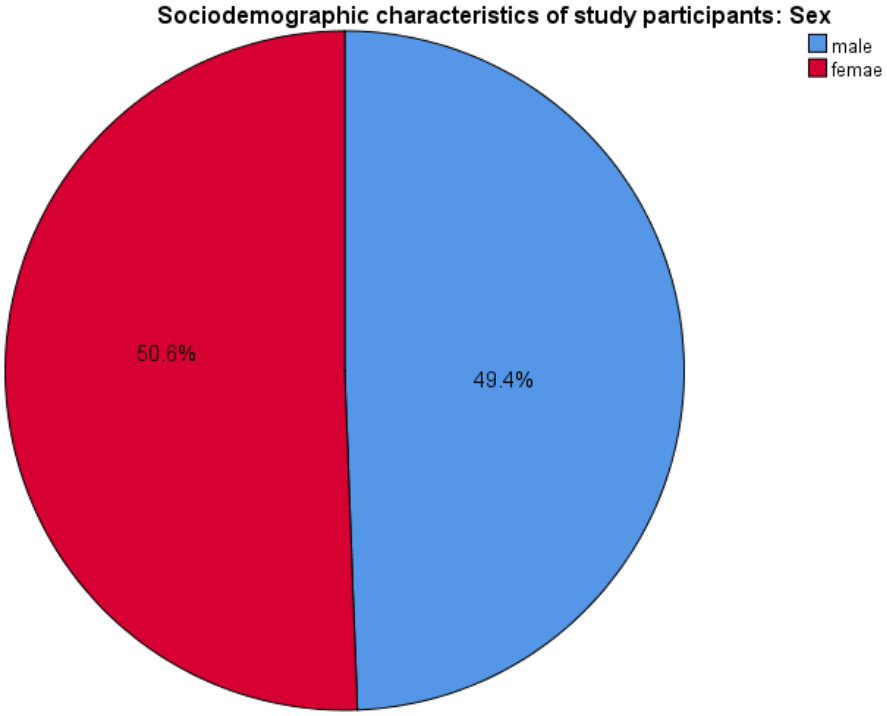


Figure 1: sociodemographic characteristic of study participants,Sex

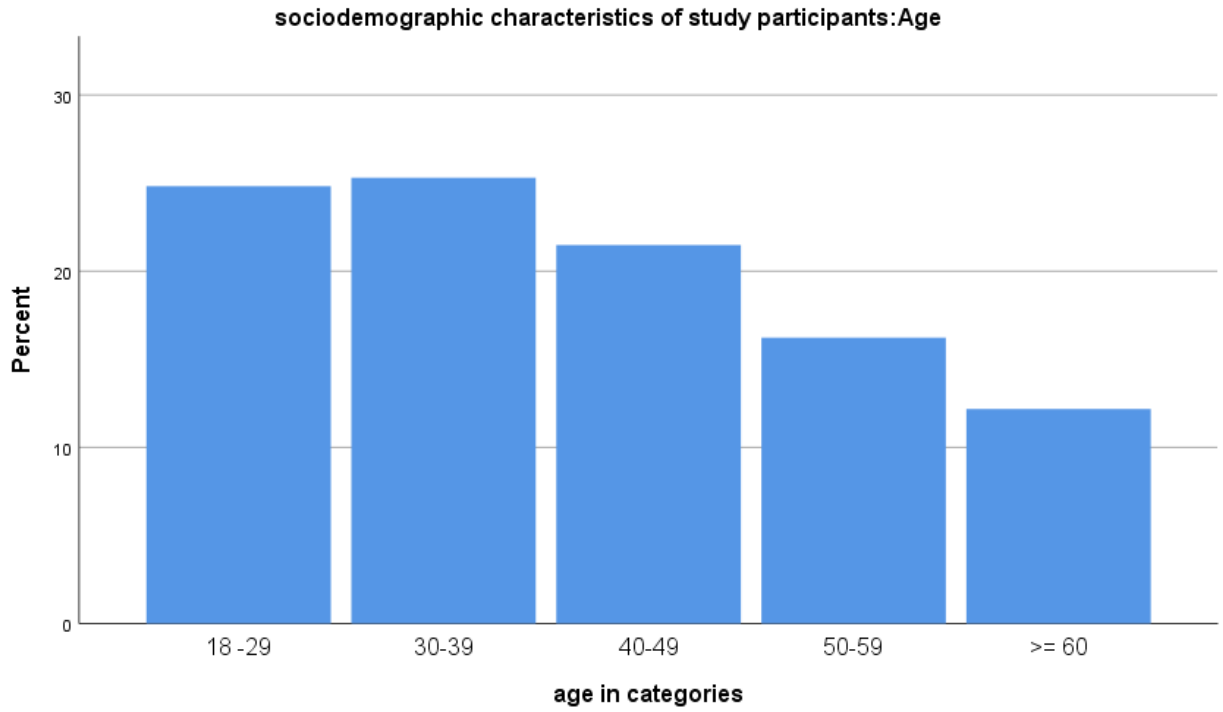


Figure 2: sociodemographic characteristic of study participants, Age

5.2 Prevalence of preoperative anxiety

Among study participants who had elective surgical procedure in TASH between November 25, 2024, and February 14, 2025, the prevalence of preoperative anxiety was found to be **53%** (95% CI: **48.9% – 57.9%**). This indicates that more than half of the surgical patients experienced anxiety before their procedures.

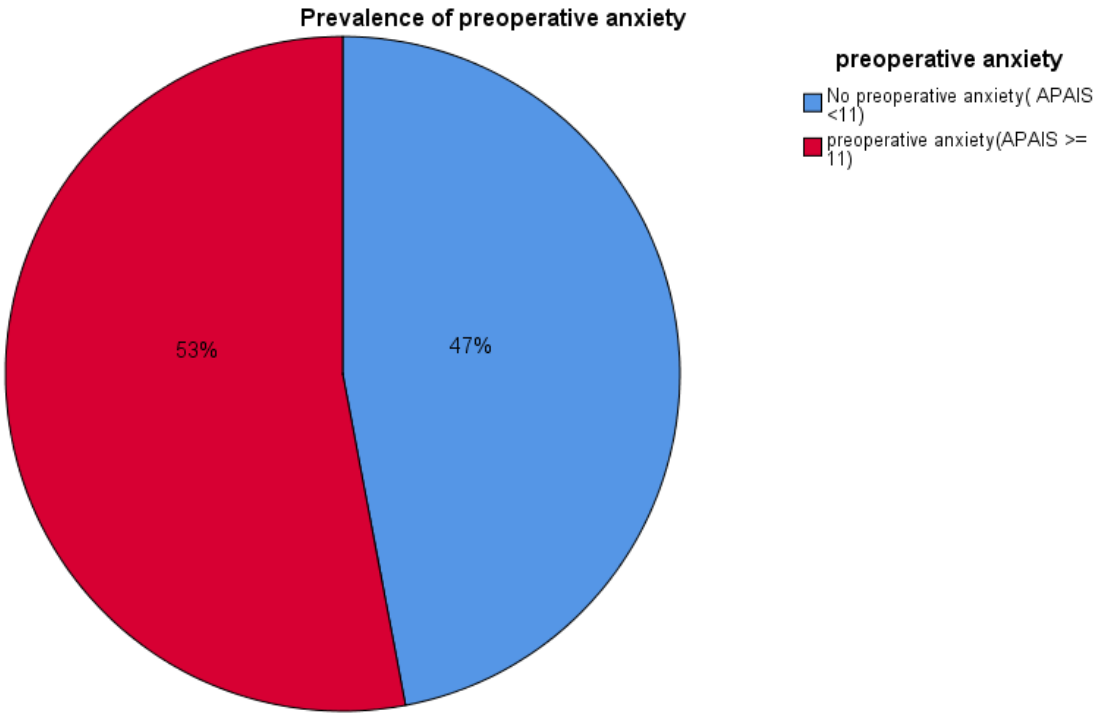


Figure 3: Prevalence of preoperative anxiety

5.3. Comparison of clinical profiles of patients with and without preoperative anxiety

Among 419 study subjects, 54.5% of female and 45.5% of male participants experienced preoperative anxiety (APAIS ≥ 11). Although a higher proportion of females reported anxiety, the difference was not statistically significant (p = 0.089). The association between age and preoperative anxiety among elective surgical patients at TASH was analyzed. The highest prevalence of preoperative anxiety was observed in the 30–39 age group (26.4%), followed by the 40-49 year age group (24.1%) and the 18-29 year age group (21.7%). However, there was no statistically notable link identified between age and preoperative anxiety (p = 0.478). The data showed significant difference in surgery type with higher rate of preoperative anxiety in neurosurgical and orthopedic procedures.

Clinical profile	No preoperative anxiety APAIS <11 (n=197)	preoperative anxiety APAIS >=11 (n=222)	P value
Sex			0.089
Male	54.5%	45.5%	
Female	45.5%	54.5%	
ASA			0.564
ASA I	14.5%	39.5%	
ASA II	20.7%	73%	
ASA III	11.9%	12.9	
AGE(in year)			0.478
18-29	28%	21.7%	
30-39	24.2%	26.4%	
40-49	18.8%	24.1%	
50-59	15.9%	16.5%	
>= 60	13%	11.3%	
Type of anesthesia			0.349
General anesthesia	24%	27%	
Spinal anestheisa	20.5%	24.3%	
Epidural anesthesia	1.2%	0.5%	
CSE	0.2%	0.7%	
others	0.5%	0	
Type of surgery			<0.001
ENT	4.5%	2.1%	
Thoracic	4%	1.9%	
vascular	3.8%	4.5%	
neurosurgery	0.2%	5.7%	
GI	8.1%	8.8%	
Gyn	3.1%	1.4%	
urology	11.2%	11.7%	
ortho	4.8%	7.9%	
obs	3.1%	6.4%	
Other	4.3%	2.4%	

Table 2: Contrasting clinical profiles of patients with and without preoperative anxiety

5.4 Comparison of heart rate at different time between patient with or without anxiety

This study assessed the hemodynamic impact of preoperative anxiety on heart rate at multiple perioperative time points. The comparison was done using the Mann-Whitney U test due to non-normal data distribution, and further supported with linear regression analysis to quantify the association.

The results showed that patients with preoperative anxiety had statistically significantly higher heart rates compared to those without anxiety at almost all measured time points, except at the ward during pre-anesthetic evaluation (mean heart rate 83.61±10.39 bpm versus 82.44±12.16 bpm , $p = 0.137$).

Before induction in the operating room, the mean heart rate for the anxiety group was 94.49 ±15.33 bpm, significantly higher than the no-anxiety group 84.91±12.04bpm ($p < 0.001$). The regression analysis showed that preoperative anxiety was associated with a 10.7 bpm increase in heart rate (95% CI: 8.2 to 13.2, $p < 0.001$). This effect persisted during induction and early post-induction periods.

During induction, mean heart rate was 95.81±16.61bpm in the anxiety group vs 84.7±11.7 bpm in the no-anxiety group ($p < 0.001$), with a regression coefficient of 9.5 bpm (95% CI: 3.2–15.8, $p = 0.004$). Similarly, at 5 minutes post-induction, the anxious group had a mean heart rate of 89.7±13.75 bpm vs. 81.31± 13.25 bpm in the non-anxious group ($p < 0.001$), corresponding to an increase of 9.1 bpm (95% CI: 6.0–12.1, $p < 0.001$) from regression analysis.

At 10 and 15 minutes after induction, significant differences also remained, with regression coefficients of 6.4 bpm and 5.1 bpm respectively (both $p < 0.01$), though the magnitude of difference appeared to taper off over time. By 30 minutes after induction, although the mean heart rate remained higher in the anxiety group (82.33±13.07 bpm vs. 78.9±10.77 bpm, $p < 0.001$ by Mann-Whitney), the association was no longer statistically significant in the multivariate regression model ($p = 0.1$, coefficient = 2.9).

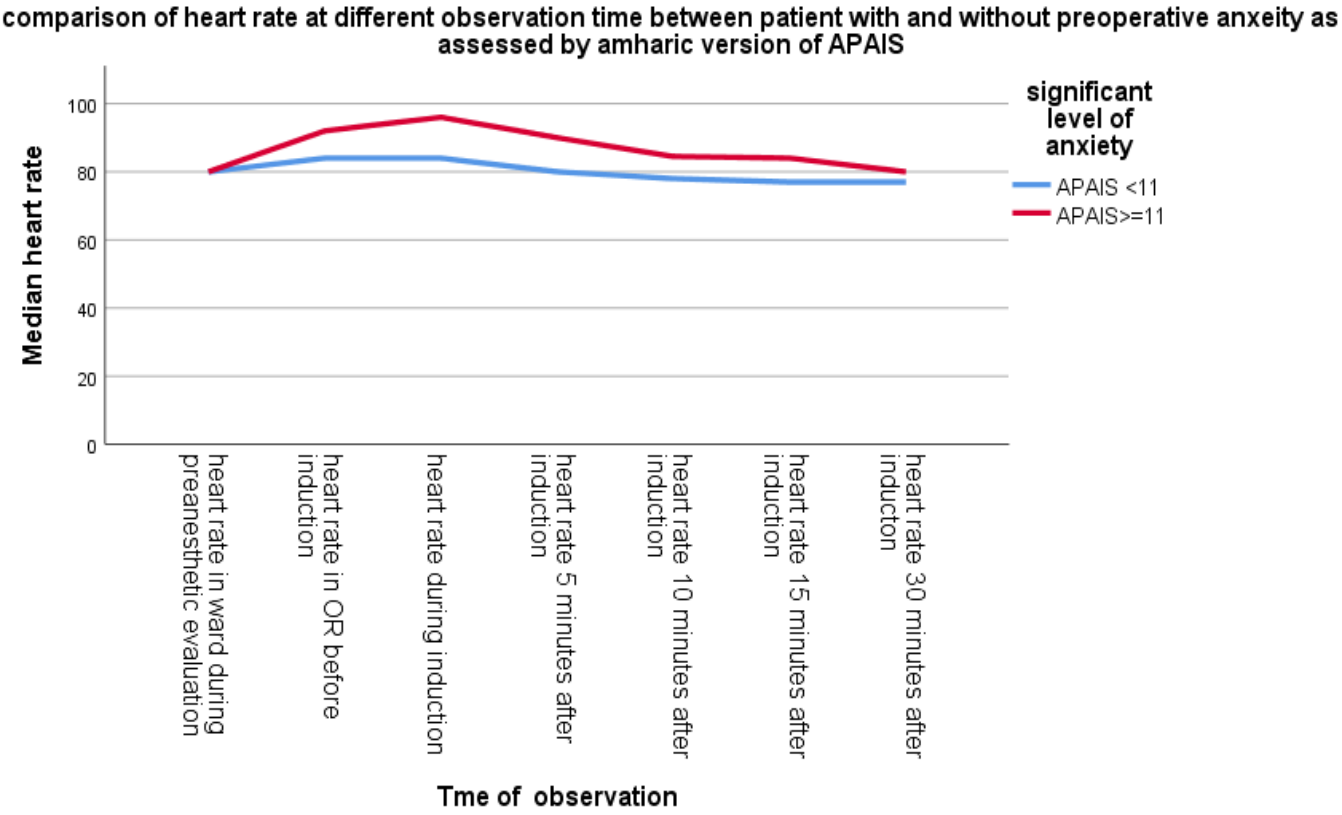


Figure 4: Comparison of mean heart rate between anxiety and no anxiety group at different observation time

5.5. Comparison of systolic blood pressure at different time points

The mean systolic blood pressure values were consistently higher in the anxiety group across various perioperative time points. At the ward, the mean systolic blood pressure was 122.33 ± 15.22 mmHg among anxious patients compared to 115 ± 11.73 mmHg in non-anxious patients, with a statistically significant difference ($p < 0.001$). The corresponding regression coefficient was 10.1 mmHg (95% CI: 6.4–13.9, $p < 0.001$).

Before induction of anesthesia in the operating room, the systolic blood pressure was significantly higher among anxious patients, with a mean of 133 ± 17.22 mmHg versus 118.73 ± 12.02 mmHg in the non-anxious group ($p < 0.001$), and a regression coefficient of 7.5 mmHg (95% CI: 3.7–11.2, $p < 0.001$). During induction, systolic blood pressure was also elevated in the anxiety group (128.84 ± 17.50 mmHg) compared to the no-anxiety group (119.43 ± 11.95 mmHg), with $p < 0.001$ and a regression coefficient of 6.2 mmHg (95% CI: 2.5–9.9, $p = 0.001$).

Five minutes after induction, the systolic blood pressure was 116.6 ± 14.63 mmHg in anxious patients versus 110.54 ± 11.42 mmHg in non-anxious patients, with a p-value of 0.022 and a regression coefficient of 3.2 mmHg (95% CI: 0.5–5.9, $p = 0.020$).

At 10 minutes post-induction, the systolic BP remained significantly elevated in the anxiety group 113.75 ± 12.72 mmHg compared to the non-anxious group 107.83 ± 12.48 mmHg , ($p < 0.001$), and the regression coefficient was 4.9 mmHg (95% CI: 2.1–7.6, $p = 0.001$).

At 15 minutes post-induction, the difference was still statistically significant with mean values of 112.69 ± 12.72 mmHg for the anxiety group and 109.55 ± 12.81 mmHg for the no-anxiety group ($p = 0.001$), regression coefficient 3.8 mmHg (95% CI: 1.4–6.3, $p = 0.002$).

By 30 minutes post-induction, no statistically significant difference in systolic blood pressure was observed between the two groups ($p = 0.285$), and the regression analysis showed no significant association (regression coefficient: 1.2 mmHg, 95% CI: -1.0–3.4, $p = 0.285$).

Systolic Blood pressure	No anxiety Mean ± SD	Preoperative anxiety Mean + SD	Regression coefficient and CI	p value
At ward	115 ± 11.73	122.33 ± 15.22	8.0(3.9-12.2)	<0.001
In the OR before induction	118.73 ± 12.02	133.01 ± 17.22	18.3(14.6-22.1)	<0.001
During induction	119.43 ± 11.95	128.84 ± 17.50	8.5(3.8-13.3)	0.001
5 minutes after induction	110.54 ± 11.42	116.60 ± 14.63	7.8(4.4-11.2)	<0.001
10 minutes after induction	107.83 ± 12.48	113.75 ± 12.72	6.9(3.5-10.4)	<0.001
15 minutes after induction	109.55 ± 12.81	112.69 ± 12.72	10.5(6.7-14.2)	<0.001
30 minutes after induction	108.80 ± 11.94	111.12 ± 12.42	8.7(4.7-12.7)	<0.001

Table 3: Comparison of systolic blood pressure between patient with and without anxiety at different observation time

5.6 Comparison of diastolic blood pressure at different time points

Patients with preoperative anxiety showed higher diastolic blood pressure compared to those without anxiety at most perioperative time points. At the ward, the mean diastolic blood pressure was 76.97 ± 10.35 mmHg in the anxiety group and 73.34 ± 7.48 mmHg in the non-anxiety group. The difference was statistically significant ($p = 0.012$) with a regression coefficient of 3.8 mmHg (95% CI: 1.9–5.8, $p < 0.001$).

In the operating room before induction, the anxious group had a higher mean diastolic pressure of 79.83 ± 9.85 mmHg compared to 74.83 ± 8.12 mmHg in the non-anxious group ($p < 0.001$), with a regression coefficient of 7.9 mmHg (95% CI: 5.7–10.2, $p < 0.001$).

During induction, the mean diastolic BP was 78.5 ± 11.04 mmHg in the anxiety group and 74.72 ± 8.04 mmHg in the no-anxiety group ($p < 0.001$), although the association was not statistically significant in the multivariate model (regression coefficient: 2.3 mmHg, 95% CI: -0.6–5.2, $p = 0.117$).

At 5 minutes after induction, mean was 71.02 ± 9.59 mmHg versus 68.81 ± 9.31 mmHg for the anxiety group and the non-anxiety group respectively. The difference was marginally significant ($p = 0.050$), but not significant in regression analysis ($p = 0.48$).

At 10 minutes after induction, the mean was 69.45 ± 9.98 mmHg in the anxiety group versus 68.19 ± 7.86 mmHg in non-anxiety group. The difference reached statistical significance ($p = 0.012$), and regression analysis confirmed this association (regression coefficient: 3.5 mmHg, 95% CI: 0.8–6.1, $p = 0.011$).

At 15 and 30 minutes post-induction, there was no significant difference in diastolic blood pressure between the groups ($p = 0.935$ and $p = 0.466$, respectively), and regression was not performed due to non-significance.

Diastolic blood pressure	No anxiety Mean ± SD	Preoperative anxiety Mean ± SD	Regression coefficient and CI	p value
At ward	73.34 ± 7.48	76.97 ± 10.35	3.8(1.9-5.8)	<0.001
In the OR before induction	74.83 ± 8.12	79.83 ± 9.85	7.9(5.7-10.2)	<0.001
During Induction	74.72 ± 8.04	78.50 ± 11.04	2.3(-0.6-5.2)	0.117
5 minutes after induction	68.81 ± 9.31	71.02 ± 9.59	0.739-1.3-2.9)	0.48
10 minutes after induction	68.19 ± 7.86	69.45 ± 9.98	3.5(0.8-6.1)	0.011
15 minutes after induction	68.58 ± 8.03	68.39 ± 8.10	……..	0.935
30 minutes after induction	68.54 ± 7.37	68.41 ± 8.13	……	0.466

Table 4: Comparison of diastolic blood pressure between patient with and without preoperative anxiety at different observation time

5.7 Comparison of mean arterial pressure at different time points

Mean arterial pressure (MAP) followed a similar trend, with the anxiety group exhibiting higher values in the OR before induction (96.43 ± 10.82 mmHg vs. 88.89 ± 8.42 mmHg; RC = 9.9; $p < 0.001$) and at ward (90.41 ± 10.04 mmHg vs. 86.49 ± 7.89 mmHg; RC = 5.1; $p < 0.001$). Post-induction differences were smaller but persisted at 10 minutes (RC = 4.8; $p = 0.001$). By 30 minutes, MAP converged between groups ($p = 0.669$).

Table 5: Comparison of mean arterial pressure between patients with and without preoperative anxiety at different observation time

Mean arterial pressure	No anxiety Mean ± SD	Preoperative anxiety Mean ± SD	Regression coefficient and CI	p value
At ward	86.49 ± 7.89	90.41 ± 10.04	5.1(2.6-7.5)	<0.001
In the OR before induction	88.89 ± 8.42	96.43 ± 10.82	9.9(7.1-12.7)	<0.001
During induction	88.97 ± 8.59	94.17 ± 12.90	3.3(0.04-6.5)	0.05
5 minutes after induction	82.32 ± 9.16	85.08 ± 11.02	1.8(-0.6-4.1)	0.14
10 minutes after induction	80.55 ± 8.68	83.86 ± 9.79	4.8(2.0-7.5)	0.001
15 minutes after induction	81.26 ± 8.44	82.97 ± 8.87	……	0.057
30 minutes after induction	81.33 ± 7.39	82.02 ± 9.07	……	0.669

6. Discussion

This study looked at how common preoperative anxiety is and how it affects heart rate and blood pressure during surgery. The results showed that more than half of the patients had anxiety before surgery, and those with anxiety had higher heart rate and blood pressure at several time points. This finding show that anxiety can affect a patient's condition during surgery and should not be ignored.

In this study conducted at Tikur Anbessa Specialized Hospital, the prevalence of preoperative anxiety among elective surgical patients found to be **53%**. This indicates that more than half of the surgical patients experience significant levels of anxiety prior to surgery, highlighting the importance of routine screening and management of psychological distress in the perioperative period. The prevalence observed in this study aligns with findings from previous research in Ethiopia. A study conducted at Yirgalem Zonal Hospital reported a 47% prevalence of preoperative anxiety, while studies at Debre Markos and Felege Hiwot referral hospitals reported 61%, and Jimma University Specialized Hospital reported 70.3% (15,16,17). The slightly lower prevalence in the current study compared to Jimma may be attributed to differences surgical case mix and institutional settings. This study finding is also comparable to the 58.9% prevalence reported in a previous study conducted at Tikur Anbessa Specialized Hospital using the same APAIS screening tool (4). The minor variation could be due to differences in sample size , sampling method and surgical case mix.

Internationally, our result falls between the lower prevalence rates reported in Western countries and the higher rates in some Asian and African nations (5,11,12). For instance, studies conducted in the United States and London reported lower prevalence rates of 20.2% and 34%, respectively(11). In contrast, studies from Pakistan and Nigeria reported higher prevalence rates of 72.7% and 76.6%, respectively (12,13). These discrepancies may stem from cultural factors, availability of preoperative information, differences in healthcare systems, and levels of psychosocial support. The variations in preoperative anxiety prevalence across different settings underscore the multifactorial nature of anxiety, influenced by socio-demographic, clinical, and institutional factors. The relatively high prevalence in this study highlights the need for incorporating routine psychological assessments and interventions in the preoperative workflow to ensure holistic patient care.

Heart rate is one of the fundamental parameters reflecting a patient's hemodynamic state, and its alteration in response to stress, such as preoperative anxiety, has been of interest in various studies. The findings of this study clearly demonstrated that preoperative anxiety was associated with a statistically significantly higher heart rate at nearly all perioperative time points of observation, particularly from the time of arrival in the operating room up to 15 minutes post-induction of anesthesia. This aligns with the prospective observational study conducted in Japan, where patients with preoperative anxiety exhibited a statistically significant increase in heart rate after entering the operating theatre compared to baseline values. In that study, baseline heart rate measured at admission, and follow-up measurement showed elevated heart rates on the day of surgery, particularly five minutes after entering the OR, suggesting an anxiety-induced sympathetic response (18).

The findings of this study is also consistent with a descriptive and analytical study from Tanzania, where the mean pre-induction heart rate increased from 80.9 ± 10.9 bpm during preparation to 88.7 ± 16.5 bpm, indicating a notable change associated with perioperative anxiety(1). While in this study, the mean heart rate increased from 84.91 ± 12.04 bpm to 94.49 ± 15.53 bpm. Furthermore, a prospective cohort study conducted between November 2019 and October 2020 in Dilla ,Ethiopia, reported a significantly higher mean heart rate (93.37 ± 12.13 bpm) in patients with high anxiety compared to those with low anxiety (88.72 ± 12.78 bpm) upon arrival to the OR(19). This finding directly corresponds to our data, which revealed a 10.7 bpm increase in pulse rate in the OR before induction among anxious patients, even after adjusting for confounders. However, that study found no significant difference in heart rate after induction, which contrasts with our results. In this study, the heart rate remained statistically significantly elevated in the anxious group up to 15 minutes post-induction, suggesting that anxiety-related sympathetic activation may persist beyond induction, although the difference began to diminish over time and became statistically insignificant by 30 minutes after induction ($p = 0.1$). This discrepancy could attributed to differences in study design and surgical case mix. Importantly, this study adds to the existing evidence by quantifying the independent effect of anxiety on heart rate through multivariate regression, revealing a robust association even after controlling for other variables such as age, sex, estimated blood loss, patient position, and type of anesthesia.

Building on the previous discussion of heart rate, blood pressure is another critical hemodynamic parameter. In this study, preoperative anxiety found to be significantly associated with elevated systolic blood pressure (SBP) and mean arterial pressure (MAP) at multiple time points, while the effect on diastolic blood pressure (DBP**)** was more variable. Patients with preoperative anxiety had consistently higher SBP values compared to those without anxiety at nearly all measured time points. The difference was statistically significant on both non-parametric analysis and multivariate regression. For instance, mean SBP at the ward was 122.33 ± 15.22 mmHg in the anxiety group versus 115 ± 11.73 mmHg in the no-anxiety group, with a regression coefficient (RC) of 8.0 (95% CI: 3.9–12.2, $p < 0.001$). The difference became even more pronounced just before induction in the operating room, where the anxious group had a mean SBP of 133.01 ± 17.22 mmHg compared to 118.72 ± 12.02 mmHg in the no-anxiety group, RC 18.3 (95% CI: 14.6–22.1, $p < 0.001$). These findings align with a Japanese study that showed a significant rise in SBP after patient entry into the OR, with values positively correlating to anxiety levels (18). Similarly, the Tanzanian study found an increase in mean systolic pressure from 125.5 ± 12.9 mmHg during pre-op preparation to 132.7 ± 20.0 mmHg before anesthetic induction, reinforcing our observation of heightened sympathetic response in anxious patients(1). Furthermore, the Ethiopian cohort study also reported higher preoperative and early intraoperative SBP in the high anxiety group (19).

While differences in DBP were less consistent, statistically significant elevations observed at specific time points. For example, at the ward, the anxiety group had a mean DBP of 76.97 ± 10.35 mmHg versus 73.34 ± 7.48 mmHg in the non-anxious group, RC 3.8 (95% CI: 1.9–5.8, $p < 0.001$). DBP before induction and during induction were also significantly higher in the anxiety group ($p < 0.001$), but the multivariate regression for DBP during induction was not significant ($p = 0.117$), suggesting other confounders may influence DBP more than anxiety alone. These mixed results mirror findings from the Tanzanian study, which reported no significant change in diastolic pressure despite elevated systolic values (1). This study is one of the few to analyze MAP in relation to preoperative anxiety. We found significantly higher MAP values in the anxiety group during the pre-induction period. At the ward, MAP was 90.14 ± 10.04 mmHg in the anxiety group versus 86.49 ± 7.89 mmHg in the non-anxious group (RC 5.1, $p < 0.001$). In the OR before induction, the difference widened (96.43 ± 10.82 vs 88.89± 8.42 mmHg), RC 9.9, $p < 0.01$. These findings suggest increased sympathetic tone leading to generalized vasoconstriction prior to anesthetic administration.

Interestingly, although MAP during induction remained significantly elevated (94.17 ± 10.82 vs 88.89 ± 8.42 mmHg, $p = 0.05$), the significance gradually diminished in the post-induction period. For instance, at 10 minutes post-induction, the difference (83.86 ± 9.79 vs 80.55 ± 8.68 mmHg) remained statistically significant (RC 4.8, $p = 0.001$), but at 30 minutes, the MAP values converged (82.02±9.07 vs 81.33±7.39 mmHg, $p = 0.669$). This trend likely reflects the effect of anesthesia and intraoperative management in normalizing sympathetic over activity.

Collectively, this findings support the hypothesis that preoperative anxiety has a measurable impact on blood pressure, especially before and during induction of anesthesia. This is likely due to activation of the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system, resulting in increased catecholamine release and vascular tone.

7. Strength and limitation of the study

This study has several notable strengths. First, it employed a prospective observational design, which allows for the real-time collection of data and strengthens the temporal relationship between preoperative anxiety and perioperative hemodynamic changes. The use of APAIS, a validated and widely used screening tool, enhances the reliability and consistency of anxiety assessment among participants.

Another important strength is the comprehensive measurement of hemodynamic parameters including heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure at multiple key time points: at the ward, in the operating room before induction, during induction, and various intervals after induction. This approach enabled a detailed examination of anxiety's physiological effects over time.

Despite its strengths, this study also has certain limitations. Being a single-center study conducted at a tertiary referral hospital may limit the generalizability of the findings to other hospitals with different case mixes, patient demographics, or levels of care. The observational nature of the study also restricts causal inference, as associations do not necessarily imply direct cause-and-effect relationships. Finally, the lack of long-term follow-up means that the enduring effects of preoperative anxiety on postoperative recovery and outcomes were not explored.

8. Conclusion and Recommendation

8.1 Conclusion

This study revealed a high prevalence of preoperative anxiety (53%) among patients scheduled for elective surgery at Tikur Anbessa Specialized Hospital. The presence of anxiety was significantly associated with increased heart rate, systolic blood pressure, and mean arterial pressure at multiple time points in the perioperative period, particularly before and during the induction of anesthesia. The findings of this study highlights the measurable hemodynamic effects of preoperative anxiety and the importance of recognizing it as part of preoperative assessment.

8.2 Recommendation

Routine screening for preoperative anxiety: validated Amharic version of APAIS should be integrated into the pre-anesthetic evaluation to allow timely identification and management.

Psychological support interventions, such as counseling, relaxation techniques, or patient education, should be offered to patients identified anxiety to mitigate its physiological effects.

Anesthesia care providers: should be aware of the hemodynamic implications of anxiety and consider it in their anesthetic planning, particularly for patients at higher cardiovascular risk.

Further research involving multiple institutions and diverse patient populations is recommended to enhance generalizability and to explore the long-term clinical outcomes of managing preoperative anxiety.

7. Reference

1. Msoma RAGH, Khamis RH, Rwanyuma LP, Akoko LO, Mkulo AZ, Msinde P. Prevalence of Pre-Operative Anxiety and Predictors among Elective Surgical Patients and Their Pre-Operative Hemodynamic Changes at Muhimbili National Hospital. Open J Med Psychol. 2023;12(02):55–70.

2. Afrassa N, Nega Kassa R, Girma Legesse T. Preoperative anxiety and its associated factors among patients undergoing cardiac catheterization at saint peter Specialized Hospital and Addis Cardiac Center, Addis Ababa, Ethiopia. Int J Afr Nurs Sci. 2022;17:100430.

3. Mavridou P, Dimitriou V, Manataki A, Arnaoutoglou E, Papadopoulos G. Patient's anxiety and fear of anesthesia: effect of gender, age, education, and previous experience of anesthesia. A survey of 400 patients. J Anesth. 2013 Feb 3;27(1):104–8.

4. Blen Ayele, Mahelet Tadesse, Rahel Tilahun, Berhanu Nega. Translation of the Amsterdam Preoperative Anxiety and Information Score (APAIS) into the Amharic Version and Its Validation for Evaluation of Preoperative Anxiety. Ethiop J Health Sci. 2021 Mar 1;31(2).

5. Abate SM, Chekol YA, Basu B. Global prevalence and determinants of preoperative anxiety among surgical patients: A systematic review and meta-analysis. International Journal of Surgery Open. 2020;25:6–16.

6. Klopfenstein CE, Forster A, Van Gessel E. Anesthetic assessment in an outpatient consultation clinic reduces preoperative anxiety. Can J Anaesth. 2000 Jun;47(6):511–5.

7. al'Absi M, Arnett DK. Adrenocortical responses to psychological stress and risk for hypertension. Biomedicine & Pharmacotherapy. 2000 Jun;54(5):234–44.

8. Tadesse M, Ahmed S, Regassa T, Girma T, Mohammed A. Institution based prospective cross-sectional study. International Journal of Surgery Open. 2022 Jun;43:100490.

9. Boker A, Brownell L, Donen N. The Amsterdam preoperative anxiety and information scale provides a simple and reliable measure of preoperative anxiety. Canadian Journal of Anesthesia/Journal canadien d'anesthésie. 2002 Oct;49(8):792–8.

10. Zemła AJ, Nowicka-Sauer K, Jarmoszewicz K, Wera K, Batkiewicz S, Pietrzykowska M. Measures of preoperative anxiety. Anestezjol Intens Ter. 2019 Mar 31;51(1):64–9.

11. Riddle DL, Wade JB, Jiranek WA. Major Depression, Generalized Anxiety Disorder, and Panic Disorder in Patients Scheduled for Knee Arthroplasty. J Arthroplasty. 2010 Jun;25(4):581–8.

12. Hellstadius Y, Lagergren J, Zylstra J, Gossage J, Davies A, Hultman CM, et al. Prevalence and predictors of anxiety and depression among esophageal cancer patients prior to surgery. Diseases of the Esophagus. 2016 Nov;29(8):1128–34.

13. Menel M, Nawel Z, Rania F, Nihel R, Thouraya A, Ali M, et al. Preoperative Anxiety in the Tertiary Care Hospitals of Sousse, Tunisia: Prevalence and Predictors [Internet]. 2018. Available from: www.symbiosisonlinepublishing.com

14. . SSD. Prevalence of preoperative anxiety among Hausa patients undergoing elective surgery- a descriptive study. Adv Soc Sci Res J. 2018 Nov 30;5(11).

15. Bedaso A, Ayalew M. Preoperative anxiety among adult patients undergoing elective surgery: a prospective survey at a general hospital in Ethiopia. Patient Saf Surg. 2019 Dec 8;13(1):18.

16. Mulugeta H, Ayana M, Sintayehu M, Dessie G, Zewdu T. Preoperative anxiety and associated factors among adult surgical patients in Debre Markos and Felege Hiwot referral hospitals, Northwest Ethiopia. BMC Anesthesiol. 2018 Dec 30;18(1):155.

17. Nigussie S, Belachew T, Wolancho W. Predictors of preoperative anxiety among surgical patients in Jimma University Specialized Teaching Hospital, South Western Ethiopia. BMC Surg. 2014 Sep 5;14(1).

18. Tanaka N, Ohno Y, Hori M, Utada M, Ito K, Suzuki T, et al. Predicting Preoperative Hemodynamic Changes Using the Visual Analog Scale. Journal of PeriAnesthesia Nursing. 2015 Dec;30(6):460–7.

19. Tadesse M, Ahmed S, Regassa T, Girma T, Mohammed A. The hemodynamic impacts of preoperative anxiety among patients undergoing elective surgery: An institution-based prospective cohort study. International Journal of Surgery Open. 2022 Jun;43:100490.

20. Ahmetovic-Djug J, Hasukic S, Djug H, Hasukic B, Jahic A. Impact of Preoperative Anxiety in Patients on Hemodynamic Changes and a Dose of Anesthetic During Induction of Anesthesia. Med Arch. 2017 Oct 1;71(5):330–3.

21. Michael A Copper, Neal H.Cohen, Lars I.Eriksson, Lee A.Fleisher, Kate Lessie, Jeanine P.Wienner-kronish2. Miller´s Anesthesia . 2020. 2020;384–401.

22. Gropper MA., Miller RD. Miller's anesthesia. Elsevier; 2020. 2824 p.

23. Potestio C, Xu X. Intraoperative Hemodynamic Monitoring for the Cardiac Surgery Patient. In: Cardiac Anesthesia. Cham: Springer International Publishing; 2021. p. 155–79.

24. Klinkmann G, Reuter DA, Haas SA. Hemodynamic Monitoring and Optimization in Cardiac Surgery. In: Advanced Hemodynamic Monitoring: Basics and New Horizons. Cham: Springer International Publishing; 2021. p. 197–208.

25. Quintão VC, Jreige Júnior A, Rizk SI, Hajjar LA. Haemodynamic monitoring in the perioperative setting. Curr Opin Crit Care. 2023 Jun;29(3):268–74.

8. Annexes

Annex 1:

Study participants information sheet

Title of the Study: Preoperative anxiety and its hemodynamic effect among elective surgical patients at TASH in 2024/2025.

You are invited to take part in this study conducted as part of ACCPM residency requirement. Please take your time to read and or listen the following information carefully before deciding whether to participate.

1. Study Goal:

If the research identifies extent as well as effect of preoperative anxiety per its objectives, it will be crucial for improving patient care in the perioperative setting and will contribute for patient satisfaction. It will also give insight for development of hospital policies and protocols regarding preoperative assessment and management of anxiety.

2. Procedure

If you agree to participate, I will ask you to complete a short checklist assessing your level of anxiety before surgery. Your heart rate and blood pressure will also be recorded at multiple time points: here in the ward, immediately after entering operation room up to half an hour of anesthesia administration.

3. Risk and Benefits

There are no known risks associated with participation in this study. While you may not receive direct personal benefit, your involvement will help improve understanding of how anxiety affects surgical patients and may help enhance patient care in the future.

4. Confidentiality:

All the information you provide will be kept strictly confidential. Your name will not appear in any publication or report. Data will be stored securely and only used for academic purposes.

5. Voluntary participation:

Participation is voluntary. You are free to refuse to take part or to withdraw from the study at any time without giving a reason and without any consequences to your treatment.

7. Contact address:

If you have any questions or need further information about this study, you contact Dr Ayantu Hordofa; phone address 0915961094
Email: hordofaayantu@gmail.com
Addis Ababa University Research CHS Department of Anesthesiology critical care and pain medicine phone.....Addis Ababa, Ethiopia.

8. Informed Consent Form:

I, the undersigned, have read (or had read to me) the information sheet regarding the mentioned study. I understand the objectives, the procedures involved, and my rights as a participant. I have had the opportunity to ask questions and have received satisfactory answers. I understand that participation is voluntary and that I may withdraw from the study at any time without any consequences. By signing below, I confirm my willingness to take part in this study.

Name and signature of participant: _____ _____ Date _____

Name and signature of Data Collector: _____ _____ Date _____

Annex 2: **Data abstraction format**

A data abstraction format prepared to collect data to assess **"**Prevalence and hemodynamic effect of preoperative anxiety among elective surgical patients at TASH in 2024/2025"

I. Socio-Demographic and general characteristics of patients

1. Age in year: _____

2. Sex:

☐ Female
☐ Male

II. Table 1: Item used to assess preoperative anxiety, Amsterdam Preoperative Anxiety and information Score

No	APAIS components	Not at all	Slightly	Moderately	very	Extremely
1	I am worried about the anesthetic					
2	The anesthetic is on my mind continually					
3	I would like to know as much as possible about the anesthetic					
4	I am worried about the procedure					
5	The procedure is on my mind continually					
6	I would like to know as much as possible about the procedure					

III. Items used to assess hemodynamic effect of preoperative anxiety

1. What is the type of anesthesia the patient take for the surgery?
   - ☐ General anesthesia
   - ☐ spinal anesthesia
   - ☐ epidural anesthesia
   - ☐ CSE
   - ☐ Other (specify) _____
2. If spinal anesthesia level of sensory block _____
3. Any premedication used and dose
   - ☐ Atropine _____
   - ☐ Midazolam _____
   - ☐ Diazepam _____
   - ☐ lidocaine _____
4. Mode of induction of anesthesia and intubation
   - ☐ RSI
   - ☐ Direct laryngoscope after long acting muscle relaxant
   - ☐ Awake fiber optic intubation
   - ☐ intubation via video laryngoscope

5. Of the following drugs, which of them are used during induction of anesthesia in this patient? Please specify the dose in u/kg
   - ☐ Fentayl _____
   - ☐ Lidocaine _____
   - ☐ Propofol _____
   - ☐ Ketamine _____
   - ☐ Others(specify)_____
6. How is anesthesia maintained in this patient?
   Inhalation anesthesia:
   - ☐ Halothane
   - ☐ Isoflurane
   - ☐ Sevofluarane

   TIVA: specify the agent and dose mg/kg/hr._____

7. How is the depth of anesthesia?

Time	Surrogates for depth of anaesthesia			
	Pupil size and reactivity	Presence or absence of motor response	Tearing or sweating	MAC of inhalation anaesthesia drug
5 minute after induction				
10 minute after induction				
15 minute after induction				
30 minute after induction				

8. What is the type of surgery patient undergoing?
   - ☐ ENT
   - ☐ Cardiac
   - ☐ Thoracic
   - ☐ Vascular
   - ☐ Neurosurgery
   - ☐ Gastrointestinal
   - ☐ Gynecological
   - ☐ Urology
   - ☐ Orthopedic
   - ☐ Other (specify)
9. What is the patient positon during the surgery?
   - ☐ Supine
   - ☐ Prone
   - ☐ Lateral
   - ☐ Lithotomy
   - ☐ Trendelenburg
   - ☐ Other (specify)_____
10. How much is the estimated blood loss in ml? _____

11. Hemodynamic parameters of the patient?

Time	Hemodynamic Parameter			
	Pulse rate	Systolic Blood pressure	Diastolic Blood pressure	Mean arterial pressure
In ward during pre anesthetic evaluation				
In OR before induction				
During induction of anesthesia				
5 minutes after induction				
10 minutes after induction				
15 minutes after induction				
30 minutes after induction				

12.ASA class of the patient :_____

Annex 3. Amharic version questionnaire

በጥቁር አንበሳ ስፔሻላይዝድ ሆስፒታል የቀዶ ህክምና ህሙማን መርሐግብር መካከል ያለው የቅድመ ቀዶ ህክምና ጭንቀት ስርጭት እና ሄሞዳይናሚክ ተጽእኖ ለመገምገም መረጃ ለመሰብሰብ የተዘጋጀ የመረጃ ማጠቃለያ ቅርጸት

I. ስነ-ሕዝብ እና የታካሚዎች አጠቃላይ ባህሪያት

1. እድሜ _____

2. ጾታ፡

- ☐ ወንድ
- ☐ ሴት

II. መንጠረዥ ነ፡ ከቀዶ ህክምና በፊት ጭንቀትን ለመገምገም የሚያገለግል ንጥል

ቁጥር	ንጥል	ፈጽሞ	በመጠኑ	መካከለኛ	በጣም	እጅግ በጣም
ነ	ስለሰመመን ህክምናው ተጨንቄለሁ					
2	ስለሰመመን ህክምናው ያለእረፍት አስባለሁ					
3	ስለሰመመን ህክምናው በተቻለመጠን ማወቅ እፈልጋለሁ					
4	ስለቀዶ ህክምናው ተጨንቄለሁ					
5	ስለቀዶ ህክምናው ያለእረፍት አስባለሁ					
6	ስለቀዶ ህክምናው በተቻለ መጠን ማወቅ እፈልጋለሁ					