T.R
KIRSEHIR AHI EVRAN UNIVERSITY
HEALTH SCIENCES INSTITUTE
PHYSIOTHERAPY AND REHABILITATION
DEPARTMENT

AFFECTING FACTORS ON PHYSICAL ACTIVITY IN PATIENTS AFTER CARDIAC SURGERY

Raed Qadri Khudhair ALJANABI

MASTER'S THESIS

KIRSEHIR / 2022

T.R.
KIRSEHIR AHI EVRAN UNIVERSITY
HEALTH SCIENCES INSTITUTE
PHYSIOTHERAPY AND REHABILITATION
DEPARTMENT

AFFECTING FACTORS ON PHYSICAL ACTIVITY IN PATIENTS AFTER CARDIAC SURGERY

Raed Qadri Khudhair ALJANABI

MASTER'S THESIS

ADVISOR
Assoc. Prof. Dr. Öznur BÜYÜKTURAN

KIRSEHIR – DECEMBER / 2022

ACCEPTANCE AND APPROVAL

Kırşehir Ahi Evran University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation, Master's thesis study titled "Affecting Factors on Physical Activity In Patients After Cardiac Surgery " prepared by student Raed Qadri Khudhair ALJANABI with the number (201211155). It has been accepted as a Master's thesis in the Department of Physiotherapy and Rehabilitation by the following jury on 2 /12 /2022.

Thesis Jury

Öznur BÜYÜKTURAN, PT, PhD, Assoc. Prof. Dr.
Kirsehir Ahi Evran University
Department of Physiotherapy and Rehabilitation
(Advisor)

Buket BÜYÜKTURAN, PT, PhD, Assoc. Prof. Dr.
Kirsehir Ahi Evran University
Department of Physiotherapy and Rehabilitation
(Member)

Ülkü ŞAHİN,PT, PhD, Assist. Prof. Dr.
Giresun University
Vocational School of Health Services
(Member)

THESIS STATEMENT

I declare that all the information in the thesis is obtained and presented within the framework of ethical behavior and academic rules, and in this study, which is prepared in accordance with the thesis writing rules, all kinds of statements that do not belong to me are fully cited to the source of the information.

Raed Qadri Khudhair ALJANABI

According to Objects 9/2 and 22/2 of the Graduate Teaching and Training Rules printed in the Authorized Newspaper dated 20.04.2016; A report in agreement with the standards identified by the Institute of Health Sciences was got by using the plagiarism software package for this postgraduate thesis.

PREFACE

First of all, I thank God, after patiently and diligently completing my study.

In addition to being an example to me with the calm and patient attitudes he has shown since the day I started my master's degree and during my master's course, the one who supported me, facilitated my difficulties, his encouragement and his helping for me continuously, and taught me a lot, he was always supports me wherever I go, teaching the most valuable information of my professional and academic life. I would like to thank my esteemed professor, advisor Assoc. Dr. I sincerely thank Öznur BÜYÜKTURAN. I also took the opportunity to express my thanks to Dr. Buket BÜYÜKTURAN, whom did not hesitate to advise me on the correction of my work.

I would like to thank all my teachers for their efforts in my education who helped, supported me with love, appreciation, advice, direction and guidance from my childhood to this stage.

I dedicate my thesis to my dear family, who have never spared their sacrifice in every period of my life, whose prayers I always felt with me, for the trust and support they have shown in me.

December 2022 **Raed ALJANABI**

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF SYMBOLS AND ABBREVIATIONS

CVD : Cardiovascular Disease

CAD : Coronary Artery Disease

CPB : Cardiopulmonary Bypass

CVA : Cerebrovascular Accident

CABG: Coronary Artery Bypass Graft

MI : Myocardial infarction

MR : Mitral Regurgitation

PCI : Percutaneous Coronary Intervention

AVR : Aortic Valve Repair/Replacement

MVR : Mitral Valve Repair/Replacement

ECC : Extracorporeal Circulation

CRP : Cardiac Rehabilitation Program

6MWT: Six Minute Walk Test

PA : Physical Activity

QoL : Quality of Life

SQ : Sleep Quality

SF-IPAQ: Short-Form International Physical Activity Questionnaire

SF-36 : Short Form-36 health survey

VAS : Visual Analogue Scale

PCS : Pain Catastrophizing Scale

TSK-11: Tampa Scale Kinesiophobia

D-12 : Dyspnea-12 Questionnaire.

PSQI : Pittsburgh Sleep Quality Index

CDS : Cardiac Depression scale

FSS : Fatigue Severity Scale

ABSTRACT

MASTER OF SCIENCE THESIS

AFFECTING FACTORS ON PHYSICAL ACTIVITY IN PATIENTS AFTER CARDIAC SURGERY

Raed Qadri Khudhair ALJANABI

Kirsehir Ahi Evran University
Institute of Health Sciences
Department of Physiotherapy and Rehabilitation

Advisor: **Assoc. Prof. Dr. Öznur BÜYÜKTURAN**

The heart and blood vessels make up the cardiovascular system. Heart and blood vessel problems known as cardiovascular diseases (CVD) include coronary heart disease, cerebrovascular disease, and congenital heart disease. The most common cause of mortality and disability worldwide is cardiovascular disease (CVD), and this trend is likely to continue. The cardiovascular system is susceptible to a wide range of issues, including endocarditis, rheumatic heart disease, and irregularities in the conduction system. Although CVD may directly result from a variety of etiologies, including rheumatic fever that causes valvular heart disease and emboli in patients with atrial fibrillation that result in ischemic stroke, addressing risk factors associated with the development of atherosclerosis is crucial because it is a common factor in the pathophysiology of CVD. Drug treatment, physical activity, good eating, and heart surgery are the mainstays of CVD treatment. As the number of ways to treat CVD has grown quickly, cardiac surgery has become less invasive, and deaths from CVD have gone down. The time after surgery can be hard. Physical and mental problems and symptoms, such as pain, anxiety, depression, the inability to move, breathing problems, not getting enough sleep, and feeling tired, can lower the quality of life and make it harder for the body to work. Adequate, regular physical exercise lowers the risk of subsequent cardiac events, hospitalizations, symptoms, sadness, anxiety, and enhances quality of life. Physical activity after cardiac surgery helps individuals recover, whereas inactivity can impair recovery. Even though physical exercise following heart surgery is crucial for avoiding

negative outcomes, postoperative patient participation in physical activity has typically been insufficient. In this study we aimed to determine affecting factors on physical activity after cardiac surgery. This study was conducted at Ibin AL-Bitar hospital for cardiac surgery. 300 patients after cardiac surgery (185=Male and 115=Female) range of their ages (18-75) years voluntarily participated in the study. Participants were selected from surgical wards in the Ibin Al-Bitar hospital for cardiac surgery during first week postoperative. Patients were evaluated with Short-Form International Physical Activity Questionnaire (SF-IPAQ), Short Form-36 health survey (SF-36), Visual Analogue Scale (VAS), pain catastrophizing scale (PCS), Tampa scale for kinesiophobia (TSK-11), Dyspnea-12 questionnaire (D-12), Pittsburgh sleep quality index (PSQI), cardiac depression scale (CDS), fatigue severity scale (FSS), 6-minute walking test (6MWT) are used as outcome measurements. All of the patients completed scales and tests during the first week postoperatively. In statistical analysis, there was a statistically significant association between the SF-IPAQ score and type of physical activity, day of assessment after surgery, VAS score (at rest and at activity), PCS, PSQI, FSS, TSK-11, D-12, CDS, 6MWT and physical functioning subscale of SF-36, P-value < 0.001. We found that fatigue, kinesiophobia, sleep disorders, depression, dyspnea, pain and pain catastrophizing negatively affected physical activity in post-surgery cardiac patients. Also, we observed that improvement in functional capacities and qualities of lives lead to enhanced in the physical activities.

December 2022, 97 pages.

Keywords: Cardiovascular diseases, cardiac surgery, physical activity, pain, functional capacity, kinesiophobia, fatigue, quality of life.

ÖZET

YÜKSEK LİSANS TEZİ

KALP CERRAHİSİ SONRASI HASTALARDA FİZİKSEL AKTİVİTEYİ ETKİLEYEN FAKTÖRLER

Raed Qadri Khudhair ALJANABI

Kırşehir Ahi Evran Üniversitesi
Sağlık Bilimleri Enstitüsü
Fizyoterapi ve Rehabilitasyon Anabilim Dalı

Danışman: Doç.Dr. Öznur BÜYÜKTURAN

Kalp ve kan arterleri kardiyovasküler sistemi oluşturur. Kardiyovasküler hastalıklar (KVH) olarak bilinen kalp ve kan damarı sorunları arasında koroner kalp hastalığı, serebrovasküler hastalık ve doğuştan kalp hastalığı bulunur. Dünya çapında en yaygın ölüm ve sakatlık nedeni kardiyovasküler hastalıktır (KVH) ve bu eğilimin devam etmesi muhtemeldir. Kardiyovasküler sistem, endokardit, romatizmal kalp hastalığı ve iletim sistemindeki düzensizlikler dahil olmak üzere çok çeşitli sorunlara karşı hassastır. KVH, kalp kapak hastalığına neden olan romatizmal ateş ve atriyal fibrilasyonlu hastalarda iskemik inme ile sonuçlanan emboli de dahil olmak üzere çeşitli etiyolojilerden doğrudan kaynaklanabilse de, ateroskleroz gelişimi ile ilişkili risk faktörlerinin ele alınması, KVH patofizyolojisinde ortak bir faktör olması nedeniyle çok önemlidir. İlaç tedavisi, fiziksel aktivite, iyi beslenme ve kalp ameliyatı, KVH tedavisinin temel dayanaklarıdır. KVH'yi tedavi etme yollarının sayısı hızla arttıkça, kalp cerrahisi daha az invaziv hale geldi ve KVH'den ölümler azaldı. Ameliyattan sonraki zaman zor olabilir, ağrı, anksiyete, depresyon, hareket edememe, nefes alma sorunları, yeterince uyuyamama, yorgun hissetme gibi fiziksel ve zihinsel problemler ve semptomlar yaşam kalitesini düşürebilir ve vücudun çalışmasını zorlaştırabilir. Yeterli düzenli fiziksel egzersiz, sonraki kardiyak olaylar, hastaneye yatışlar, semptomlar, üzüntü, kaygı riskini azaltır ve yaşam kalitesini artırır. Kalp ameliyatından sonra fiziksel aktivite bireylerin iyileşmesine yardımcı olurken, hareketsizlik iyileşmeyi bozabilir. Kalp ameliyatı sonrası fiziksel egzersiz olumsuz sonuçlardan kaçınmak için çok önemli olsa da, ameliyat sonrası hastanın fiziksel aktiviteye katılımı tipik olarak yetersiz olmuştur. Bu çalışmada kalp

cerrahisi sonrası fiziksel aktiviteyi etkileyen faktörleri belirlemeyi amaçladık. Bu çalışma kalp cerrahisi için Ibin AL-Bitar hastanesinde yapılmıştır. Çalışmaya yaşları (18-75) arasında kalp cerrahisi sonrası (185=Erkek ve 115=Kadın) 300 hasta gönüllü olarak katıldı. Katılımcılar, ameliyat sonrası ilk hafta boyunca kalp cerrahisi için Ibin AL-Bitar hastanesindeki cerrahi servislerden seçildi. Hastalar Kısa Form Uluslararası Fiziksel Aktivite Anketi (KF-UFAA), Kısa Form-36 Sağlık Anketi (KF-36), Görsel Analog Ölçeği (GAÖ), Ağrı Katastrofi Ölçeği (AKÖ), Tampa Kinezyofobi Ölçeği (TÖK-11), Dispne-12 Anketi (D-12), Pittsburgh Uyku Kalite Indeksi (PUKI), Kardiyak Depresyon Ölçeği (KDÖ), Yorgunluk Şiddeti Ölçeği (YŞÖ), 6Dakikalık Yürüme Testi (6DYT) sonuç ölçümleri olarak kullanılmıştır. Hastaların tümü ameliyat sonrası ilk hafta boyunca ölçek ve testleri tamamladı. İstatistiksel analizde, KF-UFAA puanının fiziksel aktivite türü, ameliyat sonrası değerlendirme günü, VAÖ puanı (istirahatte ve aktivitede), AKÖ, PUKI, YŞÖ, TÖK-11, D-12 ile istatistiksel olarak anlamlı bir ilişkisi vardı. , KDÖ, 6DYT ve KF-36'nın fiziksel işlevsellik alt ölçeği, P değeri < 0.001. Ameliyat sonrası kalp hastalarında yorgunluk, kinezyofobi, uyku bozuklukları, depresyon, nefes darlığı, ağrı ve ağrı katastrofisinin fiziksel aktiviteyi olumsuz etkilediğini bulduk. Ayrıca fonksiyonel kapasite ve yaşam kalitelerindeki iyileşmenin fiziksel aktivitelerde de artışa yol açtığını gözlemledik.

Aralık 2022, 97 sayfa.

Anahtar Kelimeler: Kardiyovasküler hastalıklar, kalp cerrahisi, fiziksel aktivite, ağrı, fonksiyonel kapasite, kinezyofobi, yorgunluk, yaşam kalitesi.

1. INTRODUCTION

The heart and blood vessels make up the cardiovascular system (1). Heart and blood vessel problems known as cardiovascular diseases (CVD) include coronary heart disease, cerebrovascular disease, and congenital heart disease (2). It is predicted that cardiovascular diseases will continue to be the leading cause of mortality and disability worldwide (3). Endocarditis, rheumatic heart disease, and conduction system anomalies are just a few of the many cardiovascular issues that can emerge (4). Although CVD can be caused by a variety of etiologies, such as emboli in a patient with atrial fibrillation leading to ischemic stroke or rheumatic fever leading to valvular heart disease, addressing risk factors associated with the development of atherosclerosis is critical because it is a common denominator in the pathophysiology of CVD (5). Unhealthy lifestyle choices like poor nutrition, lack of exercise, tobacco use, and alcohol abuse, as well as medical conditions like diabetes, high blood pressure, high cholesterol levels, chronic stress, and economic hardship, are all major contributors to the development of cardiovascular disease (2). The main treatment options for CVD are medication, physical activity, a balanced diet, and heart surgery (6). With the rapid advancement of CVD treatment, cardiac surgery has become less invasive and has decreased CVD mortality (7). In spite of this, heart surgery still has a significant chance of postoperative problems (8). The health and happiness of a heart patient depend heavily on regular physical activity as an essential health behavior (4). Moderate exercise regularly lowers the probability of secondary cardiac incidents and shortens of hospital stays (9), eases discomfort (10), decreases the effects of depression (11), anxiety (12), and makes people's lives better (13). Physical activity after heart surgery helps patients recover, while not enough physical activity can slow it down (14). Patients with heart disease who did not engage in regular physical activity were at increased risk for serious complications. Patients who underwent heart surgery and then engaged in cardiac rehabilitation (CR) or physiotherapist-supervised exercise had greater functional capacity, a shorter duration of stay, improved quality of life (15), decreased risks of readmission compared to people who did not participate (16). Although physical activity after heart surgery is crucial for reducing negative outcomes, postoperative patient participation in physical activity has typically been insufficient (17). Van Laar et al. (14) found that 40% of cardiac patients were not active after

surgery, and Brocks et al. (18) revealed that more than half of the study's female heart transplant recipients were inactive in the years after their surgery. In addition, according to research that looked back at people had heart surgery and then participated in CR (19), 42 percent of patients did not finish exercise-based CR, and another 28 percent stopped going to sessions altogether. To encourage cardiac surgery patients to engage in physical activity, it is vital to comprehend the elements that influence physical activity in these patients. Although numerous reviews have explored physical exercise in heart disease patients (9), however, the majority of these studies have concentrated on cardiac patients participating in CR who have coronary heart disease, myocardial infarction, or cardiac patients of all sorts (20). In general, no published systematic reviews have exclusively examined the factors that influence physical activity following heart surgery. So, the goal of this study was to fill in this gap by finding out what factors affect physical activity in post-surgery heart patients.

This study aims to determine factors affecting physical activity in post-surgical cardiac patients, and the hypotheses for this study are as follows:

1-H1: pain, pain catastrophizing, kinesiophobia, dyspnea, fatigue, sleep disorders, quality of life, depression and functional capacity adversely affecting physical activity in post-surgical cardiac patients.

1-H0: pain, pain catastrophizing, kinesiophobia, dyspnea, fatigue, sleep disorders, quality of life, depression, and functional capacity are not adversely affecting physical activity in post-surgical cardiac patients.

2- H1: There is a relationship between quality of life (QOL) and physical activity in post-surgical cardiac patients.

2- H0: There is no relationship between quality of life (QOL) and physical activity in post-surgical cardiac patients.

3- H1: There is a relationship between functional capacity and physical activity in post-surgical cardiac patients.

3- H0: There is not a relationship between functional capacity and physical activity in post-surgical cardiac patients.

4- H1: There is a relationship between physical activity in post-surgical cardiac patients and pain, pain catastrophizing, kinesiophobia, dyspnea, fatigue, sleep disorders, and depression.

4- H0: There is not a relationship between physical activity in post-surgical cardiac patients and pain, pain catastrophizing, kinesiophobia, dyspnea, fatigue, sleep disorders or depression.

2. GENERAL INFORMATION

2.1 Anatomy and Physiology of Heart

The heart is a muscular organ that collects blood that has lost oxygen from every region of the body, transports it to the lungs where it is given oxygen, and exhales carbon dioxide. The blood is then transported from the lungs and distributed to every region of the body (21). The heart can be found in the middle of the chest, somewhat off to the left (22). The atrium and ventricle are the upper and lower chambers, respectively, of the heart, while the septa separate the right and left sides of the heart. Thus, the heart has four chambers: the right atrium, the left atrium, the right ventricle, and the left ventricle (23), as shown in (Figure 2.1). Blood passes through four valves as it travels through the heart's four chambers. Blood enters the right ventricle and pulmonary valve after traveling through the tricuspid valve and the superior and inferior vena cava to reach the right atrium. It is then released into the pulmonary circulation. Four pulmonary veins are used to collect blood, which enters the left atrium, left ventricle, and aortic valve before entering the systemic circulation (24) The human heart has four valves. When functioning properly, each of the heart's four valves does one thing: it both lets blood flow forward and keeps it from flowing backward (25). The annulus that surrounds every heart valve makes it challenging to make leak-proof artificial grafts. Left ventricular outflow tract obstruction and the need for a new mitral valve are two examples that highlight the significance of anatomy and physiology. While the annulus of the aortic valve is round, that of the mitral valve is more crescent-shaped, necessitating a more complex prosthesis and method of insertion. This is reflected in the wide variety of artificial valve models, each with its own set of pros and cons depending on the patient's anatomy, physiology, and the complexity of the associated surgical process. The autonomic nervous system influences the heart's intrinsic rhythmic activity, causing the heart rate to either speed up (as in the case of a sympathetic reaction) or slow down (as in the case of a parasympathetic reaction). The hierarchy of the heart's electrical conduction system, from the sinus node to the atrioventricular node to the His bundle to the Purkinje fibers to the ventricles. Understanding the clinical consequences of cardiac electrical activity requires an understanding of its anatomical and physiologic role. The incidence of atrial fibrillation after cardiac surgery is high. Using anatomical insight, the Maze method interrupts chaotic atrial activity, thus resolving atrial fibrillation. Because of

their close proximity to the valve area, prosthetic heart valves can cause atrioventricular blockage. The success of coronary artery bypass grafting (CABG) surgery depends on the quality of the vascular grafts used. Harvesting vessels is a common surgical procedure. When compared to veins, arteries have much greater long-term durability (26). Vascular grafts can be evaluated for quality before surgery. Left and right internal mammary arteries (LIMA,RIMA), radial arteries, and saphenous vein grafts are often used vessels (SVG). Typically, the RIMA is attached to the RCA and the LIMA is connected to the LAD because of the relative lengths of these two arteries. Most frequently, a venous bypass graft is used to supply the posterior descending artery (PDA) and the left circumflex artery (LCX). Bypasses to smaller branches, including the diagonal branches of the LAD and the marginal branches of the LCX, can be created using venous grafts (27).

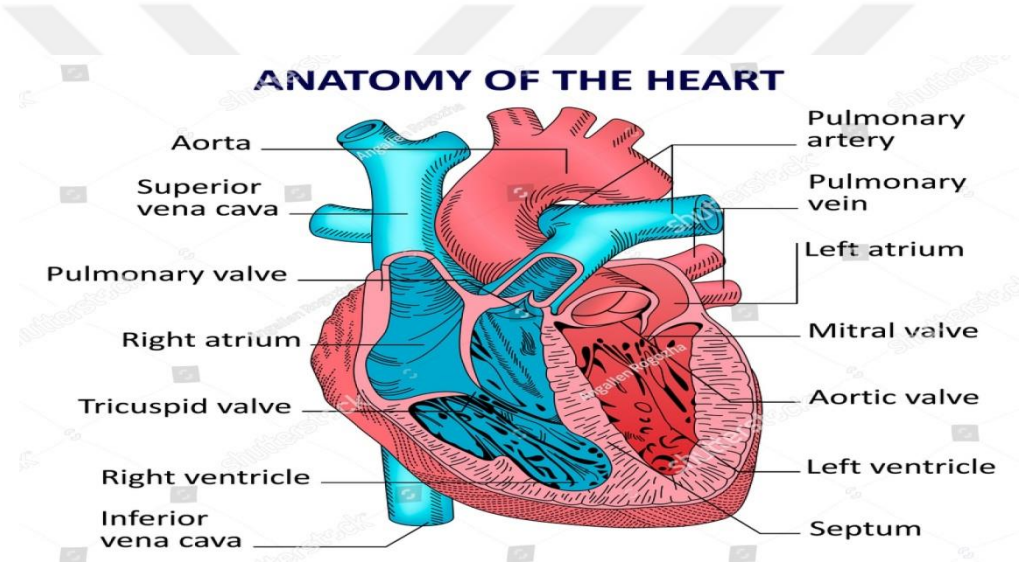

Figure 2.1: Structure of the Heart (28).

2.2 Cardiovascular Diseases (CVD)

The heart and blood vessels make up the cardiovascular system (1). Illnesses affecting the heart and blood vessels are grouped together under the umbrella term "cardiovascular diseases," which includes conditions including coronary heart disease, stroke, and congenital heart defects. Worldwide, cardiovascular illnesses are the primary killers (2). Unhealthy food, a lack of physical activity, cigarette use, and excessive alcohol use are all behavioral risk factors for cardiovascular disease (2). Diabetes, high blood pressure, high cholesterol, living in poverty, emotional and physical stress, and a family history of the disease are further contributors to the risk (2). When adults do 150 minutes of moderate physical activity each week, their risk of ischemic heart disease and type 2 diabetes is cut by almost a third or

equivalent (29). Weight loss, regulation of blood sugar and blood pressure, lipid profile, and insulin sensitivity are all aided by physical activity. Its cardiovascular advantages may be explained, at least in part, by these effects (30). Tobacco control legislation, taxes on unhealthy foods, infrastructure improvements to encourage more walking and cycling, and the provision of nutritious school meals for children are all examples of population-level interventions that may help prevent cardiovascular disease. Those who are at a high risk of acquiring cardiovascular disease should receive individualized health care measures (2). In the fight against cardiovascular disease, improving patients' quality of life is a top priority. One of the most pressing global health concerns is heart disease. Although scientific progress and cardiovascular surgery have improved the patient's life conditions, the rising morbidity and disability caused by heart disease in adults is followed by social damage (8). However, other research shows that postoperative patients' life quality did not significantly improve (31), as contrast to before the sick condition, those who have coronary artery disease likely to undergo changes in morals and values. Patients with coronary artery disease experience negative consequences on their lifestyle due to activity restrictions and their daily circumstances (32).

2.3 Etiology For Cardiovascular Diseases

There are many things that can go wrong with the cardiovascular system, such as endocarditis, rheumatic heart disease, and problems with the conduction system (4). Even though CVD can have many different direct causes, such as emboli in a patient with atrial fibrillation causing an ischemic stroke or rheumatic fever causing valvular heart disease, it is most important to deal with the risk factors that lead to atherosclerosis because it is a common factor in how CVD works. Atherosclerosis and other metabolic disturbances, such as metabolic syndrome, diabetes mellitus, and hypertension, are common among people with CVD and are strongly linked to lifestyle factors such as lack of exercise, excessive dietary calorie consumption, and the consumption of saturated fats and added sugars (5). In the interheart study, which included people from 52 countries with high, middle, and low incomes, nine modifiable risk factors made up 90% of the risk of having a first myocardial infarction (MI): smoking, dyslipidemia, hypertension, diabetes, abdominal obesity, psychosocial factors, regular alcohol consumption, and a lack of physical activity. It is important to note that in this study, smoking was linked to 36% of the risk of MI in the general population (34). A strong connection and predictive value of dyslipidemia, hypertension, smoking, and glucose intolerance have been identified in other sizable cohort studies. 60% to 90% of CHD incidents happened in people who had at least one

risk factor. The American Heart Association has incorporated these findings into health promotion initiatives with a focus on seven recommendations to lower the risk of CVD, including quitting smoking, staying active, eating well, and maintaining normal blood pressure, body weight, glucose, and cholesterol levels (35,36). However, the effects of such immutable characteristics as genetics, age, and gender vary (37). If a first-degree relative experiences cardiovascular disease (CVD) or dies from CVD before the age of 55 (in males) or 65 (in females), this is an independent risk factor for the development of atherosclerotic disease in the individual (38).

2.4 Epidemiology for Cardiovascular Diseases

Death and disability from cardiovascular diseases (CVD) now account for a disproportionate share of global mortality and disability, and this trend is expected to persist into the foreseeable future (3). The incidence of cardiovascular disease skyrockets with each passing decade (39). Across the globe, cardiovascular diseases (CVD) constitute a major cause of health issues (2). The risk of coronary artery disease (CAD) is three to five times greater in the South Asian population than it is in the population of other ethnicities, and the burden of CVD is around 80% higher among people from low- and middle-income countries (LMICs) (40,41). Heart disease was the leading cause of death in 2015, followed by cancer deaths (595,930), with cardiovascular diseases (CVD) continuing to be one of the two leading causes of death in the United States since 1975, accounting for 633,842 deaths, or 1 in every 4 fatalities (42). According to the World Health Organization, cardiovascular disease was responsible for an estimated 17.7 million deaths in 2015. Even more so than Alzheimer's and diabetes, the indirect costs of cardiovascular disease are estimated at $237 billion annually and are expected to rise to $368 billion by 2035 (43). Cardiovascular disorders caused 23048 fatalities in Croatia in 2018, accounting for 43.7% of all deaths—nearly half—according to the data. Coronary heart disease (CHD), which is the most prevalent form of cardiovascular disease, is characterized by the narrowing or obstruction of the cardiac arteries as a result of atherosclerosis (44). Coronary heart diseases (CHDs) are more common in India's metropolitan areas (7-13%) than in the country's rural areas (2-7%) overall. If current trends continue, by 2020, India would have the world's highest burden of atherothrombotic CVD. World Health Organization (WHO) estimates that between 60 and 85 percent of people in the world live sedentary lives; this includes residents of both developed and developing countries. According to World Health Organization statistics, inactivity is directly responsible for almost

3.2 million deaths worldwide every year (45). Therefore, over 20,000 heart operations are conducted annually in Australia (46), and every year in Turkey, about 66,000 cardiac operations are carried out (47). Also, each year in Japan, cardiac operations are performed on about 60,000 people (48). 70 percent of CAD patients in Europe, the United States, and Canada have CABG, and 11 percent have both CABG and valvular surgery (49).

2.5 Pathophysiology For Cardiovascular Diseases

As a result of reduced or nonexistent blood flow from blood vessel stenosis, atherosclerosis is the pathologic process that develops in the arteries and the aorta (50). It is influenced by a number of variables, including dyslipidemia, immune system events, inflammation, and endothelial dysfunction. These elements are thought to be the catalyst for the development of fatty streaks, which are essential for the creation of atherosclerotic plaque (51). The extracellular matrix and lipid-rich macrophages (foam cells), as well as the aggregation and proliferation of smooth muscle cells, are what cause the atheroma plaque to form (52). Apoptosis of the deep layers may happen when these lesions grow, causing increased macrophage recruitment that may result in atherosclerotic plaques by becoming calcified (53).

2.6 Clinical History and Physical Examination For (CVD)

Cardiovascular diseases can show up with no symptoms or with classic ones, like when a patient has typical anginal chest pain that is consistent with a myocardial infarction or when someone with an acute CVA shows up with sudden focal neurological deficits (54,55). In the past, people with coronary artery disease usually had angina, which is a substernal pain that feels like crushing or pressure and can spread to the left upper limb, the neck, or the jaw. It can also be accompanied by nausea, vomiting, palpitations, diaphoresis, syncope, or even sudden death (56). The worsening of chest discomfort during exercise or activity and improvement after rest or nitroglycerin are additional indicators of an ischemic origin (57). Most people with a thoracic aortic aneurysm won't have any symptoms, but they can start to show up as the condition gets worse. These symptoms can range from coughing, shortness of breath, or trouble speaking, to sudden crushing chest or back pain from a sudden rupture (58). In the same way, abdominal aortic aneurysms (AAA) can show no symptoms until the point of acute rupture, at which point they can induce severe abdominal discomfort or syncope (59). The diagnosis of cardiovascular disease requires a comprehensive physical examination. The first step is a thorough examination for any outward indications of distress, such as those seen in

individuals with angina or decompensated heart failure. Patients must be examined for carotid artery disease with their backs flexed at a 30 degree angle so that their carotid pulses and bruits can be palpated and auscultated and so that their jugular venous pulsations may be evaluated. First, the precordium should be visually inspected, then palpated for tenderness, thrills, and the location of the site of maximal impulse, and last, the precordium should be auscultated. When listening for heart murmurs, auscultation begins in the aortic region by identifying the S1 and S2 sounds. An essential aspect of any CVD exam is the palpation of peripheral pulses, including a bilateral examination and comparison where appropriate (60).

2.7 Evaluation For Cardiovascular Diseases (CVD)

Diagnosing CVD requires a comprehensive clinical history and physical examination focused on, but not limited to, the cardiovascular system. As an example, if a patient presents with symptoms such as those associated with obesity, angina, decreased exercise tolerance, orthopnea, paroxysmal nocturnal dyspnea, syncope or pre-syncope, or claudication, the clinician should conduct a more thorough history and physical examination and, if necessary, order ancillary diagnostic tests based on the specific clinical scenario (e.g., an electrocardiogram and cardiac enzymes for patients presenting with chest pain). In addition to a diagnosis based on clinical suspicion, primary prevention should focus on identifying and addressing modifiable risk factors in the general population. Having a conversation about cardiovascular disease risk factors and cholesterol measurement with every patient beginning at age 20 is essential (36).

2.8 Treatment / Management for Cardiovascular Diseases (CVD)

Depending on the clinical situation, there are a lot of ways to treat CVD (such as catheter-directed thrombolysis for acute ischemic stroke, angioplasty for peripheral vascular disease, and surgery or coronary stenting for CHD). However, people who already have CVD should be strongly educated about the need for secondary prevention through risk factor and lifestyle changes (36,61). Principal cardiovascular disease treatments include medication therapy, physical activity, a balanced diet, and heart surgery (6).

2.8.1 Medical Treatment of Cardiovascular Diseases (CVD)

Aspirin, beta-blockers, angiotensin-converting enzyme inhibitors, and statins are some of the medicines that can be used to treat cardiovascular disease (7).

2.8.2 Surgical Procedures For Cardiovascular Diseases (CVD)

Medical devices such as pacemakers, prosthetic valves, and patches for repairing holes in the heart may also be required in addition to more invasive treatments like balloon angioplasty, heart transplantation, and artificial heart surgeries (2). As treatment for CVD has grown quickly, cardiac surgery has tended to become less invasive. This has helped lower the number of deaths from CVD (7). Even so, there are still a lot of things that could go wrong after cardiac surgery (8). However, heart valve problems can also be inherited, develop later in life, or be brought on by an infection. Stenosis and regurgitation/insufficiency are the two main types of the disease. When it comes to heart valve disease, severe aortic stenosis is by far the most prevalent among western elderly populations. Having this condition is linked to a shorter life expectancy and a higher risk of dying. Artificial heart valves can be mechanical or organic in nature (62). Major operations such as myocardial revascularization surgery (MRS) and valve replacement or repair necessitate prompt postoperative critical care. Commonly utilized in various forms of cardiac surgery, extracorporeal circulation (ECC) can trigger a systemic inflammatory reaction, resulting in the discharge of chemicals that hinder coagulation and the immune system's ability to respond. It follows that patients with longer ECC durations are more likely to suffer from severe neurological impairments (63,64). ECC-related neurological impairment can have severe repercussions, including loss of independence and a worsened quality of life. The length of the ICU stay and mechanical ventilation, on the other hand, are the most significant factors associated with the reduction of functional independence. After being released from the hospital, these elements help make it difficult to conduct daily tasks like feeding and maintaining personal cleanliness (65–67).

2.9 Cardiac Surgery

The field of medicine known as "cardiac surgery" focuses on the diagnosis and surgical repair of heart and thoracic aortic diseases. Beginning at the tail end of the 19th century, the evolution of heart surgery reveals the full scope of today's techniques (68,69). Common indications for cardiac surgery include the correction of congenital heart defects, the treatment of valvular heart disease due to endocarditis, rheumatic fever, or atherosclerosis, and the relief of problems from ischemic heart disease (through coronary artery bypass grafting, for example). Heart transplantation is also included (68). Due to advancements in techniques and materials that have resulted in safer procedures and reduced risks during the perioperative period, cardiac surgery differs from other types of treatment. Despite these advancements,

problems are still common following surgery and affect both functional recovery and hospital stay duration (70). Most heart surgery is done through a sternotomy, as shown in (Figure 2.2). However, less invasive procedures have become more common in recent years. The sternotomy can affect how well the lungs work after surgery (71). Frequently, a patient is attached to cardiopulmonary bypass, which impacts the lungs (72). Patients who have heart surgery usually spend the first few hours after the surgery in an ICU before being moved to a cardiothoracic ward. It has been said that the length of stay after heart surgery is about 10 days (73). Approximately 48 hours are spent in an intensive care unit where heart rate, blood pressure, and oxygen levels are constantly monitored following open-heart surgery. Inserting chest tubes to drain blood around the heart and lungs (74). One way to treat ischemic heart disease with complicated atherosclerosis is through surgery called revascularization (75). Cardiac surgery involves a significant level of operational and perioperative risk, necessitating the use of trained personnel and sophisticated equipment. In addition to the diseases that necessitate cardiac surgery, the perioperative period displays a number of distinctive pathologies: systemic inflammatory response following cardiopulmonary bypass (CBP), myocardial stunning and low cardiac output syndrome, arrhythmias, massive transfusion requirements, and multiorgan involvement with kidney injury, stroke, and respiratory distress. Cardiology and cardiac surgery have recently had to adjust to the increased prevalence of interventional and minimally invasive techniques for treating heart diseases (76).

Figure 2.2: Heart Operation (77).

2.9.1 Indications For Cardiac Surgery

Cardiac surgery and interventional cardiology procedures are combined in the International Statistical Classification of Disorders and Related Health Problems (ICD), a medical classification system that uses codes to identify diseases. Regurgitation and stenotic lesions can be distinguished in patients with valvular heart disease. Valvulopathies are often graded on a scale from mild to severe, as opposed to the four-point scale used for angiographic grading in the catheterization laboratory. Valve surgery is necessary for patients with severe regurgitation or stenosis. If a patient has a damaged valve, doctors can either replace it or repair it (78). The pathophysiology of aortic regurgitation must be taken into account while making treatment decisions. Ascending aortic enlargement causes aortic regurgitation, which can only be corrected surgically. Aortic regurgitation causes symptoms in certain patients, and these patients also require surgery. The Operation is also recommended for asymptomatic patients whose left ventricular ejection fraction (LVEF) is reduced or whose left ventricular residual volumes are elevated. Rheumatic heart disease, the leading cause of mitral stenosis, is extremely uncommon in developed nations. What causes mitral regurgitation (MR) affects how it is treated (79). By implanting pacemakers, such as dual chamber devices for atrioventricular blocks, defibrillators for ventricular arrhythmia, and cardiac synchronization therapy for advanced heart failure, cardiac surgery can treat a wide variety of cardiac rhythm abnormalities. It's important to distinguish between cyanotic and non-cyanotic lesions when discussing congenital heart disease. Openings in the heart's ventricles or atrium can be patched up medically. Several medical conditions, including Ebstein anomaly, tetralogy of Fallot, and transposition of the major vessels, require specialized surgical procedures. Atrial myxoma is the most frequent benign tumor of the heart. Sarcomas are the most common type of malignant tumor seen in the heart. A surgery to repair a dissection or aneurysm in the thoracic aorta and then to replace the diseased or damaged portion with a graft is necessary when the aorta reaches a specific length. In treating coronary artery disease (CAD), coronary artery bypass grafting (CABG) is sometimes favored (80).

2.9.2. Major Common Types of Cardiac Surgery

-Coronary artery bypass grafting (CABG)

The surgical procedure known as coronary artery bypass grafting (CABG) is frequently used to treat myocardial ischemia (81). Commonly known as "revascularization," this operation aims to divert blood away from a potential clot formation in the heart and redirect it to another part of the body. This can be accomplished in a number of ways, and the arteries used can

come from a variety of locations (82). Patients with multi-vessel and left main coronary artery disease continue to benefit greatly from coronary artery bypass grafting, making it one of the most popular major procedures. Mortality during surgery and other complications have decreased dramatically over time, even though the average patient's risk profile has grown. The five- and ten-year survival rates are, respectively, 85% and 95% (83). Indications When high-grade blockages are present in either of the major coronary arteries and/or percutaneous coronary intervention (PCI) has been unsuccessful in removing the blockages, CABG is typically suggested (84).

-Surgery for valve diseases

A crucial sign for cardiac operations. Whether the disease was present at birth or was acquired later in life, this procedure is used to correct the problem. Bio-prosthetic valves or mechanical valves can be used to replace a damaged or diseased natural valve, and both have the potential to last longer than natural valves if properly cared for and treated with anticoagulant medication throughout the patient's lifetime (85). Patients with symptomatic or severe aortic stenosis or regurgitation, as well as those with moderate aortic stenosis/regurgitation following CABG or other heart valve surgery, are candidates for aortic valve repair/replacement (AVR). Patients with symptoms of moderate to severe mitral stenosis or mitral regurgitation undergo mitral valve repair/replacement (MVR), while patients with severe tricuspid dysfunction or patients with less severe tricuspid dysfunction undergoing cardiac surgery for other reasons undergo tricuspid valve repair/replacement (TVR) (86).

-Congenital heart defects surgery

Congenital heart disorders (CHD) are structural heart problems that occur at birth. They might alter the heart's typical blood flow. The most typical birth abnormality is congenital heart disease (87). Although CHD has been surgically and medically managed with great success, many procedures are palliative rather than curative, and some survivors still have substantial long-term hemodynamic and electrical conduction problems (88).

2.9.3 Complications After Cardiac Surgery

The most common causes of postoperative complications following cardiac surgery are associated diseases and risk factors, such as age, gender, time spent on cardiopulmonary bypass, diabetes, obesity, heart or kidney failure, and acute myocardial infarction (89). Pulmonary, neurological, and cardiovascular problems are common following heart surgery. An acute myocardial infarction or congestive heart failure increases the risk of cardiovascular

problems. However, a stroke is a neurological problem that can develop during the first day following surgery. Atelectasis, pneumonia, acute respiratory failure, acute respiratory distress syndrome (ARDS), and pleural effusion are all conditions that originate in the lungs (71,72). Postoperative hemorrhage is one of the significant problems as well (65), inability of the kidneys to function properly (92), ischemic mesentery and atrial fibrillation (93); and septicemia from a puncture incision in the chest (DSWI) (94). Ten percent to twenty percent of the nation's blood products are used in cardiac surgery due to complications such as postoperative bleeding, hemorrhagic shock, and coagulation problems like heparin-induced thrombocytopenia. Up to 18% of patients undergoing heart surgery develop acute renal damage. Only 2% of people need dialysis or a transplanted kidney. According to the international classification of myocardial infarction, myocardial infarction that occurs after heart surgery is considered type 5. 5-10% of occurrences are typical (95,96). Patients in the postoperative ward can frequently be seen to have fever, edema, and elevated inflammatory markers. Therefore, it could be difficult to distinguish between people with a real illness and those with sepsis that is developing (97). The passage of time can reveal new details. Investigating for infection is warranted if signs of infection appear after the second or third day of surgery (98).

2.9.4 Clinical Significance of Cardiac Surgery

Prognosis, symptomatology, risk of ischemia consequences, and functional status can all benefit after cardiac surgery (86). Patients who have had heart surgery often report an enhanced quality of life. If a patient's disease symptoms can be alleviated and their functional abilities can be enhanced, their quality of life will increase. Nevertheless, prolonged ICU stays and bed rest are sometimes necessitated by difficulties that arise when more extensive surgery and cardiopulmonary bypass are used together (8,99). Cardiothoracic surgery is a vital part of maintaining a healthy heart and blood vessels. Atherosclerosis, hypertension, and other cardiovascular disease risk factors are all part of an ongoing epidemiologic shift that has contributed to the steadily rising global prevalence of these illnesses. With an average inpatient cost of $40,000, cardiac surgery accounts for 1% to 2% of the healthcare budget in the United States, totaling $20 billion. Professionals in the fields of cardiology and cardiac surgery will be in high demand (100).

2.10 Physical Activity (PA)

Any time your body moves because of your skeletal muscles, you are physically active (101). The health and happiness of a heart disease patient depend heavily on regular physical activity as an essential health behavior (4). Moderate exercise regularly lowers the probability of secondary cardiac incidents, shortens the length of hospital stays (9), eases discomfort (10), decreases depression (11), reduces anxiety (12), and ameliorates living conditions (13). Physical activity after heart surgery helps patients recover, while not enough physical activity can slow it down (14). As an illustration, in patients aged 65 and up (14), inactivity before surgery was associated with an increased risk of problems after surgery. Cardiac surgery patients who had cardiac rehabilitation (CR) or physiotherapist-supervised exercise after surgery reported greater functional capacity, shorter hospital stays, fewer complications (15), and lower readmission rates than patients who did not participate (16). Long-term, patients who were active after surgery also had fewer heart problems (16), with a reduced rate of death over a decade's time (102). According to research, participating in regular physical activity and learning how to manage risk factors for cardiovascular diseases results in fewer postoperative complications and hospital readmissions, as well as a lower death rate for patients with heart diseases (16). Although exercise is crucial for patients recovering from heart surgery to avoid complications, postoperative patient engagement in physical activity is often insufficient (17). Van Laar et al. (14) found that 40% of post-surgery cardiac patients did not engage in physical activity, and Brocks et al. (18) observed that after heart transplantation, more than half of the ladies in her research did not engage in any physical activity. In addition, research that looked back at people who had heart surgery and then participated in CR (19), Fourty-two percent of patients did not finish exercise-based CR, and another 28 percent stopped going to sessions altogether. Therefore, it is important to identify factors affecting physical activity in patients who have undergone heart surgery in order to stimulate them to engage in physical exercise. Despite the fact that several systematic reviews have looked into the effects of exercise on heart disease patients (9), the majority of studies have been on CR participants who have coronary heart disease, myocardial infarction, or other forms of cardiac disease. There are no known review studies that have solely examined the variables affecting physical activity following heart surgery. Furthermore, the 2020 revision of the American Association of Cardiovascular and Pulmonary Rehabilitation's (AACVPR) criteria for its CR program (20).

2.11 Dyspnea After Cardiac Surgery

Early postoperative breathlessness is a major complaint, and postoperative pulmonary complications (PPCs) continue to be one of the leading causes of morbidity, death, higher costs, and prolonged hospital stays after heart surgery, particularly in this patient population (103,104). Research into the prevalence of PPCs after cardiac surgery has been done in a number of studies (103). Due to the distinct patient groups and the variety of the signs and symptoms throughout a spectrum ranging from dyspnea, cough, and fever to respiratory failure necessitating re-intubation, these studies revealed varying findings (103,104). According to another study, the proportion of heart surgery patients reporting dyspnea symptoms climbed from 60% after 5 years to 74% after 15 years (105).

2.12 Sleep Disturbances After Cardiac Surgery

Repairing the heart is a common medical practice with well-established protocols. Heart surgery patients, however, frequently have difficulties sleeping after the procedure. Disrupted sleep is a primary source of physical suffering following cardiac surgery (106,107). It stands for an unfulfilled physical urge. (108,109). Sleep disturbances can result in delayed recovery and poor quality of life (110,111). During the first week following surgery, sleep quality is especially poor (110). For most people, getting back to their sleep patterns before surgery takes about two months. However, Redeker et al. (112) discovered that sleep efficiency remains below 85% even 6 months after release. When it comes to recovering from heart surgery, it's crucial to know how patients sleep. Patients who have heart surgery often have trouble sleeping. The quality of one's sleep can be affected by a wide variety of circumstances, from internal to external (113). Poor SQ impairs the living quality of heart patients. (110). Hetal M et al. (114) found that 75% of patients had subpar sleep following cardiac surgery, whereas 25% had excellent sleep.

2.13 Pain after Cardiac Surgery

Despite improvements in surgical technique for treating ischemic and valvular heart disease, pain is still the most common symptom experienced by patients who have had cardiac surgery, which may be the cause of problems and prolonged recovery times. According to studies, between 47% and 75% of people who undergo cardiac surgery report experiencing pain after the procedure (115). Untreated pain has far-reaching negative effects on a patient's health,

including diminished quality of life, disturbed sleep, impaired physical functioning, and higher treatment expenditures (116). In the first 24 hours following cardiac surgery, pain is at its worst, and then it gradually lessens as the days go by (117). Patients' reports of how much pain they're in after heart surgery are often used as a proxy for the extent of their emotional and physical distress following the procedure. For a more objective estimation, questionnaires and scoring systems are used (118). When patients experience severe pain, it lowers their quality of life, slows their recovery from surgery, and increases their risk of developing postoperative chronic pain (119). In research conducted retrospectively at the Montréal Heart Institute, Taillefer et al. (120) found that 23% of patients were impacted by prolonged postoperative discomfort. Other research has demonstrated that the incidence of chronic pain following heart surgery ranges from 21% to 55% (121).

2.14 Kinesiophobia after Cardiac Surgery

Kinesiophobia is the abnormal and disabling dread of movement and activity that develops when a person worries that they will be physically hurt (122). Unfortunately, only a small number of studies have investigated the presence and impact of kinesiophobia in heart patients. Six months after a cardiac incident, 20% of CAD patients had a significant level of kinesiophobia (123). Another study found that 86.7% of patients who underwent heart surgery reported preoperative kinesiophobia (124). Patients recovering from cardiac surgery often develop kinesiophobia, or a dread of movement, general fitness exercises, or both. Literature suggests that a kinesiophobic person has a personality that is inherently unsuited to sitting around doing nothing. Kinesiophobia can be broken down into two categories: the biological, which includes worries about pain, fatigue, and exhaustion; and the psychological, which includes worries about being mocked for not being physically active. Both areas have an impact on the kinesiophobic patient and work together to paint a fuller picture of the condition (125,126). 20% of individuals undergoing Coronary Artery Bypass Grafting (CABG) experience kinesiophobia, which may be a natural psychological response (122).

2.15 Quality of Life after Cardiac Surgery

The term "quality of life" (QoL) has gained increasing attention in the fields of medicine, sociology, and health care because it encompasses not only the patient's objective clinical or physiologic status but also their subjective impressions of the impact of a clinical condition on their daily lives (127). Offering cardiac surgery is primarily motivated by the desire to help

people live longer and live better (128). Understanding the dynamics of the therapeutic process and intervening to prevent a functional limitation from occurring necessitates measuring functionality in both the pre- and post-operative periods due to the awareness of potential postoperative problems (129). Recovery from cardiac surgery has been associated with improved quality of life, especially in terms of physical health. According to the studies of Nielsen et al. and Myles et al. (130), one year following surgery, patients in a 2004 Croatian study reported significant improvements in health across half of the physical and mental health categories of quality of life compared to their pre-surgical state (131). Another study revealed that following cardiac surgery and rehabilitation, general health status and quality of life improved (132).

2.16 Depression after Cardiac Surgery

Previous research has shown that patient depression contributes to poor outcomes after coronary bypass surgery (133) or a replacement valve (134). Mood disorders are a leading cause of death following heart surgery, and their consequences can be felt for up to a decade after the procedure has been performed (135). Postoperative depression has been linked to increased cardiac morbidity, impaired functional status, and death, all of which negatively impact surgical recovery (133). According to previous research, prevalence estimates for depression ranged from 19% to 37% before cardiac surgery and from 15% to 33% following the procedure. Similar rates of depression, ranging from 15% pre-CABG to 21% post-CABG, have been observed in other studies that include valve replacement with CABG (136) and 37.7% after CABG (137).

2.17 Fatigue After Cardiac Surgery

Exhaustion is a common side effect of surgery, especially heart surgery, and it typically reaches a high between the second and fourth weeks after the procedure (138,139). Loss of muscle structure and function, the cardiovascular deconditioning response to exercise, patients' preoperative levels of fatigue, and the length of time it takes for patients to recover all play a role in prolonging fatigue after surgery by a few weeks or longer (140). When a medical condition is present, weariness and discomfort are substantially linked to poorer levels of older adult respondents' self-reported physical, role, and social functioning, as well as their overall independence (141). After recovering from CABG surgery, a large proportion of patients (55%, to be exact) reported feeling tired (142). According to a previous study,

prevalence of weariness following CABG surgery was similar to other research investigations (143,144).

Patient-related factors can either impede or promote physical activity following heart surgery, as seen by the aforementioned limits and aftereffects. Therefore, it is important to comprehend aspects influencing physical activity in cardiac surgery patients in order to persuade patients to engage in physical activity after surgery. Despite several meta-analyses, little original research has focused on the effects of exercise on heart disease patients (9), Most studies examining CR's effects have zeroed in on those who have coronary heart disease, myocardial infarction, or are cardiac patients of any kind. There are currently no systematic reviews that have looked solely at the factors that affect physical activity following heart surgery. Additionally, since the AACVR revised its CR program standards in 2020 (20). On the basis of these updated recommendations, it is now necessary to assess the variables impacting physical activity. This integrated review's goal was to close this research gap by identifying the factors that encourage and inhibit physical activity in cardiac patients recovering from surgery.

In despite of there are many studies about (pain, pain catastrophizing, fatigue, kinesiophobia, dyspnea, depression, functional capacity, quality of life and sleep disorders) after cardiac surgery, no studies have determined the effect of these factors on physical activity in post-surgery cardiac patients.

Therefore, this study aims to determine the affecting factors such as (kinesiophobia, pain, pain catastrophizing, dyspnea, fatigue, depression, functional capacity, quality of life, and sleep disorders) on physical activity in patients who underwent cardiac surgery.

3. METHOD

3.1 Patients & Study Design

The purpose of this research was to evaluate the factors affecting physical activity in patients after cardiac surgery by measuring the degree to which their pains, pain catastrophizing, fatigues, kinesiophobia, depression, sleep quality, qualities of life, and functional capacities affected physical activity postoperatively.

This study was found medically appropriate by the Clinical Research Ethics Committee of the Health Ministry in Iraq (Decision Number: 58 in 2022/31/1). It was conducted at the Ibin Al-Bitar Hospital for Cardiac Surgery in Baghdad, Iraq), from February to September 2022, and 300 patients were voluntarily participated in the study. They were selected from the surgical wards in Ibin Al-Bitar hospital during the first week after surgery.

Four females and five males were excluded from the study after samples were collected at random because they could not complete the six-minute walk test (6MWT). The 300 patients (male:185 and female:115) with a range of ages (18-75) were finally included in the statistical analysis.

Inclusion and Exclusion Criteria

Patients were recruited in the research if they had undergone coronary artery bypass grafting (CABG), valve replacement surgeries, atrial septal defect surgeries (ASD), heart myxoma surgeries, and all those surgeries were by sternotomy. All patients were between the ages of 18 and 75, and they were of both genders. Patients who were conscious, oriented, and able to verbally express themselves during postoperative and who were able to understand and complete questionnaires and scales. Patients who were able to complete a six minute walk test (6MWT) and patients who agreed to participate by signing consent forms. While exclusion Criteria:

- Patients under the age of eighteen and older than 75 years
- Patients who could not to complete scales, questionnaires and six minute walk test (6MWT).
- Patients who were unable to complete questionnaires, scales, or the six-minute walk test (6MWT).

- Patients who had problems after surgery, like a stroke or a lot of bleeding, renal insufficiency or failure, atrial fibrillation, a second surgery, or an infection in a deep sternal wound.
- Patients who had problems with hearing and speech.
- Patients who were on a pacemaker postoperatively.
- Patients who had an old stroke.
- People who have had mental health problems after surgery.

3.2 Method

3.2.1 Demographic and Clinical Information Collection

We recorded sex, age, marital status, height, weight, body mass index (BMI), smoking and drinking history, chronic disease history (diabetes mellitus, hypertension, hypothyroidism, bronchial allergy, hyperlipidemia, stay in the ICU, type of cardiac surgery, and any previous surgery) for all patients (Appendix 2). The following questionnaires, scales, and tests were given to all patients who participated in the study during the first week after cardiac surgery. Short-Form International Physical Activity Questionnaire (SF-IPAQ) for assessment of physical activity. Short Form-36 Health Survey (SF-36) for assessment of Quality of Life. Visual Analogue Scale (VAS) for the evaluation of pain. Pain Catastrophizing Scale (PCS) for assessment of pain catastrophizing. Tampa Scale for Kinesiophobia (TSK-11) for measurement of kinesiophobia. Dyspnea-12 (D-12) Questionnaire for evaluation of dyspnea. Pittsburgh Sleep Quality Index (PSQI) for measurement of sleep quality. Cardiac Depression Scale (CDS) for evaluation of depression. Fatigue Severity Scale (FSS) for assessment of fatigue. 6-minute walking test (6MWT) for functional capacity.

3.2.2 Outcome Measurements

-36-Item Short Form Survey (SF-36)

We used the Arabic version of the score "Medical Outcome Study Short Form-36 Items" to measure the health-related quality of life (HRQoL) (MOS SF-36) (145). With only 36 questions, this health survey serves multiple purposes. Results include scales for physical functioning (PF), role limitations due to physical difficulties (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), mental health (MH), and one item on health transition (146,147). 36 items from these

factors make up the SF-36, whose item scores are coded, added together, and transformed to a scale from 0 (worst health status) to 100 (highest health status). The SF-36 was initially intended to be a general health measure, but it has also been used with populations suffering from certain diseases. The questionnaire is given to patients to complete on their own, and a researcher or physician then scores it. Using a scoring key, the scores from the various categories are converted and combined to get a final score that ranges from poor to high in terms of quality of life (148) (Appendix. 3).

-International Physical Activity Questionnaire (SF-IPAQ)

Physical activity (PA) was measured by asking people to fill out the Short Form of the International Physical Activity Questionnaire (SF-IPAQ), in which they say how many days and how long they did vigorous, moderate, and walking activities the week before (149). These numbers were used to assign an estimated MET (metabolic equivalent of task) to each activity (149). High, moderate, and low PA levels were allocated to participants based on their IPAQ scores (150). Those who did not meet the criteria for low PA levels (minutes and/or days per week of vigorous, moderate, or walking activity) were classified as inactive. Active people, on the other hand, were those who met criteria for the high or moderate PA classifications (149–151) (Appendix .4).

-Pittsburgh Sleep Quality Index (PSQI)

The Arabic version of the Pittsburgh Sleep Quality Index (PSQI) (152) was used to assess sleep quality. The Pittsburgh Sleep Quality Index consists of 19 self-reported items that assess sleep quality over the previous month; the global score is calculated by averaging the component scores of the 19 items. The elements include daytime dysfunction, subjective sleep quality, sleep latency, sleep length, habitual sleep efficiency, and sleep disruptions. Each component's score is between 0 and 3, adding up to a total score between 0 and 21, with a larger score suggesting poorer sleep quality and a cutoff score of 5 or lower indicating better sleep quality. A PSQI score of more than five was considered to be poor sleep quality (153) (Appendix .7).

-Dyspnea-12 Questionnaire (D-12)

The Arabic D-12 was used to measure dyspnea (154). The Dyspnea-12 (D-12) Questionnaire is a simple way for patients to report how bad their shortness of breath is. Twelve words are used to describe both the physical and mental aspects of feeling out of breath. The D-12 uses 12 items to give a global rating of how bad breathlessness is (155). The overall scores range

from 0 to 36, with a higher score indicating more severe dyspnea. Each item is scored on a four-point Likert scale from zero (none) to three (severe) (156). Items 1–7 are added together to determine the physical component score, whereas items 8–12 are utilized to determine the emotional component score (156) (Appendix. 11).

-Cardiac Depression Scale (CDS)

The Cardiac Depression Scale (CDS), which has 26 questions, is used to measure depression in adults with heart disease. The CDS was made as an alternative to more general depression scales that were thought to be too blunt and not sensitive enough to the depressive symptoms cardiac patients experience (157). Every statement on the CDS is graded on a 7-point Likert scale, with 1 being the strongest disagreement and 7 being the strongest agreement. 7. The degree to which they agree or disagree with each statement is rated by the participants. A score of 4 on the scale means there is no disagreement or agreement with the statement. Seven items are scored in reverse. More severe depression is indicated by higher CDS scores. The aggregate of all components determines the CDS score, which ranges from 26 to 182. The original writers of the CDS did not offer cut-off scores for the various levels of depression, such as mild, moderate, or severe. However, it has been suggested that a cut-off score of 90 for mild depression and 100 or higher has been used to identify people with more severe depression (158) (Appendix .5).

-Tampa Scale of Kinesiophobia (TSK-11)

The Tampa Scale of Kinesiophobia (TSK) is a well-known tool for figuring out how much someone is afraid of moving and getting hurt again (159). The TSK-11 has the same properties for measuring as the original, but it is shorter and easier to use. The TSK-11 is short, reliable, and made up of 11 questions that are scored the same way as the 17-item scale. Each item gets a score between 1 and 4, where 1 means "strongly disagree," 2 means "somewhat disagree," 3 means "somewhat agree," and 4 means "strongly agree." The final score of the scale is calculated by adding the scores of each item. It ranges from 11 to 44 points, with a higher score showing more kinesiophobia (160). In this study, the Arabic version of the TSK-11 was used to measure pain-related fear of movement or re-injury (Appendix .10).

-Pain Catastrophizing Scale (PCS)

The Arab Translation of the Pain Catastrophizing Scale (PCS-A) (161) was used in this study. The PCS is a 13-item measure with three subscales: rumination, magnification, and

helplessness. It is designed to measure the degree of catastrophization, thoughts, and emotions that patients produce when in pain. Each item is scored from 0 to 4 points, where 0 means "not at all," 1 means "to a small degree," 2 means "to a moderate degree," 3 means "to a significant degree," and 4 means "always." The sum of all items, ranging from 0 to 52 points, determines the total score. The higher the score, the greater the degree of pain catastrophizing (162) (Appendix .9).

-Fatigue Severity Scale (FSS)

The FSS focuses mostly on fatigue, which is characterized as a feeling of physical exhaustion and lack of vitality. Krupp et al. created the Fatigue Severity Scale in 1989 to evaluate fatigue in multiple sclerosis patients. The FSS is made up of nine assertions that discuss how fatigue affects daily life. The patients themselves complete and score items on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). The total number of items can be between 9 and 63. The FSS can be assessed by either calculating a mean score across all 9 items or by calculating a total score, with higher scores indicating more severe fatigue, where a higher score denotes more exhaustion (163) (Appendix. 8).

-Six Minute Walking Test (6MWT)

Patients' functional ability can be assessed with the 6-minute walking test (6MWT), which is a well-known, safe, and well-tolerated measure in a variety of clinical settings (164). Methods recommended by the American Thoracic Society were used to conduct the 6MWT. A 30 meter, obstruction-free channel was utilised for this purpose. We checked the patient's vitals while they sat still, including their breathing rate, heart rate, blood pressure, oxygen levels, and subjective perception of shortness of breath (modified Borg scale) (164). Patients are told to walk as far as they can in six minutes as part of the test. The maximum distance walked shows how well a person can move (148). However, the factors that determine how far a person walks during the six-minute walk test remain unknown (6MWD). After the exam is over, the supervisor may take further measurements, such as arterial blood pressure, heart rate, and oxygen saturation, and record the results on the Borg scale for dyspnea and exhaustion. The 6MWD is computed by keeping track of the laps completed and the total distance traveled (164,165). Before and after the test, we evaluated O2 saturation, blood pressure, pulse rate, and the D-12 questionnaire (Appendix 6). We also measured how far we walked for six minutes, as seen in (Figure 3.1).

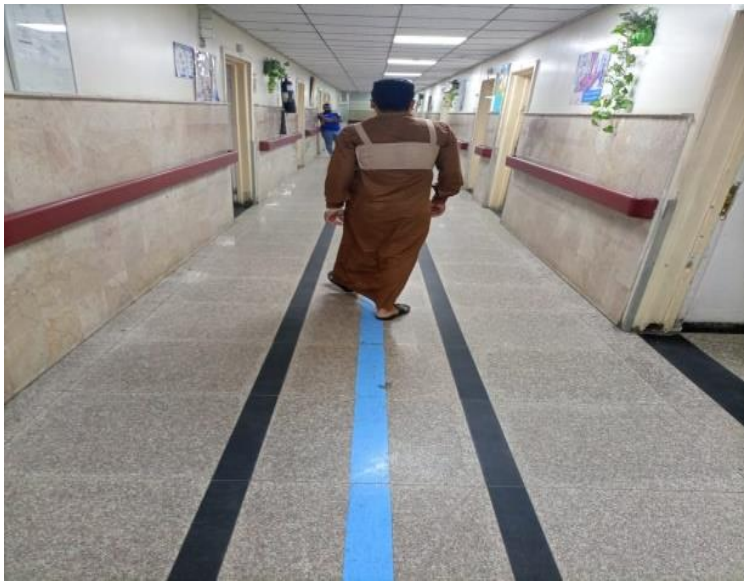

Figure 3.1: Six minute walk test (6MWT).

-Visual Analogue Scale

The Visual Analogue Scale (VAS), which aims to measure a characteristic or opinion that is believed to cover a continuum of values, is an example of a non-direct measuring technique. For example, a patient's sense of pain may range along a continuum from absolutely absent to agonizingly intense. A scale from "none" to "mild" to "moderate" to "severe" would imply that pain increases or decreases in different increments. In order to measure this underlying continuum, the VAS was created (166). A horizontal line that is 10 cm long is used to measure pain. From 0 (no pain) to 10 (very bad pain), 10 is the worst (167). Resting and active pain levels were recorded.

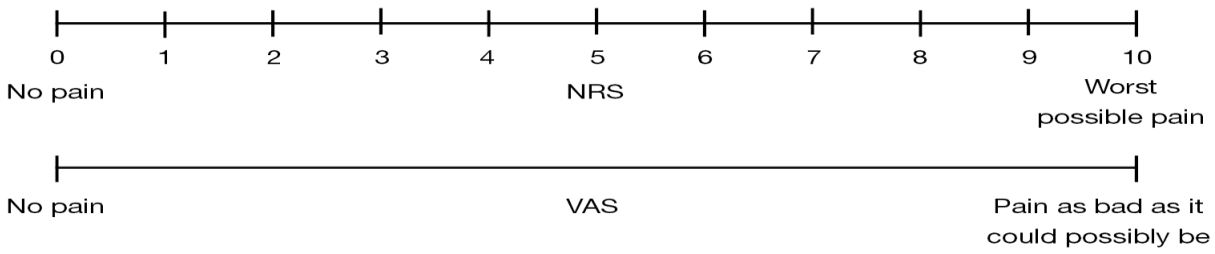

Figure. 3.2: Horizontal axis of 10 cm Visual Analogue Scale (pain scale) (166).

3.3 Statistical Analysis

The collected data were analyzed with IBM SPSS software version 28, which was used for the statistical analysis, and P-value < 0.05 was considered significant. Descriptive statistics of the patients' characteristics were done using frequencies and relative frequencies (percentage) for categorical variables, while mean and standard deviation were used for numeric variables. Independent t-test was used to compare the SF-IPAQ score across the characteristics of the patients. One way ANOVA test was used to compare SF-IPAQ score across type of cardiac surgery and marital status. Pearson correlation was done to study the association between SF-IPAQ score and characteristics of the patients. Simple and multiple linear regression analysis were used to study the association of different factors with SF-IPAQ score. Variables with p-value <0.2 in the univariate analysis were included in the multiple linear regression model. Sample size was calculated using G*Power version 3.1.9.7, using alpha of 0.05 and power of 90% in order to be capable of detecting a small effect size (F2=0.15), using up to 40 predictors that might be associated with SF-IPAQ score. The calculated sample size was 256 patients, which was increased to 300 patients to allow for up to 15% loss to follow up.

4. RESULTS

The 300 patients (male=185 and female=115) with postoperative cardiac surgery who met inclusion criteria were finally included in the statistical analysis.

The characteristics of the patients are summarized in (Table 4.1), in which mean age of the participants was: 50.92 ± 13.66. Males patients were (61.7%), while females patients (38.3%). Mean height was: 169.58 ± 9.40, mean weight was: 79.56 ± 14.90 and mean BMI was: 27.61 ± 4.64. Smokers patients were (26%), and (8.7%) of the patients were drinking. (75.7%) of the patients were hypertensive patients and (36.7%) of the patients were diabetic patients. (50.7%) of the patients suffered from hyperlipidemia. Only (5.7%) of the patients had bronchial allergy while (2.3%) of the patients suffered from hypothyroidism. All patients were operated on through sternotomy. (9.7%) of the patients had ASD cardiac surgery, (53.7%) of the patients had CABG cardiac surgery, only (2.7%) of the patients had Myxoma cardiac surgery and (34.0%) of the patients had valve replacement cardiac surgery as seen in (Table 4.1) and (Figure 4.1). (9.0%) of the patients were single, (82.7%) of the patients were married, (1.3%) of the patients were divorced and (7.0%) of the patients were widowed. Most of the patients (92.3%) stayed for 2 days in the ICU after the surgery, while (7.7%) stayed in the ICU 3 days after the surgery (Table 4.1).

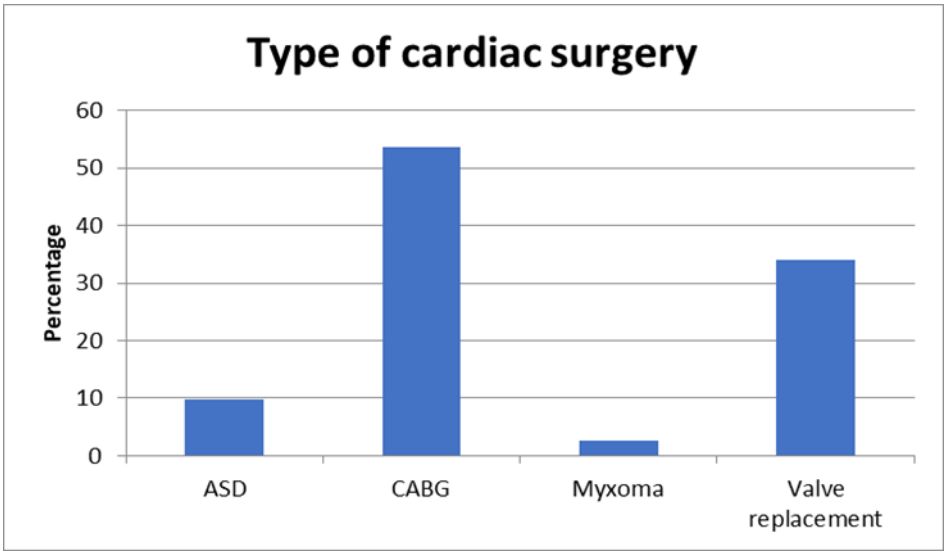

Figure 4.1: Type of cardiac surgery.

Table 4.1: Characteristics of the patients (N=300).

		N	%
Age (Mean, SD)		50.92 (13.66)	
Gender	Male	185	61.7
	Female	115	38.3
Height (Mean, SD)		169.58 (9.40)	
Weight (Mean, SD)		79.56 (14.90)	
BMI (Mean, SD)		27.61 (4.64)	
Smoker	No	222	74.0
	Yes	78	26.0
Drinking	No	274	91.3
	Yes	26	8.7
Hypertension	No	73	24.3
	Yes	227	75.7
Diabetes	No	190	63.3
	Yes	110	36.7
Hyperlipidemia	No	148	49.3
	Yes	152	50.7
Bronchial allergy	No	283	94.3
	Yes	17	5.7
Hypothyroidism	No	293	97.7
	Yes	7	2.3
Is surgery by sternotomy	Yes	300	100.0
Type of cardiac surgery	ASD	29	9.7
	CABG	161	53.7
	Myxoma	8	2.7
	Valve replacement	102	34.0
Marital status	Single	27	9.0
	Married	248	82.7
	Divorced	4	1.3
	Widowed	21	7.0
ICU length of stay	2 days	277	92.3
	3 days	23	7.7
Day of assessment after surgery, (Mean, SD)		5.84 (1.16)	
Old surgery	No	188	62.7
	Yes	112	37.3

The scores of visual analogue scale **(**VAS), pain catastrophizing scale (PCS), Pittsburgh sleep quality index (PSQI), fatigue severity scale (FSS), Tampa scale for kinesiophobia short form (TSK-11), Dyspnea-12 Questionnaire (D-12), cardiac depression scale (CDS), and six minute walk test (6MWT) across characteristics of the patients were shown in (Table 4.2). Where mean VAS score at rest was (30.85% ± 14.01%) while mean VAS score at activity was (64.67% ± 20.13%). Mean rumination was (15.13 ± 1.80), mean magnification was (8.92 ± 2.19), mean helplessness was (16.93 ± 5.41) and mean total score of pain catastrophizing scale (PCS) was (41.00 ± 8.64). Mean PSQI was (15.02 ± 3.77), mean FSS was (51.19 ± 10.82), mean TSK-11 was (33.82 ± 7.52). Mean dyspnea at rest (10.90 ± 6.29), while mean dyspnea after 6-minute walk test was (14.02 ± 7.42). Mean CDS was (118.64 ± 20.91). Mean O2 saturation before 6-minute walk test was (94.66% ± 3.29), while mean O2 saturation after the test was (95.59% ± 3.13%). Mean pulse rate before 6-minute walk test was 84.07 ± 11.02, while mean pulse rate after the test was (91.03± 10.70). Mean distance walked in 6 minutes (169.93 ± 66.31), (Table 4.2).

Table 4.2: The scores of VAS, PCS, PSQI, FSS, TSK-11, Dyspnea-12, CDS, 6MWT across characteristics of the patients.

	Mean	**SD**
VAS		
At rest	30.85%	14.01%
At activity	64.67%	20.13%
Pain Catastrophizing Scale (PCS)		
Rumination	15.13	1.80
Magnification	8.92	2.19
Helplessness	16.93	5.41
Total score	41.00	8.64
PSQI	15.02	3.77
FSS	51.19	10.82
TSK-11	33.82	7.52
Dyspnea-12		
At rest	10.90	6.29
After 6 MWT	14.02	7.42
CDS	118.64	20.91

Table 4.2: (continue) The scores of VAS, PCS, PSQI, FSS, TSK-11, Dyspnea-12, CDS, 6MWT across characteristics of the patients.

	Mean	SD
6 Minute walk test (6MWT)		
O2 saturation before test	94.66%	3.29%
O2 saturation after test	95.59%	3.13%
Pulse Rate before test	84.07	11.02
Pulse Rate after test	91.03	10.70
Distance walked in 6 minutes	169.93	66.31

VAS: visual analogue scale, PCS : pain catastrophizing scale, PSQI : Pittsburgh sleep quality index, FSS : fatigue severity scale, TSK-11: Tampa scale for kinesiophobia short form, D-12: Dyspnea-12 Questionnaire, CDS: cardiac depression scale, 6MWT : six minute walk test

The results of short form-36 quality of life questionnaire (SF-36) of the patients were as presented in (Table 4.3). Where, mean physical functioning was (20.08% ± 5.23%). As regard to role limitations due to physical health and role limitations due to emotional problems were (0.00%) for all patients. For Mean energy/fatigue (vitality) was (23.98% ± 7.77%), and mean emotional well-being was (30.12% ± 12.26%). Mean social functioning was (15.80% ± 74.51%), mean pain was (5.30% ± 6.46%) and mean general health was (25.82% ± 6.19%).

Table 4.3: Results of short form-36 quality of life questionnaire (SF-36) of the patients.

	Mean	SD
Short form-36 quality of life questionnaire (SF-36)		
Physical functioning	20.08%	5.23%
Role limitations due to physical health	0.00%	
Role limitations due to emotional problems	0.00%	
Energy/fatigue	23.98%	7.77%
Emotional well-being	30.12%	12.26%
Social functioning	15.80%	74.51%
Pain	5.30%	6.46%
General health	25.82%	6.19%

The characteristics of the short form-international physical activity questionnaire (SF-IPAQ) of the patients were (91%) of the patients had low physical activity and (9%) had moderate physical activity, where mean SF-IPAQ was 156.14 ± 119.32, as seen in (Table 4.4).

Table 4.4: Characteristics of short form-International physical activity questionnaire (SF-IPAQ) of the patients.

		N	%
Short form-International physical activity questionnaire (SF-IPAQ)			
Type of physical activity	Low	273	91.0
	Moderate	27	9.0
SF-IPAQ (Mean, SD)		156.14	119.32

A comparison of the SF-IPAQ score across characteristics of the patients is shown in (Table 4.5). Where, independent t-test was used to compare the SF-IPAQ score across characteristics of the patients, and a one way ANOVA test was used to compare the SF-IPAQ score across type of cardiac surgery and marital status.

An independent t-test was used to compare SF-IPAQ score across characteristics of the patients, as observed in (Table 4.5), where there was a statistically significant difference in drinking, as patients who were drinking had a lower SF-IPAQ score (mean= 122.81 ± 82.60) than who those were not drinking (mean= 159.30 ± 121.87), p-value = 0.048. There was a statistically significant difference in hypertension, where patients with hypertension had lower SF-IPAQ score (mean= 131.18 ± 96.16) than who didn't have hypertension (mean= 233.75 ± 148.40), p-value <0.001. There was a statistically significant difference in diabetes, as patients with diabetes had lower SF-IPAQ score (mean= 122.53 ± 87.60) than who hadn't diabetes (mean= 175.60 ± 130.60), p-value <0.001. There was a statistically significant difference in hyperlipidemia, where patients with hyperlipidemia had lower SF-IPAQ score (mean= 131.41 ± 95.04) than who hadn't hyperlipidemia (mean= 181.54 ± 135.63), p-value <0.001. There was a statistically significant difference in type of physical activity, as patients doing low physical activity had lower SF-IPAQ score (mean= 122.63 ± 55.89) than who were doing moderate physical activity (mean= 495.00 ± 0.00), p-value <0.001.

One way ANOVA test was used to compare SF-IPAQ score across type of cardiac surgery and marital status were presented in (Table 4.5), where there was a statistically significant difference in type of cardiac surgery, as patients who had ASD surgery had higher SF-IPAQ score (mean= 283.59 ± 151.81) than patients who had CABG surgery (mean= 131.84 ± 93.35), patients who had myxoma surgery (mean= 161.13 ± 34.90), and patients who had valve replacement surgery (mean= 157.87 ± 127.51), p-value <0.001. There was a statistically significant difference in marital status, as single patients had a higher SF-IPAQ score (mean=

261.22 ± 162.36) than married patients (mean= 151.02 ± 109.83), and widowed patients (mean= 92.38 ± 97.17), p-value <0.001. (Table 4.5).

Table 4.5: Comparison of SF-IPAQ score across characteristics of the patients.

*** Independent t-test**		**N**	**Mean**	**SD**	***P-value**
Gender	Male	185	159.47	115.45	0.540
	Female	115	150.78	125.62	
Smoker	No	222	153.38	118.00	0.499
	Yes	78	164.01	123.42	
Drinking	No	274	159.30	121.87	**0.048**
	Yes	26	122.81	82.60	
Hypertension	No	73	233.75	148.40	**<0.001**
	Yes	227	131.18	96.16	
Diabetes	No	190	175.60	130.60	**<0.001**
	Yes	110	122.53	87.60	
Hyperlipidemia	No	148	181.54	135.63	**<0.001**
	Yes	152	131.41	95.04	
Bronchial allergy	No	283	156.85	118.47	0.677
	Yes	17	144.41	136.06	
Hypothyroidism	No	293	157.56	119.92	0.183
	Yes	7	96.71	73.38	
Old surgery	No	188	165.73	128.60	0.055
	Yes	112	140.04	100.34	
Type of physical activity	Low	273	122.63	55.89	**<0.001**
	Moderate	27	495.00	0.00	
Length of stay in ICU	2 days	277	157.33	117.27	0.551
	3 days	23	141.87	143.96	
**** One way ANOVA test**		**N**	**Mean**	**SD**	****P-value**
Type of cardiac surgery	ASD	29	283.59	151.81	**<0.001**
	CABG	161	131.84	93.35	
	Myxoma	8	161.13	34.90	
	Valve replacement	102	157.87	127.51	
Marital status	Single	27	261.22	162.36	**<0.001**
	Married	248	151.02	109.83	
	Divorced	4	99.00	0.00	
	Widowed	21	92.38	97.17	

* Independent t-test=*P-value, ** One way ANOVA test=****P-value**

The correlation between the SF-IPAQ score and the characteristics of the patients is shown in (Table 4.6). Pearson correlation was done to study the correlation between SF-IPAQ score and characteristics of the patients. Where there was a negative medium correlation between age and SF-IPAQ score, r = -0.348, p-value <0.001. There was a positive small correlation between height and SF-IPAQ score, r = 0.137, p-value <0.001. There was a negative small correlation between weight and SF-IPAQ score, r = -0.134, p-value =0.02. There was negative small correlation between BMI and SF-IPAQ score, r = -0.236, p-value <0.001. There was positive medium correlation between the day of assessment after surgery and SF-IPAQ score, r = 0.343, p-value <0.001. There was a negative medium correlation between VAS score at rest and SF-IPAQ score, r = -0.423, p-value <0.001. There was a negative large correlation between VAS score at activity and SF-IPAQ score, r = -0.574, p-value <0.001. There was negative large correlation between rumination subscale of PCS and SF-IPAQ score, r = -0.583, p-value <0.001. There was a negative large correlation between magnification subscale of PCS and SF-IPAQ score, r = -0.607, p-value <0.001. There was negative large correlation between helplessness subscale of PCS and SF-IPAQ score, r = -0.620, p-value <0.001. There was negative large correlation between total score of pain catastrophizing Scale (PCS) and SF-IPAQ score, r = -0.660, p-value <0.001. There was a large negative correlation between PSQI and SF-IPAQ score, r = -0.502, p-value <0.001. There was negative large correlation between FSS and SF-IPAQ score, r = -0.793, p-value <0.001. There was negative large correlation between TSK-11 and SF-IPAQ score, r = -0.756, p-value <0.001. There was large negative correlation between dyspnea-12 questionnaire (D-12) at rest and SF-IPAQ score, r = -0.530, p-value <0.001. There was large negative correlation between D-12 after 6MWT and SF-IPAQ score, r = -0.513, p-value <0.001. There was large negative correlation between CDS and SF-IPAQ score, r = -0.597, p-value <0.001. There was positive medium correlation between O2 saturation before six minute walk test (6MWT) and SF-IPAQ score, r = 0.341, p-value <0.001. There was positive medium correlation between O2 saturation after six minute walk test (6MWT) and SF-IPAQ score, r = 0.315, p-value <0.001. There was a high positive correlation between distance walked in 6 minutes and SF-IPAQ score, r = 0.832, p-value <0.001. There was positive large correlation between physical functioning domain of SF-36 and SF-IPAQ score, r = 0.805, p-value <0.001. There was positive large correlation between energy/fatigue domain of SF-36 and SF-IPAQ score, r = 0.645, p-value <0.001. There was positive large correlation between emotional well-being domain of SF-36 and SF-IPAQ score, r = 0.512, p-value <0.001. There was positive large correlation between pain domain of SF-36

and SF-IPAQ score, r = 0.621, p-value <0.001. There was positive large correlation between general health domain of SF-36 and SF-IPAQ score, r = 0.648, p-value <0.001. (Table 4.6).

Table 4.6: Correlation between SF-IPAQ score and characteristics of the patients.

		SF-IPAQ
Age	Pearson Correlation	-.348
	P-value	**<0.001**
Height	Pearson Correlation	.137
	P-value	**<0.001**
Weight	Pearson Correlation	-.134
	P-value	**0.02**
BMI	Pearson Correlation	-.236
	P-value	**<0.001**
Day of assessment after surgery	Pearson Correlation	.343
	P-value	**<0.001**
VAS score		
At rest	Pearson Correlation	-.423
	P-value	**<0.001**
At activity	Pearson Correlation	-.574
	P-value	**<0.001**
Pain Catastrophizing Scale (PCS)		
Rumination	Pearson Correlation	-.583
	P-value	**<0.001**
Magnification	Pearson Correlation	-.607
	P-value	**<0.001**
Helplessness	Pearson Correlation	-.620
	P-value	**<0.001**
Total score	Pearson Correlation	-.660
	P-value	**<0.001**
PSQI	Pearson Correlation	-.502
	P-value	**<0.001**
FSS	Pearson Correlation	-.793
	P-value	**<0.001**
TSK-11	Pearson Correlation	-.756
	P-value	**<0.001**
Dyspnea-12		
At rest	Pearson Correlation	-.530
	P-value	**<0.001**
After (6MWT)	Pearson Correlation	-.513
	P-value	**<0.001**
CDS	Pearson Correlation	-.597
	P-value	**<0.001**

Table 4.6: (continue) Correlation between SF-IPAQ score and characteristics of the patients.

6 Minute walk test (6MWT)		
O2 saturation before test	Pearson Correlation	.341
	P-value	**<0.001**
O2 saturation after test	Pearson Correlation	.315
	P-value	**<0.001**
Pulse Rate before test	Pearson Correlation	0.086
	P-value	0.138
Pulse Rate after test	Pearson Correlation	0.095
	P-value	0.101
Short form-36 quality of life questionnaire (SF-36)		
Physical functioning	Pearson Correlation	.805
	P-value	**<0.001**
Energy/fatigue	Pearson Correlation	.645
	P-value	**<0.001**
Emotional well-being	Pearson Correlation	.512
	P-value	**<0.001**
Social functioning	Pearson Correlation	-0.027
	P-value	0.637
Pain	Pearson Correlation	.621
	P-value	**<0.001**
General health	Pearson Correlation	.648
	P-value	**<0.001**

VAS: visual analogue scale, PCS: pain catastrophizing scale, PSQI: Pittsburgh sleep quality index, FSS: fatigue severity scale, TSK-11: Tampa scale for kinesiophobia short form, D-12: Dyspnea-12 Questionnaire, CDS: cardiac depression scale, 6MWT: six minute walk test, BMI: body mass index

Result of simple linear regression:

Simple linear regression was used to study the association of different factors with the SF-IPAQ score, as seen in (Table 4.7). Where, there was a statistically significant association of SF-IPAQ score with hypertension, diabetes, hyperlipidemia, bronchial allergy, type of cardiac surgery, marital status, type of physical activity, age, body mass index (BMI), day of assessment after surgery, VAS score (at rest and at activity), pain catastrophizing scale (PCS) (subscales scores of rumination, magnification, helplessness and total score of PCS), PSQI, FSS, TSK-11, Dyspnea-12 (at rest, and after 6MWT), CDS, 6 Minute walk test (6MWT) (O2 saturation before test, O2 saturation after test and distance walked in 6 minutes), short form-36 quality of life questionnaire (SF-36) (physical functioning, energy/fatigue, emotional well-being, pain, and general health).

For hypertension, as compared to patients who didn't have hypertension, those with hypertension had a lower SF-IPAQ score by an average of 102.57, p-value < 0.001. As

compared to patients who didn't have diabetes, those with diabetes had a lower SF-IPAQ score by an average of 53.07, p-value < 0.001. Whit regard to hyperlipidemia, as compared to patients who didn't have hyperlipidemia, those with hyperlipidemia had a lower SF-IPAQ score by an average of 50.13, p- value < 0.001. For bronchial allergy, as compared to patients who didn't have bronchial allergy, those with bronchial allergy had a lower SF-IPAQ score by an average of 12.43, p- value < 0.001. As for type of cardiac surgery, as compared to patients who had ASD surgery, those who had CABG surgery had a lower SF-IPAQ score by an average of 151.75, p- value <0.001, those who had myxoma surgery had a lower SF-IPAQ score by an average of 122.46, p- value = 0.006, and those who had a valve replacement surgery had lower SF-IPAQ score by an average of 125.71, p- value <0.001. Regarding marital status, as compared to single patients, married patients had a lower SF-IPAQ score by an average of 110.2, p- value <0.001, divorced patients had a lower SF-IPAQ score by an average of 162.22, p- value = 0.008, and widowed patients had a lower SF-IPAQ score by an average of 168.84, p- value <0.001. For type of physical activity as compared to patients having low physical activity, patients with moderate physical activity had a higher SF-IPAQ score by an average of 372.37, p- value <0.001. Regarding age, age was associated with a lower SF-IPAQ score, as if age increased by 1 year, the average SF-IPAQ score decreased by 3.04, p- value <0.001. Regarding BMI, it was associated with a lower SF-IPAQ score, as if weight increased by 1 unit, the average SF-IPAQ score decreased by 6.08, p- value <0.001. As for day of assessment after surgery, it was associated with a higher SF-IPAQ score, as if day of assessment after surgery increased by 1 day, the average SF-IPAQ score increased by 35.29, p- value <0.001. Regarding VAS score at rest, it was associated with a lower SF-IPAQ score, as if VAS score at rest increased by 1 unit, the average SF-IPAQ score decreased by 3.6, p- value <0.001. For VAS score at activity, it was associated with a lower SF-IPAQ score, as if VAS score at activity increased by 1 unit, the average SF-IPAQ score decreased by 3.4, p- value <0.001. With regard to rumination subscale of PCS, it was associated with a lower SF-IPAQ score, as if rumination subscale increased by 1 unit, the average SF-IPAQ score decreased by 38.58, p- value <0.001. Regarding magnification subscale of PCS, it was associated with a lower SF-IPAQ score, as if magnification subscale increased by 1 unit, the average SF-IPAQ score decreased by 33.04, p- value <0.001. For helplessness subscale of PCS, it was associated with a lower SF-IPAQ score, as if helplessness subscale increased by 1 unit, the average SF-IPAQ score decreased by 13.69, p- value <0.001. Also total score of pain catastrophizing Scale (PCS), it was associated with a lower SF-IPAQ score, as if the total score increased by 1 unit, the average SF-IPAQ score decreased by 9.12, p- value <0.001. As

for PSQI, it was associated with a lower SF-IPAQ score, as if PSQI increased by 1 unit, the average SF-IPAQ score decreased by 15.89, p- value <0.001. With regard to FSS, it was associated with a lower SF-IPAQ score, as if FSS increases by 1 unit, the average SF-IPAQ score decreased by 8.75, p- value <0.001. Regarding TSK-11, it was associated with a lower SF-IPAQ score, as if TSK-11 increases by 1 unit, the average SF-IPAQ score decreased by 11.99, p- value <0.001. For Dyspnea-12 score at rest, it was associated with a lower SF-IPAQ score, as if Dyspnea-12 score at rest increased by 1 unit, the average SF-IPAQ score decreased by 10.05, p- value <0.001. As for Dyspnea-12 score after 6MWT, it was associated with a lower SF-IPAQ score as if Dyspnea-12 score after 6MWT increased by 1 unit, the average SF-IPAQ score decreased by 8.24, p- value <0.001. With regard to CDS, it was associated with a lower coefficient of SF-IPAQ score, as if CDS increased by 1 unit, the average SF-IPAQ score decreased by 3.41, p- value <0.001. O2 saturation before 6MWT, it was associated with a higher SF-IPAQ score, as if O2 saturation before 6MWT increased by 1 unit, the average SF-IPAQ score increased by 12.39, p- value <0.001. As for O2 saturation after 6MWT, it was associated with a higher SF-IPAQ score, as if O2 saturation after 6MWT increased by 1 unit, the average SF-IPAQ score increased by 12, p- value <0.001. Regarding distance walked in 6 minutes (6MWT), it was associated with a higher SF-IPAQ score, as if distance walked in 6 minutes increased by 1 unit, the average SF-IPAQ score increased by 1.5, p- value <0.001. Physical functioning subscale in SF-36, it was associated with a higher SF-IPAQ score, as if physical functioning increased by 1 unit, the average SF-IPAQ score increased by 18.38, p- value <0.001. Also energy/fatigue subscale of SF-36, it was associated with a higher SF-IPAQ score, as if energy/fatigue increased by 1 unit, the average SF-IPAQ score increased by 9.91, p- value <0.001.So emotional well-being subscale of SF-36, it was associated with a higher SF-IPAQ score, as if emotional well-being increased by 1 unit, the average SF-IPAQ score increased by 4.98, p- value <0.001. Regarding pain subscale for SF-36, it was associated with a higher SF-IPAQ score, as if pain subscale increased by 1 unit, the average SF-IPAQ score increased by 11.48, p- value <0.001. Also general health subscale in SF-36, it was associated with a higher SF-IPAQ score, as if general health subscale increased by 1 unit, the average SF-IPAQ score increased by 12.47, p- value <0.001. (Table 4.7).

Result of multiple linear regression:

The association between SF-IPAQ Score and participants' characteristics was studied using multiple linear regression according to p-value of the simple linear regression, as any variable with p-value < 0.2 was included in the model as shown in (Table 4.7).

Regarding type of physical activity as compared to patients having low physical activity, patients with moderate physical activity had a higher SF-IPAQ score by an average of 250.80 meters, 95% C.I. of the coefficient (237.54,264.06), p- value < 0.001. As for day of assessment after surgery, it was associated with a higher coefficient of SF-IPAQ score, as if the day of assessment after surgery increased by 1 day, the average SF-IPAQ score increased by 5.40, 95% C.I. of the coefficient (2.70:8.10), p- value <0.001. For helplessness subscale of PCS, it was associated with a lower SF-IPAQ score as if helplessness subscale of PCS increased by 1 unit, the average SF-IPAQ score decreased by 4.90, 95% C.I. of the coefficient (-9.22, -0.57), p-value =0.013. With regard to FSS, it was associated with a lower SF-IPAQ score as if FSS increased by 1 unit, the average SF-IPAQ score decreased by 1.36, 95% C.I. of the coefficient (-2.14, -0.59), p- value =0.001. As for TSK-11, it was associated with a lower SF-IPAQ score as if TSK-11 increased by 1 unit, the average SF-IPAQ score decreased by 1.03, 95% C.I. of the coefficients (-1.96, -0.09), p- value =0.031. Regarding distance walked in 6 minutes, it was associated with a higher SF-IPAQ score, as if distance walked in 6 minutes increased by 1 unit, the average SF-IPAQ score increased by 0.42, 95% C.I. of the coefficient (0.28,0.57), p- value <0.001. Also physical functioning subscale of SF-36, it was associated with a higher SF-IPAQ score, as if physical functioning subscale of SF-36 increased by 1 unit, the average SF-IPAQ score increased by 1.31, 95% C.I. of the coefficients (0.02, 2.59), p- value = 0.046, as seen in (Table 4.7).

Table 4.7: Simple and multiple linear regression to study the association of different factors with SF-IPAQ score.

	Univariate				Multivariate			
SF-IPAQ	Coefficient	P-value	[95% C.I]		Coefficient	P-value	[95% C.I]	
Gender								
Male	**Ref.**							
Female	-8.70	0.54	-36.61	19.21				
Smoker								
No	**Ref.**							
Yes	10.63	0.499	-20.30	41.57				
Drinking								
No	**Ref.**				**Ref.**			
Yes	-36.50	0.136	-84.58	11.59	2.27	0.683	-8.68	13.22
Hypertension								
No	**Ref.**				**Ref.**			
Yes	-102.57	**<0.001**	-131.98	-73.17	-0.40	0.938	-10.56	9.75
Diabetes								
No	**Ref.**				**Ref.**			
Yes	-53.07	**<0.001**	-80.59	-25.55	-4.44	0.221	-11.57	2.69
Hyperlipidemia								
No	**Ref.**				**Ref.**			
Yes	-50.13	**<0.001**	-76.68	-23.58	-1.60	0.724	-10.50	7.30
Hypothyroidism								
No	**Ref.**				**Ref.**			
Yes	-60.85	0.183	-150.53	28.84	-6.29	0.547	-26.81	14.24
Bronchial allergy								
No	**Ref.**				**Ref.**			
Yes	-12.43	**<0.001**	142.86	170.82	2.15	0.76	-11.69	15.99
Type of cardiac surgery								
ASD	**Ref.**				**Ref.**			
CABG	-151.75	**<0.001**	-196.07	107.42	-3.32	0.745	-23.38	16.74
Myxoma	-122.46	**0.006**	-210.21	-34.71	8.33	0.494	-15.61	32.28
Valve replacement	-125.71	**<0.001**	-171.96	-79.47	-4.74	0.592	-22.13	12.64
Old surgery								
No	**Ref.**				**Ref.**			
Yes	-25.69	0.071	-53.61	2.23	-4.73	0.169	-11.47	2.02
Marital status								
Single	**Ref.**				**Ref.**			
Married	-110.20	**<0.001**	-155.71	-64.70	8.69	0.293	-7.56	24.94
Divorced	-162.22	**0.008**	-282.53	-41.92	-9.70	0.538	-40.69	21.30
Widowed	-168.84	**<0.001**	-234.18	103.51	5.80	0.577	-14.67	26.27
Type of physical activity								
Low	**Ref.**				**Ref.**			
Moderate	372.37	**<0.001**	351.17	393.57	254.04	**<0.001**	240.08	268.01
Age	-3.04	**<0.001**	-3.98	-2.11	0.08	0.663	-0.28	0.44
BMI	**-6.08**	**<0.001**	**-8.93**	**-3.23**	-0.31	0.417	-1.07	0.45

Table 4.7: (continue) Simple and multiple linear regression to study the association of different factors with SF-IPAQ score.

Length of stay in ICU								
2 days	**Ref.**							
3 days	-15.46	0.551	-66.46	35.55				
Day of assessment after surgery	35.29	**<0.001**	24.28	46.31	5.37	**<0.001**	2.52	8.23
VAS score								
At rest	-3.60	**<0.001**	-4.48	-2.72	0.04	0.794	-0.28	0.37
At activity	-3.40	**<0.001**	-3.95	-2.85	-0.21	0.139	-0.48	0.07
Pain Catastrophizing Scale (PCS)								
Rumination	-38.58	**<0.001**	-44.71	-32.45	-3.13	0.211	-8.05	1.79
Magnification	-33.04	**<0.001**	-37.97	-28.11	-4.04	0.161	-9.69	1.61
Helplessness	-13.69	**<0.001**	-15.66	-11.71	-5.79	**0.013**	-10.35	-1.23
Total score	-9.12	**<0.001**	-10.30	-7.94	4.68	**0.038**	0.27	9.09
PSQI	-15.89	**<0.001**	-19.02	-12.77	0.57	0.305	-0.52	1.65
FSS	-8.75	**<0.001**	-9.51	-7.98	-2.41	**<0.001**	-3.14	-1.69
TSK-11	-11.99	**<0.001**	-13.18	-10.81	-2.21	**<0.001**	-3.10	-1.32
Dyspnea-12								
At rest	-10.05	**<0.001**	-11.89	-8.22	-0.48	0.638	-2.49	1.53
After 6MWT	-8.24	**<0.001**	-9.82	-6.67	0.47	0.58	-1.19	2.13
CDS	-3.41	**<0.001**	-3.93	-2.88	0.43	**0.009**	0.11	0.76
6 Minute walk test (6MWT)								
O2 saturation before tes	12.39	**<0.001**	8.50	16.28	0.20	0.84	-1.25	1.54
O2 saturation after test	12.00	**<0.001**	7.87	16.12	1.12	0.263	-0.60	2.18
Short form-36 quality of life questionnaire (SF-36)								
Physical functioning	18.38	**<0.001**	16.84	19.92	4.48	**<0.001**	1.58	4.05
Energy/fatigue	9.91	**<0.001**	8.57	11.24	0.49	0.627	-0.59	0.97
Emotional well-being	4.98	**<0.001**	4.03	5.93	1.04	0.298	-0.22	0.70
Social functioning	-0.44	0.637	-0.23	0.14				
Pain	11.48	**<0.001**	9.83	13.13	0.80	0.422	-0.41	0.98
General health	12.47	**<0.001**	10.8	14.15	0.01	0.992	-0.83	0.84

***** Ref = Reference category, CI = confidence interval, SF-IPAQ: Short-Form International Physical Activity Questionnaire, CABG: coronary artery bypass grafting, ASD: atrioventricular defect, VAS: visual analogue scale, PCS: pain catastrophizing scale, PSQI: Pittsburgh sleep quality index, FSS: fatigue severity scale, TSK-11: Tampa scale for kinesiophobia short form, D-12: Dyspnea-12 Questionnaire, CDS: cardiac depression scale, 6MWT: six minute walk test, BMI: body mass index.

5. DISCUSSION

In the present study, we examined the variables influencing physical activity (PA) in patients following heart surgery, The findings of this study have demonstrated a statistically significant relationship between physical activity and hypertension, diabetes, hyperlipidemia, bronchial allergies, type of cardiac surgery, marital status, type of physical activity, age, body mass index (BMI), day of assessment after surgery, pain, pain catastrophizing, sleep quality, kinesiophobia, dyspnea, depression, fatigue, functional capacity, and in five domains for quality of life (physical functioning, energy/fatigue, emotional well-being, pain, and general health).

In pain at rest and activity of patients was increased and associated with a significant decrease in physical activity. Also, pain catastrophizing was associated with significant decreased physical activity. There was an association of kinesiophobia with significantly lower physical activity. Also, sleep disorders, dyspnea, depression, and fatigue were associated with significantly decreased physical activity in patients postoperatively. Also, our findings show that an increase in physical activity was associated with a higher physical functioning domain for quality of life and a higher functional capacity, as well as the type of physical activity, which was moderate physical activity, because it was assessed on the final day, where the patients in this study who had low physical activity (91%), and moderate physical activity (9%).

In our results, the VAS at rest and at activity was associated with a lower SF-IPAQ score in the patients who underwent cardiac surgery in the first week postoperatively. According to our literature examination, we could not find any studies about the association of the VAS score with the SF-IPAQ score after cardiac surgery. So, we discuss some of our outcome VAS scores and SF-IPAQ scores with other studies after cardiac surgery that used different scales for the association of pain and physical activity. Micah et al. (168) demonstrated in their investigation that there is a correlation between postoperative physical activity and degrees of pain and that this correlation is considerably high in connection to pain levels on the second postoperative day (POD). They came to this conclusion after finding that postoperative physical activity was another component that showed a statistically significant association with pain levels. Despite the fact that their study evaluated pain and physical activity using

scales that were different from the ones we used, the results of their study for VAS with SF-IPAQ were comparable to the results of our study. Ogut et al. (169), they claimed that during the first 24 hours following the participants' transfer from the cardiovascular surgery intensive care unit to the clinic, moderately positive and statistically significant correlation between pain intensity scores and physical activity of the patients after cardiac surgery was discovered. These findings were consistent with our study, which measured pain and physical activity in the first week following heart surgery using a different set of scales and a smaller sample size. Tüfekçi et al. (170) cited that post-surgery pain had a big effect on physical activity in cardiac patients who were semi-dependent on the first day after surgery but became more independent after they were sent home. In their study, pain and physical activity were measured on the first day after surgery and again after the patient was sent home. In our study, pain and physical activity were only measured once, during the first week after surgery, when the scales were used. Abdurrahman et al. (171) said that the VAS score went down and physical activity went up during the first week of follow-up after surgery. These results were the opposite of ours, which showed that a higher VAS score was linked to less physical activity. This is because their study of the VAS score was done after patients were sent home for the first week, and their sample size was only 30 patients.

Our study assessed fatigue with the fatigue severity scale (FSS), and this study showed that the FSS score was associated with a significantly lower SF-IPAQ score. We could not find studies that matched our study that discussed the association of fatigue with physical activity using both FSS and SF-IPAQ scores together; therefore, we discussed the association of fatigue and physical activity with different scales in many studies after heart surgery. Zimmerman et al. (142) found that at 6 weeks and 3 months after surgery, physical activity and feeling tired were linked in a significant way. These results could fit with ours, which showed that there was a link between fatigue and less physical activity, even though our study looked at participants during the first week after surgery and all of the patients were men and women between the ages of 18 and 75, while their study looked at participants 6 weeks and 3 months after surgery and all of the patients were women 65 and older. Barnason et al. (172) at six weeks following CABG surgery, they indicated that physiological functioning, specifically role-physical (one's physical abilities impairing the quantity and type of the job), was considerably decreased for the group of exhausted patients. This is consistent with the findings of our study, despite the fact that their study assessed the physiological functioning of the

fatigued participant group six weeks after CABG surgery while our study assessed participant fatigue and physical activity during the first week following various types of cardiac surgery.

Our findings revealed that the TSK-11 score was associated with a significantly lower SF-IPAQ score in patients after cardiac surgery. Nair et al. (173) they claimed that in patients with arterial hypertension, a significant inverse relationship between TSK and SF-IPAQ scores was discovered. It was appropriate for both their study, which looked at patients with arterial hypertension, and our data, which showed a strong negative correlation between the TKS score and the SF-IPAQ score in patients who had undergone cardiac surgery. Nair et al. (174) found that even though pre-operative kinesiophobia and fear avoidance beliefs about physical activity were shown to be high among patients in another study, patients who went through in-patient cardiac rehabilitation following cardiac surgery showed considerable improvements in these areas. This was in disagreement with the results of our study for TSK, which showed that there was a kinesiophobia that affected physical activity after cardiac surgery because kinesiophobia was assessed during the first week after surgery, and also because all patients did not undergo a cardiac rehabilitation program in our study, whereas all patients in their study underwent a cardiac rehabilitation program postoperatively after cardiac surgery. Also, the sample size in our study was large (300 patients), whereas the sample size in their study was small (34 patients). Şahin et al (175) noted an increase in the TSK heart score following CR in patients with coronary artery disease; patients with a high level of kinesiophobia tend to be less physically active than those with a low level of kinesiophobia. These findings were in line with our study for the TKS and SF-IPAQ score, but their study examined patients with coronary artery disease after cardiac rehabilitation programs, and kinesiophobia with the TSK Heart. Because there is not an Arabic version of TSK Heart, we used TSK-11 in our study. For this reason, we could not find studies about TSK being associated with SF-IPAQ scores in post-surgery cardiac patients. Therefore, we discussed TSK and SF-IPAQ scores in different studies of heart diseases and different scales after cardiac surgery. Knapik et al (176) confirmed a significant kinesiophobia prevalence in patients with coronary artery disease (CAD), exceeding 76%. Because of its substantial inverse associations with activity, its prevalence is minimal. This was consistent with our results for TSK, but with physical activity, they used a different scale with their study of patients with coronary artery diseases. Knapik et al (177) in other study stated that people with CAD had a big difference between their TSK Heart score and their IPAQ score. Those results were in line with the results of our study of patients after cardiac surgery. Dąbek et al. (178)

showed that kinesiophobia has been shown to have a negative impact on individuals with coronary artery disease's level of physical activity, according to a correlation between TSK Heart and SF-IPAQ scores (CAD). This was consistent with our results in spite of TSK Heart used in their study.

The CDS score in the findings of our study was associated with a significantly decreased SF-IPAQ score in patients after cardiac surgery. According to our literature examination, we could not find studies associating CDS with SF-IPAQ scores after cardiac surgery, therefore, we discuss some of our outcomes for depression and physical activity in different scales after cardiac surgery. Wierenga et al. (179), they showed that depressive symptoms made people less active when the study group after heart surgery was taken into account. These results correspond to our findings for CDS, despite participants in our study completed measurements during the first week postoperatively, while in their study, participants completed measures of depression and potential moderating variables at baseline, 2, 6, and 12 months postoperatively. Horne et al. (180) indicated that being physically inactive was linked to depression before surgery and to new depression 6 months after surgery. This was in line with the findings of our study, which showed that higher depression symptoms were associated with lower physical activity, despite our study determined an association between depression symptoms and physical inactivity during the first week after surgery, and their study assessed physical inactivity as being associated with preoperative depression and new depression six months postoperatively. Kendel et al. (181) demonstrated that worsening physical functioning was a predictable outcome of worsening depressed symptoms, but that the inverse was not true. This was in line with the findings of our study, which showed that higher depression was associated with lower physical activity because our study assessed the impact of depression on physical activity during the first week postoperatively. Also, previous research has demonstrated a seemingly contradictory connection between physical activity and depression symptoms. People whose moods are low are less likely to engage in physical activity (182).

PSQI score in the findings of our results showed that it was associated with significant lower SF-IPAQ score in the patients after cardiac surgery. Zimmerman et al. (142) demonstrated strong associations between sleep issues and physical activity at 6 weeks and 3 months following heart surgery. This was in line with the findings of our study, which showed that there was a large negative correlation between sleep quality and physical activity in spite of our study assessed participants during the first week postoperatively and all patients were males and females aged 18-75 years, while their study assessed participats at 6 weeks and 3

months after surgery and all patients were women only aged 65 years and older. Arena et al. (183) indicated that when bedtime increases, so does the degree of immobility, which has an impact on physical activity. This suggests that when sleep quality declines, so does functional capacity. This was agreed with our study which revealed that sleep insufficient lead to reduced physical activity. Redeker et al. (184) noticed that physical activity was related to changes in sleep patterns that suggest partial sleep deprivation between 4 and 8 weeks following heart surgery. This was in line with the findings of our study, which showed that there was an association between sleep disturbances and lower physical activity in spite our study determined this association during the first week postoperatively, and their study determined it at 4 and 8 weeks after cardiac surgery. Esnaasharieh et al. (185) argued that patients with heart failure showed an improvement in sleep quality alongside a rise in physical activity, as measured by the Rapid Assessment of Physical Activity (RAPA) total score. These findings were in disagreement with our results for the PSQI score, which was increased with the association of a lower SF-IPAQ score in patients after cardiac surgery because their study examined physical activity with the Rapid Assessment of Physical Activity (RAPA) among patients with heart failure. According to our literature examination, we could not find any studies about the association of the PSQI score with the SF-IPAQ score when used after cardiac surgery. Therefore, we discussed some of our outcome PSQI scores and SF-IPAQ scores with other studies after cardiac surgery, and cardiac patients used different scales for the association of sleep quality with physical activity.

In this study, the subscales scores of SF-36 (physical functioning, energy/fatigue, emotional well-being, pain, and general health) were associated with increased significant of SF-IPAQ score in the patients after cardiac surgery. Bond et al. (186) saw that there was a statistically significant link between quality of life and getting back to physical activity 30 days after heart surgery. This was slightly correlated with our study, which observed that higher quality of life in five domains (physical functioning, energy/fatigue, emotional well-being, pain, and general health) only were associated with higher physical activity because of our study measured the subscale scores of the SF-36 and SF-IPAQ during the first week post-cardiac surgery, and their study measured quality of life with the Quality of Life in Cardiovascular Surgery (QLCS) questionnaire after 30 days postoperatively. Markou et al. (187), quality of life (QOL) and physical activity (PA) were reported to have improved across the board, although the degree to which these changes occurred varied throughout the study's three groups. Group C shows no significant improvement in PA, while groups B and A both show substantial growth.

Group A improves significantly across all five QOL areas, while groups B and C each improve across two domains. This was consistent with the results of our study, but scales were different in their study.

In this study, the dyspnea-12 questionnaire (D-12) score was associated with a significant decrease in the SF-IPAQ score in cardiac patients postoperatively. Zimmerman et al. (142) found strong connections between heart surgery recovery symptoms (shortness of breath) and physical activity six weeks and three months following surgery. This was in line with the findings of our study, which showed that there was a large negative correlation between dyspnea and physical activity, in spite of our study assessed participants during the first week postoperatively and all patients were males and females aged 18-75 years, while their study assessed participats at 6 weeks and 3 months after surgery and all patients were women only aged 65 years and older. Giacchi et al. (188) noticed an increase in dyspnea symptoms during the movement of patients who had undergone heart surgery. This was in line with the findings of our study although large sample size of our study (300 patients) and small it in their study, and also difference of scales in both study. Sjoland et al. (189) indicated that 3 months and 2 years following CABG, physical activity was greatly improved, and symptoms of dyspnea and chest discomfort were significantly decreased in both men and women. This results were opposite of our study which was during first week postoperatively. We discussed dyspnea and physical activity in studies that included different scales from our study because we could not find studies that contained the same scales.

The results of our study indicated that the increasing 6MWT scores of (distance walked in six minutes) were associated with significanlyt higher SF-IPAQ score for the patient after cardiac surgery. Fiorina et al. (190) found that the distance walked during the 6MWT was a good indicator of a person's functional capacity. In the subgroup of patients who did the 6MWT more than once, the distance walked increased significantly after the cardiac rehabilitation program after heart surgery. This was in line with our study, which showed that there was improvement in physical activity with increased 6MWT scores in the patients during the first week after cardiac surgery, although their study examined participants 15 days postoperatively who had participated in a cardiac rehabilitation program. Also in the results of this study, increased O2 saturation after (6MWT), it was associated with higher SF-IPAQ score of participants postoperatively. Giacchi et al. (188), they claimed that sustaining a higher oxygen saturation during mobilization is associated with enhanced physical function. This was

compatible with the findings of our study, which observed that increasing O2 saturation during the distance a patient walked in six minutes was associated with higher physical activity in spite our study measured physical activity with the short-form international physical activity questionnaire (SF-IPAQ), and functional status with the (6MWT), while in their study physical function was assessed using the short physical performance battery (SPPB) test.

The PCS score in our study was associated with decreased significant of SF-IPAQ score in the patients after cardiac surgery. Pei et al. (191), they found that pain exaggeration was linked to poor physical activity after total knee arthroplasty (TKA). This was similar to our study, which observed that pain catastrophizing was associated with physical activity, but we assessed pain catastrophizing after cardiac surgery, whereas their study measured pain catastrophizing after total knee arthroplasty (TKA). Because there are not studies assessing pain catastrophizing and its effects on physical activity after cardiac surgery.

6. CONCLUSION

According to the results of our study, we concluded:

1- Pain affects physical activity in the patient who underwent cardiac surgery.

2- Pain catastrophizing adversely affects physical activity in post-surgery cardiac patients.

3- Depression negatively affected physical activity after heart surgery.

4- Reduced physical activity with sleep disorders of patients who have undergone cardiac surgery.

5- Kinesiophobia had an effect on physical activity after cardiac surgery.

6- Dyspnea after cardiac surgery has an impact on physical activity.

7- Fatigue reduced physical activity in post-surgery cardiac patients.

8- The improvement in functional status and quality of life led to enhanced physical activity in patients who underwent cardiac surgery.

8- More researches is needed to identify factors that facilitate or hinder physical activity following cardiac surgery.

REFRENCES

1. Farley A, McLafferty E, Hendry C. Cells, tissues, organs and systems. J Nursing Standard. 2012; 26 (52): 40.

2. Kaptoge S, Pennells L, De Bacquer D, Cooney MT, Kavousi M, Stevens G, et al. World Health Organization cardiovascular disease risk charts: revised models to estimate risk in 21 global regions. Lancet Glob Heal. 2019; 7 (10): e1332–45.

3. Epstein FH. The epidemiology of coronary heart disease: A review. J Chronic Dis. 1965; 18 (8): 735–74.

4. Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callaway CW, Carson AP, et al. Heart disease and stroke statistics—2019 update: a report from the American Heart Association. Circulation. 2019; 139 (10): e56–528.

5. Curry SJ, Krist AH, Owens DK, Barry MJ, Caughey AB, Davidson KW, et al. Risk assessment for cardiovascular disease with nontraditional risk factors: US preventive services task force recommendation statement. Jama. 2018; 320 (3): 272–80.

6. de Albuquerque Silva B, do Nascimento Calles AC, de Faria Freire R. Perfil dos pacientes em pós-operatório de cirurgia de revascularização do miocárdio em um hospital de Maceió. Cad Grad Biológicas e da Saúde-UNIT-ALAGOAS. 2014; 2 (2): 67–76.

7. Leitz KH, Ziemer G. The history of cardiac surgery. In: Cardiac Surgery. Springer; 2017. p. 3–31.

8. Ball L, Costantino F, Pelosi P. Postoperative complications of patients undergoing cardiac surgery. Curr Opin Crit Care. 2016; 22 (4): 386–92.

9. Anderson L, Thompson DR, Oldridge N, Zwisler A, Rees K, Martin N, et al. Exercise-based cardiac rehabilitation for coronary heart disease. Cochrane Database Syst Rev. 2016;(1).

10. Taylor RS, Brown A, Ebrahim S, Jolliffe J, Noorani H, Rees K, et al. Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. Am J Med. 2004; 116 (10): 682–92.

11. Hojskov IE, Moons P, Egerod I, Olsen PS, Thygesen LC, Hansen NV, et al. Early physical and psycho-educational rehabilitation in patients with coronary artery bypass grafting: A randomized controlled trial. J Rehabil Med. 2019; 51 (2): 136–43.

12. Pogosova N, Kotseva K, De Bacquer D, von Känel R, De Smedt D, Bruthans J, et al. Psychosocial risk factors in relation to other cardiovascular risk factors in coronary heart

disease: Results from the EUROASPIRE IV survey. A registry from the European Society of Cardiology. Eur J Prev Cardiol. 2017; 24 (13): 1371–80.
13. De Smedt D, Clays E, Annemans L, Doyle F, Kotseva K, Pająk A, et al. Health related quality of life in coronary patients and its association with their cardiovascular risk profile: results from the EUROASPIRE III survey. Int J Cardiol. 2013; 168 (2): 898–903.
14. van Laar C, TImman ST, Noyez L. Decreased physical activity is a predictor for a complicated recovery post cardiac surgery. Health Qual Life Outcomes. 2017; 15 (1): 1–7.
15. Mungovan SF, Singh P, Gass GC, Smart NA, Hirschhorn AD. Effect of physical activity in the first five days after cardiac surgery. J Rehabil Med. 2017; 49 (1): 71–7.
16. Hedbäck B, Perk J, Hörnblad M, Ohlsson U. Cardiac rehabilitation after coronary artery bypass surgery: 10-year results on mortality, morbidity and readmissions to hospital. J Cardiovasc Risk. 2001; 8 (3): 153–8.
17. Griffo R, Ambrosetti M, Tramarin R, Fattirolli F, Temporelli PL, Vestri AR, et al. Effective secondary prevention through cardiac rehabilitation after coronary revascularization and predictors of poor adherence to lifestyle modification and medication. Results of the ICAROS Survey. Int J Cardiol. 2013; 167 (4): 1390–5.
18. Brocks Y, Zittermann A, Grisse D, Schmid-Ott G, Stock-Gießendanner S, Schulz U, et al. Adherence of heart transplant recipients to prescribed medication and recommended lifestyle habits: a single-center experience. Prog Transplant. 2017; 27 (2): 160–6.
19. Laustsen S, Hjortdal VE, Petersen AK. Predictors for not completing exercise-based rehabilitation following cardiac surgery. Scand Cardiovasc J. 2013; 47 (6): 344–51.
20. Rehabilitation AA of C& P. Guidelines for pulmonary rehabilitation programs. Human Kinetics; 2020.
21. Kenney WL, Wilmore JH, Costill DL. Physiology of sport and exercise. Human kinetics; 2021.
22. Rane A, Jain R, Bherde V, Nair P, Das P. CHAPTER EIGHTEEN A Virtual Book based on Human Anatomy. In: Applications of Machine intelligence in Engineering: Proceedings of 2nd Global Conference on Artificial Intelligence and Applications (GCAIA, 2021), September 8-10, 2021, Jaipur, India. CRC Press; 2022.
23. Ansari MA. The Human Anatomy of Heart: A Review literature. 2021.
24. Sievers H-H, Hemmer W, Beyersdorf F, Moritz A, Moosdorf R, Lichtenberg A, et al. The everyday used nomenclature of the aortic root components: the tower of Babel? Eur J cardio-thoracic Surg. 2012; 41 (3): 478–82.

25. Thorax, Heart. (2021) https://www.ncbi.nlm.nih.gov/books/NBK545203/ StatPearls Publ. 2022.
26. Parsa CJ, Shaw LK, Rankin JS, Daneshmand MA, Gaca JG, Milano CA, et al. Twenty-five-year outcomes after multiple internal thoracic artery bypass. J Thorac Cardiovasc Surg. 2013; 145 (4): 970–5.
27. Puskas JD, Yanagawa B, Taggart DP. Advancing the state of the art in surgical coronary revascularization. Ann Thorac Surg. 2016; 101 (2): 419–21.
28. Human-heart-anatomy-vector-diagram (2020) https://www.shutterstock.com/image-vector/ StatPearls Publ. 2022.
29. Lim SS, Gaziano TA, Gakidou E, Reddy KS, Farzadfar F, Lozano R, et al. Prevention of cardiovascular disease in high-risk individuals in low-income and middle-income countries: health effects and costs. Lancet. 2007; 370 (9604): 2054–62.
30. Mendis S, Puska P, Norrving B, Organization WH. Global atlas on cardiovascular disease prevention and control. World Health Organization; 2011.
31. English KL, Paddon-Jones D. Protecting muscle mass and function in older adults during bed rest. Curr Opin Clin Nutr Metab Care. 2010; 13 (1): 34.
32. Cameron S, Ball I, Cepinskas G, Choong K, Doherty TJ, Ellis CG, et al. Early mobilization in the critical care unit: A review of adult and pediatric literature. J Crit Care. 2015; 30 (4): 664–72.
33. Vasan RS, Sullivan LM, Wilson PWF, Sempos CT, Sundström J, Kannel WB, et al. Relative importance of borderline and elevated levels of coronary heart disease risk factors. Ann Intern Med. 2005; 142 (6): 393–402.
34. Yusuf S, Hawken S, Ôunpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004; 364 (9438): 937–52.
35. Lloyd-Jones DM, Hong Y, Labarthe D, Mozaffarian D, Appel LJ, Van Horn L, et al. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. Circulation. 2010; 121 (4): 586–613.
36. Greenland P, Alpert JS, Beller GA, Benjamin EJ, Budoff MJ, Fayad ZA, et al. 2010 ACCF/AHA guideline for assessment of cardiovascular risk in asymptomatic adults: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines developed in collaboration with the American Socie. J Am Coll Cardiol. 2010; 56 (25): e50–103.

37. Fox CS, Pencina MJ, Wilson PWF, Paynter NP, Vasan RS, D'Agostino Sr RB. Lifetime risk of cardiovascular disease among individuals with and without diabetes stratified by obesity status in the Framingham heart study. Diabetes Care. 2008; 31 (8): 1582–4.
38. Goff Jr DC, Lloyd-Jones DM, Bennett G, Coady S, D'agostino RB, Gibbons R, et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation. 2014; 129 (25_suppl_2): S49–73.
39. Savji N, Rockman CB, Skolnick AH, Guo Y, Adelman MA, Riles T, et al. Association between advanced age and vascular disease in different arterial territories: a population database of over 3.6 million subjects. J Am Coll Cardiol. 2013; 61 (16): 1736–43.
40. Bowry ADK, Lewey J, Dugani SB, Choudhry NK. The burden of cardiovascular disease in low-and middle-income countries: epidemiology and management. Can J Cardiol. 2015; 31 (9): 1151–9.
41. Gupta M, Singh N, Verma S. South Asians and cardiovascular risk: what clinicians should know. Circulation. 2006; 113 (25): e924–9.
42. Blalock A, Taussig HB. The surgical treatment of malformations of the heart: in which there is pulmonary stenosis or pulmonary atresia. J Am Med Assoc. 1945; 128 (3): 189–202.
43. Dunbar SB, Khavjou OA, Bakas T, Hunt G, Kirch RA, Leib AR, et al. Projected costs of informal caregiving for cardiovascular disease: 2015 to 2035: a policy statement from the American Heart Association. Circulation. 2018; 137 (19): e558–77.
44. Benjak T, Mihel S, Rodin U, Štefancic V, Trajanoski A. Morbidity and causes of death in the elderly population. Croat Heal Stat Yearb. 2018; 337–50.
45. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1• 9 million participants. lancet Glob Heal. 2018; 6 (10): e1077–86.
46. Wallis M, McLean B. Patients' perceptions of pain management after cardiac surgery in an Australian critical care unit. Hear Lung. 2004; 33 (1): 33–41.
47. Kervan Ü. Distribution and service quality of the cardiovascular surgery clinics in Turkey. Turkish J Thorac Cardiovasc Surg. 2011; 19 (4).
48. Masuda M, Okumura M, Doki Y, Endo S, Hirata Y, Kobayashi J, et al. Thoracic and cardiovascular surgery in Japan during 2014. Gen Thorac Cardiovasc Surg. 2016; 64 (11): 665–97.
49. Schocken DD, Benjamin EJ, Fonarow GC, Krumholz HM, Levy D, Mensah GA, et al. Prevention of heart failure: a scientific statement from the American Heart Association

Councils on epidemiology and prevention, clinical cardiology, cardiovascular nursing, and high blood pressure research; Quality of Care and Outcomes Research Interdisc. Circulation. 2008; 117 (19): 2544–65.

50. Libby P, Ridker PM, Hansson GK. Progress and challenges in translating the biology of atherosclerosis. Nature. 2011; 473 (7347): 317–25.

51. Davies MJ, Woolf N, Rowles PM, Pepper J. Morphology of the endothelium over atherosclerotic plaques in human coronary arteries. Heart. 1988; 60 (6): 459–64.

52. Sata M, Saiura A, Kunisato A, Tojo A, Okada S, Tokuhisa T, et al. Hematopoietic stem cells differentiate into vascular cells that participate in the pathogenesis of atherosclerosis. Nat Med. 2002; 8 (4): 403–9.

53. Stary HC, Chandler AB, Dinsmore RE, Fuster V, Glagov S, Insull Jr W, et al. A definition of advanced types of atherosclerotic lesions and a histological classification of atherosclerosis: a report from the Committee on Vascular Lesions of the Council on Arteriosclerosis, American Heart Association. Circulation. 1995; 92 (5): 1355–74.

54. Thaulow E, Erikssen J, Sandvik L, Erikssen G, Jorgensen L, Colin PF. Initial clinical presentation of cardiac disease in asymptomatic men with silent myocardial ischemia and angiographically documented coronary artery disease (the Oslo Ischemia Study). Am J Cardiol. 1993; 72 (9): 629–33.

55. Yew KS, Cheng E. Acute stroke diagnosis. Am Fam Physician. 2009; 80 (1): 33.

56. Kreatsoulas C, Shannon HS, Giacomini M, Velianou JL, Anand SS. Reconstructing angina: cardiac symptoms are the same in women and men. JAMA Intern Med. 2013; 173 (9): 829–33.

57. Swap CJ, Nagurney JT. Value and limitations of chest pain history in the evaluation of patients with suspected acute coronary syndromes. Jama. 2005; 294 (20): 2623–9.

58. Harris C, Croce B, Cao C. Thoracic aortic aneurysm. Ann Cardiothorac Surg. 2016; 5 (4): 407.

59. Aggarwal S, Qamar A, Sharma V, Sharma A. Abdominal aortic aneurysm: A comprehensive review. Exp Clin Cardiol. 2011; 16 (1): 11.

60. Walker HK. The origins of the history and physical examination. Clin Methods Hist Phys Lab Exam 3rd Ed. 1990;

61. Kavousi M, Leening MJG, Nanchen D, Greenland P, Graham IM, Steyerberg EW, et al. Comparison of application of the ACC/AHA guidelines, Adult Treatment Panel III guidelines, and European Society of Cardiology guidelines for cardiovascular disease prevention in a European cohort. Jama. 2014; 311 (14): 1416–23.

62. Lai KSP, Herrmann N, Saleem M, Lanctôt KL. Cognitive outcomes following transcatheter aortic valve implantation: a systematic review. Cardiovasc Psychiatry Neurol. 2015; 2015.

63. Matheus GB, Dragosavac D, Trevisan P, Costa CE da, Lopes MM, Ribeiro GC de A. Treinamento muscular melhora o volume corrente e a capacidade vital no pós-operatório de revascularização do miocárdio. Brazilian J Cardiovasc Surg. 2012; 27: 362–9.

64. Fonseca L, Vieira FN, Azzolin KDO. Fatores associados ao tempo de ventilação mecânica no pós-operatório de cirurgia cardíaca. Rev gaúcha Enferm. 2014; 35: 67–72.

65. Atwell DM, Welsby I, White WD, King SA, Mythen MG. Postoperative complications following cardiac surgery with cardiopulmonary bypass. In Critical Care. Springer;1997; p.1–52.

66. Carrazedo MA, Accetta GG, Pinto RASR, Costa FAA da. Avaliação cognitiva em pacientes submetidos à revascularização cirúrgica cardíaca. Rev bras cardiol(Impr). 2014; 254–9.

67. Pereira EEB, Souza ABF de, Carneiro SR, Sarges E do SNF. Funcionalidade global de idosos hospitalizados. Rev Bras Geriatr e Gerontol. 2014; 17: 165–76.

68. Alejandro Aris MD. Francisco Romero, the first heart surgeon. Ann Thorac Surg. 1997; 64 (3): 870–1.

69. Braile DM, Godoy MF de. History of heart surgery in the world. 1996. Rev Bras Cir Cardiovasc. 2012; 27 (1): 125–36.

70. Soares G, Ferreira D, Gonçalves M, Alves T, David F, Henriques K, et al. Prevalence of major postoperative complications in cardiac surgery. Int J Cardiovasc Sci. 2011;24(3): 139–46.

71. Kristjansdottir A, Ragnarsdóttir M, Hannesson P, Beck HJ, Torfason B. Respiratory movements are altered three months and one year following cardiac surgery. Scand Cardiovasc J. 2004; 38 (2): 98–103.

72. Apostolakis EE, Koletsis EN, Baikoussis NG, Siminelakis SN, Papadopoulos GS. Strategies to prevent intraoperative lung injury during cardiopulmonary bypass. J Cardiothorac Surg. 2010; 5 (1): 1–9.

73. Westerdahl E, Urell C, Jonsson M, Bryngelsson L, Hedenström H, Emtner M. Deep breathing exercises performed 2 months following cardiac surgery: a randomized controlled trial. J Cardiopulm Rehabil Prev. 2014; 34 (1): 34–42.

74. Lindsay GM, Smith LN, Hanlon P, Wheatley DJ. Coronary artery disease patients' perception of their health and expectations of benefit following coronary artery bypass grafting. J Adv Nurs. 2000; 32 (6): 1412–21.
75. Beck CS. The development of a new blood supply to the heart by operation. Ann Surg. 1935; 102 (5): 801.
76. Nguyen TC, George I. Beyond the hammer: the future of cardiothoracic surgery. J Thorac Cardiovasc Surg. 2015; 149 (3): 675–7.
77. https://divinehearthospital.com/services/cardiovascular-surgery/.
78. Maganti K, Rigolin VH, Sarano ME, Bonow RO. Valvular heart disease: diagnosis and management. In: Mayo Clinic Proceedings. Elsevier; 2010. p. 483–500.
79. O'Gara PT, Grayburn PA, Badhwar V, Afonso LC, Carroll JD, Elmariah S, et al. 2017 ACC expert consensus decision pathway on the management of mitral regurgitation: a report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways. J Am Coll Cardiol. 2017; 70 (19): 2421–49.
80. Mohammadi S, Kalavrouziotis D, Dagenais F, Voisine P, Charbonneau E. Completeness of revascularization and survival among octogenarians with triple-vessel disease. Ann Thorac Surg. 2012; 93 (5): 1432–7.
81. Li B, Mao B, Feng Y, Liu J, Zhao Z, Duan M, et al. The hemodynamic mechanism of FFR-guided coronary artery bypass grafting. Front Physiol. 2021; 12: 503687.
82. Alexander JH, Smith PK. Coronary-artery bypass grafting. N Engl J Med. 2016; 374 (20): 1954–64.
83. Head SJ, Milojevic M, Taggart DP, Puskas JD. Current practice of state-of-the-art surgical coronary revascularization. Circulation. 2017;136(14):1331–45.
84. Bachar BJ, Manna B. Coronary artery bypass graft. 2018;
85. Stout KK, Otto CM. Indications for aortic valve replacement in aortic stenosis. J Intensive Care Med. 2007; 22 (1): 14–25.
86. Bonow RO, Carabello BA, Chatterjee K, de Leon AC, Faxon DP, Freed MD, et al. ACC/AHA 2006 practice guidelines for the management of patients with valvular heart disease: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing committee to revise the 19. J Am Coll Cardiol. 2006; 48 (3): 598–675.
87.Ventricular Septal Defect (2019) https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC8155405/ StatPearls Publ. 2020.

88. Wang T, Chen L, Yang T, Huang P, Wang L, Zhao L, et al. Congenital heart disease and risk of cardiovascular disease: a meta-analysis of cohort studies. J Am Heart Assoc. 2019; 8 (10): e012030.
89. Cordeiro ALL, Amorim NM, Andrade PH, Esquivel MS, Guimarães AR, de Melo TA, et al. Physiological Changes from Walking and Time of Stay after Heart Surgery. Int J Cardiovasc Sci. 2015; 28 (5): 480–6.
90. Maitra S, Baidya DK, Bhattacharjee S, Som A. Gabapentina e pregabalina no período perioperatório em cirurgia cardíaca: uma revisão sistemática e metanálise. Rev Bras Anestesiol. 2017; 67: 294–304.
91. Milot J, Perron J, Lacasse Y, Létourneau L, Cartier PC, Maltais F. Incidence and predictors of ARDS after cardiac surgery. Chest. 2001; 119 (3): 884–8.
92. Salazar JD, Wityk RJ, Grega MA, Borowicz LM, Doty JR, Petrofski JA, et al. Stroke after cardiac surgery: short-and long-term outcomes. Ann Thorac Surg. 2001; 72 (4): 1195–201.
93. McKhann GM, Grega MA, Borowicz Jr LM, Baumgartner WA, Selnes OA. Stroke and encephalopathy after cardiac surgery: an update. Stroke. 2006; 37 (2): 562–71.
94. Yusuf E, Chan M, Renz N, Trampuz A. Current perspectives on diagnosis and management of sternal wound infections. Infect Drug Resist. 2018; 11: 961.
95. Laflamme M, DeMey N, Bouchard D, Carrier M, Demers P, Pellerin M, et al. Management of early postoperative coronary artery bypass graft failure. Interact Cardiovasc Thorac Surg. 2012; 14 (4): 452–6.
96. Redfors B, Généreux P, Witzenbichler B, McAndrew T, Diamond J, Huang X, et al. Percutaneous coronary intervention of saphenous vein graft. Circ Cardiovasc Interv. 2017; 10 (5): e004953.
97. Howitt SH, Herring M, Malagon I, McCollum CN, Grant SW. Incidence and outcomes of sepsis after cardiac surgery as defined by the Sepsis-3 guidelines. Br J Anaesth. 2018; 120 (3): 509–16.
98. Paternoster G, Guarracino F. Sepsis after cardiac surgery: from pathophysiology to management. J Cardiothorac Vasc Anesth. 2016; 30 (3): 773–80.
99. McIsaac DI, McDonald B, Wong CA, van Walraven C. Long-term survival and resource use in critically ill cardiac surgery patients: a population-based study. Can J Anesth Can d'anesthésie. 2018; 65 (9): 985–95.
100. Lee JJ, Park NH, Lee KS, Chee HK, Sim SB, Kim MJ, et al. Projections of demand for cardiovascular surgery and supply of surgeons. Korean J Thorac Cardiovasc Surg. 2016; 49 (Suppl 1): S37.

101. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public Health Rep. 1985; 100 (2): 126.
102. Pack QR, Goel K, Lahr BD, Greason KL, Squires RW, Lopez-Jimenez F, et al. Participation in cardiac rehabilitation and survival after coronary artery bypass graft surgery: a community-based study. Circulation. 2013; 128 (6): 590–7.
103. Saffari NHN, Nasiri E, Mousavinasab SN, Ghafari R, Soleimani A, Esmaeili R. Frequency rate of atelectasis in patients following coronary artery bypass graft and its associated factors at Mazandaran Heart Center in 2013-2014. Glob J Health Sci. 2015; 7 (7): 97.
104. Weissman C. Pulmonary complications after cardiac surgery. In: Seminars in cardiothoracic and vascular anesthesia. Westminster Publications, Inc. 708 Glen Cove Avenue, Glen Head, NY 11545, USA; 2004. p. 185–211.
105. Herlitz J, Brandrup-Wognsen G, Evander MH, Caidahl K, Hartford M, Karlson BW, et al. Symptoms of chest pain and dyspnoea during a period of 15 years after coronary artery bypass grafting. Eur J cardio-thoracic Surg. 2010; 37 (1): 112–8.
106. Abbott AA, Barnason S, Zimmerman L. Symptom burden clusters and their impact on psychosocial functioning following coronary artery bypass surgery. J Cardiovasc Nurs. 2010; 25 (4): 301.
107. Hunt JO, Hendrata M V, Myles PS. Quality of life 12 months after coronary artery bypass graft surgery. Hear Lung. 2000; 29 (6): 401–11.
108. Doering L V, McGuire AW, Rourke D. Recovering from cardiac surgery: what patients want you to know. Am J Crit Care. 2002; 11 (4): 333–43.
109. Gallagher R, McKinley S, Dracup K. Post discharge problems in women recovering from coronary artery bypass graft surgery. Aust Crit Care. 2004; 17 (4): 160–5.
110. Edéll-Gustafsson UM, Hetta JE, Arén CB. Sleep and quality of life assessment in patients undergoing coronary artery bypass grafting. J Adv Nurs. 1999; 29 (5): 1213–20.
111. Lukkarinen H, Hentinen M. Assessment of quality of life with the Nottingham Health Profile among women with coronary artery disease. Hear lung. 1998; 27 (3): 189–99.
112. Redeker NS, Mason DJ, Wykpisz E, Glica B. Sleep patterns in women after coronary artery bypass surgery. Appl Nurs Res. 1996; 9 (3): 115–22.
113. Redeker, N. S. & H. Sleep during hospitalization and recovery after cardiac surgery. J Cardiovasc Nurs. 2002; 17 (1): 56–68.

114. Hetal M Mistry GSJ. Correlation between Sleep Quality & Functional Capacity in Hospitalized Coronary Artery Bypass Grafting Patients. Int J Physiother Res. 2021; 2321–8975.
115. Chung JWY, Lui JCZ. Postoperative pain management: study of patients' level of pain and satisfaction with health care providers' responsiveness to their reports of pain. Nurs Health Sci. 2003; 5 (1): 13–21.
116. Sinatra R. Causes and consequences of inadequate management of acute pain. Pain Med. 2010; 11 (12): 1859–71.
117. Bjørnnes AK, Rustøen T, Lie I, Watt-Watson J, Leegaard M. Pain characteristics and analgesic intake before and following cardiac surgery. Eur J Cardiovasc Nurs. 2016; 15 (1): 47–54.
118. Bucerius J, Metz S, Walther T, Doll N, Falk V, Diegeler A, et al. Pain is significantly reduced by cryoablation therapy in patients with lateral minithoracotomy. Ann Thorac Surg. 2000; 70 (3): 1100–4.
119. Kehlet H, Jensen TS, Woolf CJ. Persistent postsurgical pain: risk factors and prevention. Lancet. 2006; 367 (9522): 1618–25.
120. Taillefer M-C, Carrier M, Bélisle S, Levesque S, Lanctôt H, Boisvert A-M, et al. Prevalence, characteristics, and predictors of chronic nonanginal postoperative pain after a cardiac operation: a cross-sectional study. J Thorac Cardiovasc Surg. 2006; 131 (6): 1274–80.
121. Lahtinen P, Kokki H, Hynynen M. Pain after cardiac surgery: a prospective cohort study of 1-year incidence and intensity. J Am Soc Anesthesiol. 2006; 105 (4): 794–800.
122. Bäck M, Cider Å, Herlitz J, Lundberg M, Jansson B. The impact on kinesiophobia (fear of movement) by clinical variables for patients with coronary artery disease. Int J Cardiol. 2013; 167 (2): 391–7.
123. Singh M, Alexander K, Roger VL, Rihal CS, Whitson HE, Lerman A, et al. Frailty and its potential relevance to cardiovascular care. In: Mayo Clinic Proceedings. Elsevier; 2008. p. 1146–53.
124. Gobbens RJJ, van Assen MALM, Luijkx KG, Wijnen-Sponselee MT, Schols JMGA. The Tilburg frailty indicator: psychometric properties. J Am Med Dir Assoc. 2010; 11 (5): 344–55.
125. Knapik A, Saulicz E, Gnat R. Kinesiophobia–introducing a new diagnostic tool. J Hum Kinet. 2011; 28: 25.
126. Knapik A, Saulicz E, Kuszewski M, Myśliwiec A, Rottermund J, Plinta R. Gender and level of kinesiophobia in adult population of southern Poland. Med J Rzesz Univ Natl Med Inst. 2012; 10 (3): 277–87.

127. Perrotti A, Ecarnot F, Monaco F, Dorigo E, Monteleone P, Besch G, et al. Quality of life 10 years after cardiac surgery in adults: a long-term follow-up study. Health Qual Life Outcomes. 2019; 17 (1): 1–9.
128. Neumann F-J, Sousa-Uva M, Ahlsson A, Alfonso F, Banning AP, Benedetto U, et al. 2018 ESC/EACTS Guidelines on myocardial revascularization. Eur Heart J. 2019; 40 (2): 87–165.
129. Ferraz MB. Tradução para o português e validação do questionário para avaliar a capacidade funcional" Stanford Health Assessment Questionaire". 1990;
130. Nielsen D, Sellgren J, Ricksten S-E. Quality of life after cardiac surgery complicated by multiple organ failure. Crit Care Med. 1997; 25 (1): 52–7.
131. Colak Z, Segotic I, Uzun S, Mazar M, Ivancan V, Majeric-Kogler V. Health related quality of life following cardiac surgery—correlation with EuroSCORE. Eur J cardio-thoracic Surg. 2008; 33 (1): 72–6.
132. Pačarić S, Turk T, Erić I, Orkić Ž, Petek Erić A, Milostić-Srb A, et al. Assessment of the quality of life in patients before and after coronary artery bypass grafting (CABG): a prospective study. Int J Environ Res Public Health. 2020; 17(4): 1417.
133. Mallik S, Krumholz HM, Lin ZQ, Kasl S V, Mattera JA, Roumains SA, et al. Patients with depressive symptoms have lower health status benefits after coronary artery bypass surgery. Circulation. 2005; 111 (3): 271–7.
134. Ho PM, Masoudi FA, Spertus JA, Peterson PN, Shroyer AL, McCarthy Jr M, et al. Depression predicts mortality following cardiac valve surgery. Ann Thorac Surg. 2005; 79 (4): 1255–9.
135. Connerney I, Sloan RP, Shapiro PA, Bagiella E, Seckman C. Depression is associated with increased mortality 10 years after coronary artery bypass surgery. Psychosom Med. 2010; 72 (9): 874–81.
136. Botzet K, Dalyanoglu H, Schäfer R, Lichtenberg A, Schipke JD, Korbmacher B. Anxiety and depression in patients undergoing mitral valve surgery: A prospective clinical study. Thorac Cardiovasc Surg. 2018; 66 (07): 530–6.
137. Boyer BA, Matour SJ, Crittenden KB, Larson KA, Cox JM, Link DD. Appraisals of fear, helplessness, and perceived life-threat during emergent cardiac surgery: Relationship to pre-surgical depression, trauma history, and posttraumatic stress. J Clin Psychol Med Settings. 2013; 20 (2): 173–85.
138. Rubin GJ, Hardy R, Hotopf M. A systematic review and meta-analysis of the incidence and severity of postoperative fatigue. J Psychosom Res. 2004; 57 (3): 317–26.

139. Rubin GJ, Hotopf M, Papadopoulos A, Cleare A. Salivary cortisol as a predictor of postoperative fatigue. Psychosom Med. 2005; 67 (3): 441–7.
140. Hall GM, Salmon P. Physiological and psychological influences on postoperative fatigue. Anesth Analg. 2002; 95 (5): 1446–50.
141. Bennett JA, Stewart AL, Kayser-Jones J, Glaser D. The mediating effect of pain and fatigue on level of functioning in older adults. Nurs Res. 2002; 51 (4): 254–65.
142. Zimmerman L, Barnason S, Schulz P, Nieveen J, Miller C, Hertzog M, et al. The effects of a symptom management intervention on symptom evaluation, physical functioning, and physical activity for women after coronary artery bypass surgery. J Cardiovasc Nurs. 2007; 22 (6): 493–500.
143. Zimmerman L, Barnason S, Brey BA, Catlin SS, Nieveen J. Comparison of recovery patterns for patients undergoing coronary artery bypass grafting and minimally invasive direct coronary artery bypass in the early discharge period. Prog Cardiovasc Nurs. 2002; 17 (3): 132–41.
144. Zimmerman L, Barnason S, Nieveen J, Schmaderer M. Symptom management intervention in elderly coronary artery bypass graft patients. Outcomes Manag. 2004; 8 (1): 5–12.
145. Khoudri I, Belayachi J, Dendane T, Abidi K, Madani N, Zekraoui A, et al. Measuring quality of life after intensive care using the Arabic version for Morocco of the EuroQol 5 Dimensions. BMC Res Notes. 2012; 5 (1): 1–8.
146. Ware Jr JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Med Care. 1992; 473–83.
147. Brazier JE, Harper R, Jones NM, O'cathain A, Thomas KJ, Usherwood T, et al. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. Br Med J. 1992; 305 (6846): 160–4.
148. Woo MA, Moser DK, Stevenson LW, Stevenson WG. Six-minute walk test and heart rate variability: lack of association in advanced stages of heart failure. Am J Crit Care. 1997; 6 (5): 348–54.
149. Fan M, Lyu J, He P. Chinese guidelines for data processing and analysis concerning the International Physical Activity Questionnaire. Zhonghua liu xing bing xue za zhi= Zhonghua liuxingbingxue zazhi. 2014; 35 (8): 961–4.
150. Brugnara L, Murillo S, Novials A, Rojo-Martínez G, Soriguer F, Goday A, et al. Low physical activity and its association with diabetes and other cardiovascular risk factors: a nationwide, population-based study. PLoS One. 2016; 11 (8): e0160959.

151. Sjöström M, Oja P, Hagströmer M, Smith BJ, Bauman A. Health-enhancing physical activity across European Union countries: the Eurobarometer study. J Public Health (Bangkok). 2006; 14 (5): 291–300.
152. Suleiman KH, Yates BC, Berger AM, Pozehl B, Meza J. Translating the Pittsburgh sleep quality index into Arabic. West J Nurs Res. 2010; 32 (2): 250–68.
153. Buysse DJ, Reynolds III CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989; 28 (2): 193–213.
154. Alyami MM, Jenkins SC, Lababidi H, Hill K. Reliability and validity of an Arabic version of the dyspnea-12 questionnaire for Saudi nationals with chronic obstructive pulmonary disease. Ann Thorac Med. 2015; 10 (2): 112.
155. Yorke J, Moosavi SH, Shuldham C, Jones PW. Quantification of dyspnoea using descriptors: development and initial testing of the Dyspnoea-12. Thorax. 2010; 65 (1): 21–6.
156. Yorke J, Russell A-M, Swigris J, Shuldham C, Haigh C, Rochnia N, et al. Assessment of dyspnea in asthma: validation of The Dyspnea-12. J Asthma. 2011; 48 (6): 602–8.
157. Hare DL, Davis CR. Cardiac Depression Scale: validation of a new depression scale for cardiac patients. J Psychosom Res. 1996; 40 (4): 379–86.
158. Gholizadeh L, Salamonson Y, Davidson PM, Parvan K, Frost SA, Chang S, et al. Cross-cultural validation of the Cardiac Depression Scale in Iran. Br J Clin Psychol. 2010; 49 (4): 517–28.
159. Vlaeyen JWS, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. Pain. 2000; 85 (3): 317–32.
160. Woby SR, Roach NK, Urmston M, Watson PJ. Psychometric properties of the TSK-11: a shortened version of the Tampa Scale for Kinesiophobia. Pain. 2005; 117 (1–2): 137–44.
161. Sullivan MJL, Bishop SR, Pivik J. The pain catastrophizing scale: development and validation. Psychol Assess. 1995; 7(4): 524.
162. Sehn F, Chachamovich E, Vidor LP, Dall-Agnol L, Custodio de Souza IC, Torres ILS, et al. Cross-cultural adaptation and validation of the Brazilian Portuguese version of the pain catastrophizing scale. Pain Med. 2012; 13 (11): 1425–35.
163. Krupp LB, LaRocca NG, Muir-Nash J, Steinberg AD. The fatigue severity scale: application to patients with multiple sclerosis and systemic lupus erythematosus. Arch Neurol. 1989; 46 (10): 1121–3.
164. Laboratories ATSC on PS for CPF. ATS statement: guidelines for the six-minute walk test. Am J Respir Crit Care Med. 2002; 166: 111–7.

165. Holland AE, Spruit MA, Troosters T, Puhan MA, Pepin V, Saey D, et al. An official European Respiratory Society/American Thoracic Society technical standard: field walking tests in chronic respiratory disease. Eur Respir J. 2014; 44 (6): 1428–46.
166. Johnson EW. Visual analog scale (VAS). Vol. 80, American journal of physical medicine & rehabilitation. LWW; 2001. p. 717.
167. Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. Pain. 1986; 27 (1): 117–26.
168. Micah S, Barolia R, Parpio Y, Kumar S, Sharif H. Factors associated with postoperative pain among patients after cardiac surgery in the tertiary care teaching hospital of Karachi, Pakistan. Pain Res Treat. 2019; 2019.
169. Öğüt S, Dağ GS. Pain characteristics and pain interference among patients undergoing open cardiac surgery. J PeriAnesthesia Nurs. 2019; 34(4): 757–66.
170. Tüfekçi H, Akansel N, Sivrikaya SK. Pain interference with daily living activities and dependency level of patients undergoing CABG surgery. Pain Manag Nurs. 2022; 23 (2): 180–7.
171. Kara KA, Caner T. Comparison of pain in the early post-operative period using VAS score in patients after cardiac surgery who had minimally invasive incisions vs. full median sternotomy. Ann Ital Chir. 2019; 90: 3–9.
172. Barnason S, Zimmerman L, Nieveen J, Schulz P, Miller C, Hertzog M, et al. Relationships between fatigue and early postoperative recovery outcomes over time in elderly patients undergoing coronary artery bypass graft surgery. Hear Lung. 2008; 37(4): 245–56.
173. Nair SP, SSG FI. Impact of kinesiophobia on physical activity in patients with arterial hypertension. J Heal Sci Res. 2017; 7(5): 170–5.
174. Nair SP, Harania R, Rajguru V. Evaluation of Fear Avoidance Belief and Kinesiophobia in Patients after Undergoing In-Patient Cardiac Rehabilitation Post Cardiac Surgery. Int J Heal Sci. 2018; 6 (6).
175. Şahin HB, Kalaycıoğlu E, Şahin M. The effect of cardiac rehabilitation on kinesiophobia in patients with coronary artery disease. Turkish J Phys Med Rehabil. 2021; 67(2): 203.
176. Knapik A, Dąbek J, Brzęk A. Kinesiophobia as a problem in adherence to physical activity recommendations in elderly polish patients with coronary artery disease. Patient Prefer Adherence. 2019; 13: 2129.
177. Knapik A, Dąbek J, Gallert-Kopyto W, Plinta R, Brzęk A. Psychometric features of the Polish version of TSK heart in elderly patients with coronary artery disease. Medicina (B Aires). 2020; 56(9): 467.

178. Dabek J, Knapik A, Gallert-Kopyto W, Brzek AM, Piotrkowicz J, Gasior Z. Fear of movement (kinesiophobia)–an underestimated problem in Polish patients at various stages of coronary artery disease. Ann Agric Environ Med. 2020; 27 (1).
179. Wierenga KL, Moore SM, Liu J, Sattar A. Factors influencing the impact of depressive symptoms on physical functional capacity after cardiac rehabilitation. Rehabil Nurs Off J Assoc Rehabil Nurses. 2020; 45(6): 348.
180. Horne D, Kehler DS, Kaoukis G, Hiebert B, Garcia E, Chapman S, et al. Impact of physical activity on depression after cardiac surgery. Can J Cardiol. 2013; 29(12): 1649–56.
181. Kendel F, Gelbrich G, Wirtz M, Lehmkuhl E, Knoll N, Hetzer R, et al. Predictive relationship between depression and physical functioning after coronary surgery. Arch Intern Med. 2010; 170(19): 1717–21.
182. Gostoli S, Roncuzzi R, Urbinati S, Morisky DE, Rafanelli C. Unhealthy behaviour modification, psychological distress, and 1-year survival in cardiac rehabilitation. Br J Health Psychol. 2016; 21(4): 894–916.
183. Arena R, Myers J, Williams MA, Gulati M, Kligfield P, Balady GJ, et al. Assessment of functional capacity in clinical and research settings: a scientific statement from the American Heart Association Committee on Exercise, Rehabilitation, and Prevention of the Council on Clinical Cardiology and the Council on Cardiovascular N. Circulation. 2007; 116(3): 329–43.
184. Redeker NS, Ruggiero JS, Hedges C. Sleep is related to physical function and emotional well-being after cardiac surgery. Nurs Res. 2004; 53 (3): 154–62.
185. Esnaasharieh F, Dehghan M, Mangolian Shahrbabaki P. The relationship between sleep quality and physical activity among patients with heart failure: a cross-sectional study. BMC Sports Sci Med Rehabil. 2022; 14 (1): 1–8.
186. Bond MMK, Oliveira JLR de, Souza LCB de, Farsky PS, Amato VL, Togna DJ Della, et al. Quality of life in cardiovascular surgery: elaboration and initial internal validation of a quality of life questionnaire. Brazilian J Cardiovasc Surg. 2018; 33: 476–82.
187. Markou ALP, van der Windt A, van Swieten HA, Noyez L. Changes in quality of life, physical activity, and symptomatic status one year after myocardial revascularization for stable angina. Eur J cardio-thoracic Surg. 2008; 34 (5): 1009–15.
188. Giacchi M, Nguyen M-T, Gaudin J, Bergin M, Collicoat O, Armstrong B, et al. The relationship between cardiorespiratory parameters, mobilisation and physical function following cardiac surgery. Eur J Physiother. 2021; 1–5.

189. Sjöland H, Caidahl K, Karlson BW, Karlsson T, Herlitz J. Limitation of physical activity, dyspnea and chest pain before and two years after coronary artery bypass grafting in relation to sex. Int J Cardiol. 1997; 61(2): 123–33.
190. Fiorina C, Vizzardi E, Lorusso R, Maggio M, De Cicco G, Nodari S, et al. The 6-min walking test early after cardiac surgery. Reference values and the effects of rehabilitation programme. Eur J Cardio-thoracic Surg. 2007; 32 (5): 724–9.
191. Pei J, Chen H, Ma T, Zhang Y, Wang X, Li C, et al. Pain catastrophizing and associated factors in preoperative total knee arthroplasty in Lanzhou, China: a cross-sectional study. BMC Musculoskelet Disord. 2022; 23(1):1–8.

Appendixes: Appendix 1. Ethics committee Approval

SAGLIK BAKANLIGI

BAGHDAD ALKARH SAĞLIK İDARESİ

İNSAN VE EĞİTİM GELİŞİM DAİRESİ MERKEZİ

ARAŞTIRMA KURUL

DOSYA NO:03/2021

KARAR NO: 58

KARAR TARİHİ:31.01.2022

ARAŞTIRMA KURUL KARARI

BAGHDAD /ALKARH SAĞLIK İDARESİ DEPARTMANI ARAŞTIRMA KOMİTESİNCE ,ARAŞTIRMACI TARAFINDAN SUNULAN ARAŞTIRMA PROJESİ İNCELENDİ NUMARASI(2022042

Afecting factors on physical activity in patients after cardiac surgery

ARAŞTIRMACI TARAFINDAN SUNULAN (**RAED QADRI KHUDHAIR**)MERKEZ EĞİTİM VE İNSAN GELİŞİMİ DEPARTMANI,BİLGİ YÖNETİMİ VE ARAŞTIRMA DEPARTMANINA SUNULMUŞTUR.BAGHDAD ALKARH SAĞLIK İDARESİ TARİH:19.01.2022.

KURULUN KARARI:

BU ARAŞTIRMA TEZ PROJESİ KURULUMUZ TARAFINDAN KABUL GÖREREK SAĞLIK BAKANLIĞI TARAFINDAN ONAYLANDI. ÖZEL ÇEVRE TEZ UYGULAMA MERKEZİ BU KONUDA UYGULAMAYA ENGEL YOKTUR MERKEZİN ADI KALP CERRAHİ BRANŞ MERKEZİ.BU TEZİN ARAŞTIRMASINDA VE UYGULAMASINDA BİR ENGEL BULUNMAMAKTADIR.

ARAŞTIRMA KURUL MÜDÜRÜ

KURUL BAŞKANI

İMZA- 30.01.2022

DOKTOR KAŞESİ

DOKTOR ZAFER KAZIM AVED

FAKÜLTE BRANŞ DOKTORU

SUAD KAMİL RAHEEM

İMZA

İŞ BU FOTOKOPİ BELGE ARAPÇADAN TÜRKÇEYE TARAFIMDAN TERCÜME EDİLMİŞTİR.

وزارة الصحة / البينة
دائرة صحة بغداد الكرخ
مركز التدريب والتنمية البشرية
لجنة البحوث

دائرة صحة بغداد - الكرخ
Baghdad Al-Karkh Health Directorate

دائرة صحة بغداد الكرخ
مركز التدريب والتنمية البشرية
لجنة البحوث

استمارة رقم ٢٠٢١/٠٣

رقم القرار: ٥٨
تاريخ القرار: ٢٠٢٢/ ١/ ٢١

قرار لجنة البحوث

درست لجنة البحوث في دائرة صحة بغداد / الكرخ مشروع البحث ذي الرقم (٢٠٢٢٠٤٢ / بغداد - الكرخ) المعنون:

Affecting factors on physical activity in patients after cardiac surgery

والمقدم من قبل الباحث (رائد قدري خضير) إلى وحدة إدارة البحوث في مركز التدريب والتنمية البشرية في دائرة صحة بغداد / الكرخ بتاريخ ٢٠٢٢/١/١٩ وقررت اللجنة:

قبول مشروع البحث أعلاه كونه مستوفياً للمعايير المعتمدة في وزارة الصحة / البينة والخاصة بتنفيذ البحوث ولا مانع من تنفيذه في مركز ابن البيطار التخصصي لجراحة القلب.

الطبيب الاختصاص
سعد كامل رحيم
المدير العام/ وكالة
رئيس لجنة البحوث
٢٠٢٢/ ١ / ٢٠

الدكتور
ظافر كاظم عوض
معاون المدير العام للشؤون الادارية

Appendix 2. Demographic Information Questionnaire

أسم المريض: التاريخ: \ \ ٢٠٢٢

العمر: الطول: الوزن : مؤشر كتلة الجسم (BMI):

الجنس : □ ذكر □ أنثى

● هل المريض أجرى عمليات سابقة ؟

□ نعم □ لا

أخرى.....

● هل المريض لديه أمراض مزمنة؟

□ ارتفاع ضغط الدم □ داء السكري □ فشل القلب الاحتقاني

□ الفشل الكلوي □ قصور الغدة الدرقية □ أمراض المفاصل والفقرات

□ الربو والحساسية القصبية □ أمراض الكبد

أخرى.....

● هل المريض مدخن؟

□ نعم □ لا

● هل المريض يشرب الكحول؟

□ نعم □ لا

● هل المريض أجرى العملية القلبية من خلال شق عظم القص(فتح صدر) ؟

□ نعم □لا

● ماهو نوع العملية القلبية التي أجريت للمريض؟

□ زرع الشرايين التاجية □ تبديل أحدى الصمامات القلبية

أخرى.....

● كم يوما بقى المريض في العناية المركزة؟

□ يومان (48 ساعة) □ ثلاثة أيام أو أكثر

● في أي يوم تم إجراء الاختبارات وأخذ المعلومات من المريض بعد العملية؟

□ اليوم الثالث □ اليوم الرابع □ اليوم الخامس □ اليوم السادس □ اليوم السابع

أخرى.....

اوافق على المشاركة في الدراسة لما لها من أهمية في الحقل الطبي وتحسين الخدمة المقدمة المرضى. توقيع المشارك:

Appendix 3. Short Form-36 Health survey questionnaire (SF-36)

Please answer the 36 questions of the Health Survey completely, honestly, and without interruptions.

CIRCLE YOUR BEST ANSWER

1) GENERAL HEALTH: In general, would you say your health is:
Excellent Very Good Good Fair Poor

2) Compared to one year ago, how would you rate your health in general now?
Much better Somewhat better About the same Somewhat worse Much worse

Limitations of Activities: The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

3) Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.
Yes, Limited a lot Yes, Limited a Little No, Not Limited at all

4) Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

5) Lifting or carrying groceries
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

6) Climbing several flights of stairs
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

7) Climbing one flight of stairs
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

8) Bending, kneeling, or stooping
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

9) Walking more than a mile
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

10 Walking several blocks
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

11) Walking one block
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

12) Bathing or dressing yourself
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

Physical Health Problems: During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

13) Cut down the amount of time you spent on work or other activities
Yes No

14) Accomplished less than you would like
Yes No

15) Were limited in the kind of work or other activities
Yes No

16) Had difficulty performing the work or other activities (for example, it took extra effort)
Yes No

Emotional Health Problems:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

17) Cut down the amount of time you spent on work or other activities
Yes No

18) Accomplished less than you would like
Yes No

19) Didn't do work or other activities as carefully as usual
Yes No

20) SOCIAL ACTIVITIES: Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?
Not at all Slightly Moderately Severe Very Severe

21) PAIN: How much bodily pain have you had during the past 4 weeks?
None Very Mild Mild Moderate Severe Very Severe

22) During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?
Not at all A little bit Moderately Quite a bit Extremely

Energy and Emotions:

These questions are about how you feel and how things have been with you during the last 4 weeks. For each question, please give the answer that come closest to the way you have been feeling.

23) Did you feel full of pep?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

24) Have you been a very nervous person?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

25) Have you felt so down in the dumps that nothing could cheer you up?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

26) Have you felt calm and peaceful?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

27) Did you have a lot of energy?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

28) Have you felt downhearted and blue?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

29) Did you feel worn out?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

30) Have you been a happy person?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

31) Did you feel tired?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

Social Activities:

32) During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?
All of the time Most of the time A good Bit of the Time Some of the time A little bit of the time None of the Time

General Health: How true or false is each of the following statements for you?

33) I seem to get sick a little easier than other people
Definitely true Mostly true Don't know Mostly false Definitely false

34) I am as healthy as anybody I know
Definitely true Mostly true Don't know Mostly false Definitely false

35) I expect my health to get worse
Definitely true Mostly true Don't know Mostly false Definitely false

36) My health is excellent
Definitely true Mostly true Don't know Mostly false Definitely false

Appendix 4. Short Form International Physical Activity Questionnaire (SF-IPAQ)

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____ **days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Appendix 5: Cardiac Depression Scale (CDS)

Cardiac Depression Scale (CDS)

This questionnaire consists of a number of statements about the way you feel **at present.**

Next to each statement there is a rating scale from 1 to 7 for you to indicate how much you agree or disagree with the statement

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Please indicate how strongly you agree or disagree with each statement by circling one of the numbers on the scale.

THERE ARE NO RIGHT OR WRONG ANSWERS

PLE ASE ENSURE YOU HAVE COMPLETED ALL 26 ITEMS

CDS	
1. I have dropped many of interests and activities…	1 2 3 4 5 6 7 None dropped … All dropped
2. My concentration is as good as it ever was…	1 2 3 4 5 6 7 Very poor concentration … Excellent concentration
3. I can't be bothered doing anything much…	1 2 3 4 5 6 7 Keen to do things … Can't be bothered
4. I get pleasure from life at present....	1 2 3 4 5 6 7 No pleasure … Great pleasure

5. I am concerned about the uncertainty of my health...	1 Not concerned	2	3	4	5	6	7 Very concerned
6. I may not recover completely...	1 Will recover completely	2	3	4	5	6	7 Will not recover
7. My sleep is restless and disturbed...	1 Not restless	2	3	4	5	6	7 Very restless
8. I am not the person I used to be...	1 Just the Same	2	3	4	5	6	7 Completely different
9. I wake up in the early hours of the morning and cannot get back to sleep...	1 Never wake	2	3	4	5	6	7 Always wake
10. I feel like I am living on borrowed time...	1 Unlimited time	2	3	4	5	6	7 Very much on borrowed time
11. Dying is the best solution for me...	1 No solution	2	3	4	5	6	7 Best solution
12. I feel in good spirits...	1 Very poor spirits	2	3	4	5	6	7 Excellent spirits
13. The possibility of sudden death worries me...	1 Not at all	2	3	4	5	6	7 Very worried
14.There is only misery in the future for me...	1 No misery	2	3	4	5	6	7 Only misery
15. My mind is as fast and alert as always...	1 Slow and inattentive	2	3	4	5	6	7 Very fast and alert

16.I get hardly anything done...	1 Everything done	2	3	4	5	6	7 Nothing done
17. My problems are not yet over...	1 All problems over	2	3	4	5	6	7 Still major problems
18. Things which I regret about my life are bothering me...	1 Absolutely no regrets	2	3	4	5	6	7 Great regrets
19. I gain just as much pleasure from my leisure activities as I used to...	1 No pleasure at all	2	3	4	5	6	7 Very great pleasure
20. My memory is as good as it always was...	1 Very poor memory	2	3	4	5	6	7 Excellent memory
21. I become tearful more easily than before...	1 Not at all tearful	2	3	4	5	6	7 Very easily tearful
22. I seem to get more easily irritated by others than before...	1 Never irritated	2	3	4	5	6	7 Very easily irritated
23. I feel independent and in control of my life...	1 No Independence	2	3	4	5	6	7 Completely independent
24. I lose my temper more easily nowadays...	1 Never lose temper	2	3	4	5	6	7 Lose it very easily
25. I feel frustrated...	1 Not at all frustrated	2	3	4	5	6	7 Extremely frustrated
26. I am concerned about my capacity for sexual activity...	1 No concern at all	2	3	4	5	6	7 Grave concern

Appendix 6: Six Minute Walk Test (6MWT)

SIX-MINUTE WALK TEST(6MWT)

SPO2:
Before Test: **After Test:**

Pulse Rate:
Before Test: **After Test:**

Blood pressure:
Before Test: **After Test:**

How long distance the patient walked in 6 minutes?

□

Appendix 7. Pittsburg sleep quality index (PSQI)

PITTSBURGH SLEEP QUALITY INDEX (PSQI)

INSTRUCTIONS: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, when have you usually gone to bed at night?

   USUAL BED TIME _____

2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?

   NUMBER OF MINUTES _____

3. During the past month, when have you usually gotten up in the morning?

   USUAL GETTING UP TIME _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)

   HOURS OF SLEEP PER NIGHT _____

INSTRUCTIONS: For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
(a) ...cannot get to sleep within 30 minutes	☐	☐	☐	☐
(b) ...wake up in the middle of the night or early morning	☐	☐	☐	☐
(c) ...have to get up to use the bathroom	☐	☐	☐	☐
(d ...cannot breathe comfortably	☐	☐	☐	☐
(e) ...cough or snore loudly	☐	☐	☐	☐
(f) ...feel too cold	☐	☐	☐	☐
(g) ...feel too hot	☐	☐	☐	☐
(h) ...had bad dreams	☐	☐	☐	☐
(i) ...have pain	☐	☐	☐	☐
(j) Other reason(s), please describe				
How often during the past month have you had trouble sleeping because of this?	☐	☐	☐	☐

PSQI Page 1

	Very good	Fairly good	Fairly bad	
6. During the past month, how would you rate your sleep quality overall?	☐	☐	☐	

٦ / ٢

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?	☐	☐	☐	☐
8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	☐	☐	☐	☐

	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐

	No bed partner or roommate	Partner/ roommate in other room	Partner in same room, but not same bed	Partner in same bed
10. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐

If you have a roommate or bed partner, ask him/her how often in the past month you have had...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
(a) ...loud snoring	☐	☐	☐	☐
(b) ...long pauses between breaths while asleep	☐	☐	☐	☐
(c) ...legs twitching or jerking while you sleep	☐	☐	☐	☐
(d) ...episodes of disorientation or confusion during sleep	☐	☐	☐	☐
(e) Other restlessness while you sleep; please describe	☐	☐	☐	☐

_____

_____

Appendix 8: Fatigue Severity Scale (FSS)

FATIGUE SEVERITY SCALE

During the past week, I have found that:	Strongly Disagree			Neither Agree Nor Disagree			Strongly Agree
1. My motivation is lower when I am fatigued.	1	2	3	4	5	6	7
2. Exercise brings on my fatigue.	1	2	3	4	5	6	7
3. I am easily fatigued.	1	2	3	4	5	6	7
4. Fatigue interferes with my physical functioning.	1	2	3	4	5	6	7
5. Fatigue causes frequent problems for me.	1	2	3	4	5	6	7
6. My fatigue prevents sustained physical functioning.	1	2	3	4	5	6	7
7. Fatigue interferes with carrying out certain duties and responsibilities.	1	2	3	4	5	6	7
8. Fatigue is among my three most disabling symptoms.	1	2	3	4	5	6	7
8. Fatigue interferes with my work, family, or social life.	1	2	3	4	5	6	7

Appendix 9: Pain Catastrophizing Scale (PCS)

We are interested in the types of thoughts and feeling that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

	Not at all	To a slight degree	To a moderate degree	To a great degree	All the time
I worry all the time about whether the pain will end	0	1	2	3	4
I feel I can't go on	0	1	2	3	4
It's terrible and I think it's never going to get any better	0	1	2	3	4
It's awful and I feel that it overwhelms me	0	1	2	3	4
I feel I can't stand it anymore	0	1	2	3	4
I become afraid that the pain will get worse	0	1	2	3	4
I keep thinking of other painful events	0	1	2	3	4
I anxiously want the pain to go away	0	1	2	3	4
I can't seem to keep it out of my mind	0	1	2	3	4
I keep thinking about how much it hurts	0	1	2	3	4
I keep thinking about how badly I want the pain to stop	0	1	2	3	4
There's nothing I can do to reduce the intensity of the pain	0	1	2	3	4
I wonder whether something serious may happen	0	1	2	3	4

Appendix 10: Tampa Scale of Kinesiophobia (TSK-11)

Tampa Scale-11 (TSK-11) **Name:** **Date:**

This is a list of phrases which other patients have used to express how the view their condition. Please circle the number that best describes how you feel about each statement.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
1. I'm afraid I might injure myself if I exercise.	1	2	3	4
2. If I were to try to overcome it, my pain would increase.	1	2	3	4
3. My body is telling me I have something dangerously wrong.	1	2	3	4
4. People aren't taking my medical condition serious enough.	1	2	3	4
5. My accident/problem has put my body at risk for the rest of my life.	1	2	3	4
6. Pain always means I have injured my body.	1	2	3	4
7. Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening.	1	2	3	4
8. I wouldn't have this much pain if there wasn't something potentially dangerous going on in my body.	1	2	3	4
9. Pain lets me know when to stop exercising so that I don't injure myself.	1	2	3	4
10. I can't do all the things normal people do because it's too easy for me to get injured.	1	2	3	4
11. No one should have to exercise when he/she is in pain.	1	2	3	4

Appendix 11: Dyspnea-12 Questionnaire

DYSPNOEA-12

This questionnaire is designed to help us learn more about how your breathing is troubling you.

Please read each item and then tick in the box that best matches your breathing these days. If you do not experience an item tick the "none" box. Please respond to all items.

	None	Mild	Moderate	Severe
My breath does not go in all the way	☐	☐	☐	☐
My breathing requires more work	☐	☐	☐	☐
I feel short of breath	☐	☐	☐	☐
I have difficulty catching my breath	☐	☐	☐	☐
I cannot get enough air	☐	☐	☐	☐
My breathing is uncomfortable	☐	☐	☐	☐
My breathing is exhausting	☐	☐	☐	☐
My breathing makes me feel depressed	☐	☐	☐	☐
My breathing makes me feel miserable	☐	☐	☐	☐
My breathing is distressing	☐	☐	☐	☐
My breathing makes me agitated	☐	☐	☐	☐
My breathing is irritating	☐	☐	☐	☐

RESUME

Personal Information	
Name and surname	Raed Qadri ALJANABI
Place of birth	Iraq, Baghdad
Nationality	Iraqi

Education Information	
License	
University	Baghdad
Faculty	Medical Technology College
Department	Physical therapy and rehabilitation
Graduation Year	2001

Articles and Papers
International Conferences and Symposia: 1- International Hagia Sophia Conference On Multidisciplinary Scientific Studies (Istanbul, October, 2022)