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Assessment of preoperative anxiety, its contributing factors, and impact on immediate postoperative outcomes among cardiac surgery patients - A cross-sectional study

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ASSESSMENT OF PREOPERATIVE ANXIETY, ITS CONTRIBUTING FACTORS, AND IMPACT ON IMMEDIATE POSTOPERATIVE OUTCOMES AMONG CARDIAC SURGERY PATIENTS - A CROSS-SECTIONAL STUDY

By

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13th, November 2023

Dedication

I would like to dedicate my thesis to my affectionate parents, Mr. Nizar Ali and Mrs. Rashida Nizar Ali, and my beloved siblings, Noureen Nizar Ali and Aly Shah Nizar Ali, whose constant and unconditional support, motivation, and prayers encouraged me to accomplish my challenging yet rewarding journey. I would also like to dedicate this dissertation to my fiancé Mr. Arif Saleem, for his continuous support and encouragement throughout this period. Their belief in me and their constant words of encouragement have been the driving force behind every step I took toward completing this thesis.

Abstract

Background

Preoperative anxiety is characterized by an intense sensation of fear, apprehension, and nervousness. In the domain of cardiac surgery, the assessment and management of preoperative anxiety is of paramount importance, as it plays a pivotal role in shaping the patient's surgical experience and immediate postoperative outcomes. While the etiology of preoperative anxiety is multifaceted, the influence of sociodemographic factors in this context is of paramount importance. However, limited studies have been conducted in developing countries regarding this phenomenon.

Purpose

The study aimed to identify the frequency of preoperative anxiety, its contributing factors, and its impact on immediate postoperative outcomes among all adult elective cardiac surgery patients presenting at a tertiary care hospital in Karachi, Pakistan.

Methodology

A quantitative cross-sectional analytical study design was used to address the study question. The non-probability convenience sampling technique was used to recruit a total of 106 consecutive patients planned for elective cardiac surgery. This study was conducted at the cardiac surgery units of the Aga Khan University hospital in Karachi, Pakistan. According to the hospital's policy, patients are admitted an evening before the surgery, during which the primary investigator approached and recruited patients who met the eligibility criteria. The data was collected from the study participants through structured questionnaires, and by using the State-Trait Anxiety Inventory (STAI) scale. Moreover, the association of patient characteristics

including socio-demographic, preoperative and postoperative clinical characteristics with anxiety was assessed by using one-way ANOVA, independent t-test, and Pearson correlation.

Findings

The study enrolled 106 (49 males and 57 females) patients. Their mean age was 46.4 ± 15.72 (range 18-80 years). The findings of the study revealed that 67% of the cardiac surgery patients experienced mild to moderate levels of preoperative anxiety.

Furthermore, the analysis of independent variables showed that there was a statistically significant relationship of patient's age ($r = -0.74$, $p<0.05$), patient's gender ($t=3.41$, $p<0.05$), patient's educational level ($F= 4.04$, $p<0.05$) and postoperative pain ($r= 0.96$, $p<0.01$) with preoperative anxiety.

Conclusion

This study's results shed light on the hidden burden of preoperative anxiety among cardiac surgery patients in developing countries, emphasizing the crucial need for comprehensive preoperative assessment and patient-centered interventions. By understanding the contributing factors and their impact on immediate postoperative outcomes, healthcare providers and policymakers can strive to enhance the quality of care for these patients. Ultimately, this study's findings aim to pave the way for more compassionate, patient-centric, and effective healthcare practices, with the potential to improve the surgical journey and overall well-being of cardiac surgery patients in developing countries.

List of Abbreviation

AHA	American Heart Association
APAIS	Amsterdam Preoperative Anxiety and Information Scale
ASD	Atrial Septal Defect
CABG	Coronary Artery Bypass Grafting
CAD	Coronary Artery Disease
CBT	Cognitive Behavioural Therapy
CCU	Coronary Care Unit
CICU	Cardiac Intensive Care Unit
CMO	Chief Medical Officer
CVD	Cardiovascular Disease
CVI	Content Validity Index
DALY	Disability-Adjusted Life Years
ECG	Electrocardiogram
ERC	Ethical review committee
GABA	Gamma-Aminobutyric Acid
GBD	Global Burden of Disease
HADS	Hospital Anxiety and Depression Scale
HCPs	Healthcare Professionals
HCWs	Healthcare Workers
HF	Heart Failure
HICs	High-Income Countries
IHD	Ischemic Heart Disease

JCIA	Joint Commission International Accredited
LAD	Left Anterior Descending
LAMA	left against medical advice
LMICs	Low and Middle-Income Countries
NCDs	Non - Communicable Diseases
PCI	Percutaneous Coronary Intervention
QoL	Quality of Life
RTC	Randomized Control Trial
SD	Standard Deviation
STAI	State-Trait Anxiety Inventory
vNRS	Verbal Numerical Rating Scale
VR	Virtual Reality
VSD	Ventricular Septal Defect
WHO	World Health Organization

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To begin with, I want to express my gratitude to Almighty Allah for His abundant blessings and the strength He has bestowed upon me to accomplish my goals. I also extend my heartfelt thanks to His Highness the Aga Khan, for providing an exceptional institution to pursue higher education.

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I also wish to express my thanks to my thesis editor, Ms. Fatima Shahabuddin, for her linguistic and editorial support in refining my thesis. Her guidance and punctual feedback have significantly enhanced the quality of my work.

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I extend my gratitude to each of you for having faith in me and my capabilities.

Declaration

I declare that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university and to the best of my knowledge it does not contain any material previously published or written by another person, except where due reference has been made in the text.

The editorial assistance provided to me has in no way added to the substance of my thesis which is the product of my own research endeavours.

(Signature of Candidate)

13th, November 2023

Date

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Chapter One Introduction

This chapter comprises of the study's background, followed by study's purpose, rationale, and research questions. Subsequently, it also highlights the significance of the research.

Background

Overview of cardiovascular disease; The cardiovascular disease (CVD) refers to a group of diseases related to heart and blood vessels**,** such as high blood pressure, Peripheral vascular disorder, rheumatic heart condition, cerebrovascular illness, and coronary arteries disease (CAD), valvular diseases, congenital heart defects, heart failure (HF), and cardiomyopathies (Greenfield & Snowden, 2019).

Prevalence of CVD; The World Health Organization (WHO) report states that in 2016, an estimated of 17.9 million people died from CVDs, representing 31% of all reported mortalities (WHO, 2021). About 85% of these deaths are thought to have been caused by heart attacks and strokes. The burden of CVD varies by geography, disproportionately affecting low- and middle-income countries (LMICs) (Gaziano, Bitton, Anand, Abrahams-Gessel, & Murphy, 2010). The incidence of CVDs is rising in many LMICs as lifestyle changes and risk factors, like cigarette use, poor diets, and physical inactivity, rise. In terms of financial burden also, CVD plays a substantial role in healthcare expenses and lost productivity. According to the American Heart Association (AHA) recent report, both direct and secondary expenditures related with CVD and stroke in the United States alone stand an of estimated $407.3 billion, yearly (Tsao et al., 2023).

Risks, morbidity, and mortality of CVD; CVD stands as one of the primary causes of mortality and morbidity, worldwide. In the last decade, there has been a 12.5% global increase in deaths caused due to CVD (Joseph et al., 2017; Roth et al., 2017). There are several reasons

behind the increase in the frequency of cardiovascular mortality, such as poor diet, stress, genetics, diabetes, smoking, and a sedentary lifestyle. In 2016, ischemic heart disease (IHD) emerged as the primary cause of the overall worldwide burden of CVD, accounting for 49% of the total CVD burden (Watkins et al., 2018). According to WHO, 17.9 million people lose their lives annually because of cardiovascular diseases, which are estimated to account for 31% of deaths, globally (WHO, 2021). According to the 2016 Global Burden of Disease (GBD) research, in the category of non-communicable diseases, CVD was the primary cause of 24% of the burden for males and 20% of the burden for females (Rehman, Rehman, Ikram, & Jianglin, 2021).

Different countries have different patterns of steady or worsening CVD Disability-adjusted life years epidemiology factors (Rehman et al., 2021). The American Heart Association indicates that, in the USA, CVD was responsible for 836,546 deaths annually and it also showed that CAD was the cause of 43.8% of the total deaths. Over 6% of the people in Canada and the US who are aged 20 years or above have CAD, the most prevalent kind of CVD (Foldes-Busque et al., 2021). Furthermore, statistics suggest that this number will increase to 23.6 million by late 2030 (Greenfield & Snowden, 2019).

CVD in lower and middle-income countries; LMICs have contributed for highest in the total burden of CVD, particularly in terms of mortality occurring at a younger age, in comparison to high-income countries (HICs) (Rehman et al., 2021). A similar study showed the CVD burden in LMIC to be: Mexico (19.7%), Indonesia (8.8%), the Philippines (25.3%), Bangladesh (27.4%), China (6.6%), and India (15.4%) (Qureshi et al., 2021). In 2019, according to GBD, the number of prevalent instances of all CVD nearly doubled to 523 million, while the incidence of CVD mortality climbed gradually, from 12.1 million to 18.6 million, globally (Roth et al., 2020).

Moreover, in 2019, an estimated, 30-40% of all deaths in Pakistan occurred because of CVD (Qasem Surrati, Mohammedsaeed, & Shikieri, 2021). Furthermore, recent studies show that 80% -86% of deaths in LMIC are caused by CVD, including countries like Pakistan, India, Nepal, Bangladesh, and Sri Lanka (Barolia & Sayani, 2017; Khanal et al., 2017; Chowdhury et al., 2018).

The epidemiologic shift from communicable to non-communicable diseases (NCDs) in LMICs is causing this burden to rise, with CVD mortality increasing rapidly (Vervoort, Parikh, Raj, & Swain, 2020). Today, CVD has significantly reduced quality of life (QoL) and life expectancy; moreover, exerts heavy financial stress on global healthcare systems (Amini, Zayeri, & Salehi, 2021). Surgery is usually performed on patients with CVD. The main goal of surgery, however, is to relieve symptoms, increase patient survival, and enhance QoL (Bachar & Manna, 2023).

In 2020, the WHO ranked Pakistan as 30th for its death rate due to cardiac diseases. Moreover, CVD is the major reason of most fatalities in Pakistan. One in every four middle-aged men and women are at the risk of developing CVD. Moreover, around 250,000 people die each year due to CVD in Pakistan (Hassan, Riehl-Tonn, Dumanski, Lyons, & Ahmed, 2022).

Role of Coronary Artery Bypass Grafting, valvular and congenital defect surgery; In comparison to Percutaneous Coronary Intervention (PCI), Coronary Artery Bypass Grafting (CABG) is advised when high-grade blockages exist in any of the main coronary arteries and/or when PCI has not been successful in clearing the obstructions. According to AHA, other indications for CABG are two-vessel disease, including left anterior descending (LAD) artery and one other major artery, or more than 50% blockage of the left main artery and more than 70% involvement of the proximal LAD in the three-vessel CAD (Bachar & Manna, 2023).

Besides CABG, other open-heart surgeries such as cardiac valvular surgeries and congenital defect repairs, including closures of ventricular septal defects (VSD) and atrial septal defects (ASD), are critical in restoring heart function and managing heart diseases. These surgeries address significant structural and functional issues, such as damaged heart valves or congenital defects, that can impair cardiac performance. Indications for valvular surgeries include conditions like aortic stenosis or mitral regurgitation, which, if not addressed, can result in heart failure (Otto et al., 2021). Similarly, ASD and VSD closures are essential for congenital heart defects, preventing complications and improving overall heart health (Miranović, 2014). These procedures are pivotal in restoring heart function, alleviating symptoms, and enhancing the QoL for patients.

The potential risks and complications with open heart surgery include stroke, graft failure, renal dysfunction, sternal wound infection, postoperative atrial fibrillation, hospital readmission, and death (Bachar & Manna, 2023; O. K. Jawitz et al., 2020; Khalifa, Eisa, Abdel Bary, Ismail, & Taha, 2018). Fazlinović et al. (2021) have identified that overall, cardiac surgeries performed worldwide reveal that, despite an increase in patient risk profile, there has been a steady reduction in in-hospital mortality, and improved survival and QoL in patients with left ventricular (LV) dysfunction, CAD, and HF. Moreover, various heart conditions that are unresponsive to other non-invasive treatments are typically treated with it (Sigdel et al., 2020).

Cardiac surgery is regarded as a safe surgical treatment, with a low risk of life-threatening complications. The AHA estimates that the risk of death after open heart surgery is less than 2%, overall, and that the chance of serious side effects, including infection, kidney failure, or stroke is likewise minimal. The risk factors of open-heart surgery include age, surgeon experience, general health, and type of surgery. Open heart surgery is one of the lifesaving

surgeries but is also a major procedure (Lifespan, 2018). It usually involves a hospital stay of one week or more, depending upon the patient's recovery. Moreover, according to a recent study, the rate of cardiac surgical procedures is raising by up to one million around the world annually (Vervoort et al., 2020).

CABG is the most frequently performed open-heart surgical treatment globally. While in the USA, around 700,000 cardiac procedures are performed every year, in LMICs, only about 38,000 cardiac procedures are performed (Q. Chen, 2022). Although cardiac surgery is a widely used procedure to treat various CVDs globally, more than 48% of patients undergoing heart surgeries experience anxiety prior to surgery (Abate, Chekol, & Basu, 2020). Moreover, preoperative anxiety affects up to 97% of patients worldwide and varies, based on the country, the operation type, purpose for the surgery, and the patient's gender. One study shows that the there is a distinct preoperative anxiety prevalence among cardiac patients in high and LMICs; it is low in the USA, contributing 20.2%, and high in Nigeria contributing 90% (Hernandez-Palazon et al., 2018). However, in Pakistan, the data is not available (Meneghetti et al. 2017).

Psychological stress and CVD; Recent research has deepened our understanding of the intricate connection between psychological stress and cardiovascular disease (CVD). Stress, whether chronic or acute, has emerged as a significant contributor to the development and progression of CVD. Multiple pathways mediate this relationship, involving the activation of the sympathetic nervous system, the release of stress hormones, and the promotion of inflammation and oxidative stress. Chronic exposure to stress has been linked to adverse cardiovascular outcomes, including hypertension, atherosclerosis, and increased vulnerability to acute cardiac events. Additionally, the psychosocial impact of stress influences health behaviors such as smoking, sedentary lifestyle, and poor dietary choices, further exacerbating cardiovascular risks

(Dar, 2019). Recent studies highlight the role of stress management interventions in improving cardiovascular outcomes, emphasizing the importance of addressing psychological well-being in comprehensive cardiovascular care (Osborne, 2020).

Impact of anxiety; There is an increased influence of anxiety on autonomic nervous system, thoughts, feelings, and behaviour, and often leads to adverse psychological and physiological impacts on the patient. Numerous studies have concluded that preoperative anxiety is directly proportional to postoperative mortality and morbidity, particularly in elderly or cardiac patients (Woldegerima Y.B., 2018). This is because anxiety may trigger the hypothalamic-pituitary-adrenal axis. Consequently, the patients in prolonged stress may trigger hypertension, fatigue, immunosuppression, and myopathy; thus, these negative responses may delay the weaning process and, eventually, result in increased disease morbidity and mortality in cardiac patients (Mofredj, Alaya, Tassaioust, Bahloul, & Mrabet, 2016).

Additionally, anxiety leads to endothelial dysfunction and platelet dysfunction, which results in atherosclerosis and atherothrombosis, respectively. Also, it influences vascular permeability, which influences blood pressure, respiration, and consumption of myocardial oxygen, heart rate, and plasma norepinephrine and epinephrine concentrations. Moreover, vascular permeability can result in tissue injury and platelet aggregation in the body (Celano, Daunis, Lokko, Campbell, & Huffman, 2016).

The early after-effects of surgery can differ, depending upon the procedure and the patients' general condition. There are some typical immediate post-operative effects; these are pain and discomfort, and the degree of pain might vary based on the procedure and the patient's tolerance for pain. To address this, the medical staff will typically prescribe pain medication. Nausea and vomiting are the consequences that some people may experience after surgery or

anesthesia, but these symptoms can be treated with medication. Additionally, exhaustion and drowsiness are other side-effects that might persist for different numbers of hours following surgery. Other effects may include bleeding, as following certain surgical operations, bleeding may occur. If this happens, it can be controlled with medication or, in certain cases, by undergoing additional surgery (Pahwa et al., 2021).

There are several elements that influence cardiac patients' anxiety before surgery. Research carried out in Ethiopia revealed the potential causes of preoperative anxiety in cardiac patients. These included: the fear related to the recovery after the anesthesia, family issues, dependency, postoperative pain, fatality, uncertain outcomes, disability, or negligence of medical professionals (Woldegerima Y.B., 2018). Another study conducted in Ethiopia reported fear of complications, fear of postoperative discomfort and pain, concerns about family, and fear of death as predominant factors causing anxiety (Mulugeta, Ayana, Sintayehu, Dessie, & Zewdu, 2018).

Preoperative anxiety poses serious complications for cardiac patients, such as a higher chance of myocardial infarction, HF, arrhythmias pulmonary edema, and delirium. The nature and degree of the procedure determine the immediate after-effects of surgery. The area around the surgery site may experience pain, swelling, bruising, and discomfort as some typical acute effects. Additionally, anesthesia or painkillers may cause a sick feeling in the stomach and cause vomiting. Additionally, possible immediate effects include bleeding, infection, blood clots, and harm to the tissues and organs in the immediate vicinity. Although they are uncommon, these side effects can be serious and require medical attention (Hernandez-Palazon et al., 2018). Moreover, frequent readmission and a high rate of cardiac mortality are also reported, which compromise a patient’s QoL (Abate et al., 2020). Also, patients who experienced a higher levels

of preoperative anxiety required large doses of anesthesia; and had higher levels of postoperative pain; prolonged recovery, impairment in myocardial perfusion, and increased morbidity in the hospitals (Woldegerima Y.B., 2018).

A study carried out in Paris found that patients became more anxious due to a lack of preoperative information and inaccessibility to awareness about the surgery (Stephanie, Mathieu, Aurore, & Monique, 2021). Therefore, the authors suggested that the assessment of anxiety is vital to assist healthcare professionals in identifying high-risk patients, to prevent undesirable outcomes and cardiovascular mortality (D. M. Stamenkovic et al., 2018). Moreover, by providing quality information about the surgery can facilitate the reduction in preoperative anxiety levels in patients and reduce hospital stays (Prado-Olivares & Chover-Sierra, 2019). Furthermore, this enhances the comfort, tolerance, and contentment of both patients and nurses, which also lessens the nursing workload.

Gao et al. (2021) reveal that by developing and applying different strategies, including preoperative anxiety assessment and guided tours, healthcare professionals can reduce patient preoperative anxiety and improve patient recovery. Their research highlighted that appropriate preoperative counseling with patients, based on their cultural, lingual, and religious preferences, could help in alleviating preoperative anxiety. Olivares and Sierra (2019) suggest that patients who have severe anxiety before to surgery may experience bronchospasms, severe hypertension, tachycardia, cardiac arrhythmias, surgery cancelation, irritability, and several other complications that pose a continuous threat to life.

Study Purpose

The study aimed to evaluate preoperative anxiety, its contributing factors, and its impact on immediate postoperative outcomes among elective cardiac surgery patients, in a tertiary care hospital in Karachi, Pakistan.

Study Rationale

The purpose of the study was to assess the frequency of preoperative anxiety, its causes, and impact among cardiac surgery patients. As the literature clearly states, patients experiencing preoperative anxiety experience post-operative morbidities; therefore, it is very important to assess patients timely, to prevent post-operative complications. Moreover, preoperative anxiety causes major complications, such as rise in postoperative pain, requiring higher doses of anesthetic medications, delay in healing, poor recovery, and thus ending up in prolonged hospital stay (Mulugeta et al., 2018). In addition, several studies confirm that certain sociodemographic contributors, such as female sex and younger age, are significantly associated with high preoperative anxiety (Hernandez-Palazon et al., 2018; Ramesh et al., 2017). All this ultimately leads to decreased patient satisfaction and increased financial burden on patients.

Major section of literature highlights that most of the studies were carried out in HICs, while there are very limited studies that have been carried out in LMICs. In the context of Pakistan, despite its serious health complications, preoperative anxiety's magnitude, its contributing factors, and its impact on immediate postoperative outcomes have not been explored. The increasing trend of the cardiac disease burden in Pakistan makes it very important to address preoperative anxiety in cardiac surgery patients, to prevent postoperative morbidities and enhance the patients' QoL.

As per Pakistan Society of Cardiovascular and Thoracic Surgeons, the prevalence of CVD and the need for open-heart surgery are both rapidly growing in Pakistan (Ziyaefard, Ershad, Jouybari, Nikpajouh, & Khalili, 2019). Hence, due to the higher incidence of CVD in the population, it is particularly crucial to evaluate anxiety before surgery in patients undergoing elective open-heart surgery in Pakistan. Healthcare providers can create efficient interventions to lessen anxiety and enhance patient outcomes by having a better understanding about the prevalence, contributing factors, and effects of preoperative anxiety on post-surgery results.

The population of this study is, in a way, like HICs because in this study also, as the respondents are those who have cardiovascular disease. However, there are some other factors that were considered important for conducting this study in Pakistan. The first factor is that the literacy rate of patients is quite low, as compared to other countries, and secondly, the infrastructure facilities in Pakistan are not up to the mark, when compared with high-income countries. All these factors increase the importance of this study (Bedaso & Ayalew, 2019).

Research Questions

Primary questions.

1. What is the frequency of preoperative anxiety among adult cardiac patients admitting in a tertiary healthcare setting in Karachi, Pakistan for open heart surgery?

2. What are the associated causes or factors of preoperative anxiety, particularly in cardiac surgery patients, in the tertiary hospital in Karachi, Pakistan?

Secondary questions.

1. What is the impact of preoperative anxiety on immediate postoperative outcomes in cardiac surgery patients in the tertiary hospital in Karachi, Pakistan?

Significance of the Study

Preoperative anxiety assessment, prior to surgery, plays a vital role in identifying and timely intervening to prevent the adverse outcomes of surgery. Nurses are the primary healthcare providers who answer patients' queries and concerns and respect their needs; hence, it is vital for healthcare professionals (HCPs) to provide appropriate interventions to cardiac patients to improve their anxiety levels and cardiovascular indices. This study will contribute to filling the gap in the prediction of preoperative apprehension in cardiac surgery patients, which may be beneficial to future research concentrating on patients undergoing open-heart surgery. Additionally, this study was conducted to have a more profound understanding of the factors contributing to pre-anxiety among patients, to enable appropriate and timely management. The results of this study can create an insight among health care workers (HCWs) to play a vital role in delivering better care, providing quality education to patients and their families, reducing stressors and patients' anxiety before surgery. Lastly, looking at the current practice, no such tool is used in the hospital that assesses the preoperative anxiety of patients admitted for cardiac surgery, thereby catering to individualized needs. Therefore, the findings of this study can guide the hospital authorities to bring modifications in current practices to further improve patient care outcomes. In the researcher's best knowledge, this study is the first to be conducted in Pakistan to evaluate preoperative anxiety, its contributing factors, and its impact on immediate postoperative outcomes among elective cardiac surgery patients.

Summary

This chapter discussed an outline of the phenomenon, the research questions, and the study's significance. The next chapter presents a literature review on preoperative anxiety, its contributing factors, and its impact on cardiac surgery patients.

Chapter Two Literature Review

This chapter provides an analysis of both theoretical and empirical research demonstrating the global incidence and determinantal factors related to preoperative anxiety among cardiac surgery patients. The review of literature includes recent research studies that have explored the impact of preoperative anxiety on post-cardiac surgery outcomes.

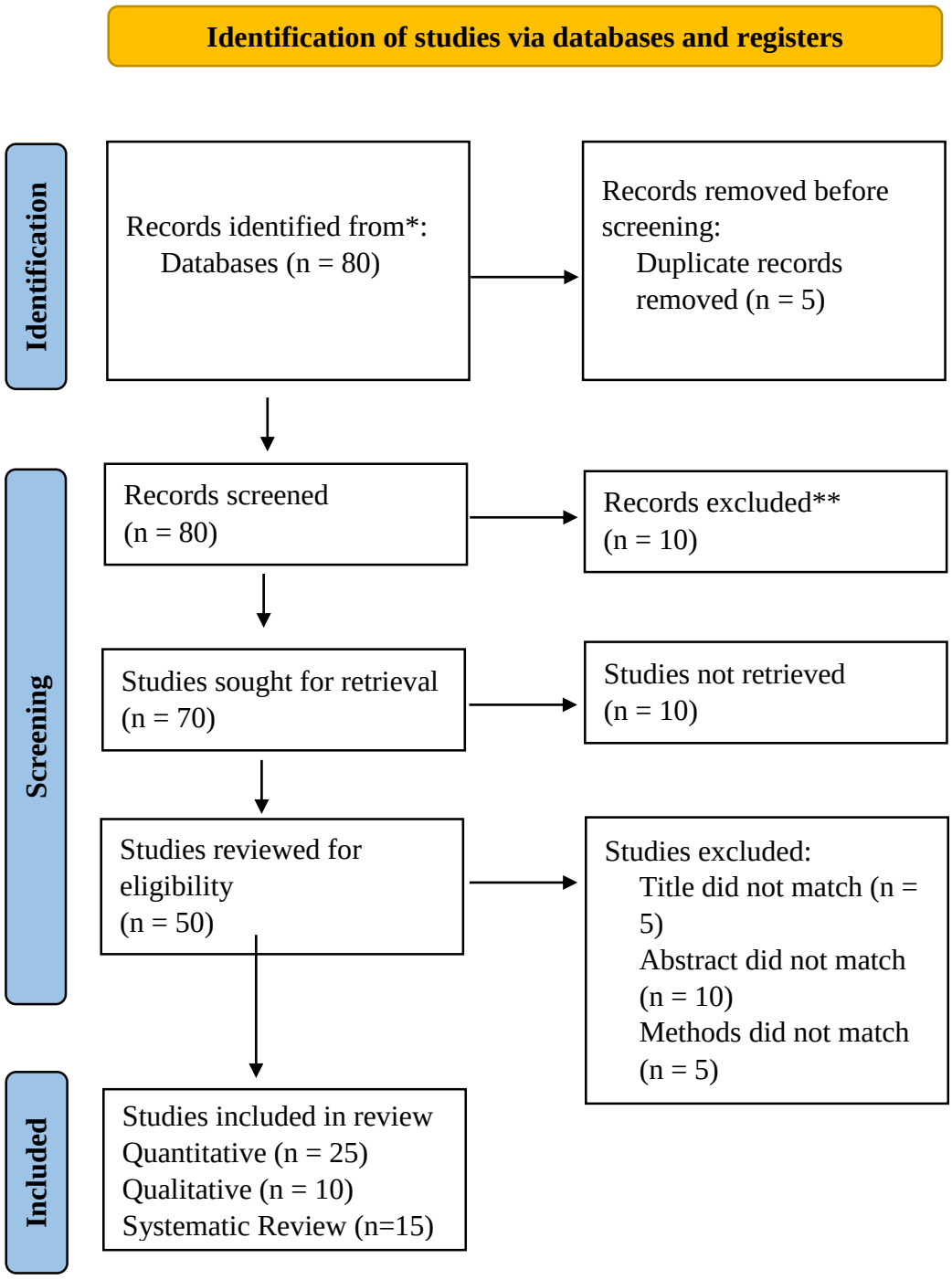
This chapter is further divided into eight sections: search strategy, theoretical framework, the concept of anxiety, the prevalence of anxiety among cardiac surgery patients, factors contributing to anxiety among cardiac surgery patients, the impact of anxiety on cardiac surgery patients, measures to decrease anxiety among cardiac patients, and gap analysis.

Search Strategy

A thorough literature review was conducted to examine the most recent studies that are relevant to the study's phenomenon. Google Scholar, Pub Med, COCHRANE review, CINAHL, Science Direct, and databases were used for the literature search to find both qualitative and quantitative research studies. The search was carried out by using keywords including: “Cardiovascular Disease (CVD)” OR “Coronary Artery Disease (CAD)” OR “Cardiac Surgery” OR “Preoperative Anxiety” OR “Apprehension” OR “Anxiety Factors” OR “Anxiety Effects” OR “Anxiety AND Cardiac Surgery Outcomes” OR “Patient education” OR “Cross-sectional study”, AND “Prospective and Consecutive Study” etc. To integrate the study's keywords, boolean expressions with the operators "OR" and "AND" were applied when searching for the articles. Moreover, in this review, the most relevant literature of the previous twelve years, i.e., from 2011 to 2023, was included. After applying the keywords in the initial search, 80 studies were found. By using filters and manually searching through websites, Google Scholar,

and various sources, a total of 70 studies were identified. Followed by the elimination of duplicates and less relevant publications, only 50 full-text studies were selected.

Figure 1: Search Strategy



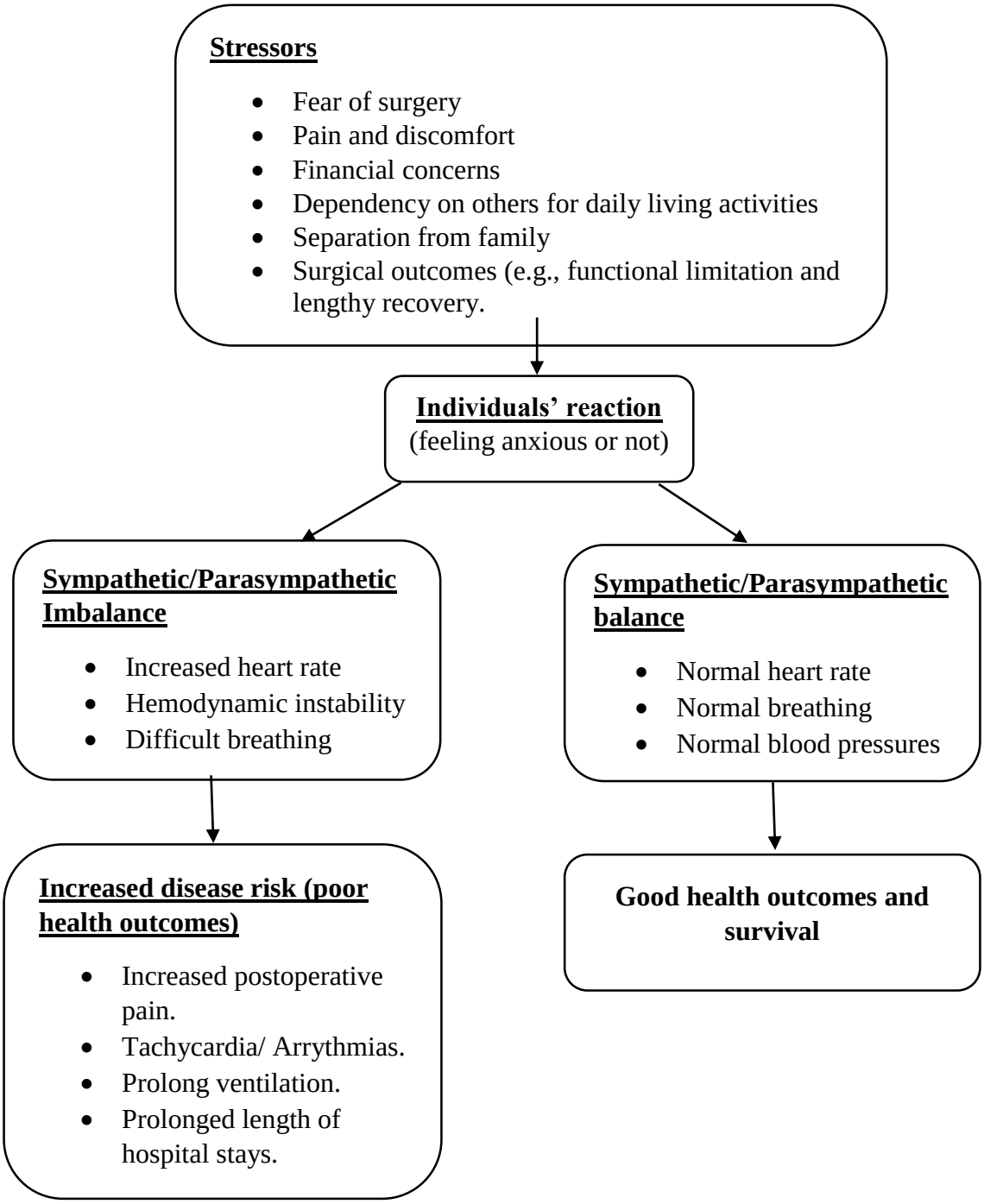
Theoretical Framework

To illustrate the association among study variables, organize and understand the literature review the stress and outcome model of Hans Selye's Stress Response Theory was adopted as the conceptual framework. The study employed the Stress Response Theory as a framework for characterizing acute situational anxiety during the preoperative period of hospitalization. According to this theory, acute situational anxiety can be deconstructed into three key components: the presence of a stressor or threat, the individual's emotional responses (such as fear, anxiety, or elation), and the body's physiological fight-or-flight reaction aimed at maintaining health and survival, that comprises of the hormonal responses and central nervous system (Rice, 2012). The hypothetical interpretation of acute situational anxiety, as described by the Stress Response Theory, refers to a personal emotional state characterized by fear, which is influenced by immediate circumstances. It is important to note that the extent and the intensity of this anxiety can differ among patients during the preoperative phase of hospitalization (Acar, Cuvaş, Ceyhan, & Dikmen, 2013; Rice, 2012; Webster, 2016). Therefore, the application of the Stress Response Theory model will offer a comprehensive framework for understanding how the body reacts to stress, encompassing both psychological and physiological responses. When applied to the context of preoperative anxiety, it provides a multi-dimensional approach to examining the impact of acute stress on cardiac surgery patients.

The healthcare needs of cardiac surgery patients are critical and require rigorous efforts in preparing patients for surgery. It's important for cardiac surgery patients to understand the complex nature of the disease and for their healthcare providers to work closely together to ensure that all aspects of their care are carefully considered and managed. This comprehensive approach can significantly improve the chances of a successful outcome and better overall health

for these patients. The basic components utilized in this study from the Stress Response Theory model are stressors, patient reactions, and health outcomes. Figure 2 describes the relationship among the concepts of the stress model.

Figure 2: **Relationship among the Concepts of the Stress Response Model of Hans Selye**



Stress, whether psychological, physical, or perceived, triggers both an individual's emotional reaction and a stimulation of the central nervous system, commonly referred to as the "fight or flight" reaction. This sympathetic activation occurs in response to stressors but typically subsides once the stressful situation ends. However, alongside the reduction in sympathetic activity, parasympathetic mechanisms are also engaged. Together, these two systems collaborate to maintain a balanced autonomic nervous system (Hill Rice, 2012). Unfortunately, achieving perfect equilibrium is often hindered by recurrent episodes of acute stress and the persistent burden of chronic stress. Consequently, sympathetic drive tends to remain heightened, leading to long-term damage to the vasculature and other regulatory systems. In 1993, McEwen and Stellar explained this idea of imbalance as "allostatic load," illustrating how it may lead to unfavourable health outcomes, if it is not properly evaluated, addressed, and managed (Jaruzel, 2017).

The integration of the stress response model into the literature review sheds light on the dynamics surrounding surgical stressors and preoperative anxiety. Within this conceptual framework, surgery is identified as the primary stressor, and preoperative anxiety is acknowledged as the individual's reaction to this stressor, influenced by their perception of the impending surgical procedure. According to the literature review, model further emphasizes that the patient's ability to cope with the stressor plays a crucial role in determining subsequent health outcomes. If a patient effectively manages and copes with the stress induced by the impending surgery, it is anticipated that positive health outcomes will ensue. On the contrary, inadequate coping mechanisms or heightened preoperative anxiety may contribute to adverse health outcomes.

In a nutshell, understanding these associations is vital and can guide the development of targeted interventions that mitigate preoperative anxiety and minimize the potential negative

impact of stress on the surgical process and patient recovery, ultimately enhancing overall cardiac care.

Concept of Anxiety

Anxiety is there and nearly everyone experiences some extent of anxiety in regard to an actual or imaginary threat (Csikszentmihalyi, 2014). The concept of anxiety was introduced by Greek clinicians and philosophers. Freud mentioned that anxiety rises when the ego, which is the part of the psyche responsible for mediating between the realities of the external world and the demands of it, is overwhelmed by unconscious disagreements and impulses. According to Freud, these unconscious forces might be associated with repressed aggressive and sexual desires, unresolved disagreements in childhood, and other sources of inner disagreements (Gomes & Bezerra, 2017).

In recent times, anxiety is described as a physiologically induced emotional situation of fear, unease, and worry about potentially dangerous situations. It is characterized by restlessness, fatigue, trouble concentrating, and tension in the muscles (Abate et al., 2020).

Anxiety is described by the American Psychiatric Association in the Diagnostic and Statistical Manual for Mental Disorders as a "subjective feeling of worry, nervousness, or fearful concern that includes autonomic and somatic manifestations" (Khan et al., 2012). Anxiety is a usual, emotional, rational, and anticipated reaction to actual or possible threats (Woldegerima Y.B., 2018). Moreover, Polikandrioti in 2014, states that anxiety is a general human reaction that might be experienced in both pathological and non-pathological conditions, and it can be triggered by both internal and external factors.

An American psychiatric, nurse theorist Heldegard E. Peplau presented four levels of anxiety, based on how severe the patient's depicting symptoms are. The first stage of mild

anxiety is a typical physiological response to stimuli that affect the individual positively. A patient may exhibit symptoms of mild anxiety such as irritation, and impatience, and complains of little discomfort. The second stage of anxiety is called moderate anxiety, and it is described by emotions of concern, tensions, and anxiousness. Physical manifestations, like diaphoresis, headaches, muscle tension, a racing heartbeat, and others may be present in patients with moderate anxiety. The third stage is intense anxiety, which is characterized by feelings of horror or awe. Panic is the final and most powerful stage of anxiety, marked by frightening emotions that might cause a person to lose control (DiSano, 2015; Videbeck, 2014).

Prevalence of Anxiety among Cardiac Surgery Patients

The perioperative experience of patients is significantly impacted by anxiety, considering the strong behavioral and psychologic reaction that is amplified by preoperative worries about the primary disease and upcoming anesthesia, and surgical procedure. Preoperative anxiety affects adult patients at varying rates, depending on the surgical group, ranging from 11% to 80% (Hernandez-Palazon et al., 2018). Research findings revealed that 28 % patients, experienced severe preoperative anxiety. The average score for the Amsterdam Preoperative Anxiety and Information Scale (APAIS) was 11.4 ± 4.3. Patients planned for CABG surgery, who were hospitalized prior to surgery, and had no past anesthesia experience, scored higher on the anxiety scales. CABG was independently linked with preoperative high anxiety (odds ratio 3.026; 1.509-6.067; p ¼ 0.002). This is comparable to the prevalence of higher anxiety previously reported by various researchers, which varied from 20% to 35% (Hernandez-Palazon et al., 2018).

Preoperative anxieties are a widespread phenomenon in open-heart surgery patients as the thought of undergoing such a complicated surgery makes the patient feel insecure. This

assumption is validated through the findings gathered through descriptive, analytical, cross-sectional study carried out in Spain, among cardiac surgery patients, which showed that more than 80% of the study's participants displayed a high level of anxiety (Prado-Olivares & Chover-Sierra, 2019). Furthermore, in a similar study, they stated that their study results were consistent with other researches which showed 48% to 76 high anxiety in cardiac surgery patients (Prado-Olivares & Chover-Sierra, 2019).

Preoperative anxiety is considered as a major risk factor for CVD by numerous studies conducted on individuals scheduled for cardiac surgery. These research studies demonstrated that preoperative anxiety can escalate possibility of comorbidities in the instant post-operative phase, including an increased risk of hemodynamic instability, prolonged mechanical ventilation, an increase in postoperative discomfort and pain, a significant need for analgesics, and an increased risk of readmission rates (Abate et al., 2020; Aust et al., 2018; Hernandez-Palazon et al., 2018).

A multivariate study reported a relationship among preoperative anxiety and CABG surgery (Patel, Minhas, & Chung, 2015). Research findings supported that a higher rate of preoperative anxiety and a higher prevalence of comorbid anxiety affected about 55% of the patients who planned to undergo CABG operation (Hernandez-Palazon et al., 2018). Moreover, several research investigations, conducted in Brazil, Iran, London, and Spain in the context to open-heart surgeries, imply a significant crucial risk in many instances. These researches have also found that CABG patients exhibited high levels of anxiety, i.e., 20-55%, before the procedure, and that their anxiety levels steadily decreased after the procedure (M. Fathi et al., 2014; Guo, 2015; Prado-Olivares & Chover-Sierra, 2019). Subsequently, Sigdel et al. (2020), found higher preoperative anxiety, of 58.5%, among elective cardiac surgery patients.

According to studies, individuals undergoing heart surgery frequently experience anxiety, with estimates ranging from 20% to 80% (Rodrigues, 2018). According to Sigdel et al. (2020), 50% of the patients having cardiac surgery report moderate to severe anxiety, which may hinder their recovery and lower their quality of life (QoL), in general.

Patients undergoing heart surgery may experience considerable effects from anxiety. Complications during and following surgery, such as infection, bleeding, and extended hospital stays, are more common in anxious patients. Additionally, anxiety can hinder a patient's recovery by preventing the immune system from functioning properly and delaying the healing of wounds. Additionally, anxiety can detrimentally affect a patient's mental well-being and QoL, leading to depression, post-traumatic stress disorder (PTSD), and impaired social functioning (Khajian Gelogahi, Aghebati, Mazloum, & Mohajer, 2018).

Moreover, Evidence shows that patients who experienced a higher levels of anxiety before surgery required large dosages of anesthesia; and had higher levels of postoperative pain; prolonged recovery, impairment in myocardial perfusion, and increased morbidity in the hospitals (Woldegerima Y.B., 2018). On the other hand, a question has been raised by researchers as to whether patients fear anesthesia or surgery; however, many studies have concluded that patients fear surgery more than anesthesia (Aust et al., 2018).

Many therapies have been suggested to lessen the detrimental impact of anxiety on heart surgery patients. These include preoperative counseling and education to get patients ready for surgery and to calm their anxieties. Moreover, it has been demonstrated that pharmaceutical treatments, for instance benzodiazepines and beta-blockers, are successful in lowering anxiety levels in patients undergoing heart surgery (Tavares Gomes, 2019). Additionally, it has been

demonstrated that non-pharmacological therapies like cognitive-behavioral therapy, relaxation training, and music therapy are beneficial in lowering anxiety levels in patients.

Factors that Influence Preoperative Anxiety among Cardiac Surgery Patients

Various studies have revealed that multiple factors trigger anxiety in patients undergoing cardiac surgery. Usually, the hospital's environment, fear of the unknown, unethical behavior of the clinical staff, waiting time for surgery, surgery's outcome, and nervousness regarding future prognosis may create feelings of stress and anxiety in the patients. According to Wassenaar et al. (2014), an analysis of 11 studies through a systematic review revealed that patients feels more anxious because of their comorbid conditions, such as hypertension, diabetes, asthma, and cancer, or due to unsafe practices during hospitalizations, such as discrepancies in care, perceived loss of control, and unaddressed psychological needs (Woldegerima Y.B., 2018).

Another meta-analysis, of 25 studies, showed several types of predictors of preoperative anxiety (Abate et al., 2020). The most common risk factors included fear of death, not being able to awaken from anesthesia, long-term disability, or any unpredicted outcomes of surgery. Moreover, the findings also revealed other significant factors, such as preoperative anxiety being four times higher in patients afraid of adverse outcomes. Preoperative anxiety was also found to be in higher frequency in patients having fear of awakening during operation RR 2.58 (95% confidence interval (CI): 2.17 to 3.06), apprehensions about medical errors RR 1.93 (95% confidence interval (CI): 1.57 to 2.36), and post-surgery pain RR 1.43 (95% confidence interval (CI): 1.31 to 1.56) (Abate et al., 2020).

According to Abate et al. (2020), the socioeconomic-demographic variables (age, educational status, gender, ethnicity, religious beliefs, marital status, pay, and residency), behavior (substance abuse, alcohol addiction, smoking, and introduction to health-oriented

media), underlying health conditions (history of psychiatric illness, cancer, persistent illness, ache), past anesthesia and operation, type of present surgical procedure, and wellbeing related (anesthesia and surgical education) are very prominent with regards to preoperative anxiety. Subsequently, other researchers, too, found that sociodemographic characteristics were mainly correlated with preoperative anxiety, including sex and educational level (Eberhart et al., 2020; Mulugeta et al., 2018). These findings were found to be consistent with a Spain descriptive cross-sectional study on cardiac surgery patients, in which they found a statistically relevant, inverse association (p 0.05) among the educational level and the anxiety level (Prado-Olivares & Chover-Sierra, 2019).

In a Korean study, it was observed that anxiety in patients aged over 45 is linked with 20% of hemodynamic changes in the initiation of anesthesia (R. Wang, Huang, Wang, & Akbari, 2022). The study supports this finding by showing fluctuations in response to elevated catecholamine levels in the aging process.

Moreover, female patients showed higher anxiety than male patients; this agrees with many global studies, including those conducted in Iraq, Ethiopia, Nepal, Turkey, and Pakistan. A study conducted in Iraq showed that female patients had higher global anxiety 10.68 ± 3.604 than male patients 9.37 ± 3.137 (Abutiheen, 2021). A study from Pakistan reported the greater prevalence of preoperative anxiety in general surgery patients, where they found gender to be a contributing factor. The evidence presented females to be more anxious than males; 73% and 48%, respectively (E. Erkilic et al., 2017; Patel et al., 2015; Woldegerima Y.B., 2018), also studied the correlation between incidence of anxiety in preoperative patients and their genders. Erkilic et al. (2017), mentioned in their study that, sex was an important indicator of preoperative uneasiness, and being female was correlated to a higher level of uneasiness. The elevated anxiety

levels observed in females were attributed to elevated trait anxiety and increased sensitivity. This higher level of mood and anxiety disorders was explained by variations in progesterone and estrogen levels in women (E. Erkilic et al., 2017). Similarly, Woldegerima Y.B et al. (2018), carried a cross-sectional study out among 178 patients in Northwest Ethiopia, also found a greater rate of preoperative anxiousness in female patients in comparison to male patients, 62.2% and 56.2%, respectively.

Furthermore, Ramesh et al. (2017), used the STAI tool and revealed that the average preoperative state-anxiety and trait-anxiety scores in females were 52.04 ± 12.55 and 44.34 ± 12.23, respectively, before the CABG surgery. Subsequently, a Nepalese study, that used the APAIS scale among cardiac surgery patients, also revealed female gender to be a contributing factor in experiencing higher preoperative anxiety (OR 0.31, 95% CI 0.15–0.65, $P<.001$) than in males (Sigdel et al., 2020).

Additionally, in a Northwest Ethiopian study, several other factors were also identified, for example, patients who were unemployed or came from a low financial background were more susceptible to get anxious in the preoperative period as compared to patients coming from a good financial background; the rate of anxiety was 87% and 83.3%, respectively. This can be because of the constant distress of financial burden and the inability to overcome the financial loss (Woldegerima Y.B., 2018).

In an international cross-sectional study, carried out in the USA, 592 inpatients were evaluated for preoperative anxiety. Elevated preoperative anxiety levels were identified to have a significant correlation with a history of psychiatric illnesses (OR=5.93), smoking history (OR=7.47), history of malignant tumour (OR=2.26), moderate to intense pain (OR=2.12),

moderate surgery (OR=1.52), female sex (OR=2.0), around 12 years of schooling (OR=1.36), and over twelve years of education (OR=1.68) (Aust et al., 2018).

Numerous studies suggest that surgical patients are more concerned and require in-depth knowledge regarding their procedure; the numbers showed that only 30.9% to 47.8% were aware of the kind of anesthesia and surgery they were going to have (Zubrzycki et al., 2018). Whereby lack of complete information was found to be related with an increased preoperative anxiety level. Wells et al. also support this finding by suggesting that insufficient knowledge can worsen the fear and feeling of uneasiness, as it can result in misunderstanding and misleading (Aust et al., 2018; Eberhart et al., 2020; Mulugeta et al., 2018). Moreover, another study, carried out among Nepalese preoperative cardiac surgery patients found higher anxiety (IRR 1.44, 95% CI 1.21–1.73, $P<.001$) because of insufficient information (Sigdel et al., 2020).

Besides this, nicotine is well known for its anxiogenic characteristics, which cause anxiety by interacting with other central neurotransmitters. In one of Brazil's studies, it was shown that five out of six, which is 83.3% of smoker patients, have experienced greater anxiety thus making smoking a significant factor in preoperative anxiety. Furthermore, although earlier studies show a negative association between a patient having previous surgical experience and preoperative anxiety, a recent study, states that previous surgery and anesthesia experience are associated with higher anxiety. This could be because the patient might have witnessed traumatic events, such as the death of neighboring patients if the patient had a history of prolonged admission (Woldegerima Y.B., 2018).

Findings of previous studies conducted in Pakistan (Karachi and Peshawar) among general surgery patients, excluding cardiothoracic surgery, show that age, level of education,

previous surgery, and fear of complications are contributing factors for anxiety (Jafar & Khan, 2009; Zeb, 2019).

Impact of Anxiety on Cardiac Patients

Cardiovascular surgical procedures are not only considered life-threatening by patients, but they are also high-risk operations. Therefore, anxiety before cardiac surgeries is very prevalent, which leads to negative surgery outcomes (Jarmoszewicz, Nowicka-Sauer, Zemla, & Beta, 2020). Generally, surgery is often considered a significant life changer for a patient, and life transitions typically cause anxiety. Since the distressing experiences cause tension, unease, and a high level of autonomic activity, the recovery process may be harmed (Bedaso & Ayalew, 2019).

Moreover, preoperative anxiety levels may negatively impact a variety of anaesthesiologic procedures, surgical recovery, and outcomes. The stimulated metabolic and hormonal processes caused by anxiety also stimulate the sympathoadrenal pathway, resulting in increased secretions, greater stomach acidity, increased gastrointestinal motility, and higher catecholamine levels (Cevik, 2018).

According to E. Aboalizm (2016), in the recovery period, preoperative anxiousness is more detrimental. Complications include nausea, discomfort, vomiting, fatigue, elevated heart rate, and blood pressure, resulting in prolonged complete bed rest, difficulty in sleeping, exhaustion, and increased apprehension about mobility and carrying out daily activities. Furthermore, it has been indicated that these complications may cause prolonged hospitalization, impair QoL, and sometimes lead to death (Bayrak, Sagiroglu, & Copuroglu, 2019; E. Aboalizm, 2016; Rodrigues, 2018).

A study conducted in Boston concluded that, according to a recent meta-analysis comprising 44 studies, a strong association was founded between anxiety and adverse cardiac outcomes, including recurring cardiac events and mortality. In addition, it has also been found that poor physiological outcomes, which include alterations in platelet aggregation, autonomic dysfunction, inflammation, and endothelial dysfunction, lead to recurrent incidence of hospitalizations and death (Celano et al., 2016).

A prospective observational study, conducted among cardiac surgery patients, found a significant relationship in patients having preoperative anxiety. Patients above the age of 65 were more likely to require extended mechanical breathing and, thus, had a higher rate of acute renal injury, and neurologic impairment (Hernandez-Palazon et al., 2018).

Moreover, other literature evidence suggests that higher anxiety could impact neuroendocrine balance, leading to a suppression of growth hormone release and a delay in tissue regeneration (healing) (Bayrak et al., 2019; Prado-Olivares & Chover-Sierra, 2019). A recent prospective observational study also supports this finding. The researcher found that preoperative anxiety leads to complications, such as excess cortisol production, and insulin resistance, with abnormalities in the sympathetic and vagal systems. Furthermore, he mentioned that increased cortisol levels, triggered by heightened anxiety, could potentially suppress the immune system, leading to postoperative infectious complications. In another study, infectious problems were the most frequent, among anxious patients; these included anastomotic leaks (20% vs. 15.1%), surgical site infections (23.7% vs. 18.6%), and pulmonary problems (16.3% vs. 9.4%) (Kassahun, Kassie, Tilahun, & Bizuneh, 2022).

The major consequence of preoperative anxiety that an anaesthesiologist face is postoperative pain. A systematic review examined 53 studies, revealing a major association

among the frequency of preoperative anxiety with the intensity of postoperative discomfort and pain. The review emphasized that higher levels of preoperative anxiety correlate with an increased necessity for analgesia. Additionally, it disclosed an association between preoperative anxiety and higher requirements for anesthesia dosage during both induction and maintenance. Lastly, preoperative anxiety was identified as a major contributor to psychological distress and a tendency to manifest pain in the postoperative phase. This somatization tendency is associated with unfavourable outcomes following major surgeries, including cardiac, orthopedic, and gynecologic procedures (Prado-Olivares & Chover-Sierra, 2019; D. M. Stamenkovic et al., 2018; Turksal, Alper, Sergin, Yuksel, & Ulukaya, 2020).

Preoperative anxiety also leads to burdening costs for individuals, the health sector, and countries. It also hinders the patient's recovery and thus makes the postop outcomes undesirable. Anxiety is common that if left undiagnosed or untreated could lead to severe consequences. It can cause glucose intolerance, organ failure, and unnecessary postponements in operations (Woldegerima Y.B., 2018).

Several studies reveal that, by developing and applying different interventional strategies, healthcare professionals can reduce patient preoperative anxiety and improve patient recovery. Offering patients preoperative education is among the most effective strategies for alleviating preoperative anxiety, aiding them in emotional and physical readiness for the upcoming surgery. Preoperative education includes any verbal, written, or audio-visual material that aids in understanding the surgical procedure (Abdi, Ghazavi, & Abrishamkar, 2019; Bisbey, 2017; Prado-Olivares & Chover-Sierra, 2019). Moreover, some investigations on the influence of using preoperative multimedia information versus verbal information, for perioperative anxiety, discovered a significant difference ($P<0.005$) in the anxiety levels between patients who

received video-based knowledge and basic routine information (Abdi et al., 2019; Zarei, Valiee, Nouri, Khosravi, & Fathi, 2018).

Subsequently, in another research it was found that preoperative written and verbal information, visual demonstration of specific care, and open communication are thought to be beneficial nursing interventions for reducing patient both, preoperative and postoperative anxiety and increasing self-confidence in postoperative care (Bisbey, 2017; Zarei et al., 2018).

In a randomized controlled trial (RCT) carried out in the USA, it highlighted that how in patients undergoing open-heart operation, virtual reality (VR) can aid as a beneficial non-pharmacological method to mitigate preoperative anxiety (Hendricks, Gutierrez, Stulak, Dearani, & Miller, 2020). A systemic review of 11 studies revealed that non-pharmacological approaches, for instance audio-visual and video information, guided imagery, verbal teaching, and telephonic intervention can reduce patient stress and anxiety before cardiac procedures (Carroll, Malecki-Ketchell, & Astin, 2017).

One research highlighted that appropriate preoperative counseling with patients could help in easing preoperative anxiety. Moreover, staff training regarding the content and delivery of the counseling should be considered a high priority. A nurse-coordinated preoperative education and training could be an effective intervention to improve preoperative anxiety (Guo, 2015). Moreover, a study in Greece concluded that, by encouraging and engaging the patient family in preoperative teaching, patient anxiety can be reduced (Mamoureli, 2017).

These visits provide additional chances for interaction with patients and the development of therapeutic relationships that increase patients' feelings of security (Haiyan Du, 2018; Sadati et al., 2013; Zarei et al., 2018). Preoperative nurse visits involve patient assessment, making observations, listening to the patient's worries, and addressing those worries. Thus, they offer a

chance to gather information that can improve patient management throughout the surgery and assist in educating patients about the procedure and the postoperative care regimen.

Furthermore, according to Zarei et al. (2018), during the preoperative nursing visit, using multimedia for the right information can help reduce preoperative anxiety as well as stabilize vital signs. In a RCT study of 60 patients, it was found that the patients' group that was approached by nurses, to explain the procedure and to assist them relax, had a considerably reduce anxiety levels as compared to control cohort (p 0.05). Additionally, in comparison to the control cohort, vital sign stabilization, postoperative discomfort, and initial postoperative mobility all significantly took less time (Sadati et al., 2013; Zarei et al., 2018).

It has been found that stress and anxiety, along with physiological factors like breathing, heart rate, and blood pressure, can be alleviate through utilizing music therapy, a cost-effective and non-invasive therapeutic intervention (Amiri, Sadeghi, & Negahban Bonabi, 2017; Ji, Sang, Zhang, Zhu, & Bo, 2022; Mohammadi, Mirbagher Ajorpaz, Torabi, Mirsane, & Moradi, 2014). Cardiovascular patients may get relief from anxiety through music therapy. Patients can unwind and experience a decrease in anxiety by engaging in music therapy sessions or listening to peaceful music. The mood and general sense of well-being of patients can also be improved through music therapy. Additionally, music therapy has good neurological effects that improve patient well-being, promote relaxation, and aid in anxiety reduction (Amiri et al., 2017; R. Wang et al., 2022). In a quasi-experimental trial among 60 preoperative patients, researchers revealed a substantial association (p=0.01) between anxiety and musical intervention time (Mohammadi et al., 2014).

A comprehensive review and meta-analysis revealed that preoperative education, delivered through various mediums such as pamphlets, videos, audiotapes, or verbal discussions

about surgery, led to a reduction in anxiety levels among patients undergoing CABG surgery (Salzmann, Salzmann-Djufri, Wilhelm, & Euteneuer, 2020). Moreover, in a randomized clinical trial, it was found, that a 40-minute intervention exercise, an "orientation tour," wherein patients visited a vacant operating theater, the intensive care unit, and engaged with staffs or other admitted patients, resulted in a reduction of preoperative anxiety among individuals planned for CABG surgery, in comparison to a control group (Niknejad, Mirmohammad-Sadeghi, Akbari, & Ghadami, 2019; Salzmann et al., 2020).

According to studies Prado-Olivares & Chover-Sierra (2019), a presurgical visit to pre-cardiac surgery patients can positively impact the lowering of anxiety-state levels, easing the coping with surgery. Moreover, a recent systemic review conducted in China suggested, that the use of a basic screening questionnaire may help in bedside examinations. Also, a short assessment of anxiety symptoms during the preoperative visit may help identify high-risk patients, allowing for the application of proper pharmaceutical or psychotherapy therapies (Ji et al., 2022).

Heilmann et al. (2016), conducted a randomized control trial in Germany in which they revealed that a short (30-minute) a nurse-led intervention, providing personalized education and psychological support one day prior to surgery, resulted in decreased pre and postoperative anxiety among CABG patients, in contrast to routine medical treatment alone (Salzmann et al., 2020). In another RCT, a "supportive educational" intervention delivered by nurses, encompassing procedural education, encouraging patient to articulate apprehension and fear, and providing teaching in relaxation exercises like deep breathing, resulted in decreased anxiety levels and enhanced quality of sleep for patients preparing for CABG surgery (Mousavi Malek, Zakerimoghadam, Esmaeili, & Kazemnejad, 2018; Salzmann et al., 2020).

Measures to Decrease Anxiety among Cardiac Patients

Due to the nature of their ailment, cardiac patients frequently have severe anxiety. Anxiety can affect a person's cardiac health by raising the heart rate and blood pressure and causing irregular heartbeats. Hence, it is imperative to take action to reduce anxiety levels in cardiac patients. According to Guo (2015), the primary approach to alleviate anxiety in cardiac patients involves providing education. Information about a patient's illness, including its causes, symptoms, and available treatments, should be given to them. They should also be made aware of lifestyle changes that they can adopt to strengthen their cardiovascular system, such as regular exercise, a good diet, giving up smoking, and stress management.

Another measure identified by Guo, in 2015 is relaxation, which has a great deal of potential for lowering anxiety in cardiac patients. Some relaxation methods include deep breathing exercises, progressive muscular relaxation, and visualization exercises. These methods can aid in patient relaxation and anxiety reduction. While yet another measure is medication; cardiac patients' anxiety might be reduced with medication. To lessen anxiety and stop panic episodes, doctors may prescribe anti-anxiety drugs such as benzodiazepines and beta-blockers. But medicine should not be the lone strategy for reducing anxiety; moreover, it should only be used under a doctor's supervision. Abed et al in 2014 have identified that exercise is also a powerful method for calming anxious heart patients. Regular exercise helps lower stress levels and enhances cardiovascular health in general. Additionally, it can boost patients' self-assurance in their capacity to control their illness, which can lessen worry.

Cognitive behavioral therapy (CBT) is another measure that has been proven to be successful in lowering anxiety in cardiac patients. To treat anxiety, CBT focuses on recognizing harmful thoughts and beliefs and changing them with empowering realistic ones. Patients may

feel more in control of their illness and have less anxiety as a result. Additionally, advisory services can be incredibly beneficial for anxious cardiac patients.

The discipline of mindfulness entails being fully present at the moment without passing judgment (Olafiranye, Jean-Louis, Zizi, Nunes, & Vincent, 2011). It may be a useful method for calming anxious heart patients. Patients who practice mindfulness exercises like yoga and meditation, may experience greater calm and focus. Additionally, these exercises can enhance the general health and QoL of patients (Olafiranye et al., 2011). Moreover, interacting with animals, such as dogs or cats, during pet therapy helps to increase health and well-being. For cardiac patients who are anxious, pet therapy can be helpful. Patients who interact with animals' report feeling more at ease and having less anxiety. Additionally, this helps raise patients' spirits and general well-being.

A key element in lowering anxiety in cardiac patients is social support. It might be calming and reassuring to talk to people who are experiencing similar things. Support groups can also give people helpful pointers and recommendations for controlling their condition. Moreover, to help patients manage their condition, family, and friends can offer them encouragement, practical support, and emotional support. Patients who receive social support may feel less alone and more bonded to others, which lowers anxiety (Hunt-Shanks, Blanchard, & Reid, 2009).

Gap Analysis

A comprehensive review of the existing literature unveiled that many research studies on this topic have been undertaken in high-income countries (HICs). This research is probably the first of its type in Pakistan, to the researcher's utmost knowledge, as no similar study was found that had been carried out in the Pakistani context. Hence, data about anxiety before cardiac surgery, associated factors, and its impact on immediate postoperative outcomes in the national

context was not found. However, only two studies conducted in Pakistan were found which reported a 62% -67% prevalence of anxiety among general surgery patients (Aurang Zeb, 2019; Jafar & Khan, 2009).

Literature also depicted adverse outcomes of preoperative anxiety including morbidities and poor QoL. It is, therefore, crucial to focus on increasing patients' awareness about and contentment with the surroundings, surgery, and outcomes associated with the surgery. Based on the gaps that have been found, and the researcher's personal experiences as a Cardiac Intensive Care Unit (CICU) nurse, there was a justifiable necessity for a study that assessed preoperative anxiety, its associated factors, and its impact on immediate postoperative outcomes among cardiac surgery patients.

Summary

This chapter explained and provided a detailed analysis of the national and global literature in the area being studied. It described preoperative anxiety before cardiac surgery, emphasized the significance of evaluating the factors that influence anxiety and using appropriate strategies to improve the outcomes. The importance of undertaking the current study has been highlighted based on the gap analysis presented in the chapter.

Chapter Three Methodology

This chapter describes the study's design, setting, population, eligibility requirements (including exclusion and inclusion criteria), primary and secondary outcome variables, data collection methodologies, sample size, sampling strategy, data analysis, and ethical considerations with respect to this study.

Study Design

The analytical cross-sectional study design was used to conduct this study, in a tertiary care hospital in Karachi Pakistan, with elective patients admitted a day before their planned cardiac surgery. The study evaluated the presence of preoperative anxiety, it's associated factors, and its impact on immediate postoperative outcomes, using a questionnaire, including sociodemographic data, the STAI tool, and postoperative clinical variables. According to X. Wang and Cheng (2020), the analytical cross-sectional design is an observational study that represents the data of a population collected at one specific point in time, it is a well-recognized study approach for investigating the prevalence of a specific disease. Furthermore, a cross-sectional study design aims to measure and assess the association among various variables and factors in the study (Setia, 2016).

Study Setting

This study was carried out at the surgery units of the Aga Khan University Hospital in Karachi, Pakistan. The carefully chosen study setting is a Joint Commission International Accredited (JCIA) institute, since 2015, and has successfully maintained this accreditation encompassing more than six hundred beds. Located in the center of Karachi, Pakistan, it is a renowned organization known for its incredible tertiary care that provides care to everyone, regardless of cast, creed, race, religion, and background. The reason for selecting this institution

was that it is recognized for its healthcare delivery, to improve the QoL in the developing world. Moreover, it provides a wide range of exemplary care to all patients coming from diverse socioeconomic backgrounds. The selected units specifically offer care to cardiac medicine, cardiothoracic surgery, pulmonology, vascular, neuro, and general surgery patients. The primary areas that cater to these specialty patients are the coronary care unit (CCU), E1, E2, E3, E4, D1, B1, and cardiac intensive care unit (CICU).

Study Population

This study focused adult cardiac surgery patients admitted in the hospital. The participants were recruited exclusively from the hospital's surgery units. Data was collected between 24th January 2023 to 19th May 2023. All patients admitted to the surgical units during this time period, that met the inclusion criteria and gave informed consent, were involved in the study.

Eligibility Criteria

Inclusion Criteria.

1. Patient aged 18 years or older (both male and female), with a known of cardiovascular disease (CVD).
2. Those documented and planned for elective open-heart surgery.
3. All patients with Coronary Artery Bypass Grafting (CABG), valvular surgeries, Atrial Septal Defect (ASD), Ventricular Septal Defect (VSD), and other open-heart surgeries.
4. Able to understand and speak either English or Urdu.
5. Able to give informed consent.

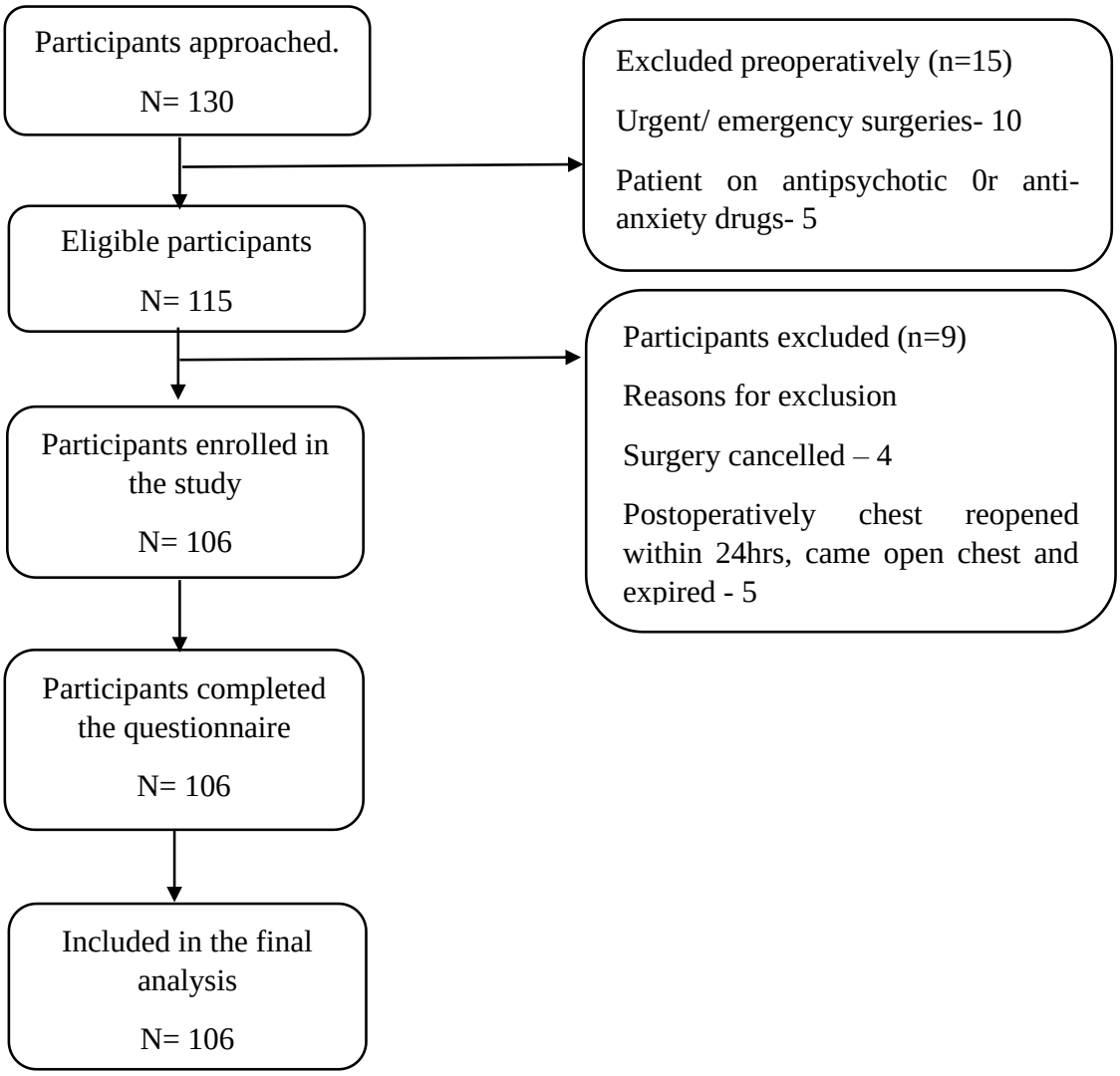
Exclusion Criteria.

1. Patients underwent urgent or emergency cardiac surgeries.
2. Patients who left against medical advice (LAMA).
3. Those with cognitive impairment.
4. History of any diagnosed psychiatric illness (will be checked through medical record).
5. Patients on any antipsychotic drugs.
6. Alcoholic patients.
7. Patients who refused to take part in the study.
8. Patients with open chest postoperatively.
9. Patients whose chest was reopened postoperatively within 24 hours.

Participant Recruitment

Initially, permission was obtained from the Chief Medical Officer (CMO), AKU, and the surgery services Nurse Manager. After the patients were admitted to the hospital in the surgery wards, the investigator accessed the electronic admission portal and obtained information about the patients' admission from the unit in-charge. According to the hospital's policy for elective cardiac surgery, patients must be admitted an evening before the surgery. Patients who met the eligibility criteria were approached and recruited an evening before the surgery by the researcher. After taking their informed consent for voluntary participation they were enrolled in the study.

Figure 3: Sample Recruitment Flow Chart



Outcome Measurements

Primary outcome. Anxiety was the primary outcome of the study, measured using the State-Trait Anxiety Inventory (STAI), a tool designed by Spielberger and Saroson in 1976. Permission was obtained from Mind Garden (United States of America) to use the English and Urdu-translated versions of the tool (refer to Appendix I). The STAI comprises of two sections: STAI-S (State) assesses immediate emotional states resulting from stressful experiences, while STAI-T (Trait) evaluates individual differences in traits related to long-term anxiety. The entire

scale consists of 40 items, with 20 items each for the STAI-S and STAI-T scales, both can be used and examined separately. For the state anxiety, Cronbach's alpha ranged between 0.94 and 0.96 (Ozdemir et al., 2015). In the present study, the Cronbach's Alpha for the scale was calculated to be 0.994.

The STAI-S scale consists of 20 items, where each item asks patients to rate their anxiety levels using a 4-point Likert scale ("not at all", "somewhat", "moderately", and "very much", with rating keys of 1, 2, 3, 4, accordingly) (refer to Appendix J). Each subscale's individual participant scores were summed to calculate a total score range of 20 to 80 points. The thresholds for "no anxiety," "mild anxiety," "moderate anxiety," and "severe anxiety" are, less than 20, 20-39, 40-59, and 60-80 respectively (Basar, Beşli, Keçebaş, Kayapınar, & Turker, 2015; Fernandez-Blazquez, Avila-Villanueva, Lopez-Pina, Zea-Sevilla, & Frades-Payo, 2015).

In the current study, the Urdu version of STAI-S (see Appendix K) was employed. In the local context, the STAI-S version in Urdu has been validated (Kausar, 2018). STAI Urdu translated version was available and was provided by the original tool developer from the Mind Garden. According to numerous studies, the STAI-S stands out as one of the most extensively utilized anxiety assessment scales among cardiac patients (Hosseini, Heydari, Vakili, Moghadam, & Tazyky, 2016; Huber et al., 2013; Moradi & Adib Hajbaghery, 2015).

Preoperative anxiety.

Conceptual definition. Preoperative anxiety can be explained as an overwhelming experience of fear and uneasiness, in which the actual cause is usually general and unknown to the person. However, as a result, the body causes hemodynamic instability in response to sympathetic, parasympathetic, and endocrine stimulation (Abate et al., 2020).

Operational definition: It is a state of disturbing feeling experienced by patients awaiting surgical procedures, with STAI-S scores of 20 and above. The STAI-S scores range from 20–39 (low anxiety), 40–59 (mild anxiety), and 60–80 (severe anxiety) (Basar et al., 2015).

Secondary outcomes. Postoperative clinical variables, such as, postoperative pain, onset of arrhythmias, prolonged ventilation time, and length of hospital stay were the secondary outcomes of the study. Postoperative pain was measured by the researcher postoperatively, for 48 hours after extubation, using the verbal numerical rating scale (vNRS) every 2 hourly as per the institution's cardia ICU policy. Additionally, the onset of arrhythmias and ventilation time were also assessed. Lastly, the researcher also measured the length of hospital stay of all study participants. Postoperatively all four clinical variables were measured by the researcher and documented in a self-developed checklist (see Appendix H). After a thorough literature search, it was decided that the cut-off for all three postoperative clinical variables, i.e., postoperative pain, onset of arrhythmias, and ventilation time will be measured for 48 hours.

Postoperative pain.

*Conceptual definition***.** It is the state of a distressing sensory and emotional feeling resulting from actual or possible tissue injury that patients experience after surgery (Correia & Duran, 2017).

Operational definition. Postoperative pain can be measured through different pain scales. The verbal NRS pain score ranges from 1-3 mild pain, 4-6 moderate pain, and 7 to 10 severe pains (Gomarverdi, Sedighie, Seifrabiei, & Nikooseresht, 2019). The threshold for measuring postoperative pain after extubation was 48 hours (Bethenod et al., 2019; Fernandez-Castro et al., 2022).

Arrhythmias.

Conceptual definition. It is an abnormal heartbeat and can be defined as any variation in the normal conduction of electrical activity in the heart. The electrical impulses may be too fast or too slow, causing irregular heartbeats (AHA, 2022; Clinic, 2023).

Operational definition: Arrhythmia can be identified by an abnormal heart rate, i.e., 100 bpm, or from an abnormal rhythm from a patient's electrocardiogram (ECG) on a cardiac monitor. The onset was measured as yes or no, and even one episode was considered as yes. ECG was monitored for 48 hours postoperatively (Bessissow, Khan, Devereaux, Alvarez-Garcia, & Alonso-Coello, 2015; Melby et al., 2015).

Prolonged ventilation time.

Conceptual definition. Mechanical ventilation is a sort of life-support system. When patients are unable to breathe adequately on their own, a mechanical ventilator which is a device takes over (Hickey & Giwa, 2023).

Operational definition. It is the time measured in hours from the time of intubation to the time of extubation, in CICU; more than 48 hours after surgery was considered as prolonged ventilation time (Fernandez-Zamora et al., 2018; Sharma et al., 2017).

Prolonged Length of hospital stay.

Conceptual definition. It is a clinical indicator that counts the duration in days, from admission to discharge, of a patient's stay in the hospital (Baek et al., 2018).

Operational definition. Evidence reports, that if a patient stays for more than 6-7 days after cardiac surgery, it is considered as prolonged hospital stay.

Data Collection Method

After the approval from ERC, and permission from the nurse manager and head nurses, data was collected by the researcher, from 24th January 2023 to 19th May 2023, on the day of admission i.e., an evening prior to surgery, from all the adult patients planned for open heart surgery. The researcher went to the clinical setting and assessed all the patients against the eligibility criteria and enrolled them in the study. An evening prior to the surgery, a calm and relaxed environment was provided to the patients. After that, the aim and process of the research study were explained to each participant along with the provision of an information sheet regarding the subject. The evening before the surgery, the study participants were approached by the researcher who gave them a questionnaire that comprised of demographic/clinical data and the STAI tool. Informed consent was obtained (refer to Appendix D and E) prior to the data collection. The sociodemographic (refer to Appendix F and G) and STAI form (refer to Appendix J and K) were filled, and data was collected in the counseling/treatment room in the presence of the researcher. Lastly, the data of postoperative clinical outcome variables of the recruited study participants were collected by the researcher.

Sample Size

The required sample size was calculated applying the formula for a single population proportion. The frequency of preoperative anxiety at 28% was obtained from a similar study carried out in Spain among cardiac surgery patients to calculate the estimated sample size (Hernandez-Palazon et al., 2018).

$n=Z2P(1-P)/d2$

Assumption n is the required sample size, Z is the critical value for normal distribution at 95% confidence level (1.96), P is the expected frequency, and d is the precision 0.09 (9% margin of error).

$n = (1.96)2 \times (0.28 \times 0.72) / (0.09)2$

$=3.8416*0.2016/0.0081$

$= 95.61$ round off to 96. Then 10% non-response rate was added.

$= 96 \times 10\% = 9.6$

$= 96 + 9.6 = 105.6$, rounded off to 106, this was considered the total sample size.

Sampling

This study employed a non-probability convenience sampling method to gather data from participants. This method involved selecting all consecutive patients scheduled for elective cardiac surgery who met the inclusion criteria. This type of sampling technique offers structure and rigor by allowing, the selection of all admitted patients who are available during the study period (Martinez-Mesa, Gonzalez-Chica, Duquia, Bonamigo, & Bastos, 2016).

Pilot Testing

Before conducting the final study, the content validity index (CVI) was conducted. Content validity refers to the degree to which an instrument has an acceptable sample of items for the construct being measured, and it is an important process in scale development. In a quantitative analysis, CVI is most frequently utilized. The researcher approached 5-6 experts in the field for CVI; they rated and gave feedback on the questionnaire (demographic and the STAI-S scale). After that feedback was incorporated and an updated questionnaire was developed and again sent back to the experts for review. Then this finalized questionnaire was used for the

study. Pretesting of the scale was also carried out on 10% of the initial participants. This helped the investigator to have an insight into the participants' understanding level, and the total time consumed in filling the questionnaire. The received responses were integrated into the scale and then implemented in the study. The data from the pilot study was excluded from the study's final sample.

Quality Checks

After collecting the complete data from the participants, the questionnaires were reviewed daily by the researcher for any missing information. After that, the entered data was double-checked for any errors. Moreover, to maintain the quality of data, and the consistency, thoroughness, legibility, and accuracy of the data entries, field editing was conducted by the researcher.

Data Analysis Plan

Data analysis was done using the Statistical Package for Social Sciences (SPSS for Windows, version 21.0). The study data was analysed through using both descriptive and inferential statistics. Frequency and percentage were calculated to present the socio-demographic characteristics of the patients, while mean, standard deviation, and minimum and maximum scores were computed to report the anxiety scores.

The association of anxiety scores with demographic characteristics and other secondary outcome variables was examined using the t-test, ANOVA, bivariate correlation and linear regression. The correlation coefficient, beta coefficients, along with 95% confidence interval, and p-values were reported. Variables were considered statistically significant with p-value < 0.05.

Ethical Consideration

For this study, permission was obtained from the Aga Khan University Ethical Review Committee (AKU-ERC). After the ERC approval was received, approval was taken from the cardiothoracic surgery head, nurse manager, and head nurse to conduct the study. The STAI scale has restricted access, and permission was required, therefore, permission for using the STAI questionnaire for assessing preoperative anxiety was taken. The participants were informed in detail about the study, including the study purpose, risks, and benefits, and then informed written consent was taken for their participation. The participants were volunteers, who were not given any incentives, and even after giving consent for the study, they were given rights to withdraw from the study at any point in time. Furthermore, the anonymity, confidentiality, and privacy of the participants were maintained by using codes, instead of identifiable information, in the data, and they were assured about confidentiality throughout the study. The data, which just included the findings and not the participants' information, was accessible only to the committee members, the hard copies were secured under lock and key, and the soft copy folders on the computer were protected by a password.

Summary

The methodology for the study was covered in this chapter. It included a comprehensive summary of the study population and study design. Also, it highlighted the eligibility requirements for the study. Furthermore, the intervention, participants' recruitment, and outcome variables were discussed. Also, the method for data collection, the sample size, the sampling strategy, and the methodology for data analysis were covered. Lastly, the study's ethical considerations were addressed. In the following chapter, the study's results will be discussed.

Chapter Four Results

This chapter discusses the findings of the study. It is divided into four sections. The first section describes the sociodemographic details and the clinical and hospitalization characteristics of patients. The second section includes the findings regarding the frequency of preoperative anxiety among cardiac surgery patients. The third section describes the association of anxiety with the sociodemographic, clinical, and hospitalization characteristics of the patients. The last section describes the association of anxiety with immediate post-operative clinical variables.

Socio-demographic Characteristics of Patients

Table 1 illustrates the socio-demographic characteristics of patients. A total of 106 patients who had planned cardiac surgery were enrolled in the study. The age of patients varied from 18 to 80 years, with a mean age of 46.4 (SD 15.72). More than 33.3% (n=35) of patients were in the 56 years and above age category. Moreover, the study found that over half of the patients, that is, 54% (n=57), were females, and 72.9% (n=78) patients were married. The educational background of the participants in the study indicated that most of the patients, 51% (n=55), had secondary-level or less education, with only 15% (n=15) having university-level education. With regard to employment status, the majority 40% (n= 43) of the patients were employed, and 34% (n=36) were earning 50,000-100,000 rupees. Furthermore, the study revealed that more than half of the cardiac surgery patients, 71.3% (n=75), were residing in the urban areas, with the majority, 54% (n=57), living in nuclear families (small family of immediate members, consisting of a couple i.e., parents and their children). Whereas 46% (n=49) were living in joint families (known as extended families, living with multiple generations in single household).

Table 1: Socio-demographic Characteristics of Patients

Variables	Frequency (n)	Percentage (%)
Age (in Years) Mean ± SD	46.4 ± 15.72	
Categories of age		
18-25	8	7.5%
26-35	16	15.0%
36-45	25	23.5%
46-55	22	20.7%
56 or more	35	33.3%
Gender		
Male	49	46.0%
Female	57	54.0%
Marital Status		
Single	22	20.6%
Married	78	72.9%
Widowed	3	2.8%
Divorced	1	1.8%
Separated	2	1.9%
Education Level		
Secondary or less	55	51.0%
High school	36	34.0%
University	15	15.0%
Occupation		
Unemployed	9	8.0%
Employed	43	40.0%
Student	33	33.0%
Retired	21	19.0%
Socio-economic status		
4000-20,000	6	6.0%
21,000-49,000	29	27.0%

50,000-10,0000	36	34.0%
More than 100000	35	33.0%
Residency		
Urban	75	71.3%
Rural	31	28.7%
Family Structure		
Nuclear	57	54.0%
Joint	49	46.0%

Clinical and Hospitalization Characteristics of Patients

Preoperative clinical characteristics. The clinical characteristics of patients are described in Table 2. The findings show that 41% (n = 43) of the patients underwent CABG surgery, 36% (n = 38) underwent valvular surgery, and 23% (n = 25) underwent open-heart surgery for procedures, including ASD, VSD, aortic root aneurysm and CABG + valvular mixed surgeries.

The most common comorbidities were diabetes mellitus (n=36, 34%) and hypertension (n=24, 23%). The records showed that more than half of the participants, 59% (n=63), were nonsmokers. However, 23.0% (n=24) of the patients had a history of substance abuse, and none used alcohol. The previous hospitalization characteristics report shows that more than half of the patients, 71.4% (n=76), were hospitalized for the first time, but 28.6% (n=30) had a previous history of hospitalization. Among them only, 9.3% (n=10) and 14.8% (n=14) patients had past anesthesia and surgical experience, respectively.

Postoperative clinical outcomes of patients. The postoperative clinical outcome variables of patients are also discussed in Table 2. The mean postoperative pain score was 3.90 (SD 1.76) with the verbal numerical rating scale. Moreover, the study revealed that 46% (n=49)

of the patients developed arrhythmias within 48 hours of cardiac surgery. The mean intubation time was 1.45 (SD 0.50) hours. Regarding the length of hospital stay, that is, from admission to discharge, over half of the patients, 65% (n=69), were discharged in less than 7 days, with a mean of 8.12 (SD 2.93).

Table 2: Clinical and Hospitalization Characteristics of Patients

Variables	Frequency (n)	Percentage (%)
Clinical Characteristics		
Surgical Procedure		
CABG	43	41.0%
Valvular Surgeries	38	36.0%
Other Open-heart Surgeries (including ASD, VSD, aortic root aneurysm, and CABG + valvular mixed surgeries)	25	23.0%
Comorbidities		
Diabetes Mellitus		
Yes	36	34.0%
No	70	66.0%
Hypertension		
Yes	24	23.0%
No	82	77.0%
Smoking		
Yes	43	41.0%
No	63	59.0%
Substance Abuse		
Yes	24	23.0%
No	82	77.0%
Hospitalization Characteristics		
Previous Hospitalization		
Yes	36	29.0%

No	70	71.0%
Anesthesia Experience		
Yes	10	9.3%
No	96	90.7%
Past Surgery Experience		
Yes	14	14.8%
No	92	85.2%
Postoperative Clinical Outcomes		
Categories of Pain		
Mild pain	21	20%
Moderate pain	74	70%
Severe pain	11	10%
Arrhythmias		
Yes	49	46%
No	57	54%
Prolonged ventilation		
> 48 hours	48	45%
< 48 hours	58	55%
Length of Hospital Stay		
> 7 days	37	35%
< 7 days	69	65%

Frequency of Preoperative Anxiety

Preoperative anxiety was assessed using the STAI tool. The Cronbach's Alpha for the anxiety scale (SAI), based on this data, was 0.994. Moreover, the study findings indicated that most of the patients, 67% (n=71), admitted for elective cardiac surgery experienced a mild to moderate level of anxiety. However, 18% (n=19) of participants experienced severe anxiety as well.

Table 3: Frequency of Preoperative Anxiety

Category of Anxiety	Scores Ranges	n	%
No anxiety	< 20	16	15%
Mild anxiety	20-39	37	35%
Moderate anxiety	40-59	34	32%
Severe anxiety	60-80	19	18%

n= 106

Association of Preoperative Anxiety with the Socio-demographic, Clinical, and Hospitalization Characteristics

Inferential analysis was conducted for independent variables, to assess their association with preoperative anxiety. The relationship of socio-demographic and clinical characteristics, with preoperative anxiety, was evaluated using bivariate correlation for two continuous variables (age and socio-economic status), one-way ANOVA for categorical variables having more than two categories (education level and past surgical experience) with a continuous variable, and independent sample t-test for grouped variables (gender, marital status, employment status, residency, family structure, comorbidities, smoking history, substance abuse, and previous hospitalization status). The p-value of <0.05 was considered significant for analysis. The statistical values (p values) of preoperative anxiety with independent variables are shown in Table 4.

A statistical significance ($p= < 0.05$) was observed in patients' age ($r= - 0.74$, $p < 0.001$), patients' gender ($t= 3.41$, $p= 0.04$) and patients' educational status ($F= 4.04$, $p = 0.02$) with preoperative anxiety. It demonstrated that the younger the patient, the higher the anxiety levels would be. Moreover, the mean preoperative anxiety score was significantly higher in females as

compared to males (p-value = 0.04). Similarly, for education status, anxiety levels had a significantly higher fraction among study participants with secondary or below the level of education. However, there was no statistical difference (p= >0.05) in patients' marital status (p= 0.20), employment status (p= 0.67), socioeconomic status (p= 0.66), residency (p= 0.46), and family structure (p=0.60) regarding preoperative anxiety.

The clinical characteristics of cardiac surgery patients, for instance, the presence of comorbidities, diabetes mellitus (p= 0.35), hypertension (p= 0.22), history of smoking (p= 0.94) and substance abuse (p= 0.06) were not significantly associated with preoperative anxiety. With regard to current surgical procedures, no statistical significance (p= 0.15) was found with respect to anxiety. Furthermore, the hospitalization details revealed that there was no statistical difference in previous hospitalization (p= 0.46), past anesthesia (p= 0.39), or surgery experience (p= 0.30) with regard to preoperative anxiety.

Table 4: Analysis of Sociodemographic, Clinical, and Hospitalization Characteristics with Anxiety

S.No.	Independent Variables	Frequency (n)	Mean ± SD	Statistics	p. Values
	Sociodemographic Characteristics				
1.	**Patient's Age**				
	Mean age ± SD		46.4 ±15.72	r= - 0.74	<0.001**
2.	**Gender**			t= 3.41	0.04*
	Male	49 (46.0%)	2.89 ± 0.93		
	Female	57 (54.0%)	2.74 ± 0.89		
3.	**Marital Status**			t= 1.28	0.20
	Married	78 (72.9%)	2.87 ± 0.91		
	Single (divorced, single, separated, widowed)	28 (27.1%)	2.60 ± 0.88		
4.	**Education Level**			F= 4.04	0.02*

	Secondary or less	55 (51.0%)	2.22 ± 1.33		
	Higher secondary	36 (34.0%)	2.81 ± 0.97		
	University	15 (15.0%)	3.00 ± 0.53		
5.	**Employment Status**			t=0.41	0.67
	Working	43 (40.0%)	2.83 ± 0.92		
	Not Working (unemployed, student and retired)	63 (60.0%)	2.75 ± 0.90		
6.	**Socio-economic status**			r= 0.04	0.66
	4,000-20,000	6 (6.0%)	2.93 ± 0.92		
	21,000-49,000	29 (27.0%)	2.93 ± 0.92		
	50,000-100,000	36 (34.0%)	2.93 ± 0.92		
	More than 100,000	35 (33.0%)	2.93 ± 0.92		
7.	**Residency**			t= -0.74	0.46
	Urban	75 (71.3%)	2.77 ± 0.91		
	Rural	31 (28.7%)	2.91 ± 0.91		
8.	**Family Structure**			t= -0.52	0.60
	Nuclear	57 (54.0%)	2.85 ± 0.95		
	Joint	49 (46.0%)	2.76 ± 0.87		
	Clinical Characteristics				
9.	**Surgical Procedure**			F= 0.67	0.15
	CABG	43 (41.0%)	2.21 ± 1.34		
	Valvular Surgeries	38 (36.0%)	2.87 ± 0.95		
	Other Open-heart surgeries	25 (23.0%)	3.01 ± 0.55		
10.	**Comorbidities**				
	Diabetes Mellitus			t= 0.93	0.35
	Yes	36 (34.0%)	2.75 ± 0.90		
	No	70 (66.0%)	2.92 ± 0.93		
	Hypertension			t= -1.33	0.22
	Yes	24 (23.0%)	2.70 ± 0.92		
	No	82 (77.0%)	3.18 ± 0.76		
11.	**Smoking**			t= 0.07	0.94

	Yes	43 (41.0%)	2.80 ± 0.92		
	No	63 (59.0%)	2.81 ± 0.90		
12.	**Substance Abuse**			t= -1.82	0.06
	Yes	24 (23.0%)	2.71 ± 0.90		
	No	82 (77.0%)	3.09 ± 0.89		
	Hospitalization Characteristics				
13.	**Previous Hospitalization**			t= 0.46	0.46
	Yes	36 (29.0%)	2.70 ± 0.95		
	No	70 (71.0%)	2.60 ± 0.94		
14.	**Anesthesia Experience**			t= 0.85	0.39
	Yes	10 (9.3%)	2.93 ± 0.96		
	No	96 (90.7%)	2.76 ± 0.89		
15.	**Past Surgery Experience**			t= 0.14	0.30
	Yes	14 (14.8%)	0.29 ± 1.00		
	No	92 (85.2%)	2.74 ± 0.88		

*p<0.05 **p<0.001

Association of Preoperative Anxiety with Postoperative Outcome Variables

With regard to postoperative clinical outcomes, pain was found to be positively correlated and highly significant (r= 0.96, p< 0.001) with anxiety. This demonstrated that an increase in the pain scores caused an increase in the level of anxiety. However, other postoperative outcomes, such as arrhythmia (p= 0.66), prolonged ventilation (p= 0.85), and length of hospital stay (p= 0.43), were negatively correlated, and showed no statistical difference with preoperative anxiety. The statistical association of preoperative anxiety with immediate postoperative outcomes are summarised in Table 5.

Table 5: Results of Pearson Correlation Analysis of Anxiety with Postoperative Outcomes

Variables	Correlation Coefficient	p. Value
Pain	0.96	<0.001**

Arrhythmia	-0.04	0.66
Prolonged Ventilation	-0.01	0.85
Length of hospital stay	-0.07	0.43

*p<0.05 **p<0.01

Summary

This chapter provides a summary of the findings of this study. The results of the study discussed the frequency of preoperative anxiety among study participants and its relationship with socio-demographic details, hospitalization, and clinical characteristics. Along with this, the chapter also discussed the association of anxiety with immediate postoperative outcomes of cardiac surgery patients. Overall, a statistically significant association was found with patients' age, gender, education level, postoperative pain, and preoperative anxiety.

Chapter Five Discussion

This chapter discusses the key findings of the study with literature support. Initially, it describes the frequency and prevalence of preoperative anxiety found among cardiac surgery patients. Next, it discusses the association of socio-demographic details, clinical and hospitalization characteristics, and immediate postoperative outcomes with the level of preoperative anxiety. Lastly, this chapter describes the strengths and limitations of the study, along with the recommendations at the educational, practice and policy, and research levels.

Frequency of Preoperative Anxiety Among Cardiac Surgery Patients

The purpose of the study was to assess preoperative anxiety among patients undergoing open-heart surgery. The results of this study highlighted that following cardiac surgery, most of the patients experienced preoperative anxiety. Approximately, 67% of the participants reported mild to moderate levels of anxiety, using the STAI scale, with 18% of the patients demonstrating significantly high levels of anxiety (scores > 60), while only 15% had average preoperative anxiety scores below 20, indicating no anxiety. The univariate analysis of the independent variables showed that the patients' preoperative anxiety was significantly correlated with their age, educational level, gender, and postoperative pain intensity.

The average mean score of preoperative anxiety suggests that the patients planned for cardiac surgery, in this study, experienced moderate preoperative anxiety. The results are consistent with other studies conducted with surgical patients, which claimed preoperative anxiety affects 60–80% of the patients (Woldegerima, Fitwi, Yimer, & Hailekiros, 2018). The incidence of preoperative anxiety was reported to be 76.7% in Sri Lanka (Jayawardane, Gankanda, & Gunathilake, 2021) and 70.3% in Jimma, Ethiopia (Nigussie, Belachew, & Wolancho, 2014). Similarly, another study carried out among Indian surgical patients using a

different instrument found that the overall incidence of preoperative anxiety was 58.9% (Saini & Dayal, 2016). However, the findings of this study were higher as compared to other studies carried out in Nigeria, Austria, and Saudi Arabia, where preoperative anxiety was found to be prevalent, overall, in admitted surgical patients, at 51%, 45.3%, and 55%, respectively (Akinsulore, Owojuyigbe, Faponle, & Fatoye, 2015; Mulugeta et al., 2018). On the contrary, this study observed a lower frequency of preoperative anxiety compared to similar studies conducted in Canada, Sri Lanka, and Niger. In those studies, the incidence of preoperative anxiety was notably higher at 89%, 76.7%, and 90%, respectively (Mulugeta et al., 2018).

The differences in the results could be attributed to differences in the socio-demographic characteristics of patients, for instance, participant's age, as the current study consisted mainly of older adults, with a mean age of 46.4. The other possible reasons for this variation could be due to the strong impact of family and social support in the Pakistani society, poor educational status, and difference in the study methodology and study instrument used to assess preoperative anxiety.

According to several studies, factors that contribute to increased preoperative anxiety include long wait times, being under 65, worry about anesthesia and surgery, knowledge deficit about the surgery, distress of postoperative pain and an change in physical appearance, and being separated from loved ones (Kashif, Hamid, & Raza, 2022).

Patients' Age and Level of Preoperative Anxiety

Patients' age could be one of the potential contributors to preoperative anxiety in patients undergoing cardiac surgery. The univariate analysis demonstrated a negative and significant association ($r = -0.74$, $p < 0.001$) of patient age with preoperative anxiety, that is, younger

patients are at more risk to develop higher anxiety, and as the age increases, the frequency of preoperative anxiety decreases. The research findings of this study are in line with a study conducted in Northwest Ethiopia, which found that age was adversely associated with preoperative anxiety. They reported that age between 30 and 45 years was linked with elevated preoperative anxiety levels (AOR = 5.72, CI = 1.61- 20.28). Additionally, individuals aged 18 to 30 years exhibited more preoperative anxiety (AOR = 6.92, CI = 1.39 - 33.82) than those aged 60 years and above (Woldegerima et al., 2018). Another study, carried out by Smith et al. (2021), also suggested the same correlation between a patient's age and preoperative anxiety. However, some research conducted in Spain and Turkey has indicated that elderly patients had higher preoperative anxiety levels than younger patients, because of the comorbidities (Abate et al., 2020; Fernández-Castro et al., 2022; Hernandez-Palazon et al., 2018).

The reason for these findings could be lack of previous surgical experience, fear of the unknown, concerns about outcomes, and body image. In addition, higher levels of anxiety in younger patients could also be due to the socio-cultural status and values of older adults. Furthermore, in the present study, the average age of the participants was 46.4 ± 15.72, and a majority of the patients belonged to the 56 years or older category.

Research findings also indicate that patients who are well-prepared both physically and emotionally for surgery experience better surgical outcomes (Mulugeta et al., 2018). Hence, it is essential for nurses to explore patients' perceptions in detail, and give emotional and psychological support to their patients, and give younger patients more opportunity to discuss their apprehensions and fears related to surgery and recovery.

Patients' Gender and Level of Preoperative Anxiety

Patients' sex was another socio-demographic characteristic that was significantly linked with preoperative anxiety. The results of this study found that female patients experienced statistically significant ($t= 3.41$, $p < 0.05$) higher levels of preoperative anxiety as compared to males. Moreover, in the current study, most of the study participants (54 %, n= 57) were females and their mean was 2.74 ± 0.89. The significant association of the female gender with preoperative anxiety, found in this study, is in line with other similar studies conducted in the Czech Republic, India, Turkey, Taiwan, Lithuania, China, and Ethiopia (Abate et al., 2020; Homzová & Zeleníková, 2015; Kuzminskaitė, Kaklauskaitė, & Petkevičiūtė, 2019; Liu et al., 2018; Matthias & Samarasekera, 2012; Saini & Dayal, 2016; Yilmaz, Sezer, Gürler, & Bekar, 2012). Moreover, the findings of studies conducted in Iran with patients going for cardiac surgery (Mehdi Fathi et al., 2014), and in Spain, by Diez-Alvarez and Valenzuela Millán, (2012) found that, 70% of the participants with severe anxiety were female. This association among gender and anxiety was also discovered in a study conducted in Brazil, by Rodrigues et al. (2018) which employed the Hospital Anxiety and Depression Scale (HADS) to evaluate preoperative anxiety. However, the findings of the current study was in contrast with other research studies that reported lack of a significant relationship of gender with preoperative anxiety (Kim, Byeon, Song, & Lee, 2010; Nigussie et al., 2014).

Several studies have pointed out that gender independently predicts preoperative anxiety, with females tending to experience higher levels of preoperative anxiety (Woldegerima et al., 2018). Moreover, one study explained that this difference in high anxiety in female patients could be because of their emotional sensitivity to fearful events, and the hormonal fluctuations of estrogen and progesterone levels (Forlani et al., 2014). In addition, a 2018 meta-analysis,

conducted by Mulugeta et al (2018), revealed that this difference could also be attributed to variations in how females cope with stress, females tend to express their concerns, feelings, and anxiety more readily than males. Moreover, women are more affected by family separation.

Therefore, involving the patient's family in the preoperative process can have a major influence on reducing patient anxiety. Family members can provide emotional support and reassurance, which would help the patient be more comfortable and prepared for the surgery. Research has shown that social support, including support from family members, can have a positive impact on health outcomes.

Patients' Educational Status and Level of Preoperative Anxiety

Regarding socio-demographic variables, a statistically significant and inversely proportional relationship ($F= 4.04$, $p < 0.05$) was also found between the level of education and the levels of anxiety. In this study, the largest proportion of the study participants (51%, n= 55) belonged to the secondary or less than secondary level educational category, with a mean of 2.22 ± 1.33, and it was found that the level of anxiety reduced with the increase in the level of education. These findings are consistent with other similar studies, where they observed education status as a significant predictor of anxiety, that is, patients with university-level education tended to experience a lower levels of anxiety (Díez-Álvarez et al., 2012; Ezgi Erkilic et al., 2017; Prathapan et al., 2013). This could be because patients with high levels of education have a better ability to comprehend the provided information, which helps them prepare and reduce anxiety preoperatively.

These findings are contradictory to the results of the other similar studies, which reported, that the level of preoperative anxiety rises with an increasing education level (Bayrak et al., 2019; Nigussie et al., 2014; Yilmaz et al., 2012). This correlation has been described by the

fact that highly educated individuals tend to express their feelings, have knowledge-seeking behavior, and have awareness about potential complications. In addition, if they receive insufficient information from different resources, their level of anxiety will rise (Woldegerima et al., 2018).

Hence, to mitigate preoperative anxiety it is crucial that during the patient's preoperative visit, information regarding the specific type of surgery and anesthesia, as well as an explanation of the roles of the multidisciplinary team is included, and explanations are provided in a language that the patient can easily understand (Dusica M Stamenkovic et al., 2018).

Postoperative Pain and Level of Preoperative Anxiety

The immediate postoperative outcome, on which preoperative anxiety has a significant impact, is the patient's postoperative pain, which was found to be statistically associated ($p < 0.001$) with preoperative anxiety. In this study, using the verbal numerical rating scale (vNRS), results showed that the post-surgery pain scores were considerably higher in patients whose preoperative anxiety levels were high and, therefore, increased analgesics were needed. These findings are in line with the other studies, which discovered a positive correlation of preoperative anxiety with postoperative pain (Fernández-Castro et al., 2022; Oliver K Jawitz et al., 2020; Liu et al., 2018). Hence, the presence of preoperative anxiety has been identified as a significant predictor of postoperative pain (Lin, Hsieh, Yeh, Lee, & Niddam, 2013; Williams et al., 2013), and high levels of preoperative anxiety may lead to poor post-surgery pain management and higher morbidity (Friedrich, Reis, Meybohm, & Kranke, 2022).

This may be attributed to the role of GABA in regulating pathological pain and inhibiting hyperalgesia, which represents a potential mechanism through which preoperative anxiety intensifies postoperative pain. Nevertheless, anxiety could also diminish presynaptic GABA

release and hinder the functioning of postsynaptic GABA receptors (J. Chen et al., 2018; Mody & Maguire, 2012). The results of this study are also aligned with that of Miguel et al. as cited in Navarro-García et al. (2011), who used the HADS to assess preoperative anxiety and reported a significant association between preoperative anxiety and postoperative pain. In contrast, these findings are not in agreement with some other studies, that do not indicate any correlation among preoperative anxiety and postoperative pain (Ahmed, Pilling, Ahmed, & Buchan, 2019; Laufenberg-Feldmann, Kappis, Schuster, & Ferner, 2016; Mandy & Feeney, 2014).

Hence, in clinical practice, to improve patients' postoperative recovery, certain measures should be taken, such as non-pharmacological methods, including music therapy, cognitive behavioral therapy (CBT), and guided imaginary relaxation therapy, to alleviate preoperative anxiety, to lessen postoperative pain and suffering.

In summary, the stress response theoretical framework served as a guiding framework in understanding and addressing the relationship of stress with preoperative anxiety. This theory allows researchers to examine how physiological stress reactions may contribute to adverse postoperative outcomes, such as complications, prolonged recovery, or increased morbidity. Preoperative anxiety assessment should be integrated with the available questionnaires in the preoperative protocol of the cardiac surgery to timely address the patient's apprehension and fears, in order to promote better postoperative outcomes. This is important, as the study findings, also show that variables such as patients' age, gender, level of education, and postoperative pain, displayed a significant association with the continuous dependent variable, that is, preoperative anxiety. Along with this literature suggests that there is a need to increase awareness about preoperative anxiety, and proper medical staff training is required to enable them to recognize patients with anxiety who need psychosocial support (Dusica M Stamenkovic et al., 2018).

Hence, in this regard, nurses can play a crucial role in the critical assessment of preoperative anxiety. A nurse-led comprehensive educational guidance to patients in the preoperative phase can lead to improved patient outcomes, shorter hospital stays, and greater patient satisfaction.

Strengths of the Study

The current study had the following strengths:

- To the researcher's best knowledge, no study has been carried out in the Pakistani context that had assessed the frequency of preoperative anxiety along with its associated factors and its impact on immediate postoperative outcomes among cardiac surgery patients, hence, this probably the first study of this kind.
- The tool employed in this study was contextually reliable and was validated in the Urdu language, which was linguistically appropriate and easy to understand by the Pakistani patients.
- The internal consistency was found to be satisfactory for the overall study tool.
- A comprehensive review of relevant literature was done, which demonstrated that the study is built upon a solid foundation of existing research, acknowledging what is already known and identifying gaps that the thesis aimed to address.

Limitations of the Study

The current study had the following limitations:

- The study did not include the patients listed for urgent and emergency cardiac surgeries and the pediatric population.
- The participants were recruited from one single hospital only, which restricts the generalizability of the results.

- All potential causes of preoperative anxiety, such as waiting time, were not considered. Additionally, other outcomes like postoperative analgesic requirement, or quality of life following surgery were not reported.
- There was no postoperative anxiety assessment, which would have provided an additional opportunity to study the relationship between pre and postoperative anxiety.

Recommendations

The results of the current study generated recommendations at the educational, practice and policy, and research levels.

Educational level. Following are the recommendations for strengthening HCPs knowledge regarding the assessment of preoperative anxiety and for incorporating measures to reduce anxiety among cardiac surgery patients.

- Nursing and medical schools should integrate comprehensive training on anxiety assessment and management into their curriculum. This will help future HCPs, recognize the significance of preoperative anxiety, and provide better support to patients.
- Educational sessions, face-to-face training, and online webinars should be conducted to educate nurses, doctors, and other healthcare professionals regarding how crucial thorough assessment of preoperative anxiety is, and how providing patient-centered, individualized care can reduce patient anxiety.
- Arranging mandatory and frequent in-service sessions for nurses and other healthcare professionals, especially in the cardiac surgery field, to improve their

communication skills with patients, can help alleviate anxiety. Patients should be informed, engaged, and comforted through effective communication.

- Training sessions should be arranged for nurses to reinforce the importance of evaluating preoperative anxiety in cardiac surgery patients, along with its impact on patients' postoperative recovery and overall quality of life.
- Healthcare providers should be educated about the Stress Response Theory, including surgeons, anesthesiologists, and nurses, to enhance their understanding of the physiological and psychological aspects of stress. This knowledge can lead to better communication with patients, improved preoperative counseling, and tailored interventions to address preoperative anxiety. Training programs can include modules on recognizing stress-related responses in patients and how to effectively manage them.

Practice and policy level. A few recommendations at the practice and policy level, for the effective implementation of measures to reduce preoperative anxiety, and to make the pre and postoperative surgery process smooth for patients and their families, are given below.

- Based on the study findings, it is strongly recommended that evidence-based interventions specifically designed to address preoperative anxiety should be developed and adopted. These interventions should be an integral part of preoperative care plans for cardiac surgery patients when they are admitted an evening before the surgery.
- Hospitals and healthcare institutions should establish emotional support programs for cardiac surgery patients. These programs can include support groups,

counseling services, and mental health resources, to help patients manage their preoperative anxiety.

- Standardized protocols for assessing preoperative anxiety in cardiac surgery patients should be developed and implemented. These protocols should be adopted as a standard practice across healthcare institutions, to ensure consistency in the evaluation of anxiety.
- The existing system of preoperative assessment needs to be modified in a way, that routine preoperative anxiety screening and assessment is made a mandatory part of the preoperative evaluation process. This can help identify high-risk patients and provide timely interventions.
- Establishment of interdisciplinary care teams, involving surgeons, anaesthesiologists, nurses, psychologists, and social workers, should be promoted. These teams should collaborate in the assessment and management of preoperative anxiety, to provide comprehensive care.
- Individualized care plans should be developed for patients, based on their anxiety levels, and contributing factors. This approach will ensure that patients receive tailored support and interventions that address their specific needs.
- Educational materials and programs should be developed to inform patients about the potential impact of preoperative anxiety on postoperative outcomes. Patients should also be educated about coping strategies and the resources available to them.
- Nursing leadership should play an active role in quality improvement programs that monitor and evaluate the effectiveness of anxiety assessment and

management in cardiac surgery units. Regular audits can identify areas for improvement.

- Healthcare institutions can establish policies that recognize the significance of addressing preoperative anxiety in cardiac surgery patients. Selye's theory can inform policies aimed at reducing stressors within the hospital environment, implementing standardized anxiety assessments, and ensuring access to psychological support for patients. These policies can promote a patient-centered approach and encourage the integration of stress management techniques into preoperative care protocols.
- Healthcare practices can benefit from Selye's Stress Response Theory by implementing stress-reduction interventions as a routine part of the preoperative care plan for cardiac surgery patients. Practices may include relaxation techniques, mindfulness exercises, or counseling services. Furthermore, monitoring physiological stress markers, as suggested by the theory, can be integrated into the preoperative assessment to identify patients at higher risk and provide them with targeted support.

These recommendations, when implemented through practice and policy, can help healthcare systems better address preoperative anxiety among cardiac surgery patients, resulting in improved immediate postoperative outcomes and overall patient well-being.

Research level. The study generated a few recommendations for future research in this area.

- Long-term follow-up studies to investigate the lasting effects of preoperative anxiety on cardiac surgery patients need to be conducted. These will provide a

more comprehensive understanding of the impact on their health and their quality of life, beyond the immediate postoperative period.

- A mixed-method study, with a larger sample size and across multiple healthcare institutions, can be conducted to explore preoperative anxiety and postoperative outcomes. This will allow for diverse patient populations, stronger statistical analyses, and generalization of the findings.
- The role of effective patient-provider communication in reducing preoperative anxiety and improving postoperative outcomes needs investigation. Also, the impact of communication training for healthcare professionals needs to be assessed.
- Interventional studies can be carried out to evaluate the difference in the preoperative anxiety levels and postoperative outcomes in the control and interventional groups.
- Researchers can use Selye's theory as a foundational framework for designing studies that explore the association between preoperative anxiety, physiological stress responses, and immediate postoperative outcomes. This approach can guide the selection of relevant stress markers, such as cortisol levels, to assess the stress response's impact on surgical results. Research findings can inform evidence-based interventions and contribute to a better understanding of how to optimize preoperative care.

These research recommendations will contribute to a deeper understanding of preoperative anxiety, its contributing factors, and its impact on immediate postoperative outcomes in cardiac surgery patients. Such knowledge will facilitate the development of

evidence-based interventions and policies, which is crucial for enhancing patient outcomes and well-being throughout the surgical journey.

Conclusion

The study assessed the frequency of preoperative anxiety, its associated factors, and impact on immediate postoperative outcomes among patients undergoing cardiac surgery at a tertiary care hospital in Karachi, Pakistan. The study indicated a significant frequency of preoperative anxiety among cardiac surgery patients. Additionally, the findings showed significant correlations between preoperative anxiety levels and the patient's age, gender, educational background, and postoperative pain levels.

Evaluating preoperative anxiety in cardiac surgery patients holds paramount importance for nurses to ensure the delivery of high-quality nursing care. Addressing anxiety before surgery is crucial for implementing timely interventions and preventing poor postoperative outcomes. The study presented few recommendations at the educational, practice, policy, and research levels. These include the development of effective strategies for assessing preoperative anxiety and the implementation of suitable therapies to alleviate anxiety. Such initiatives aim to improve postoperative outcomes, enhance long-term prognosis, and elevate the overall QoL for patients following cardiac surgery.

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Appendix A: Permission letter from Chief Medical Officer

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

Dated: September 8, 2022

Title: Prevalence and factors associated with preoperative anxiety among adult elective cardiac surgery patients of a tertiary care hospital in Karachi, Pakistan

Principal Investigator: Dr. Laila Ladak
Associate Professor, School of Nursing
Aga Khan Hospital
Karachi

The above-entitled study is a Cross-Sectional Analytical study in the Aga Khan University Hospital, Karachi.

As Chief Medical Officer at the Aga Khan University Hospital, Karachi, I approve the above named study to be conducted within the Hospital, following required approvals and maintaining compliance with all Institutional ethical and regulatory requirements

Asim F. Belgaumi,
Professor, Pediatric Hematology & Oncology,
Department of Oncology.
Chief Medical Officer,
Associate Dean for Clinical Affairs
Aga Khan University Hospital.

Stadium Road, P. O. Box 3500, Karachi 74800, Pakistan
Telephone: +92 21 3493 0051, Fax: +92 21 3493 4294 / 3493 2095, Website: www.aku.edu

Appendix B: Permission from the Ethical Review Committee

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

15-Nov-2022

Dr. LAILA LADAK
Department of School of Nursing and Midwifery
Aga Khan University
Karachi

Dear Dr. LAILA LADAK,

2022-7966-23347, LAILA LADAK: Frequency and factors associated with preoperative anxiety among adult elective cardiac surgery patients of a tertiary care hospital in Karachi, Pakistan

Thank you for submitting your application for ethical approval regarding the above mentioned study.

Your study was reviewed and discussed in ERC meeting. There were no major ethical issues. The study was given an approval for a period of one year with effect from 15-Nov-2022. For further extension a request must be submitted along with the annual report.

List of document(s) approved with this submission.

Submission Document Name	Submission Document Date	Submission Document Version
CITI_Laila Ladak (Biomedical Responsible Conduct of Research)		
CITI Naveen (Biomedical Research)		
CITI Hina Inam (GCP – Social and Behavioral Research Best Practices for Clinical)		
CITI -Sehrish Sajjad (Biomedical Research)		
CITI- Fauzia (Social and Behavioral Responsible Conduct of Research)		
Preoperative English Questionnaire	26-Aug-2022	1
Preoperative Urdu Questionnaire.	26-Aug-2022	1
Written Consent Form-English	26-Aug-2022	1
Tool Use and Translation Permission	26-Aug-2022	1
Affidavit for Translation	26-Aug-2022	1
CMO Permission Letter	08-Sep-2022	1
Research Protocol	10-Nov-2022	3
N-Written Consent Form-Urdu	10-Nov-2022	2
ERC Response Sheet	10-Nov-2022	1

Any changes in the protocol or extension in the period of study should be notified to the Committee for prior approval. All informed consents should be retained for future reference.

Please ensure that all the national and institutional requirements are met.

Thank you.

Sincerely,

Page 1 of 2

Dr. Shabbir Akhtar

Chairperson
Ethics Review Committee

Appendix C: Amendments Approval from Ethical Review Committee

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

13-Feb-2023

Dr. LAILA LADAK
Department of School of Nursing and Midwifery
The Aga Khan University
Karachi

Dear Dr. LAILA LADAK,

Re: 2023-7966-24033, LAILA LADAK - Assessment of Preoperative Anxiety, its Contributing Factors, and Impact on Immediate Postoperative Outcomes among Cardiac Surgery Patients.

Thank you for your submission.

The proposed amendments have been reviewed and approved. Please note that this only constitutes an approval to your requested amendment(s) till the current validity period of your ERC approval. If any further extension is required, then kindly apply for an extension separately by creating a subform.

List of amended document(s) approved with this submission.

Submission Document Name	Submission Document Date	Submission Document Version
Updated English Questionnaire	01-Feb-2023	2
Updated English Consent	01-Feb-2023	2
Updated Urdu Consent	01-Feb-2023	3
Update Urdu Questionnaire	01-Feb-2023	2
Updated_Research Protocol	01-Feb-2023	4
Affidavit for Translation	01-Feb-2023	2

Any changes in the protocol or extension in the period of study should be notified to the committee for prior approval. All informed consents should be retained for future reference.

Thank you.

Sincerely,

Dr. Shabbir Akhtar

Chairperson

Ethics Review Committee

Page 1 of 1

Appendix D: Informed Consent Form (English)

WRITTEN INFORMED CONSENT

PROJECT INFORMATION	
Project Title: Study Title: Assessment of Preoperative Anxiety, its Contributing Factors, and Impact on Immediate Postoperative Outcomes among Cardiac Surgery Patients	Version & Date:
ERC Project No: 7966	Sponsor: Not applicable
Principal Investigator: Dr. Laila Ladak	Organization: The Aga Khan University, School of Nursing and Midwifery.
Location: Karachi	Phone: 02134865401
Other Investigators: Naveen Nizar Ali	Organization: The Aga Khan University, School of Nursing and Midwifery.
Location: Karachi	Phone: 03342688513

INTRODUCTION

I am Naveen Nizar Ali, a student for a Master of Science in Nursing at Aga Khan University School of Nursing and Midwifery Karachi Pakistan. As a requirement of the MScN program, I am conducting a research study titled "Assessment of Preoperative Anxiety, its Contributing Factors, and Impact on Immediate Postoperative Outcomes among Cardiac Surgery Patients." This study will be conducted under the supervision of Dr. Laila Ladak. The study will be conducted after approval by the ERC of Aga Khan University Hospital Karachi. Heart disease is a growing cause of death worldwide. Many patients experience preoperative anxiety in the hospital which makes

post-operative outcomes unfavorable. At present, there is not enough evidence of prevalence and factors associated with preoperative anxiety specifically among elective adult cardiac surgery patients in Pakistan.

STUDY PURPOSE

You are being asked to participate in a research study designed to identify the frequency, associated factors and impact of preoperative anxiety on immediate postoperative outcomes among elective adult cardiac surgical patients. This study will help healthcare providers to take appropriate measures to alleviate anxiety before surgery to avoid any undesirable outcomes and enhance post-surgery recovery.

PROCEDURES

The researcher will explain to you the study questionnaire and then you will be asked to answer the questions. These questions would be related to you, your medical background, and your family, assessing your anxiety before surgery. It will take 10-15 minutes of your valuable time.

POSSIBLE RISKS OR BENEFITS

There will be neither potential risk nor any type of benefit (money or any other incentives) directly to the participant. However, the data of this study will benefit future research to study the postoperative adverse outcomes of preoperative anxiety.

CONFIDENTIALITY

Your identity and information will be kept confidential throughout the process. It will not be accessible to anyone except the principal investigator and thesis committee members. Any publication which comes out of the analysis of the data will be in the aggregated form without disclosing the identity. However, the data may be seen by the ethical review committee.

RIGHT TO REFUSE OR WITHDRAW

Your participation will be voluntary. You will have the right not to answer any study question or to withdraw from the study anytime without stating the reason.

AVAILABLE SOURCES OF INFORMATION

For any query, regarding the consent form or research procedure, you may contact the researcher at e-mail at Naveen.nizar2@scholar.aku.edu or contact number 03342688513.

AUTHORIZATION

I have read and fully understood the information provided in this consent form. I understand that I will receive a copy of this form. I voluntarily agree to participate in this study after knowing all the terms and conditions. I further understand that nothing in this consent form is intended to replace any legal rights in the case of negligence or other legal faults of anyone who is involved in this study.

Name of participant	Signature of participant	Date

Signature of Principal Investigator	Date

Name and Signature of person obtaining consent	Date

FOR PARTICIPANTS UNABLE TO READ WITNESS:

I have witnessed the accurate reading of the consent form to the potential participants, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Witness Name: _____ Participant's Thumb Print: _____

Signature: _____

Date: _____

Appendix E: Informed Consent Form (Urdu)

1

تحریری باخبر رضامندی
پروجیکٹ معلومات

پروجیکٹ کا عنوان: دل کی سرجری کے مریضوں میں قبل از آپریشن تشویش ، اس کی وجہ بننے کے عوامل اور بعد از آپریشن فوری نتائج پر اس کا اثر	ورژن اور تاریخ:
ای آر سی پروجیکٹ نمبر :7966	سپانسر : قابل اطلاق نہیں
پرنسپل انویسٹی گیٹر : ڈاکٹر لیلیٰ لادک	تنظیم: آغا خان یونیورسٹی، اسکول آف نرسنگ اینڈ مڈوائفری.
محل وقوع: کراچی	فون: 02134865401
دیگر تفتیش کار : نوین نزار علی	تنظیم: آغا خان یونیورسٹی، اسکول آف نرسنگ اینڈ مڈوائفری.
محل وقوع: کراچی	فون: 03342688513

تعارف

میں نوین نزار علی ہوں جو آغا خان یونیورسٹی اسکول آف نرسنگ اینڈ مڈوائفری کراچی پاکستان میں ماسٹر آف سائنس ان نرسنگ کی طالبہ ہوں۔ ایم ایس سی این پروگرام کی ضرورت کے طور پر ، میں ایک تحقیقی مطالعہ کر رہی ہوں جس کا عنوان ہے" دل کی سرجری کے مریضوں میں قبل از آپریشن تشویش ، اس کی وجہ بننے کے عوامل اور بعد از آپریشن فوری نتائج پر اس کا اثر ". یہ مطالعہ ڈاکٹر لیلیٰ لادک کی نگرانی میں کیا جائے گا۔ یہ مطالعہ آغا خان یونیورسٹی اسپتال کراچی کے ای آر سی کی منظوری کے بعد کیا جائے گا .

دل کی بیماری دنیا بھر میں موت کی بڑھتی ہوئی وجہ ہے۔ بہت سے مریضوں کو اسپتال میں پری آپریٹو اضطراب/ پریشانی کا سامنا کرنا پڑتا ہے جس کی وجہ سے آپریشن کے بعد کے نتائج ناسازگار ہوجاتے ہیں۔ فی الحال، پاکستان میں منتخب بالغ کارڈیک سرجری کے مریضوں میں خاص طور پر پری آپریٹو اضطراب/ پریشانی سے وابستہ پھیلاؤ اور عوامل کے کافی ثبوت نہیں ہیں۔

مطالعہ مقصد

آپ سے کہا جا رہا ہے کہ آپ ایک تحقیقی مطالعے میں حصہ لیں جو منتخب بالغ کارڈیک سرجیکل مریضوں میں پری آپریٹو پریشانی کے پھیلاؤ اور اس سے وابستہ عوامل کی شناخت کرنے کے لئے

ڈیزائن کیا گیا ہے۔ اس مطالعے سے صحت کی دیکھ بھال فراہم کرنے والوں کو سرجری سے قبل پریشانی کو کم کرنے کے لئے مناسب اقدامات کرنے میں مدد ملے گی تاکہ کسی بھی ناپسندیدہ نتائج سے بچا جاسکے اور سرجری کے بعد صحت یابی میں اضافہ کیا جاسکے۔

طریقہ کار

محقق آپ کو مطالعاتی سوالنامہ کی وضاحت کرے گا اور پھر آپ سے سوالات کا جواب دینے کے لئے کہا جائے گا۔ یہ سوالات آپ کے مطالق ، آپ کے طبی پس منظر اور آپ کے خاندان سے متعلق ہوں گے، سرجری سے پہلے آپ کی پریشانی کا جائزہ لیں گے۔ اس میں آپ کے قیمتی وقت کے 10-15 منٹ لگیں گے .

ممکنہ خطرات یا فوائد

شرکاء کو براہ راست نہ تو ممکنہ خطرہ ہوگا اور نہ ہی کسی قسم کا فائدہ)پیسہ یا کوئی اور مراعات(. تاہم، اس مطالعے کے اعداد و شمار مستقبل کی تحقیق کو فائدہ پہنچاؤں گا تاکہ آپریشن سے پہلے کی پریشانی کے بعد کے منفی نتائج کا مطالعہ کیا جاسکے .

رازداری

اس سارے عمل کے دوران آپ کی شناخت اور معلومات خفیہ رکھی جائیں گی۔ یہ پرنسپل انویسٹی گیٹر اور تھیسس کمیٹی کے ارکان کے علاوہ کسی کے لئے قابل رسائی نہیں ہوگا۔ کوئی بھی اشاعت جو اعداد و شمار کے تجزیے سے باہر آتی ہے وہ شناخت ظاہر کیے بغیر مجموعی شکل میں ہوگی۔ تاہم یہ اعداد و شمار اخلاقی جائزہ کمیٹی دیکھ سکتی ہے .

انکار کرنے یا واپس لینے کا حق

آپ کی شرکت رضاکارانہ ہوگی۔ آپ کو یہ حق حاصل ہوگا کہ آپ کسی بھی مطالعاتی سوال کا جواب نہ دیں یا وجہ بتائے بغیر کسی بھی وقت مطالعہ سے دستبردار ہوں .

معلومات کے دستیاب ذرائع .

کسی بھی سوال کے لیے، رضامندی کے فارم یا تحقیقی طریقہ کار سے متعلق، آپ محقق سے ای میل Naveen.nizar2@scholar.aku.edu پر رابطہ کر سکتے ہیں یا نمبر 03342688513 پر رابطہ کر سکتے ہیں

اجازت

میں نے اس رضامندی فارم میں فراہم کردہ معلومات کو پڑھا اور مکمل طور پر سمجھا ہے۔ میں سمجھتا ہوں کہ مجھے اس فارم کی ایک کاپی موصول ہوگی۔ میں تمام شرائط و ضوابط جاننے کے بعد رضاکارانہ طور پر اس مطالعہ میں حصہ لینے پر رضامند ہوں۔ میں مزید سمجھتا ہوں کہ اس رضامندی فارم میں کسی بھی چیز کا مقصد غفلت یا اس مطالعہ میں شامل کسی بھی شخص کی دیگر قانونی غلطیوں کی صورت میں کسی قانونی حقوق کو تبدیل کرنا نہیں ہے۔

3

شریک کا نام _____

شریک کے دستخط_____

تاریخ_____

پرنسپلانویسٹی گیٹر کے دستخط_____

تاریخ_____

رضامندی حاصل کرنے والے شخص کا نام_____

دستخط_____

تاریخ_____

شرکاء کے لیے, پڑھنے سے قاصر

:گواہ

میں نے ممکنہ شرکاء کو رضامندی فارم کے درست مطالعہ کا مشاہدہ کیا ہے، اور فرد کو سوالات پوچھنے کا موقع ملا ہے۔ میں تصدیق کرتا ہوں کہ فرد نے آزادانہ طور پر رضامندی دی ہے۔

گواہ کا نام_____

دستخط _____

تاریخ_____

شرکا کا انگوٹھا پرنٹ_____

Appendix F: Demographic and Clinical History Questionnaire (English)

(ANNEXURE-I1: PROFORMA)

Assessment of Preoperative Anxiety, its Contributing Factors, and Impact on Immediate Postoperative Outcomes among Cardiac Surgery Patients

SECTION A:

DEMOGRAPHIC INFORMATION

1. Study ID #: _____
2. Date of data collection: | D | D | M | M | Y | E | A | R |
3. Age (Years): _____

   □ 18-30 □ 31-45 □ 46-59 □ ≥ 60
4. Gender: □ Male □ Female
5. Marital Status: □ Single □ Married □ Widowed □ Separated

   □ Divorced
6. Religion:
7. Ethnicity:
8. Education Level: □ No Studies □ Primary □ High School □ University
9. Occupation Status: □ Unemployed □ Employed □ Student □ Retired
10. Socioeconomical Status (Income in Rupees): □ (4,000 to 20,000) □ (21,000 to 49,000) □ (50,000 to 100,000) □ (> 100,000)
11. Residency: □ Rural □ Urban
12. Family Structure: □ Nuclear □ Joint
13. Current Surgery: □ CABG □ Aortic Valve Repair □ Mitral Valve Repair

    □ Dual Valve Repair □ Aortic Valve Replacement □ Mitral Valve Replacement

□ CABG + Valve Surgery □ Atrial Septal Defect □ Ventricular Septal Defect

□ Other Procedures: _____

14. Diabetes Mellitus: □ Yes □ No

15. Hypertension: □ Yes □ No

16. Smoking: □ Yes □ No

17. Alcohol addiction: □ Yes □ No

18. Substance Abuse: □ Yes □ No

19. History of Psychiatric Illness: □ Yes □ No

20. On any Antipsychotic Drugs Currently or in the Past □ Yes □ No

21. Any Other Illness: □ Yes □ No

22.If yes, which: _____

23. History of Previous Hospitalization: □ Yes □ No

24. Previous Anaesthesia Experience: □ Yes □ No

25. Past Surgery Experience: □ Yes □ No

26. If yes, what kind of surgery: _____

27. Prior information related to current surgery: □ Yes □ No

28. If yes, from which source: _____

Appendix G: Demographic and Clinical History Questionnaire (Urdu)

(انیکسر :IIپروفورما)

مطالعے کا عنوان:

دل کی سرجری کے مریضوں میں قبل از آپریشن تشویش، اس کی وجہ بننے کے عوامل اور بعد از آپریشن فوری نتائج پر اس کا اثر

سیکشن الف:
شماریاتی معلومات

1۔ مطالعے کا شناخت نمبر: _____

2۔ معلوماتی مواد جمع کرنے کی تاریخ: ☐☐ دن ☐☐ مہینہ ☐☐☐☐ سال

3۔ عمر (سالوں میں): _____

اٹھارہ سے تیس سال ☐ اکتیس سے پینتالیس سال ☐ چھیالیس سے انسٹھ سال ☐ ساٹھ یا اس سے زائد ☐

4۔ جنس: مرد ☐ خاتون ☐

5۔ ازدواجی حیثیت:

غیر شادی شدہ ☐ شادی شدہ ☐ بیوہ/رنڈوا ☐ علیحدگی ☐ مطلقہ ☐

6۔ مذہب: _____

7۔ قومیت: _____

8۔ تعلیمی معیار:

کوئی تعلیم نہیں ☐ پرائمری ☐ ہائی اسکول ☐ جامعہ ☐

9۔ پیشے کی نوعیت:

بے روزگار ☐ ملازم پیشہ ☐ طالب علم ☐ ریٹائرڈ ☐

10۔ سماجی معاشی حیثیت (آمدنی روپوں میں):

چار ہزار سے تیس ہزار روپے ☐ اکیس ہزار سے انچاس ہزار روپے ☐

پچاس ہزار سے ایک لاکھ روپے ☐ ایک لاکھ روپے سے زائد ☐

11۔ رہائش:

شہری ☐ دیہی ☐

12۔ خاندان کی نوعیت:

علیحدہ ☐ مشترکہ ☐

13۔ موجودہ سرجری:

CABG ☐ Aorticوالو کی درستگی ☐ Mitralوالو کی درستگی ☐

Dualوالو کی درستگی ☐ Aorticوالو کی تبدیلی ☐ Mitralوالو کی تبدیلی ☐

CABGاور والو کی سرجری ☐ Atrial Septal Defect ☐

Ventricular Septal Defect ☐

دیگر پروسیجرز: ☐ _____

14۔ ذیابیطس: جی ہاں ☐ جی نہیں ☐

15۔ بلند فشار خون: جی ہاں ☐ جی نہیں ☐

16۔ سگریٹ نوشی: جی ہاں ☐ جی نہیں ☐

17۔ الکحل کی عادت: جی ہاں ☐ جی نہیں ☐

18۔ منشیات کی لت: جی ہاں ☐ جی نہیں ☐

19۔ نفسیاتی بیماری کی سابقہ تاریخ: جی ہاں ☐ جی نہیں ☐

20۔ نفسیاتی عارضوں کے لئے فی الحال یا ماضی میں کسی دوا کا استعمال جی ہاں ☐ جی نہیں ☐

21۔ کوئی اور بیماری: جی ہاں ☐ جی نہیں ☐

22۔ اگر ہاں، تو کون سی: _____

23۔ پچھلی مرتبہ ہسپتال میں داخلے کی تاریخ: جی ہاں ☐ جی نہیں ☐

24۔ انستھیسیا کا پچھلا تجربہ: جی ہاں ☐ جی نہیں ☐

25۔ پچھلی سرجری کا تجربہ: جی ہاں ☐ جی نہیں ☐

26۔ اگر ہاں، تو کس قسم کی سرجری: _____

27۔ موجودہ سرجری سے متعلق پہلے سے معلومات: جی ہاں ☐ جی نہیں ☐

28۔ اگر ہاں، تو کسی ذریعے سے: _____

Appendix H: Postoperative Outcomes Variable Checklist

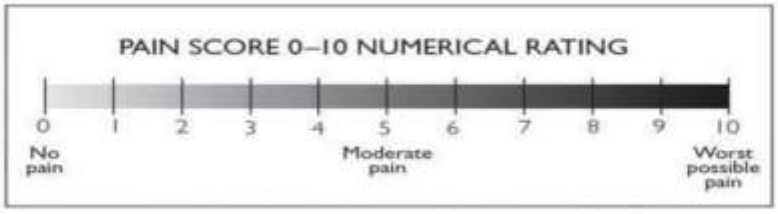
4

SECTION C

Immediate Postoperative Clinical Variables

Pain:

Verbal Numerical Rating Scale (NRS) for Pain



Behavioral Pain Scale (BPS) Tool

Item	Description	Score
Facial expression	Relaxed	1
	Partially tightened (e.g., brow lowering)	2
	Fully tightened (e.g., eyelid closing)	3
	Grimacing	4
Upper limbs	No movement	1
	Partially bent	2
	Fully bent with finger flexion	3
	Permanently retracted	4
Compliance with ventilation	Tolerating movement	1
	Coughing with movement	2
	Fighting ventilator	3
	Unable to control ventilation	4

Arrythmias: □ Yes □ No

Ventilation time: _____ hours.

Length of Hospital Stay: _____ days.

Appendix I: Permission from Mind Garden to use English and Urdu STAI Tool

State-Trait Anxiety Inventory for Adults
English: **Instrument (Adult Form) and Scoring Guide**
Urdu: **Instrument (Adult Form)**

Developed by Charles D. Spielberger
in collaboration with R.L. Gorsuch, R. Lushene, P.R. Vagg, and G.A. Jacobs

Published by Mind Garden, Inc.

info@mindgarden.com
www.mindgarden.com

Appendix J: State-Trait Anxiety Inventory Tool (English)

SELF-EVALUATION QUESTIONNAIRE STAI Form Y-1

Please provide the following information:

Name_____ Date_____ S_____

Age_____ Gender (*Circle*) **M** **F** T_____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

Appendix K: State-Trait Anxiety Inventory Tool (Urdu)

سوالنامہ برائے ذاتی جانچ

Y-1 کیفیتی وخاصیتی تشویش کاپیمانہ (کیفیتی)

برائے میربانی مندرجہ ذیل معلومات فراہم کریں:

نام _____ تاریخ _____

عمر _____جنس (دائرہ لگائیں) مرد عورت

ہدایات

ذیل میں کچھ بیانات دیئے گئے ہیں جو لوگوں نے اپنے آپ کو بیان کرنے کے لئے استعمال کئے ہیں۔ ہر بیان کو پڑھیے اور پھر اس کے بائیں جانب دیئے گئے مناسب ہندسہ پر دائرہ لگائیں جو یہ ظاہر کرے کہ آپ اس وقت کیسا محسوس کر رہے ہیں۔ یعنی اس لمحے۔ کوئی بھی جواب درست یا غلط نہیں ہے۔ کسی بھی ایک بیان پر زیادہ وقت صرف نہ کریں لیکن وہ جواب دیں جو آپ کے خیال میں آپ کے موجودہ احساسات کو بہترین طور پر بیان کرتا ہو۔

		بالکل نہیں	کچھ حد تک	درمیانی حد تک	بہت زیادہ حد تک
.1	میں پر سکون محسوس کرتا/کرتی ہوں۔	1	2	3	4
.2	میں محفوظ محسوس کرتا/کرتی ہوں۔	1	2	3	4
.3	میں تناؤ میں ہوں۔	1	2	3	4
.4	میں کچھاؤ محسوس کرتا/کرتی ہوں۔	1	2	3	4
.5	میں آسانی محسوس کرتا/کرتی ہوں۔	1	2	3	4
.6	میں پریشان ہوں۔	1	2	3	4
.7	آجکل میں ممکنہ بدنصیبیوں پر پریشان رہتا/رہتی ہوں۔	1	2	3	4
.8	میں اطمینان محسوس کرتا/کرتی ہوں۔	1	2	3	4
.9	میں خوفزدہ محسوس کرتا/کرتی ہوں۔	1	2	3	4
.10	میں آرام محسوس کرتا/کرتی ہوں۔	1	2	3	4
.11	میں خود اعتمادی محسوس کرتا/کرتی ہوں۔	1	2	3	4
.12	میں گھبراہٹ محسوس کرتا/کرتی ہوں۔	1	2	3	4
.13	میں جھنجلاہٹ محسوس کرتا/کرتی ہوں۔	1	2	3	4
.14	میں قوت فیصلہ کی کمی محسوس کرتا/کرتی ہوں۔	1	2	3	4
.15	میں راحت محسوس کرتا/کرتی ہوں۔	1	2	3	4
.16	میں قناعت محسوس کرتا/کرتی ہوں۔	1	2	3	4
.17	میں فکرمند ہوں۔	1	2	3	4
.18	میں الجھاوا محسوس کرتا/کرتی ہوں۔	1	2	3	4
.19	میں مستقل مزاج ہوں۔	1	2	3	4
.20	میں خوشگوار محسوس کرتا/کرتی ہوں۔	1	2	3	4

TA-423 – STAIAD – Urdu

Appendix L: Literature Review Table

Name of Author and Year	Aim of the study	Sample Size and Study Design	Main findings
Abate et al., (2020)	The purpose of the meta-analysis and systematic review was to present data regarding the prevalence of preoperative anxiety in surgical patients worldwide and its determinants.	Systemic review and meta-analysis Total studies: 56	Among surgical patients, they reported, global aggregated prevalence of preoperative anxiety was 48%. Preoperative anxiety was shown to be around four times higher in patients who feared complications, according to the systematic review and meta-analysis (RR = 3.53; 95% confidence interval (CI: 3.06 to 4.07, 6 studies).
Abutiheen et al., (2021)	To measure the level of anxiety that patients experienced before to elective surgery.	Cross-sectional study Sample size: 104	Anxiety affected more than one-third 37 (35.6%) of the patients. The level of anxiousness prior to surgery was considerably higher in women. Additionally, they found a strong correlation between preoperative anxiety and the desire for information.
ALKAN KAYHAN et al., (2022)	This study was conducted to assess the correlation between preoperative anxiety levels and the occurrence of atrial fibrillation following coronary artery bypass graft surgery.	Descriptive study Sample size: 126	Atrial fibrillation manifested in 26.5% of the participants. Those who experienced atrial fibrillation exhibited a statistically significant mean trait anxiety scale score of 40.2 ± 7.8. Logistic regression results indicated that an elevated trait anxiety score, older age, the presence of comorbid diseases, and noncompliance with respiratory physiotherapy were associated with an increased risk of developing atrial fibrillation.
Amiri et al., (2017)	The research aimed to determine how patients having coronary artery	Randomized control trial	The intervention group exhibited a significantly lower mean anxiety level than the control group, both

	bypass graft surgery (CABG) feel less anxious when exposed to natural noises.	Sample size: 90	half an hour after the intervention and in the preoperative waiting room ($p = 0.001$). Furthermore, the mean anxiety for the intervention group decreased, while it increased for the control group over time ($p < 0.001$).
Arslan Isik & Emir (2022)	The objective of this study was to evaluate the extent of preoperative anxiety in patients slated for coronary artery bypass grafting (CABG) and to examine the correlation between anxiety levels and postoperative symptoms.	Descriptive study Sample size: 74	The Anxiety Specific to Surgery Questionnaire (ASSQ) total scores were notably higher in female participants compared to their male counterparts ($p < 0.05$). Furthermore, a statistically significant positive correlation was observed between preoperative anxiety levels in patients before CABG and the severity of postoperative pain and dyspnea ($p < 0.05$).
Aurang Zeb et al., (2019)	The aim of the study was to assess the level of anxiety in preoperative patients.	Quantitative descriptive cross-setional design. Sample size: 70	Among the 70 participants, 2.9% reported no anxiety, 30.0% had mild anxiety, 42.9% experienced moderate anxiety, 12.9% faced severe anxiety, and 11.4% had very severe anxiety. Various factors, including gender, participants' level of education, and the type of surgery, were found to influence anxiety levels. Additionally, concerns about pain and the operating theater environment also had an impact on the level of anxiety.
Aust et al., (2018)	The primary aim of this study was to conduct a thorough comparison of anxiety levels related to both surgery and anesthesia. Additional objectives involved evaluating the prevalence and intensity of preoperative anxiety.	Cross-sectional study Sample size: 3200	A total of 3,200 patients were included in the study, and 3,087 (57% females) were included in the analysis. According to APAIS scores, 92.6% reported preoperative anxiety. The mean anxiety level about surgery was higher than the mean anxiety level about anesthesia 5.5 (SD 2.1) compared to 4.3 (SD 1.9), with a p-value of < 0.0001.

Bayrak et al., (2019	Study aim to investigate how patients' anxiety levels affect intraoperative hemodynamic parameters, postoperative pain, patient satisfaction, and hospital stay duration.	Descriptive study. Sample size: 72	No significant correlation has been identified between the level of anxiety and age, gender, marital status, level of education, profession, general anesthesia, comorbidity, and postoperative shivering. However, patients with high preoperative anxiety scores exhibited unstable intraoperative hemodynamic parameters (arterial pressure, heart rate, peripheral oxygen saturation, increased postoperative pain, elevated analgesic consumption, and reported dissatisfaction).
Bedaso & Ayalew (2019)	The aim of this study was to explore the incidence of preoperative anxiety and identify its predictors among adult patients scheduled for elective surgery.	Cross-sectional study. Sample size: 407	The prevalence of preoperative anxiety among patients scheduled for elective surgery was 47.0%. Factors such as strong social support, concern about harm from a doctor or nurse mistake, unexpected operation results, inability to recover, and the need for blood transfusion were significantly correlated with preoperative anxiety.
Carroll et al., (2016)	The aim of this review was to evaluate the effectiveness of non-pharmacological interventions (procedural education, relaxation techniques, psychological preparation) in alleviating psychological distress among patients undergoing cardiac catheterization.	Systemic review Total studies: 29	Results indicated that non-pharmacological interventions were successful in significantly decreasing psychological distress among certain patients undergoing cardiac catheterization.
Eberhart et al., (2020)	The objective of this study was to identify independent predictors of	Cross-sectional	40.5% of subjects reported high anxiety (APAIS-A-T > 10). Out of nine independent predictors of

	anxiety and to quantify the significance of specific fears, particularly those linked to anesthesia.	Sample size: 3087	anxiety, only three variables (female gender, negative and positive anesthetic experience) independently predicted all three APAIS anxiety subscales. Other variables had a specific impact on one or two APAIS anxiety subscales only. Female gender exerted the strongest impact on all three APAIS anxiety subscales. The adjusted r2 values for the three models were all below 13%.
Fathi et al., (2014)	The objective of this study was to assess preoperative anxiety and its contributing factors in a cohort of adult patients undergoing any type of heart surgery.	Analytical descriptive Sample size: 300	Descriptive anxiety levels indicated that the mean state and trait anxiety scores of our study participants fell within the moderate range. The correlation between state and trait anxiety was more pronounced in females ($r = 0.80$) than in males ($r = 0.70$) ($p < 0.001$). There were notable differences in the mean preoperative anxiety levels across various LVEF values for each EF level ($p < 0.001$, $F = 6.47$); individuals with an LVEF exceeding 50% exhibited significantly lower mean anxiety scores.
Fernández-Castro et al. (2022)	Study objective was to examine the impact of preoperative anxiety levels on postoperative pain in individuals undergoing cardiac surgery, and to investigate the connections between preoperative anxiety, postoperative pain, analgesic needs, and gender.	Prospective cohort study Sample size: 116	Study found that considering the extracorporeal circulation time, type of surgery, and body surface area, it was noted that each percentile increase in preoperative state anxiety resulted in an additional administration of 0.068 mg of morphine. With each additional year of age, the required amount of morphine decreased by 0.26 mg. There was no observed difference between men and women in terms of

			preoperative anxiety or postoperative analgesic requirements.
Guo (2015)	To review the current evidence regarding the efficacy of preoperative education in patients undergoing cardiac surgery.	Comprehensive review Total studies: 6	Six trials were identified, yielding conflicting results. Some trials have shown the impact of preoperative education in enhancing the physical and psychosocial recovery of cardiac patients, while others have found no evidence indicating a reduction in patients' anxiety or any effect on pain or hospital stay.
Hernandez-Palazon et al. (2018)	The objective of this study was to evaluate the extent of preoperative anxiety in patients slated for cardiac surgery, pinpoint potential influencing clinical factors, and evaluate the correlation between anxiety and postoperative morbidity.	A prospective and consecutive study Sample size: 200	Study revealed that 28% cardiac surgery patients had higher preoperative anxiety. Patients scheduled for coronary artery bypass surgery, without prior anesthetic exposure, and those hospitalized before the procedure exhibited elevated anxiety scores. CABG (odds ratio 3.026; 1.509-6.067; p = 0.002) was independently associated with high-level preoperative anxiety. Common causes of anxiety included the anticipation of surgery, uncertainty about the procedure, fear of not waking up from anesthesia, and a sense of vulnerability to the medical staff. Importantly, anxiety did not alter the postoperative course.
Ji, Sang, Zhang, Zhu, & Bo (2022)	The objective of this review was to locate studies investigating the correlation between personality traits and preoperative anxiety, along with their link to postoperative outcomes.	Literatre review Total studies: 25	This study highlights that literature indicates that anxiety might act as a mediator in the connection between personality and postoperative outcomes. Profound anxiety could, to some extent, account for the negative impact of specific personality traits, like neuroticism, on postoperative outcomes. Nevertheless, the precise nature of the relationship involving

			personality traits, preoperative anxiety, and postoperative outcomes remains ambiguous.
Kashif, Hamid, & Raza (2022)	This study aim was to measure preoperative anxiety levels in all patients scheduled for cardiac surgery and subsequently examine the impact of varying anxiety levels on postoperative pain scores.	Prospective cohort study. Sample size: 100	The study found that mild preoperative anxiety was evident in 64% of patients, while 36% experienced moderate to severe anxiety. The postoperative mean pain score was significantly higher in the moderate to severe anxiety group compared to the mild anxiety group, with a mean pain difference of 1.64 (95% CI: 1.38-1.89) at 12 hours and 0.51 (95% CI: 0.29-0.73) at 24 hours, both p-values being 0.0005.
Polikandrioti (2014)	This review examines into the connection between anxiety and coronary artery disease.	Systemic revie Total studies: 10	The study reported that recognizing the substantial link between anxiety and coronary artery disease should motivate healthcare professionals to systematically identify anxiety in patients with cardiovascular disease. Effectively managing anxiety should be a priority in the care of all critical patients, as it positively impacts disease outcomes and significantly contributes to improving the patients' quality of life.
Prado-Olivares & Chover-Sierra (2019)	The objective of this research was to examine pre-surgical anxietyin patients undergoing cardiac surgery.	Descriptive cross-sectional study Sample size: 60	Study findings reported that over 80% exhibited a moderate to high level of anxiety. Of the participants, 26.7% underwent valve surgery, and 47% underwent coronary artery bypass graft (CABG) surgery, with the latter group showing higher anxiety levels. Statistically significant associations were identified between anxiety levels and educational attainment, the nature of the first surgical intervention, and the

			assessment of their previous surgical experience.
Ramesh et al. (2017)	The aim of the study was to evaluate preoperative anxiety in patients undergoing coronary artery bypass graft surgery.	Cross-sectional study Sample size: 140	The study found that the majority of patients, 118 (84%), experienced preoperative anxiety prior to coronary artery bypass graft surgery. An association between gender and anxiety was identified, with a Pearson chi-square value of 11.57 ($p < 0.001$).
Stamenkovic et al. (2018)	The aim of this narrative review was to emphasize to anesthesiologists the feasibility of measuring anxiety using specialized tools in clinical practice, to elucidate the repercussions of preoperative anxiety on postoperative patient recovery, and to recognize the significance of a tailored anesthesia plan in managing anxious adult patients.	Narrative review Total studies 12	Conducting a preoperative assessment several weeks before surgery in an outpatient clinic is a viable option for providing information about the surgical procedure, anesthesia, and postoperative pain. During this period, patient preoperative anxiety can be assessed using the VAS-A. Detecting elevated anxiety levels early allows for timely intervention, and patients with high anxiety levels can be referred to a psychologist for preoperative preparation.Then the authors suggested that there is a need for increased education within the surgical community regarding the consequences of preoperative anxiety. They advocate for the adoption of a systematic approach and the implementation of guidelines for managing preoperative anxiety.
Woldegerima Y.B et al. (2018)	The aim of this study was to ascertain the prevalence and factors linked to preoperative anxiety among elective surgical patients.	Cross-sectional study Sample size: 178	The study reported that preoperative anxiety was observed in 59.6% of the patients, with a mean (± SD) STAI score of 48.63 ± 17.56. High preoperative anxiety was associated with age groups 18–30 years (AOR = 6.92, 95% CI = 1.39–33.82) and 31–45 years (AOR = 5.72, 95% CI =

			1.61–20.28), as well as no income (AOR = 3.21, 95% CI = 1.01–10.27) and low income (AOR = 3.06, 95% CI = 1.18–7.93). Moreover, the leading sources of preoperative anxiety were the fear of being unable to recover from anesthesia (53.9%), postoperative pain (51.7%), and family concerns (43.3%).