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College of Nursing

Adult Nursing

Effect of Slow Deep Breathing Exercises by Using Incentive Spirometry on Cardio-pulmonary Parameters, Electrocardiographic Findings and Functional Capacity among Patients with Coronary Artery Disease

Thesis Submitted to the College of Nursing Council/ University of Kerbala, in Partial Fulfillment of the Requirement for Master Degree in Nursing Sciences

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بسم الله الرحمن الرحيم

﴿ٱللَّهُ لَآ إِلَٰهَ إِلَّا هُوَ ٱلۡحَيُّ ٱلۡقَيُّومُۚ لَا تَأۡخُذُهُۥ سِنَةٞ وَلَا نَوۡمٞۚ لَّهُۥ مَا فِي ٱلسَّمَٰوَٰتِ وَمَا فِي ٱلۡأَرۡضِۗ مَن ذَا ٱلَّذِي يَشۡفَعُ عِندَهُۥٓ إِلَّا بِإِذۡنِهِۦۚ يَعۡلَمُ مَا بَيۡنَ أَيۡدِيهِمۡ وَمَا خَلۡفَهُمۡۖ وَلَا يُحِيطُونَ بِشَيۡءٖ مِّنۡ عِلۡمِهِۦٓ إِلَّا بِمَا شَآءَۚ وَسِعَ كُرۡسِيُّهُ ٱلسَّمَٰوَٰتِ وَٱلۡأَرۡضَۖ وَلَا يَـُٔودُهُۥ حِفۡظُهُمَاۚ وَهُوَ ٱلۡعَلِيُّ ٱلۡعَظِيمُ﴾

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Supervisor Certification

I certify that this thesis, entitled " **Effect of Slow Deep Breathing Exercise by Using Incentive Spirometry on Cardio-pulmonary Parameters, Electrocardiographic Findings and Functional Capacity among Patients with Coronary Artery Disease**" was prepared under my supervision at the College of Nursing, University of Kerbala as a partial requirement for fulfillment of master degree in Nursing Sciences.

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Approval Certification

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We members of the examining committee, have looked at the thesis **"Effect of Slow Deep Breathing Exercises by Using Incentive Spirometry on Cardio-pulmonary Parameters, Electrocardiographic Findings and Functional Capacity among Patients with Coronary Artery Disease"** Which is submitted by (Zahra Abdulmunem Ahmed) from the Department of Adult Nursing and we have examined the student in its contents and what is related to it and we can decide that it is qualified for pursuing the degree of master in Nursing Sciences with the specialty of Adult Nursing.

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Dedication

I dedicate my thesis to my dear family, a special feeling of gratitude to my loving parents, their words of encouragement and their support to persevere have been my source of inspiration and strength throughout this journey. Their constant moral, spiritual, and emotional support helped me finish this thesis.

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Abstract

A condition known as coronary artery disease occurs when the myocardium does not receive enough blood or oxygen caused by plaques that is formed in the coronary artery lumen. That supplies the heart with blood, a muscle that needs aerobic exercise to generate enough Adenosine Triphosphate to keep contracting. It is brought on by coronary artery blockage and is distinguished by an imbalance in the supply and demand of oxygen. The study aimed to investigate the impact of slow, deep breathing exercises using incentivized spirometry on cardio-pulmonary parameters, electrocardiographic findings, and functional ability in coronary artery disease patients. The study involved fifty participants, divided into two groups: control and study. To assess the impact of slow deep breathing exercises incentive spirometry was used instrument, which includes four parts. Each part has many items. The instrument's validity was obtained by a 10-person pundit panel, while the instrument's dependability was assessed using a test-and-retest approach. Data analysis was performed using inferential and descriptive statistics. Three weeks after the intervention, re-test of functional capacity investigated between two groups. The result of study shows significant in the functional capacity with self-care ability, family and social ability, movement ability, lifting ability, work ability, physical functional ability, with p-value= (.000). The study concluded that flow-oriented incentive spirometry was beneficial in improving functional capacity compared between control and the study groups, with no significant side effects. This methodology can be applied in future research to examine long-term impacts over weeks or months and is suitable for self-monitoring at home due to its simplicity and non-intrusive nature.

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List of Abbreviations

Acute Coronary Syndrome	ACS
Adenosine Triphosphate	ATP
Analysis of Variance	ANOVA
Angiotensin-Converting Enzyme	ACE
Atrioventricular	AV
Autonomic Nervous System	ANS

Bare Metal Stents	BMS
Blood Pressure	BP
Body Mass Index	BMI
Cardiac Output	CO
Cardiovascular Diseases	CVD
Cardiovascular Disorders	CVDs
Central Venous Pressure	CVP
Cerebral Palsy	CP
Chronic Kidney Disease	CKD
Chronic Obstructive Pulmonary Disease	COPD
Coronary Artery Bypass Grafting	CABG
Coronary Heart Disease	CHD
Coronavirus Disease	COVID
Deep Breathing	DP
Diabetes Mellitus	DM
Diastolic Blood Pressure	DBP/DP
Electrocardiographic	ECG /EKG
Endothelial Nitric Oxide Synthase	e-NOS
Flow-Oriented Incentive Spirometer	FIS
Forced Vital Capacity	FVC
Fourth Thoracic Vertebra	T4
Fractional Flow Reserve	FFR
Glyceryl Trinitrate	GTN
Heart Rate	HR
Heart Rate Variability	HRV
Human Immunodeficiency Virus	HIV
Incentive Spirometer	IS
Inflammatory Bowel Disease	IBD

Inspiratory Muscle Training	IMT
Intravenous	IV
Ischemic Heart Disease	IHD
Jugular Venous Pressure	JVP
Left Atrium	LA
Left Ventricle	LV
Low-Density Lipoprotein	LDL
Mean Arterial Pressure	MAP
Myocardial Infarction	MI
Non-Alcoholic Fatty Liver Disease	NAFLD
Non-St-Elevation Myocardial Infarction	NSTEMI
Nucleus Tractus Solitarii	NTS
Parasympathetic Nervous System	PNS
Percutaneous Coronary Intervention	PCI
Peripheral Oxygen Saturation	SPo2
Physical Functional Ability Questionnaire	FAQ5
Pound	Ibs
Pulse Pressure	PP
Rate-Pressure Product	RPP
Respiratory Rate	RR
Rheumatoid Arthritis	RA
Right Atrium	RA
Right Ventricle	RV
Self-Care Deficit Nursing Theory"	SCDNT
Sinoatrial	SA
Standard Deviation	Std. Deviation

Standard Error Difference	Std. Error Difference
Statistical Package for the Social Sciences	SPSS
St-Segment Elevation Myocardial Infarction	STEMI
Sympathetic Nervous System	SNS
Systemic Lupus Erythematosus	SLE
Systolic Blood Pressure	SBP/SP
Transient Ischemic Attack	TIA
Video-Assisted Thoracic Surgery	VATS
Volume-Oriented Incentive Spirometer	VIS
World Health Organization	WHO

List of statistical Symbols

Degree of freedom,	Df
F-statistics	F
Less Than	<
Mili second	Ms
MilliVolt	mV
More or equal	≥
Natural numbers	N or NN
Percentage	%
Significance	Sig
T-Test	T

Chapter One

Introduction

Chapter One

Introduction

1-1 Introduction

Cardiovascular mortality and morbidity are related to an increased risk of autonomic dysfunction, such as a decrease in heart rate variability. so, the current understanding of the pathophysiological foundation of myocardial ischemia stems from the experimental finding that coronary blood flow is restricted by coronary artery constriction, The coronary artery is a blood vessel that provides blood to the heart, a muscle that needs aerobic exercise to generate enough Adenosine triphosphate (ATP) to keep contracting (Benjamin et al., 2019); (Roth et.al., 2020)

A coronary artery disease occurs when the myocardium does not receive enough blood or oxygen and is an ailment or damage to the heart's main blood arteries. It is caused by blockage of the coronary arteries myocardial infarction, which is another term for a heart attack happens when the blood supplied to the heart is interrupted, and restricted to the point where the heart muscle is unable to contract locally or affecting all due to the high demand for oxygen being met by the reduced blood flow, and is characterized by an imbalance in the supply and demand of oxygen. Usually, it involves blood flow obstruction caused by plaques that is formed in the coronary artery lumen. It is the leading global cause of death. Comprehending these intricate disease pathways can aid medical practitioners in diagnosing, treating, and averting potential consequences of CVD. (Shahjehan et al., 2023).

Deep breathing (Db) can control both excessively active sympathetic and underactive parasympathetic nerve activity, which will enhance cardiovascular health. Breathing encouraged the gamma-aminobutyric acid pathways in the brain become vagal activated, which reduces anxiety and tension. Moreover, the brain and cardiovascular system seem to benefit from the improvement in autonomic balance brought on by deep breathing. (Ghorbani et al., 2018); (Zaccaro et al., 2019).

Deep breathing exercises are beneficial to health. Clinical uses of slow breathing have included the treatment of heart failure, hypertension, anxiety, depression, and pulmonary ailments such as asthma and chronic obstructive lung disease. It has also been used to treat cardiovascular and stress-related problems. An essential component of many mind-body techniques is slow breathing. An established technique for determining sympathetic and parasympathetic tone is heart rate variability (HRV) analysis, which can be performed using the HRV power spectrum. It is necessary to carry out these spectral measurements of autonomic modulation under controlled circumstances. It is crucial to take into account how varying respiratory rates may affect HRV. (McCraty et al., 2015); (Russo et al., 2017); (Hamasaki et al., 2020); and (Birdee et al., 2023).

Through slow breathing and diaphragmatic excursions, DB heightens blood pressure and heart rate fluctuations, enhancing blood pressure oscillations, heart rate variability, and baroreflex sensitivity. The autonomic nervous system's ability to regulate breathing is closely related. The vagus (parasympathetic) nerve is related to the diaphragm's controlling nerve, the phrenic nerve. The parasympathetic neural system is triggered when DB lowers the respiratory rate (RR), whereas the sympathetic nervous system is suppressed. leisurely breathing at a rate of eight breaths per minute helps the parasympathetic nervous system's balance dominate (Russo et al., 2017); (Wu et al., 2020); and (Birdee et al., 2023)

The Incentive Spirometer (IS) has received extensive research in the inpatient context and is the cornerstone of therapy for postoperative and hospitalized patients. Stretching and opening constricted airways, help the patient to inhale slowly and deeply using visual cues. Exercise with an incentive spirometer is beneficial since it is affordable, easy to use, and free of known adverse effects. Once the patient has received training in its use, it can be used independently. In addition, achieving the visual aim motivates the patient to give it their all, which helps to increase patient compliance (Franklin et al., 2023).

1.2. Important of the Study

Globally, coronary heart disease (CHD) is the primary cause of heart surgery as the burden of cardiovascular diseases and CVD increases. It is the primary cause of death worldwide, accounting for a growing number of deaths in emerging as well as high-income nations. The number of fatalities from CVD reached 17.9 million in 2019, accounting for 32% of all deaths worldwide. CVDs are on the rise. Heart attacks and strokes were the cause of 85% of these fatalities. (Roth et.al., (2020).

World Health Organization (WHO) stated the stroke and coronary artery disease (CAD) are the two most common symptoms of CVD, which it is still the primary cause of death. The main factor in disability and the leading cause of mortality worldwide are CVD, especially stroke and ischemic heart disease (IHD). The incidence of all cases of cardiovascular disease increased nearly double from 271 million cases (257 to 285 million people) in the year 1990 to a total of 523 million cases (497 to 550 million people) in 2019, and the total number of deaths due to CVD steadily rose from 12.1 million cases (11.4 to 12.6 million people) in 1990 to 18.6 million cases (17.1 to 19.7 million) in 2019. (Mensah et al., (2019).

The main factor in disability is CVDS, particularly IHD, during that time, the number of years lived with a disability doubled, from 17.7 million (12.9 to 22.5 million people) to 34.4 million (24.9 to 43.6 million people). Global patterns for years of life lost and life years adjusted for disability (DALYs) also increased significantly. Since 1990, the total number of DALYs caused by IHD has increased consistently, reaching a total of 182 million (170 to 194 million people) DALYs, 9.14 million cases (8.40 to 9.74 million people) fatalities, and 197 million (178 to 220 million people) common cases in the year 2019 (Roth et al., (2019)

Statistics was obtained from the Ministry of Health, Karbala Health Department, and Planning Department for patients with atherosclerosis during the past five years, started in 2017 and ended in 2021.

Table 1-1. Rates of non-communicable diseases for inpatients according to governorate

Ischemic Heart Diseases				
Years	In-patient		Grand Total	Rates
	Male	Female		
2017	51742	38280	90022	33.3
2018	51197	36914	88111	32.60
2019	55009	39013	94022	29
2020	38661	25287	63948	27
2021	50391	32323	82714	33

Table 1-2. Rates of non-communicable diseases for inpatients according to kerbala

Ischemic Heart Diseases				
Years	In-patient		Grand Total	Rates
	Male	Female		
2017	2265	1560	3816	37.0

2018	2940	2152	5092	50.0
2019	3102	2391	5493	52
2020	3724	2244	5968	72
2021	4311	2760	7071	73

Table 1-3. Rates of non-communicable diseases for outpatient in health care centers according to governorate

Ischemic Heart Diseases				
Years	Outpatient health care centers		Grand Total	Rates
	Male	Female		
2017	6885	7905	14790	0.53
2018	3204	2747	5951	0.23
2019	3754	4325	8079	0.28
2020	2330	2325	4655	0.18
2021	4039	3598	7637	0.25

Table 1-4. Rates of non-communicable diseases for outpatient in health care centers according to Kerbala

Ischemic Heart Diseases				
Years	Outpatient health care centers		Grand Total	Rates
	Male	Female		

2017	39	57	96	0.06
2018	33	49	82	0.06
2019	26	69	95	0.06
2020	71	141	212	0.19
2021	62	61	123	0.09

Table 1-5. Rates of non-communicable diseases for outpatient in hospitals according to governorate

Ischemic Heart Diseases				
Years	Outpatient		Grand Total	Rates
	Male	Female		
2017	74662	70048	144710	8.9
2018	80696	77383	158079	9.6
2019	71397	70124	141521	9
2020	4039	3598	7637	0.25
2021	88133	82000	170133	11.8

Table 1-6. Rates of non-communicable diseases for outpatient in hospitals according to Kerbala

Ischemic Heart Diseases				
Years	Outpatient		Total	Rates
	Male	Female		

2017	489	672	1161	2.0
2018	649	1364	2013	3.3
2019	529	1296	1825	3
2020	613	672	1285	2.6
2021	485	567	1052	1.8

Cardiovascular issues continue to be the primary cause of most ailments worldwide. The burden of CVD is still rising in almost all non-high-income countries, and alarmingly, in certain places, the age-standardized rate of CVD has begun to rise while it has been declining in high-income countries. (Tsao et al., (2020).

The cardiac autonomic nervous system (ANS) can become dysfunctional due to pathological alterations in coronary heart disease. A significant controller of the cardiovascular system is the autonomic nervous system (ANS). To handle daily circumstances, it temporarily adjusts blood pressure and heart rate. While sympathetic branch activity counteracts the parasympathetic (vagal) modulation's effects and controls peripheral vasoconstriction, it also causes a drop-in heart rate and cardiac contractility. This is exhibited by an increase in sympathetic nerve activity and a decrease in vagus nerve excitability. cardiovascular disease and cardiac dysfunction are caused by autonomic nervous system dysfunction. (Hadaya et al., (2020).

Patients are also more likely to experience complications like a arrhythmia (flutter and fibrillation of the ventricles), an increase in rate of heart, an increase in blood pressure's systolic value, and an increase in rate-pressure product (RPP), which happens earlier and has a strong correlation with cardiac oxygen consumption; it also serves as an indirect indicator of cardiac blood flow and oxygen consumption than an electrocardiographic

(ECG) change. Conscious breath control results in an increase in vitality, bodily cleansing, and immunity. It also aids in achieving tranquility, inner calm, and mental clarity. (Wu et al., (2020).

According to studies, slow and fast breath control achieved through the use of particular techniques and exercises has a variety of physiological consequences and an impact on the parameters affecting cardiac and pulmonary function. DB replenishes the air in all sections of the lung, whereas shallow breathing just replenishes the air at the base of the lungs. A deep, cleansing breath helps people take in more oxygen and lowers carbon dioxide levels. As a result, the brain receives fresh oxygen, which revitalizes the brain cells and allows for sound blood circulation and an adequate supply of oxygen. (Bentley et al., (2023).

Deep breathing is a useful integrated body-mind method for treating psychosomatic disorders and stress. Diaphragmatic breathing causes the diaphragm to contract, the abdomen to expand, and the inhalations and exhalations to become deeper. As a result, the body produces more blood gases and breathes less frequently. (Ma. et al., 2017)

According to physiological research, even a single breathing exercise can significantly lower blood pressure, increase HRV and oxygenation, improve pulmonary function, and increase cardiorespiratory fitness and respiratory muscle strength. These effects have been shown in studies by Lehrer & Gevirtz 2014); and (Wei et al., 2016).

1.3. Problem Statement

A common cardiac condition called coronary artery disease involves atherosclerotic plaque buildup in the arterial lumen. This affects blood flow and oxygen delivery to the myocardium, which leads to a variety of problems. Risk factors can be divided into two categories: variables that can't be altered and risk variables that can altered. Risk variables that can't be altered include age, gender, ethnicity, and family history of CAD. Risk variables that can be altered include diabetes, obesity, smoking, poor eating habits, sedentary lifestyles, high blood pressure, high cholesterol, and stress (Bauersachs et al., (2019); Brown, et al., (2023).

Globally, one of the main causes of disease burden is coronary artery disease, or CAD. Based on research showing that involvement in cardiac rehabilitation (CR) can lower cardiovascular and all-cause mortality, increase functional ability, and enhance quality of life, it is a class I recommendation for all patients with CAD . (Giuliano et al., 2017).

Through planned exercise prescription, education, and risk factor reduction, cardiac rehabilitation (CR) offers a financially advantageous therapy that attempts to expedite recovery after an acute event and lower the likelihood of recurring episodes. A increasing body of research indicates that involvement in CR can lower hospital bed utilization, cardiovascular mortality, and enhance functional capability and quality of life. As a result, CR refe CR model relies on the continuity of care to increase the potential for long-term benefits and reduce the risk of a secondary event (secondary prevention).rral is a class I recommendation for all CAD patients. (Bellmann et al., 2020).

Due to the growing specializations in clinical care, patients are now treated by a variety of medical experts in a variety of venues and specializations. A greater chance of care fragmentation has resulted from this paradigm change. Because of this, a coordinated effort is needed to sustain excellent patient outcomes, reduce division, and establish continuity in modern health care models.

Coordinated discharge planning, integrated care, and case management were used to meet this need. Three distinct domains informational, managerial, and relational continuity are included in the definition of the unified phrase "continuity of care," which is defined as the timely, logical, and coherent delivery of services.

1.4. Research Question

Is the potential cardio-pulmonary parameters, electrocardiographic findings and functional capacity effects of slow deep breathing exercises by using incentive spirometry among patients with coronary artery disease

1.5. Research Hypothesis

1.5.1. Null Hypothesis.

There is no relation between the effect of slow deep breathing exercises by using incentive spirometry on the patient's cardio-pulmonary parameters, electrocardiographic findings, and functional capacity and with their demographical characteristics.

1.5.2. Alternative Hypothesis.

There is a significant relation between the effect of slow deep breathing exercises by using incentive spirometry on the patient's cardio-pulmonary parameters, electrocardiographic findings, and functional capacity and with their demographical characteristics.

1.6. Objectives of the Study

1. Determine the effects of slow deep breathing exercises by using incentive spirometry on cardio-pulmonary parameter among patients with coronary artery disease.

2. Investigate the effects of slow deep breathing exercises by using incentive spirometry on electrocardiographic finding among patients with coronary artery disease.

3. Evaluate the effects of slow deep breathing exercises by using incentive spirometry on functional capacity among patients with coronary artery disease.
4. To find out the relationship between effect of slow deep breathing exercises by using incentive spirometry on the patient's cardio-pulmonary parameters, electrocardiographic findings and functional capacity and with their demographical characteristics.

1.7. Definition of Terms

1.7.1. Incentive spirometry

1.7.1.a. Theoretical Definition

Devise used to encourage patients to breathe in deeply and deliberately in order to fully expand their lungs with the aid of visual cues. (Franklin et al., 2023).

1.7.1.b. Operational Definition

A tool that helps the patient by measuring the amount of air that is inhaled into the lungs to perform a slow and deep inspiration through visual feedback

1.7.2. Electrocardiography

1.7.2.a. Theoretical Definition

Recording of electrical impulses produced by the cardiac muscle. The contraction of the heart muscles is started by these impulses. It is a crucial component of diagnosing cardiovascular disease. An essential diagnostic tool for some metabolic issues and heart conditions is the electrocardiogram (ECG). (Madapaddy 2021).

1.7.2.b. Operational Definition

A diagnosis test that can be used to check electrical activity to detected cardiac problem**.**

1.7.3. Cardio-pulmonary Parameter

1.7.3.a. Theoretical Definition

Cardiovascular parameters, which control organ and systemic blood flow and, consequently, the supply of oxygen to the tissues, include blood pressure, cardiac output, and systemic vascular resistance. (Seri, 2018).

1.7.3.b. Operational Definition

Cardiovascular parameters that vary from beat to beat include heart rate, arterial blood pressure, stroke volume, and the structure of electrocardiographic complexes.

1.7.4. Functional capability

1.7.4.a. Theoretical Definition

A measurement of a person's capacity to carry out physical actions required for autonomous functioning. (Kvarstein et al., 2023).

1.7.4.b. Operational Definition

The ability of an individuals to perform activities daily living.

Chapter Two

Review of Literature

Chapter Two

Review of Literature

This chapter provides an overview of studies and concepts that help understand the topic of the current study**.**

2.1. Theoretical Framework

In order to maintain and improve their health and quality of life, patients with chronic illnesses need to possess the motivation, expertise, and ability to engage in the activities that are essential; these behaviors are all centered around the concept of self-care. Essentially, Orem's nursing theory revolves around this notion. Consequently, it can offer a suitable foundation for research on people with chronic disorders. (Ausili et al., 2014); & (Drevenhorn E. 2018).

According to Orem's nursing philosophy, an individual's actions to preserve, enhance, or reestablish their health are referred to as self-care. Nurse's view patients not as helpless recipients of medical treatment, but as robust, trustworthy, accountable, and competent individuals. of making decisions in order to take good care of their own health. Three nursing models, including fully compensatory, partially compensatory, and supportive-educative models, were defined by Orem. When a patient is prepared to learn something but needs assistance and direction, the nurse steps in to play a supportive educational role. (Khademian et al., 2020).

2.1.1. The Self-Care Deficit Nursing Theory of Orem

Self-Care Deficit Nursing Theory (SCDNT's) foundation is the science of self-care, focusing on the social, personal, and health components of self-care, Orem (2001) (10) sought to enhance its integration both structurally and functionally within the nursing practice framework. Self-care, according to her definition, is the "practice of actions that people take on their own initiative and carry out for the purpose of preserving their own life, health, and well-being." Encouraging patients and their families to take care of themselves while outlining the role of nurses in situations where helping others or oneself is not possible, Orem improved the definition of nursing over the course of five decades. (Hartweg, & Metcalfe, 2022).

As a framework for nursing curriculum at all levels of nursing education, Orem's theoretical work has been successfully implemented to nursing practice and administration around the world. It has also been validated and improved by nursing research. With publications spreading throughout the Middle East, Asia, Europe, and the Americas, as well as clinical settings, patient populations, and continents, SCDNT's continued value and efficacy are evident today. (Meleis, 2011); & (Khademian et al., 2020).

2.1.2. Application of Dorothea Orem's Theory in to Nursing Practice

Orem formed this idea based on his definition of what nursing is. When is nursing care necessary? Which state ought to offer nursing care? These were the driving forces for the development of a comprehensive nursing theory. The main tenet of the self-care deficit nursing philosophy is that everyone needs to take care of themselves and that they may heal as quickly and fully as possible by taking care of themselves. This approach is specifically used to restoration in several contexts when patients were required to be self-sufficient. (Naz, 2017).

One advantage of Orem's idea of the self-care deficit is its applicability to a wide range of client scenarios in nursing. While clients and nurses may work together to ensure that the clients receive the best treatment possible, clients can take responsibility for their own well-being thanks to the complete statement of its principles and concepts. Nurses may use Dorothea Orem's idea to help patients transition out of the hospital and take care of themselves at home because of her dedication to the profession and her hard work in the area .(Nahid et al., 2020)

The underlying tenet of Orem's theory is that all patients desire self-care and can improve more swiftly and thoroughly if they take as much care of themselves as they can. Orem's idea is incredibly simple to apply to a wide range of patients and is generalizable. Even if this idea has a substantial influence on each patient's level of independence, those who require complete care or support with self-care tasks, such as infants and the elderly, cannot instantly be included in the concept of self-care. (Khademian et al., 2020).

The emotional and social well-being of individuals with chronic diseases is equally at risk as their bodily well-being. Thus, it is especially crucial to measure quality of life while dealing with chronic illnesses. One important determinant of cardiovascular health is found to be quality of life. It is also seen as a crucial indicator of the success of therapy. Research indicates that people with cardiovascular disorders have a lower quality of life. (Alligood et al., 2017).

Orem's nursing philosophy defines self-care as actions people take to preserve, reestablish, or enhance their health. Nurses view patients as strong, dependable, responsible, and capable decision-makers who can take proper care of their health, not as passive people in need of medical assistance. Three nursing systems were defined by Orem: fully compensatory, somewhat compensatory, and supportive-educative. When a patient is ready to learn but needs assistance and direction to do so, the nurse steps in to fill out the duties within the supportive educational system. (Dahmardeh et al., 2018).

Enhancing patients' self-care skills via health education and skill training is a more sustainable and efficient approach for nurses than providing immediate treatment. The goal of self-care theory is to improve patients' prognoses and quality of life by continuously arousing their self-awareness, encouraging them to participate in their own nursing plans and medical activities, and allowing them to fully utilize their self-care talents (Khademian et al., 2020)

2.2. Coronary Artery Disease

Atherosclerotic conditions are the most common cardiovascular disorders (CVDs) which affect all arterial regions indicating the preponderance of transient ischemic attack (TIA), stroke, and coronary artery disease (CAD). 7.3 million individuals worldwide pass away with CAD each year. (Olvera Lopez, et al., 2023).

2.2.1. Pathogenesis

The most common cause of CAD is atherosclerosis, although other uncommon causes include aortitis, vasculitis, and autoimmune connective tissue disorders. The chronic inflammatory disease known as atherosclerosis affects the arterial wall and is characterized by focal deposits of lipid-rich atheroma. These deposits are not clinically significant until they become large enough to impede tissue perfusion or until the lesion becomes ulcerated and disrupted, resulting in thrombotic occlusion or distal embolization of the vessel. Atherosclerosis begins with early lipid depositions in the vascular wall, which are often seen in areas with altered bifurcations, induce arterial shear stress, and are associated with alterations in endothelial function in those areas. (Kobiyama & Ley. (2018).

Type I lesions contain atherogenic lipoprotein that stimulates macrophage production and the development of macrophage foam cells. These alterations are more prominent in artery locations with adaptive intimal thickening, which are responses to local mechanical pressures. Type II lesions consist of layers of lipid-laden smooth muscle cells and macrophage foam cells, along with fatty streaks. Type III lesions, a stage between type II and type IV, consist of dispersed collections of extracellular lipid droplets and particles that disrupt the coherence of intimal smooth muscle cells. This extracellular lipid is the precursor to the larger, confluent, and more disruptive extracellular lipid core that characterizes type IV lesions. Lesions with a lipid core appearing around the fourth decade of life may also feature extensive fibrous connective tissue layers and/or thrombus, hematoma, and fissure. (Boren et al., (2020).

Atherosclerosis can cause complicated alterations in the medium that cause remodelling of the arteries. Certain segments of arteries may progressively narrow (negative re-modelling), whilst other segments may progressively broaden (positive re-modelling). These changes are important because they have the potential to change how much atheroma encroaches on the lumen of the artery. (Mahmood et al., (2014).

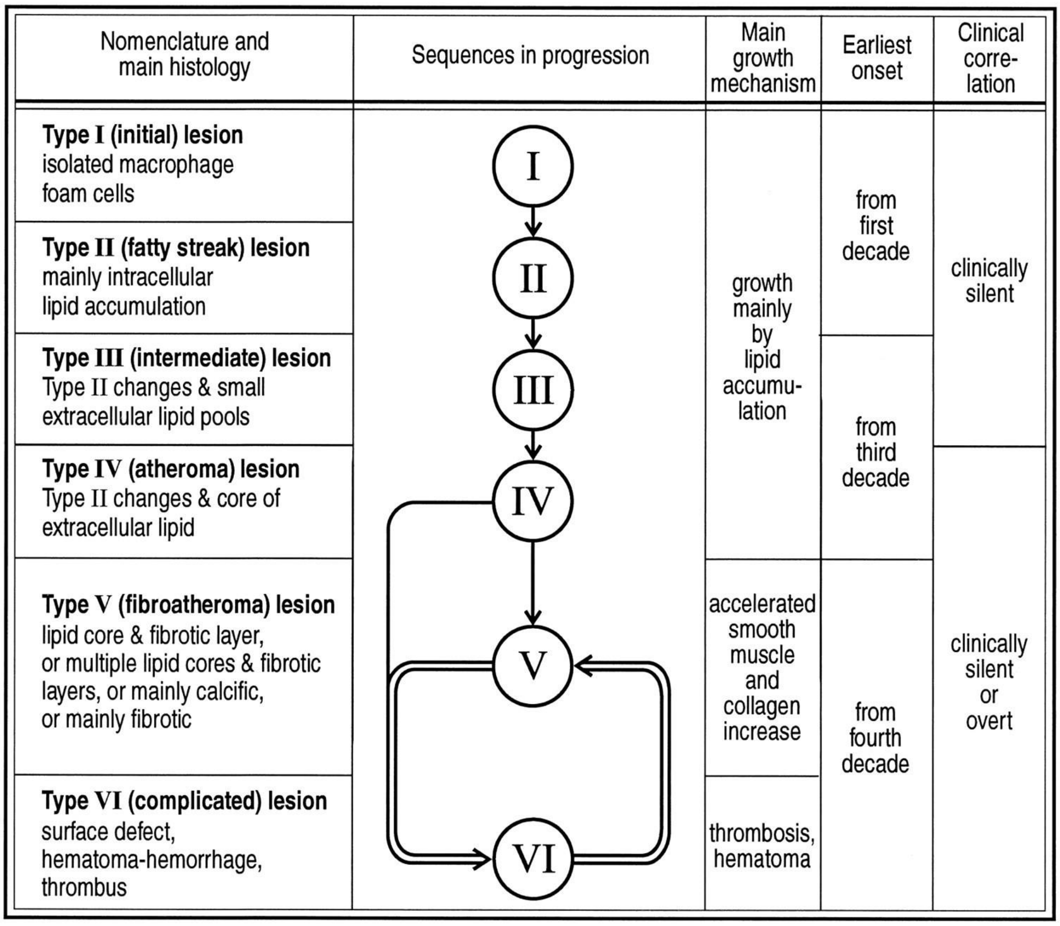

Figure 2-1. The flow diagram depicts the development and progression of human atherosclerotic lesions, with Roman numerals

representing histologically characteristic categories Fan, & Watanabe (2023).

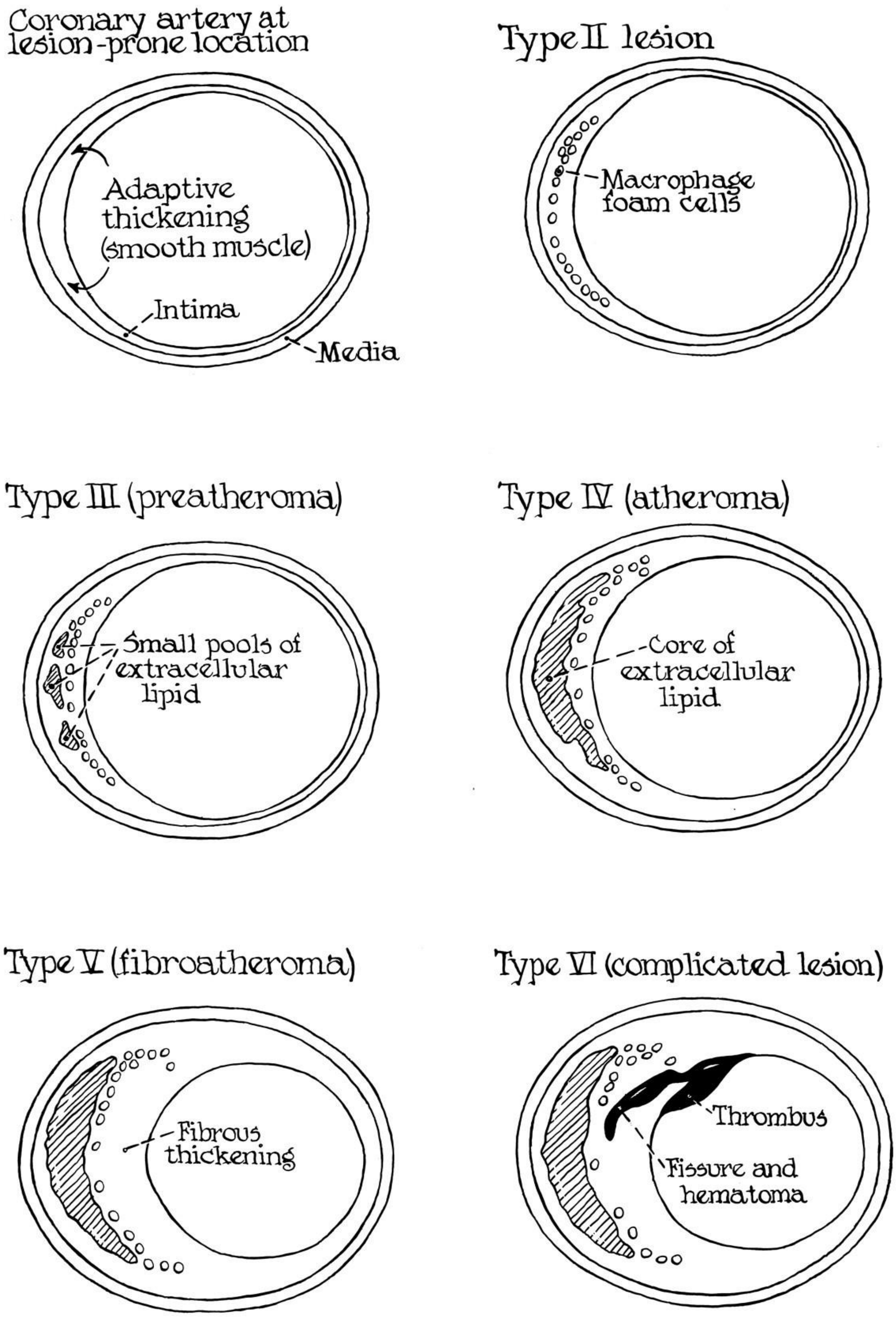

Figure 2-2. Depicts left anterior descending coronary artery cross-sections, revealing the progression of atherosclerotic lesion types that could result in type VI. (Fan, & Watanabe, 2023).

2.2.2. Risk Factors

There are two categories of risk factors for coronary artery disease: modifiable and non-modifiable. Age: In both men and women, the frequency of CAD rises after the age of 35. After 40, the lifetime risk of getting coronary artery disease (CAD) is 49% for men and 32% for women. Gender: Compared to women, men are more at risk, Family history: Another important risk factor is family history. Individuals under 50 years old who have a family history of early heart illness are at higher risk of dying from CAD. (Pencina, et al., 2019)

The significance of modifiable risk factors is less, but not insignificant. However, barely two thirds of patients receive the best possible drug treatments. A significant decrease in CAD occurrences would result from doing this. Diabetes mellitus, hypertension, and hyperlipidemia which is thought to be the second most frequent risk factor for ischemic heart disease. In addition to increasing the chance of acquiring additional CAD risk factors including hypertension, hyperlipidemia, and diabetes mellitus, obesity is a risk factor for CAD on its own. cigarette smoking, Unhealthy diet: It has taken time for the link between saturated fat and coronary heart disease to emerge. Sedentary lifestyle: Physical activity helps shield against the onset of coronary artery disease (CAD). (Hajar, 2017).

Apart from the conventional cardiovascular risk factors, research has also been conducted on new risk factors. Non-alcoholic fatty liver disease (NAFLD), chronic kidney disease (CKD), systemic lupus erythematosus (SLE), rheumatoid arthritis (RA), inflammatory bowel disease (IBD), HIV, thyroid dysfunction, testosterone, and vitamin D are a few of these. (Brown et al., 2023).

2.2.3. Management

The goal of Primary prevention is to make lifestyle adjustments or treatment interventions to prevent CAD and other types of atherosclerosis in the general population or in healthy people who are at high risk of illness. Secondary prevention is starting treatment in patients who have already experienced an incident in order to decrease the risk of future events. (Regmi et al., (2023).

2.2.3.1. Primary Prevention

The population-based method tries to adjust the entire population's risk factors through nutrition and lifestyle counseling, with the assumption that even slight reduction in smoking or average cholesterol, or a shift in exercise and diet, will result in considerable benefits. Obesity and smoking, for example, are risk factors for a variety of illnesses and should be actively discouraged by public health measures. The focused method aims to identify and treat high-risk patients, who often have a combination of risk indicators that may be quantified using composite scoring systems. Before initiating therapy, it is crucial to assess an individual's absolute risk of atheromatous cardiovascular disease, since this will assist establish if the potential advantages of intervention exceed the cost, inconvenience, and potential adverse effects. (Rippe, 2018).

2.2.3.2. Secondary prevention

This entails concentrating therapies on people who already exhibit signs of cardiovascular disease. Patients recovering from a clinical event, such as a myocardial infraction (MI) are often motivated to help themselves and are especially responsive to lifestyle advice, such as dietary adjustments and smoking cessation. Additional therapies for persons suffering from angina pectoris or acute coronary syndrome are explored further below (Muga et al., 2019).

2.2.4. Angina Pectoris

Angina pectoris refers to symptom complex induced by transitory myocardial ischemia, which occurs when there is an imbalance between myocardial oxygen supply and demand. (Hung et al., 2020).

2.2.4.1. Pathogenesis

Angina is usually caused by atherosclerosis. Almost invariably, angina is associated with a significant blockage of at least one major coronary vessel. To fulfill its constant needs, the myocardium typically absorbs a significant quantity of oxygen from the coronary circulation. When demand increases, flow via the coronary arteries must increase. When a coronary artery is obstructed, flow cannot be increased, leading to ischemia. (Ford et al., 2020).

2.2.4.2. Angina Types

Exercise-induced pain that is relieved by rest and/or nitroglycerin is known as stable angina, Prestigious angina, or crescendo angina, is characterized by angina that is not stable; rest or nitroglycerin does not relieve symptoms, which escalate in frequency and severity, Angina that is uncontrollable or resistant: severe chest discomfort that is incapacitatin, Prinzmetal's angina, sometimes referred to as variant angina, is characterized by reversible ST-segment elevation and resting pain that is thought to be brought on by coronary artery vasospasm, Silent ischemia occurs when there is objective evidence of ischemia (such as electrocardiographic changes during a stress test) but the patient experiences no pain. (Gillen et al., 2022).

2.2.4.3. Angina severity scale

I-Angina is not caused by normal physical exertion like stair climbing or walking. Angina develops as a result of severe, fast, or extended effort at work or in play, II- Minimal interference with daily activities. Shortly after eating, in the cold, wind, or during the first few hours after awakening, angina attacks might happen when walking or climbing stairs rapidly, uphill, or under mental stress. Traversing more than one flight of standard stairs and more than two blocks on level ground at a typical pace speed and condition causes angina, III- Significant physical activity limits. In normal settings and at a regular pace, walking 1 to 2 blocks on level ground and climbing 1 flight of stairs causes angina, IV- Inability to undertake any physical activity without discomfort—anginal symptoms may be present at rest. (Owlia et al., 2019).

2.2.4.4. Clinical Manifestations

Stable angina is defined by central chest pain, discomfort, or shortness of breath that is caused by exertion or other forms of stress and is quickly resolved by rest. Choking or heavy feeling in the upper chest might be one of the signs of cardiac muscle ischemia, in addition to discomfort. Often, it is felt in the retrosternal region, which is deep in the chest beneath the sternum. The pain or discomfort is usually poorly confined, extending to the inner regions of the upper arms (usually the left arm), the neck, the chin, and the shoulders. The sufferer frequently experiences tightness or heavy choking or strangling feeling with a viselike, relentless character. (Gillen et al., 2022).

2.2.4.5. Management

Antiplatelet treatment is recommended for all individuals with CAD related angina. Since low-dose aspirin (75 mg) lowers the possibility of MI, it should be recommended to all patients and kept up to date forever. If aspirin induces dyspepsia or other adverse effects, 75 mg of clopidogrel per day is an equally efficient substitute. If patient's cholesterol is within normal range, they should still be. (Layne, & Ferro, 2017).

2.2.4.5.a. Anti-Anginal

An easy-to-follow regimen is the goal of anti-anginal therapy, which tries to manage symptoms doesn't have any negative side effects. The prevention and treatment of angina can be accomplished using five different medication groups. A beta blocker and sublingual glyceryl trinitrate (GTN) are typically used to begin therapy. If necessary, Long-acting nitrate or a calcium channel antagonist can then be added. (Ferrari et al., (2019).

2.2.4.5.b. Nitrates

Nitrates cause venous and arteriolar dilation by acting on vascular smooth muscle, reducing oxygen requirements and increasing it by widening coronary arteries. Sublingual GTN is suitable for acute episodes and relieves symptoms in two to three minutes. It is recommended to take the medication as a preventative measure before exercise. Headaches may occur, but if the patient sticks with treatment, they usually go away. (Rousan, & Thadani, 2019).

2.2.4.5.C. Beta-Blocking Agents

Beta blockers decrease heart rate, blood pressure, and myocardial contractility, lowering oxygen demand. However, they can cause bronchospasm in asthmatic individuals. Cardioselective medication is recommended, and abrupt stopping can cause severe arrhythmias. (Morales et al., 2017)

2.2.4.5.d. Activators of potassium channels

There is currently only one medication in this class that is approved for clinical usage, and that is oral nerandil (10–30 mg twice day). It has the benefit of not displaying the tolerance associated with nitrates and functions as a vasodilator, affecting both the venous and arterial systems. Ivabradine is the first medication in this class that is an if channel antagonist. By altering the sinus node's ion channels, it causes bradycardia. It doesn't seem to impair cardiac contractility and is safe for use in heart failure patients. (Cheng et al., (2021).

2.2.4.5.e. Ranolazine

This medication reduces the symptoms of angina by blocking the late inward sodium current in the smooth muscle cells of the coronary arteries. It also has a secondary effect on calcium flux and vascular tone. (Foroutan, B. (2023).

2.2.4.5.f. Antagonists of Calcium Channels

Nifedipine and amlodipine are examples of calcium channel antagonists, can reduce blood pressure and cardiac contractility, lowering myocardial oxygen demand. They can be taken as monotherapy or combined with β blockers to prevent reflex tachycardia. However, they should be administered cautiously in individuals with poor left ventricular function. (Sica, 2001)

2.2.4.5.g. Non-Pharmacological Treatment

Percutaneous Coronary Intervention (PCI)

A technique that optimally uses the radial artery to insert an inflatable balloon and metal stent into the coronary artery. A stenosis's severity is determined by its fractional flow reserve (FFR), with an FFR of >0.80 requiring medical intervention to improve patient outcomes. Bleeding, hemorrhage, dissection, and pseudoneuralysm are examples of complications. Within 6 to 9 months, there is a 20–30% chance that bare metal stents (BMS) will re-stenosis. Patients suffering stable angina symptoms were randomized in the courage to obtain the best possible medical care or PCI with stenting. (Walker, & Colledge, 2013).

Coronary Artery Bypass Grafting (CABG)

Anastomosing autologous veins to the native coronary arteries distal to the stenosis and the ascending aorta. Off pump surgery is comparable to standard CABG but may have more repetition vascularizations. Three major randomized controlled trials showed that exercise tolerance and angina symptoms were much enhanced after CABG, which also decreased the requirement for anti-anginal treatment. It is recommended for triple vesselcad and impaired left ventricular function, with left stem disease requiring revascularization. (Kwiecinski et al., 2022).

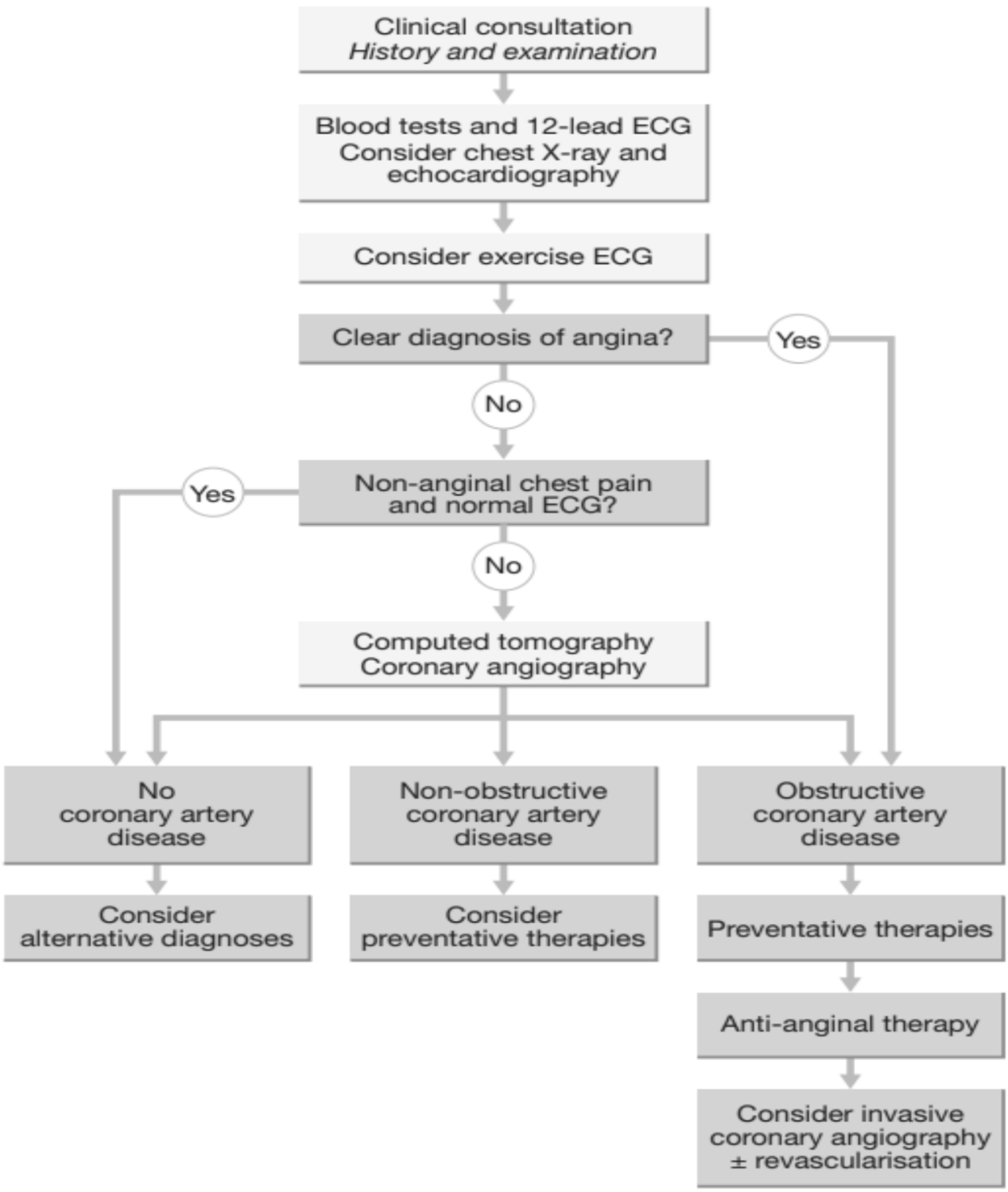

Figure 2-3. The plan for managing persistent angina, recommended for those without prior coronary artery disease, suggests using magnetic resonance perfusion, computed tomography coronary angiography, or echocardiography for established patients**.** (Ralston et al., 2018).

2.2.5. Acute Coronary Syndromes

Unstable angina, ST- elevation myocardial infarction, and non-ST-elevation myocardial infarction is all referred to as the "acute coronary syndrome" (ACS), These three syndromes differ from one another in the following ways: Elevated cardiac enzymes, notably the very sensitive cardiac biomarker troponin, show myocardial necrosis in STEMI and NSTEMI., In unstable angina, there is no myocardial necrosis and troponins are normal, STEMI is diagnosed when the ECG demonstrates persistent ST elevation in an appropriate area compatible with STEMI, but in NSTEMI, any or no ECG alterations, or extremely transitory self-limiting ST elevation, may occur, The ECG is read as for NSTEMI and frequently displays ST depression, no change, or T-wave inversion in unstable angina. (Singh et al., 2023).

2.2.5.1. Clinical Characteristics

2.2.5.1. a. Symptoms

long-lasting heart pain in the chest, throat, arms, epigastrium, or back, fear of death, anxiety, nausea, and vomiting, as well as breathlessness, collapse/syncope. (Sharifov et al., 2023)

2.2.5.1.b. Physical Symptoms

Sweating, tachycardia, Pallor are indicators for sympathetic activation, Bradycardia and vomiting are mark for vagal activation, Symptoms of deteriorating myocardial function (Oliguria, hypotension, and cold extremities, Restricted pulse pressure, Boosted jugular venous pulse (JVP), Third heartbeat, First heart sound in silence, Spreading apical impulse, Lungs that creak), Fever is a sign of tissue injury, Complication warning signs, such as pericarditis and mitral regurgitation. (Cervellin, & Rastelli, 2016).

2.2.5.2. Pathogenesis

Acute coronary syndrome is nearly invariably associated with atherosclerosis. A complicated ulcerated or fissured atheromatous plaque with adherent platelet-rich thrombus and local coronary artery spasm is typically the culprit lesion that causes the acute event. The degree of obstruction may either rise, resulting to full artery occlusion, or recede due to the effects of platelet disaggregation and endogenous fibrinolysis during an acute coronary syndrome**.** An occlusive thrombus is virtually invariably present at the rupture or erosion of an atheromatous plaque in acute myocardial infarction (MI). The thrombus may lyse spontaneously during the next few days, but permanent cardiac damage has already happened. In 20-30% of patients who do not receive therapy, the MI-causing artery is permanently present blocked. Because the infarction process takes many hours, most patients present while the myocardium can still be saved and the result improved. (Theofilis et al., 2023).

2.2.5.3. Diagnosis

A study of the nature of the pain and any accompanying symptoms, a review of the ECG, and repeated measures of biochemical indicators of cardiac injury such as troponin I and T are all important in determining the severity of acute chest pain. (Kim et al., 2022).

2.2.5.4. Acute Myocardial Infarction Treatment Guidelines

Ibanez, et al., (2018), reported that guidelines began be to the hospital, take rapid transit, a 12-lead electrocardiogram should be obtained and read in 10 minutes, blood samples for cardiac biomarkers, such as troponin, should be collected for testing, to help with diagnosis clarification, get further diagnostics, the start of routine medical procedures (Supplementary oxygen, Nitroglycerin, Beta-blocker with morphine and aspirin, Within 36 hours of administering an angiotensin-converting enzyme (ACE) inhibitor, Heparin and platelet inhibitors are used as anticoagulants, Statin), Indicators of reperfusion therapy should be evaluated:(Transcatheter aortic valve replacement, Fibrinolytic therapy is a form of thrombolysis.), The recommended course of therapy, (Clopidogrel (Plavix), fondaparinux, intravenous (IV) heparin, low-molecular-weight heparin, or bivalirudin, Glycoprotein IIb/IIIa inhibitor, During at least 12 to 24 hours, bed rest, At discharge, a statin was recommended).

2.3. Slow Deep Breathing

Breathing is the process of taking air from the atmosphere into the lungs, absorbing oxygen into the blood, and then releasing the air back into the atmosphere together with carbon dioxide and water vapor. Every four to five seconds, the breathing process is repeated. Therefore, at sleep or rest an adult will typically breathe twelve to fifteen times each minute, each time allowing 500 miles of air to enter the lungs all of the body's cells, including the brain and the organs that are crucial for life, are oxygenated by breathing. The body becomes more prone to illnesses when there is insufficient oxygen present. (Pleil et al., 2021).

The ability to manage and be aware of one's breathing can help to maintain and improve overall health as well as prevent many medical issues. Exercises that involve deep breathing can improve relaxation and alleviate diseases that are linked to stress. It can enhance digestion and avoid constipation and indigestion. Additionally, it can help with circulation and stabilize erratic heartbeats. It can normalize blood pressure and improve the performance of the neurological system. It has also been demonstrated to be helpful for a variety of illnesses, including gastric ulcers, migraines, chronic neck and back pain, sleeplessness, and panic disorders. Hamasaki H. (2020).

The lungs expand more fully when you breathe deeply, diaphragmatically, or abdominally with the lower portion expanding more than the upper portion. This promotes a greater exchange of gases. More oxygen needs to be inhaled and more carbon dioxide needs to be exhaled. (Kavitha, & Sujatha, 2018).

Heart disease risk factors that need to be considered include unhealthy lifestyle choices like smoking, obesity, inactivity, and poor food. So, changing these lifestyle variables is where management must start. The primary management for cardiac disease is pharmacological therapy. The deep breathing technique is one of the extra non-pharmacological therapies that can be used with lifestyle changes. Deep breath relaxation therapy was chosen as a non-pharmacological management method to lower patients' cardio parameters because it may be applied on its own. Compared to other non-pharmacological therapies, it is comparatively simple to implement. (Rippe, 2018).

While spontaneous breathing is carried out by the medulla oblongata, deep breathing is a conscious action to regulate breathing profoundly by the cerebral cortex. Nitric oxide, which is responsible for calming down people and lowering high blood pressure, will be stimulated by deep breathing and enter the lungs and even the brain center. Nitric oxide synthase, an endothelial enzyme, produces nitric oxide from L-arginine Endothelial nitric oxide synthase (eNOS). Local mediators, which also elevate intracellular calcium, have an impact on the activity of eNOS and the creation of nitric oxide. Bradykinin, histamine, serotonin, and other neurotransmitters are among the local mediators. Nitric oxide is continuously produced, and this will alter vascular resistance. It is also known that eNOS inhibition raises blood pressure. (Herawatiet et al., 2023); (Förstermann, & Sessa, 2012).

The continual production of nitric oxide, a vasodilator that is vital for controlling blood pressure, from the arterial and arteriolar endothelium stresses the endothelial cells by causing blood viscosity against the vascular wall. The stress created can alter the structure of endothelial cells to flow in that direction and enhance the release of nitric oxide, which causes the blood vessels to become relaxed, elastic, and dilated. Blood arteries that are relaxed will open up, allowing for improved cardiac function, smoother blood flow, and a reduction in central venous pressure (CVP). Following a drop in CVP, cardiac output will also drop, and arterial pressure will remain stable. Atherosclerotic arteries and veins have similar resistance but veins have a bigger diameter. Consequently, veins also function as blood volume storage and are referred to as capacitance channels. (Hoesny et al., 2020).

Cardiac output (CO) is the amount of blood that the heart pumps through the systemic circulation in a time frame that is measured in liters per minute. Three parameters, namely filling volume or end-diastolic volume, ejection fraction, and heart frequency, have a direct impact on cardiac output. Lower cardiac output and blood volume can result in lower blood pressure. Deep breathing exercises are a comprehensive and non-invasive treatment that can help with lung disorders, excessive blood pressure, depression, anxiety, insomnia, and cardiac autonomic function. It is regarded as a wonderful method to promote relaxation since it has been shown to balance body and brain function, consciousness-unconsciousness, and sympathetic-parasympathetic systems function. (Ghorbani et al., 2018); (Bruss, & Raja, 2022).

Examples of respiratory muscle training techniques include breathing exercises and machine-assisted respiratory exercises like inspiratory muscle training (IMT). This significantly affects dyspnea, inspiratory muscle strength, and walking distance. These breathing exercises are appropriate for both hospital and non-hospital settings since it has been shown that they reduce the risk factors for cardiovascular disease by using breathing modification and relaxation strategies. (Wang, & Yeh, 2019).

Regulation of breathing offers a strong voluntary portal for coordinating and controlling brain autonomic networks. Deep slow breathing has shown promise as a relaxing strategy in numerous cardiorespiratory studies. Breathing at 6 breaths per minute, or approximately 0.1 Hz, has been shown in recent studies to promote behavioral relaxation and baroreflex resonance effects, which maximize heart rate variability. Sevoz, & Laborde, 2022).

2.4. Incentive Spirometer

A device to measures how much air is inhaled into the lungs during inspiration. Because it provides the patient with visual cues to conduct a slow and deep inspiration, the incentive spirometry device is frequently utilized in physical, speech, and respiratory therapy .t's crucial to inhale slowly when using a spirometer since it stretches the lungs and widens the airways, simulating the deep breathing that occurs when yawning or sighing. The incentive spirometer assesses a patient's inspiratory effort by monitoring inhalation volume. The incentive spirometer can be utilized as a helpful tool in rehabilitation because it is inexpensive, simple to use, and has no known negative effects. It is simple to teach and does not require assistance after a patient has learnt how to use it correctly. Furthermore, the visual input promotes patient compliance. (Soet et al., 2012); and (Franklin, 2023).

2.4.1. Types of Incentive Spirometer

First-A ball is contained in each of the three chambers that make up the flow-oriented Incentive Spirometer (FIS) (Tri-flow device), arranged in a series. As the patient breathes in, beneath the atmosphere is created above the ball, causing it to rise in the chamber. Achieving the ball rises in the first chamber at 600 mL/s, the ball in the second column at 900 mL/s, and the ball in the third chamber at 1200 mL/s when there is an inspiratory flow to rise. (Eltorai et al., 2018)

Second-The tiny volume-oriented incentive respirometer (VIS), which has a 4000 mL capacity, has a one-way valve that limits the amount of air that may be exhaled into the device. It consists of a mouthpiece and large-bore breathing hose that are corrugated, which connects the patient to a flexible plastic bellow. Through an indicator on the device enclosure, the bellow rises when the patient inhales through the breathing hose, showing volumetric displacement. When the bellow has reached, the patient is instructed to retain the end-inspiratory hold, or its maximum displacement, for a duration of 5 to 10 seconds in the same position. Upon finishing the technique, the patient takes off the mouthpiece, enabling gravity to bring the bellow back to its initial position place. (Amin et al., (2021).

2.4.2. Indication of Incentive Spirometer

General surgery that necessitates a longer stay in the hospital: In the preoperative and postoperative circumstances, incentive spirometry use is ineffective on its own to prevent pulmonary problems after surgery. In order to reduce postoperative pulmonary problems, incentive spirometry might be combined with other pulmonary rehabilitation strategies, such as deep breathing exercises, targeted coughing, sufficient pain management, and early mobilization. (Fuchshuber et al., 2012).

Ankylosing Spondylitis: By improving their arterial blood gases and lung function, patients with ankylosing spondylitis may benefit from incentive spirometry. (Soet al., 2012).

Parkinson's illness: A less frequent sign of the illness is respiratory impairment. Respiratory early on in the disease's progression, muscular weakness may be observed. In the more developed phases, coughing becomes less effective due to lung enlargement, bad posture, and restricted chest motion. Aspiration pneumonia, one of the largest risk factors for mortality for people with Parkinson's disease in its advanced stages, could result from this. When persons with Parkinson's disease have respiratory dysfunction, inspiratory muscle exercise can be useful. van de Wetering-van (Dongen et al., 2020).

Adults who suffer from mild to severe asthma may discover that using breathing techniques enhances their life quality, lessens improves lung function and alleviates symptoms of hyperventilation. (Santino et al., 2020).

Cystic Fibrosis: The incentive spirometer can aid patients with cystic fibrosis by cleaning their airways and improving lung function. (Sokol et al., 2015)

Coronavirus illness COVID-19: Patients with mild to severe symptoms of COVID-19, such as pneumonia and secretory clearance issues, are advised to undergo pulmonary rehabilitation, which includes inspiratory muscle training. Additionally, there are significant benefits to strengthening the inspiratory muscles in individuals undergoing mechanical breathing. Patients with a fever, dry cough without productive discharge, or radiographic findings showing no changes in the thorax should not perform breathing exercises. (Bernal et al., 2021).

In cases of lung fibrosis caused by an unknown cause, pulmonary rehabilitation has been demonstrated to enhance exercise tolerance and reduce respiratory symptoms. Enhancement in respiratory muscle strength, pulmonary compliance, and breathing efficiency could be attributed to the expansion of the chest when taking long, deep breaths exercise as well as thoracic muscle stretching. The majority of research on pulmonary rehabilitation for patients with idiopathic pulmonary fibrosis combines exercises that target both resistance and suppleness in the peripheral skeletal muscles with aerobic exercise, such as walking or cycling. In patients awaiting lung transplantation as well as at any point in the course of the idiopathic pulmonary fibrosis disease process, pulmonary rehabilitation should be taken into consideration. (Spagnolo et al., 2018).

Among the most dangerous pulmonary consequences inside connective tissue illnesses is interstitial lung disease. Exercises like walking, lifting weights, using the muscles of the inspiratory system, and breathing exercises are examples of non-pharmacological therapies. (Vacchi et al., 2020).

Multiple Sclerosis: Resistant inspiratory muscle training has been shown to considerably raise patients with mild to severe multiple sclerosis at their highest inspiratory pressure. (Rietberg et al., 2017).

2.4.3. Contraindication of Incentive Spirometer

The use of an incentive spirometer requires a number of safety measures. Spirometry can be used in any situation, yet there are several that are definitely not recommended. circumstances should be taken into consideration before beginning inspiratory muscle training: A respiratory tract infection, Unknown source of hemoptysis, Pneumothorax, Unmanaged high blood pressure, Aneurysm, Recent surgery on the thoracic, abdominal, or ocular regions, Nausea, vomiting, or discomfort; and Dementia or confusion. (Jat, 2013)

When employing a high-intensity incentive spirometer, patients with bullous emphysema should exercise caution. The patient's repeated, strong breaths against resistance while suffering from emphysema and lung hyperinflation may have contributed to the development of the pneumothorax. Large changes in intrathoracic pressure during inspiratory breathing can put the lung tissue under more strain. (Kenny, & Kuschner, 2013)

2.5. Electrocardiographic Findings

A graphic representation of the electric potentials the heart produces is called an electrocardiogram (ECG or EKG). The instantaneous variations in electrode potential are clearly seen in the ECG leads. Because it is quick, non-invasive, low-cost, and incredibly adaptable test, the ECG has clinical utility. Electrocardiography is used for a variety of purposes, including the detection of arrhythmias, conduction abnormalities, and myocardial ischemia. It may also show signs of life-threatening metabolic abnormalities, such as hyperkalemia or conditions like QT prolongation syndromes that enhance a person's risk of sudden cardiac death. (Sattar, & Chhabra, 2023).

2.4.1. Major ECG Abnormalities

The typical speed of ECG paper is 25 mm/second, meaning that a small box (1 mm) corresponds to 0.04 seconds (40 milliseconds) and a large box (5 mm) to 0.2 seconds (200 milliseconds). Note the standardization square, which is typically 10 mm high by 5 mm wide, at the start of an ECG. This will notify you of the proper paper speed as well as the P, QRS, and T-wave complex standard amplification. ECG wave and interval value, RR time interval: 0.6–1.2s, P wave duration: 80 ms, PR interval: between 120 and 200 ms, PR segment duration: 50–120 ms, QRS complex: between 80 and 100 ms, ST segment: between 80 and 120 ms, T wave duration: 160 ms و When the heart rate is 60 beats per minute (bpm), the QT interval is 420 milliseconds or less. (Sattar , & Chhabra, 2023)

Diagnosing both acute and chronic ischemic heart disease relies heavily on the ECG. The extent (transmural versus subendocardial), duration (acute versus chronic), localization (anterior versus anteroposterior), and the dichotomy between the reversible process (ischemia) and the irreversible process (infarction) around the findings, as well as the presence of other underlying abnormalities (ventricular hypertrophy, conduction defects). In cases of transmural acute ischemia, the ST vector is typically moved in the direction of the outer (epicardial) layers, resulting in ST elevations and, occasionally, in the early stages of ischemia, tall, positive so-called hyperacute T waves across the ischemic zone. (Sattar, & Chhabra, 2023).

The intensity of acute ischemia ST deviations is influenced by a variety of variables. In most cases, extremely acute ischemia is indicated by profound ST elevation or depression in several leads. The localization of ST-elevation areas is typically easier using the ECG leads than non-ST-elevation ischemia. Leads II, III, and aVF undergo alterations as a result of inferior wall ischemia. Reciprocal ST depressions in leads V1 to V3 may serve as an indirect indicator of "posterior" wall ischemia, which is typically linked to lateral or inferior involvement. This ST elevation is "equivalent" to acute coronary syndrome. (Birnbaum et al.,2014).

In the right-sided chest leads, right ventricular ischemia frequently results in ST elevations. It is common for After ischemic ST elevations, which are the initial signs of acute infarction, progressive T-wave inversions and frequently Q waves will show up in the same lead distribution in a matter of hours to days. The ST elevations may completely vanish in a few minutes, depending on the severity and duration of the ischemia, or they may be followed by T-wave inversions that continue for several hours or even days. When experiencing episodes of acute transmural ischemia, patients with baseline ECGs that already exhibit anomalous T-wave inversions may, on the other hand, experience T-wave normalization (pseudonormalization). (Said et al., 2015).

Depolarization (QRS) alterations and repolarization (ST-T) anomalies frequently coexist with infarction. Even in the absence of transmural, significant myocardial necrosis may result in aberrant Q waves or decreased R-wave amplitude in the anterior or inferior leads. Reverse increases in R-wave amplitude in lead V1 and V2 without diagnostic Q waves in any of the conventional leads may occur when depolarization forces are lost as a result of a posterior or lateral infarction. (Haïssaguerre et al., 2019).

Changes in P-wave morphology, atrial arrhythmias, or atrial current damage may all be related to atrial infarction and result in PR-segment deviations. ST-segment elevations, on the other hand, that last for a few weeks or longer after a Q-wave infarct typically indicate a serious underlying wall motion abnormality (akinetic or dyskinetic zone), albeit not always a true ventricular aneurysm. Depending on the exercise technique used, ischemia-related ECG alterations may happen on their own or are induced by it. (Lu et al., 2015).

2.5. Previous Studies

First Study:

"Comparison of the effect of incentive spirometry and deep breathing exercises on hemodynamic parameters of patients undergoing coronary artery bypass graft surgery: A Clinical Trial " Zerang et al., (2022) 39

Background and Objective

This study is conducted because One of the most frequent side effects following coronary artery bypass graft (CABG) surgery is hemodynamic alterations. Patients having CABG surgery frequently benefit from deep breathing exercises (DBEs) and incentive spirometry (IS). The purpose of the study was to assess how IS and DBEs affected the patients' oxygenation and hemodynamic parameters during CABG surgery.

Methods

Forty individuals with heart disease who were eligible for coronary artery bypass graft surgery participated in this research trial. Convenience sampling was used to choose participants, who were then split into two groups at random. One group learned how to conduct DBP the day before surgery, whereas the other group learned how to actually employ IS. Prior to the intervention, as well as on the first, second, and third days following the intervention, hemodynamic and oxygenation indices were assessed and documented. Descriptive and inferential statistical tests, as well as SPSS version 16, were used for data analysis.

Results

On the initial day following the intervention, patients in the IS group had significantly higher mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) compared to those in the DBE group ($p<0.05$). On the third post-intervention day, patients in the IS group had a considerably higher mean arterial oxygen saturation (SaO_2) and a significantly lower mean respiratory rate (RR) than those in the DBE group ($p <0.05$). But there was no discernible difference between the two groups in terms of other indices ($p> 0.05$).

Conclusion and Recommendation

Based on the findings, it is advised to employ IS to help patients undergoing CABG achieve better hemodynamic and oxygenation indices, since it has been shown to have a stronger impact on these parameters than DBE.

Second Study:

" Efficacy of Incentive Spirometer in Increasing Maximum Inspiratory Volume in an Out-Patient Setting " Tutor (2022).

Background

The cornerstone of therapy for postoperative patients that has received extensive research in the inpatient setting is incentive spirometry (IS). Research has demonstrated that the use of IS increases lung capacities and lowers the incidence of pneumonia in patients recovering from surgery. The benefits of it are, however, unclear from the literature because many studies also show no discernible benefits, particularly when compared to early ambulation. The purpose of our study was to ascertain whether lung function in an outpatient context can be enhanced by a regular IS program.

Methods

The study involved patients in a physical medicine and rehabilitation clinic during the COVID pandemic. Each participant was given the IS along with hands-on instruction on how to use the device and accurately record measurements. Patients were asked to lie down and inhale and exhale through the tube ten times. Patients were instructed to complete this exercise three times a day for 30 days. Patients were advised to contact their primary care physician if they experienced any new symptoms.

Results

A study involving 48 patients with a mean age of 58.0 years found that after exercise, lung capacity increased significantly. However, no significant difference was observed between baseline and maximum inspiratory volumes. During the 30-day period, no symptoms or COVID-19 infection were reported, and no participants contacted primary care physicians.

Conclusion

Study participants saw a 16% increase in maximal inspiratory volume over a 30-day period when prescribed daily breathing exercises with an incentive spirometer, and they did not require consultation with their primary care physician during the study.

Third Study:

" Effects of incentive spirometry on cardiopulmonary parameters, functional capacity and glycemic control in patients with Type 2 diabetes "[39]

Aweto, et al., (2020)

Background and Objective

Cardiopulmonary impairment and inspiratory muscle weakness are common symptoms in patients diagnosed with Type 2 diabetes mellitus (T2DM). this study determines how incentive spirometry (IS) affects certain cardiac measures, functional ability, and glycemic management in individuals with type 2 diabetes.

Methods

The study was completed by fifty-nine individuals (25 men and 34 women) who were randomly assigned to two groups and recruited from the outpatient clinic of the Department of Medicine of two hospitals in Lagos State, Nigeria. While the control group remained only with medication care of T2DM, the IS group received incentive spirometry in addition to it. At the start of the intervention and at its conclusion, a number of cardiovascular, pulmonary, functional ability, and fasting blood glucose levels were measured. SPSS Version 21, the statistical package for social sciences, was used to examine the data. All of the cardiovascular indicators of the IS group showed statistically significant improvements, with the exception of systolic blood pressure. In contrast to the control group, the IS group experienced significant changes in all pulmonary indices, functional ability, and glycemic control. With the exception of diastolic blood pressure and blood glucose level, there were notable disparities in the mean changes of a number of chosen end variables between the two groups.

Results

All of the cardiovascular indicators of the IS group showed statistically significant improvements, with the exception of systolic blood pressure. In contrast to the control group, the IS group experienced significant changes in all pulmonary indices, functional ability, and glycemic control. With the exception of diastolic blood pressure and blood glucose level, there were notable disparities in the mean changes of a number of chosen end variables between the two groups.

Conclusion

IS improved glycemic control, functional ability, and cardiopulmonary function in T2DM patients.

Fourth Study:

" Effect of Incentive Spirometry on Cardiac Autonomic Functions in Normal Healthy Subjects " Ajudia, et al., (2013)

Background and Objective

One definition of breathing exercise, or pranayama, is a therapeutic intervention in which a specific breathing pattern is intentionally altered. Fundamental interventions for prevention and all-encompassing management include breathing exercises. The main reason for researching pranayama is its potential benefits in treating autonomic nervous system imbalances, pulmonary diseases, cardiovascular diseases, and psychological or stress-related disorders. Various pranayama techniques stimulate distinct autonomic nervous system branches. The Objective of it was to investigate the impact of Incentive Spirometry on cardiac autonomic functioning in healthy, normal participants aged 18 to 25.

Methods

This study involved thirty people, fifteen in the Study group and fifteen in the Control group. The investigation lasted for three months. Testing cardiac autonomic function was one of the primary outcome measures. Prior to and three months following the trial, outcome measures were documented.

Results

The following parameters showed statistically significant changes ($p < 0.05$) after three months of practicing incentive spirometry: minimum heart rate and deep breathing difference (DBD) during heart rate response to deep breathing test; basal heart rate, immediate maximum heart rate, steady state heart rate, and steady state heart rate (time in seconds).

Conclusion

The autonomic function response is altered by three months of incentive spirometry practice.

Fifth Study:

" Comparison between deep breathing exercises and incentive spirometry after CABG surgery " Renault et al. (2009)

Background and Objective

Following CABG surgery, patients frequently experience atelectasis, restrictive ventilatory disorder, and hypoxemia, among other forms of pulmonary dysfunction. The inability to perform effective coughing and periodic deep inspiration due to changes in lung mechanics following surgery causes pain and postoperative fear, which can lead to secretion accumulation, alveolar collapse, and altered gas exchange. The aim of study compared the effects of Flow-oriented incentive spirometry (IS) and breathing exercises (DBE) were administered to patients who had received coronary artery bypass grafting (CABG).

Methods

During the first 24 hours following extubation, 36 patients in the CABG postoperative period received 30 minutes of non-invasive ventilation. They were then randomized into two groups: DBE (n = 18) and IS (n = 18). On the preoperative period and the seventh postoperative day (POD), the spirometric variables were measured. On the preoperative period, first, second, and seventh postoperative days, the respiratory muscle strength and oxygen saturation were measured.

Results

The study found homogeneous groups with similar demographic and surgical variables. FVC and FEV1 values fell between preoperative and seventh postoperative days, with partial recovery until seventh postoperative day. The oxygen saturation was the only variable that was completely recovered on the seventh POD, also without significant differences between groups.

Conclusion

Patients who underwent deep breathing exercises and flow-oriented incentive spirometry following coronary artery bypass grafting did not exhibit statistically significant differences in maximal respiratory pressures, spirometric variables, or oxygen saturation.

Chapter Three

Methodology

Chapter Three

Methodology

All of the methodological techniques utilized in this study design will be covered in this chapter: the study's administrative agreement, ethical dilemma, sampling strategy, inclusion and exclusion standards, stage of the investigation, study tool, and data collection and analysis techniques**.**

3.1. The study's Design

To accomplish the aims of these studies, a quasi-experimental design was in conjunction with the use of pre and post-test approaches for both the study and controlled groups. This study applied in the Kerbala Center for cardiovascular diseases and surgery started from 26 September 2022 to 22 January 2024.

3.2. Administration of Arrangement

In accordance with the Nursing College Council's acceptance of the study project (Appendix B), the investigator sent a comprehensive explanation of the study objectives sent to the Ministry of Planning to ensure the letter's consent and collaboration, additional permission was also obtained from the Department of Planning and Health Research and the Directorate of the Kerbala Center for cardiovascular diseases and surgery (Appendix D).

3.3. Ethical Considerations

The study was approved by the ethical committee of research in the faculty of nursing sciences (Appendix A, and B). Before beginning the study, authorization was obtained in writing and orally from the Arrangement of Ministry of Health /Kerbala Health Department / Training and Human Development Center and the Kerbala Center for cardiovascular diseases and surgery (Appendix D and C).

The study aimed to determine whether a slow, deep breathing regimen was useful for treating patients with coronary artery disease. The participants received assurance of that information. Data gathered by the questionnaire would be kept created and only used for research purposes (Appendix F).

3.4. Setting of the Study

The Kerbala Center for cardiovascular diseases and surgery was chosen as the site for data collection. The following criteria were used to select the hospital:

3.4.1 All adult patients with heart illnesses who receive treatment and follow-up were visit hospital.

3.4.2 These hospitals have cardiac care units and medical divisions.

3.4.3 The Kerbala Center for cardiovascular diseases and surgery this center consists of three Catheterization laboratories, a Catheterization unit one for males and the other for females each with 7 beds capacity for, white the third one is a Coronary care unit consisting of 18 beds.

3.4.4. The availability of physical necessities like an ECG, monitor, pulse oximeter, balance scale, and sphygmomanometer that are required for the program's implementation.

3.5. Study Samples

The purposive sample of (50) patients who provide diagnosis with coronary artery disease status divided into two equal groups. The control group receive a routine medical therapy for CAD, while the study group received both medical management of CAD and intervention session slow, deep breathing using incentive spirometer techniques. The following criteria were used to choose participants:

3.5.1. Inclusion Criteria

1. An official CAD medical diagnosis.

2. The patient's condition is stable.
3. Adults above the age of 18 who could participate in study procedures and follow instructions.
4. Patient not participating in a systematic aerobic exercise program in the six months before.
5. Mindful, goal-oriented, and cooperative**.**

3.5.2. Exclusion Criteria

1. Patients who are anticipated to be unable to perform or adhere to IS, such as those with cognitive or neurological limitations.
2. People who suffer from both acute and chronic respiratory diseases.
3. Patients who are unable to receive instructions or supervision to ensure proper device use.
4. Patients having cardiac surgery, including emergency and elective procedures.
5. Patients who require prolonged mechanical ventilation (more than 24 hours), re-intubation, or who experience breathing problems, invasive ventilator support, or oxygen saturation below 90%.
6. Bradycardia, hypotension, and hemodynamic instability impair protocol performance**.**

3.6. Selection of the Sample

A total sample of (60) patients with CAD was admitted to the cardiac care unit during the time of the study period met the study criteria and agreed to participate. Ten patients for the pilot study were excluded from the study. twenty-five to the study group who participated in the program and twenty-five were assigned to the control group that did not participate in the program.

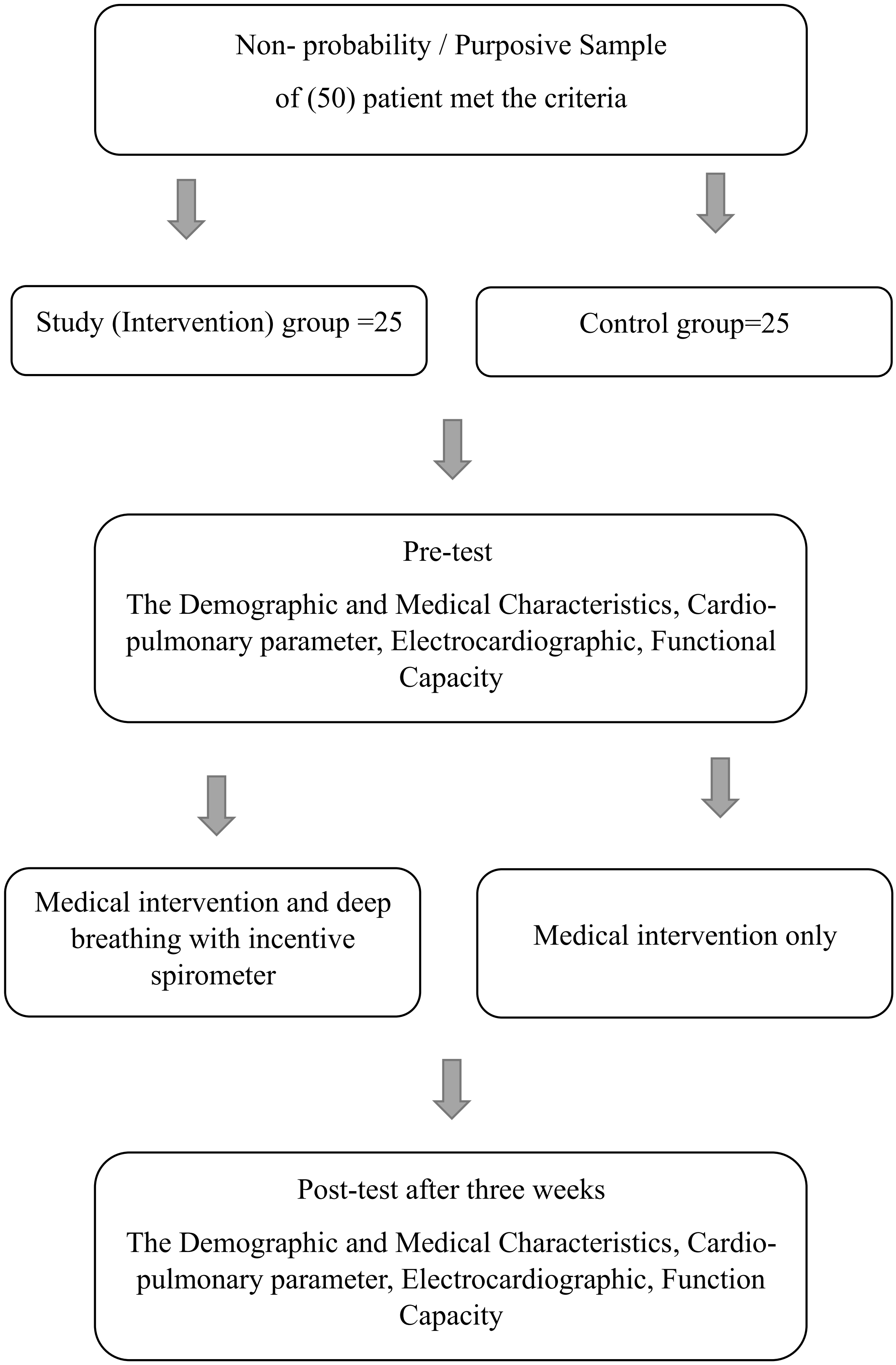

Figure 3-1. Study Steps

3.7. Group Assignment

3.7.1. Control Group

The control group received the medical care without the intervention programs.

3.7.2. Study Group

The study group received the same information as the control group plus an intervention of deep breathing by using an incentive spirometer, The program consisted of three sessions per day every 8 hours and was implemented for three weeks period.

Each session was designed and scheduled for approximately 20 -30 minutes which ran for three weeks at home with direct communication with the researcher and providing all participants with steps of the procedure. physical materials which were used during these sessions included (an incentive spirometer).

3.8. Review the Steps

The following step was taken in the current study

3.8.1. Need Assessment

Chosen 10 patients from the Karbala Center for cardiovascular diseases and Surgery to assess the knowledge about the use and benefits of the slow deep breathing and incentive spirometer the result shows the rate of false answer was 81% camper with the true answerer was19% (appendix F_1).

3.8.2. Program and Questionnaire

3.8.2.a. Implementation of the Program

The Implementation of the intervention was carried out in cardiac care units in the Kerbala Center for Cardiovascular Diseases and Surgery beginning on February 27 and running through June 5, 2023, to collect 50 patients with CAD according to the criteria and to conduct the study, the implementation of the program which was introduced to the study group, The daily working hours to collect the sample varied from one day to the next, and the method of collecting information was through interviews and biophysical to obtain cardiovascular parameter Demographic data form was filled by each participant at cardiac care unit, The questionnaire consisted of (4 parts) introduced to both study and control groups. The time varied from one patient to another to obtain the data and the application of the procedure and then teach the patient about the steps of the intervention and apply them for patients was performed, and every patient in the study was given a pre-test.

The preliminary examination for the pre-test for the questionnaire lasted 20 minutes Approximately The pre-test for the therapeutic program was 20 -30 minutes The therapeutic program was introduced to the 25 patients with CAD in the study cohort. Three weeks passed during the program. In-home sessions were used to implement the curriculum. Every session was planned and arranged to approximately the procedure 10 times every 8 hours three times a day for three weeks with follow-up daily to ensure the program's effect. while giving each patient a brochure containing the steps of the intervention and obtaining

The special number to create a special group for women and men for continuous follow-up and ensuring the implementation of the procedure, along with creating a daily schedule for the sessions that the patient takes. After three weeks of intervention, the participants were contacted to come to the Karbala Center for Cardiac Diseases and Surgery to perform the post-procedure, and information was obtained. All patients in this study sample were immediately exposed to retesting at the intervention end for both the intervention and the control groups, regarding the control group, the same above steps were followed except for the deep breathing exercises.

3.8.2.b. Instrument Construction

A Four-part administered questionnaire was used to evaluate the impact of the program on the patient by assessing the importance and advantages of slow, deep breathing when using IS on patients with CAD (appendix G).

Part: I: The Demographic and Medical Characteristics

This section focuses on gathering demographic information from patients via interview questionnaires, including questions about age, gender, marital status, place of residence, smoking status, smoking habit type, daily cigarette/hookah consumption rate, years of smoking history, weight, height, body mass index (BMI), and other chronic diseases.

Part II: Cardio-pulmonary parameter

This section was focused on assessing the patient's Cardio-Pulmonary Parameters which consists of apical Rate, Pulse Rate, Blood Pressure (Systolic Blood Pressure and Diastolic Blood Pressure), Rate Pressure, Mean Arterial Pressure, Pulse Pressure, Cardiac Output, Respiratory Rate, Oxygen Saturation

Part III: Electrocardiographic Findings

The purpose of this section was to assess patient ECG changes in the condition. This consists of Rate, Rhythm (Regular or Irregular), P-wave, Axis, (Normal, Left Axis Deviation, Right Axis Deviation), P-R interval QRS- wave, ST-segment, T-wave.

Part IV: Function Capacity

The Physical Functional Ability Questionnaire (FAQ5), a performance-based instrument that focuses on each individual's ability to A self-care ability assessment includes require total care for bathing, toilet, dressing, moving, and eating, require frequent assistance, require occasional assistance, independent with self-care. family and social ability assessment included. unable to perform any - chores, hobbies, driving, sex, and social activities, able to perform some, able to perform many, able to perform all. and movement ability assessment includes able to get up and walk with assistance, unable to climb stairs. able to get up and walk independently; able to climb one flight of stairs; able to walk short distances and climb more than one flight of stairs; able to walk long distances and climb stairs without difficulty. lifting ability assessment included able to lift up to 10 lbs occasionally; able to lift up to 20 lbs occasionally; able to lift up to 50 lbs occasionally; able to lift over 50 lbs occasionally. and work ability assessment unable to do any work able to work part-time and with physical limitations able to work part-time or with physical limitations the ability to perform normal work was utilized in the construction of this component to evaluate functional capacity. evaluations of your lifting and working abilities.

3.9. Rating and scoring

The following guidelines were used in the examination and grading of the items:

3.9.1. Rating and scoring for body mass index (BMI)

Adults' anthropometric height and weight features are currently defined through the body mass index (BMI), which is additionally utilized to classify (categorize) adults into groups.

3.9.2. Rating and scoring for rate-pressure product (RPP)

The product of systolic blood pressure (SBP) and heart rate (HR) is known as the rate-pressure product (RPP), it a commonly used clinical indication of myocardial oxygen demand. It is very dependable.

$$RPP = HR * SBP$$

According to Verma, et al., (2018) The usual rate pressure product, or RPP, shouldn't be more than 10,000. Ranges for the RPP index are displayed in the table below.

Rate pressure product	**Hemodynamic response**
≥30,000	High
25,000-29,999	High intermediate
20,000-24,999	Intermediate
15,000-19,999	Low intermediate
≤14,999	Low

3.9.3. Rating and scoring for Mean Arterial Pressure

Mean arterial pressure (MAP) is defined as the average arterial pressure during systole and diastole of a single cardiac cycle. Systemic vascular resistance and cardiac output both have an impact on MAP, and they are both controlled by many factors. The formula below is a typical technique for estimating the MAP:

$$MAP = DP + 1/3(SP - DP) \text{ or } MAP = DP + 1/3(PP)$$

According to DeMers, et al., (2019) A normal range for mean arterial pressure is 70–100 mmHg.

3.9.4. Rating and scoring for pulse pressure.

Pulse pressure is the difference between the diastolic and systolic blood pressure.

The highest pressure that the aorta experiences during a heartbeat, when blood is expelled from the left ventricle into it, is known as the systolic blood pressure (about 120 mmHg). The lowest pressure that the aorta experiences before the heart contracts and let's go of blood from the left ventricle is known as the diastolic blood pressure, which is roughly 80 mmHg.

$$PP = SBP - DBP$$

According to Homan, et al., (2023) Consequently, a normal pulse pressure is about 40 mmHg.

3.9.5. Rating and scoring for Cardiac Output

Cardiovascular output (CO) is the amount of blood the heart pumps out every minute, and blood is distributed throughout the body by this mechanism, particularly to the brain and other essential organs. King, et al., (2023).

$$CO = (PP * HR) * .002$$

3.10. Interventional Protocol

According to the study convected by Franklin, et al., (2023); and Kumar, et al., (2016)

1. Maintaining good posture whether sitting or standing, as well as holding the incentive spirometer erect and correctly,
2. Inhaling slowly and deliberately through the mouthpiece is advised for the patient.
3. The piston rising to the marking provides the patient with visible feedback.
4. Holding his breath is instructed for the patient. at full inspiration for a minimum of two or three seconds.
5. The mouth should no longer be sealed shut during the quiet, leisurely process of expiration.
6. To help further empty the lungs of the mucus, coughing should be encouraged after ten inhalations.

7. Advised the participant to repeat the incentive spirometer use for at least ten deep breaths every three times per day for three weeks

3.11. Validity of the Program and the Questionnaire

A panel of 10 experts with a combined experience of the program's content was reviewed by professionals with more than five years in their professions. These experts were requested to examine the program and the instruments for content, clarity, relevance, and appropriateness; after a conversation with each expert and after the instrument was deemed legitimate (Appendix E).

Experts	Number
Faculty of Nursing at the University of Al-Ameed	1
Faculty of Nursing at the University of Al-Safwa	1
Faculty of Nursing at the University of Karbala	2
Faculty of Nursing at University of Babylon	1
Faculty of Nursing at University of Kufa	3
Ministry of Health	2
Total	10

3.12. A Reliability of the Instrument

Using a test-and-retest methodology, the reliability of the questionnaire was assessed by examining 10 patients chosen from the Karbala Center for Cardiac Diseases and Surgery for three weeks.

Methods of reliability	Criteria of the study	Actual values	No. of Items	Assessment
Correlation	Physical Functional Ability Questionnaire	0.763	26	Acceptable

There is display the research instrument is acceptable and sufficient to evaluate the sample according to Correlation value (0.   0.763).

3.13 . Pilot Study

To determine the reliability of the intervention and study instruments, A pilot study was carried out on (10) participants who were randomly divided into two groups five participants in each group, study and control groups. The participants in the pilot study had the same criteria as the original study sample, it was conducted at The Kerbala Center for Cardiovascular Diseases and Surgery during the period from 1 February 2023 to 21 February 2023.

Participants in both groups had been submitted to a pre-test and only the study group was exposed to the intervention. Finally, test-re-test was introduced to both groups the sample of the pilot study was excluded from the original study.

3.13.1. The Purpose of Pilot Study

1. To determine whether the study participants could understand and follow the program's instructions.
2. To determine how much time will be needed to answer each question.
3. To assess the accuracy of the questionnaires.

3.13.2. The Results of Pilot Study Showed that

1. The program was easy to understand.
2. 20 to 30 minutes were needed to complete the questionnaire.
3. Each patient's learning period in the program takes about 20 minutes and provides all patients with folded-up steps of therapy.
4. Each session lasted for just under an hour.

3.14. Data Collection

A pre-test was carried out to assess the created program was put into action. To assess the benefits of the slow deep breathing which practiced by

IS after three weeks of the program's execution, a post-test using the same questionnaire was conducted.

3.15. Statistical Analysis

The statistical analysis system SPSS (Statistical Package for Social Sciences) version 26 and the Excel program are used to analyze data. The outcomes of the study were analyzed and evaluated using the following statistical data analysis techniques:

3.15. 1. Descriptive data analysis:

$$\text{Percentages (\%)} = \frac{\text{Frequencies}}{\text{Sample Size}} * 100$$

3.15. 2. Inferential data analysis:

The following statistical hypotheses were among those that were used to determine whether to accept or reject them:

1. The Paired-Samples T Test-technique compares the two variables' means for a single group.
2. Independent samples t-test: examines two means of independent groups to see if the hypothesis that the associated population means differ noticeably is statistically supported.
3. Analysis of variance (ANOVA), which stands for Analysis of Variance: is a statistical test that examines how the means of more than two groups differ from one another.

Chapter Four

Results of the Study

Chapter Four

Study Results

Table 4.1. ***Participants' demographic characteristics***

	Study Group (n = 25)		Control Group (n = 25)		p-value
	Frequency (f)	Percent (%)	Frequency (f)	Percent (%)	
Smoking					
Never	13	52.0	13	52.0	
Before	7	28.0	8	32.0	.959
Currently	5	20.0	4	16.0	
Smoking Type					
Cigarette	7	58.3	7	58.3	
Cigarettes and hookah	2	16.7	5	41.7	
Electronic cigarettes and cigarettes	3	25.0	0	0.0	.858
Total	12	100.0	12	100.0	
Number of cigarettes					
< 10	3	25.0	6	50.0	
10-20	9	75.0	6	50.0	.595
Total	12	100.0	12	100.0	
Duration of smoking (Years)				*	
< 10	1	8.3	1	8.3	
10-20	8	66.7	4	33.3	.832
> 20	3	25.0	7	58.3	
Total	12	100.0	12	99.9	

* Percent is not exactly 100.0%

The mean age for participants in the study group is 60.0 ± 7.59; less than a third age 55-60-years (*n = 8*; 32.0%), followed by those who age 49-54-years (*n = 6*; 24.0%), those who age each of 61-66-years and 67-72-years (*n = 5*; 20.0%) for each of them, and one who ages 42-years (*n = 1*; 4.0%). For the control group, the mean age is 57 .6 ± 8.38; more than a third age 49-54-years (*n = 9*; 36.0%), followed by those who age 61-66-years (*n = 8*; 32.0%), those who age each of 55-60-years and 67-72-years (*n = 3*; 12.0%), and those who age 42-48-years (*n = 2*; 8.0%).

Concerning sex, most in the study group are males (*n = 15*; 60.0%) compared to females (*n = 10*; 40.0%). For the control group, more than half are males (*n = 13*; 52.0%) compared to females (*n = 12*; 48.0%).

Regarding marital status, all participants in the study and control groups are married (*n = 25*; 100.0%) for each of them.

With respect to residency, most in the study group reported that they have been living in urban areas (*n = 19*; 76.0%) compared to those who have been living in rural areas (*n = 6*; 24.0%). For the control group, the majority reported that they have been living in urban areas (*n = 21*; 84.0%) compared to those who have been living in rural areas (*n = 4*; 16.0%).

Table 4.2. ***Participants' smoking status***

	Study Group (n = 25)		**Control Group (n = 25)**		**p-value**
	Frequency (f)	Percent (%)	Frequency (f)	Percent (%)	
Smoking					
Never	13	52.0	13	52.0	.959
Before	7	28.0	8	32.0	
Currently	5	20.0	4	16.0	
Smoking Type					
Cigarette	7	58.3	7	58.3	.858
Cigarettes and hookah	2	16.7	5	41.7	
Electronic cigarettes and cigarettes	3	25.0	0	0.0	
Total	12	100.0	12	100.0	
Number of cigarettes					
< 10	3	25.0	6	50.0	.595
10-20	9	75.0	6	50.0	
Total	12	100.0	12	100.0	
Duration of smoking (Years)				*	
< 10	1	8.3	1	8.3	.832
10-20	8	66.7	4	33.3	
> 20	3	25.0	7	58.3	
Total	12	100.0	12	99.9	

* Percent is not exactly 100.0%

The study results display that more than half of participants in the study group reported that they never smoked (*n = 13*; 52.0%), followed by those who smoked before "ex-smokers" (*n = 7*; 28.0%), and those who are currently smokers (*n = 5*; 20.0%). For the control group, more than half reported that they never smoked (*n = 13*; 52.0%), followed by those who smoked before “ex-smokers” (n = *8*; 32.0%), and those who are currently smokers (n = *4*; 16.0%).

Concerning smoking type, more than half of smokers in the study group reported that they have been smoking cigarettes (n = *7*; 58.3%), followed by those who smoke both electronic cigarettes and cigarettes (n = *3*; 25.0%), and those who smoke cigarettes and hookah (n = *2*; 16.7%). For the control group, more than half of smokers reported that they have been smoking cigarettes (n = *7*; 58.3%), followed by those who smoke cigarettes and hookah (n = *52*; 41.7%).

Regarding number of cigarettes, most of smokers in the study group reported that they smoke 10-20 cigarettes per day (n = *9*; 75.0%) followed by those who smoke less than 10 cigarettes per day (n = *3*; 25.0%). For the control group, smokers are equal in terms of smoking less than 10 cigarettes and 10-20 cigarettes per day (n = *6*; 50.0%) for each of them.

With respect to duration of smoking, most of smokers in the study group reported that that they have been smoking for 10-20-years (n = *8*; 66.7%), followed by those who have been smoking for more than 20-years (n = *3*; 25.0%), and one who has been smoking for less than 10-years (n = *1*; 8.3%). For the control group, more than half reported that that they have been smoking for 10-20-years (n = *7*; 58.3%), followed by those who have been smoking for more than 20-years (n = *7*; 58.3%), and one who has been smoking for less than 10-years (n = *1*; 8.3%).

Table 4.3. ***Tests of Normality***

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age (Study group)	.095	25	.200*	.968	25	.604
Age (Control group)	.131	25	.200*	.963	25	.475

*. This is a lower bound of the true significance. a. Lilliefors Significance Correction

The study results display that the study participants are normally distributed (p-value = .604, .475) respectively.

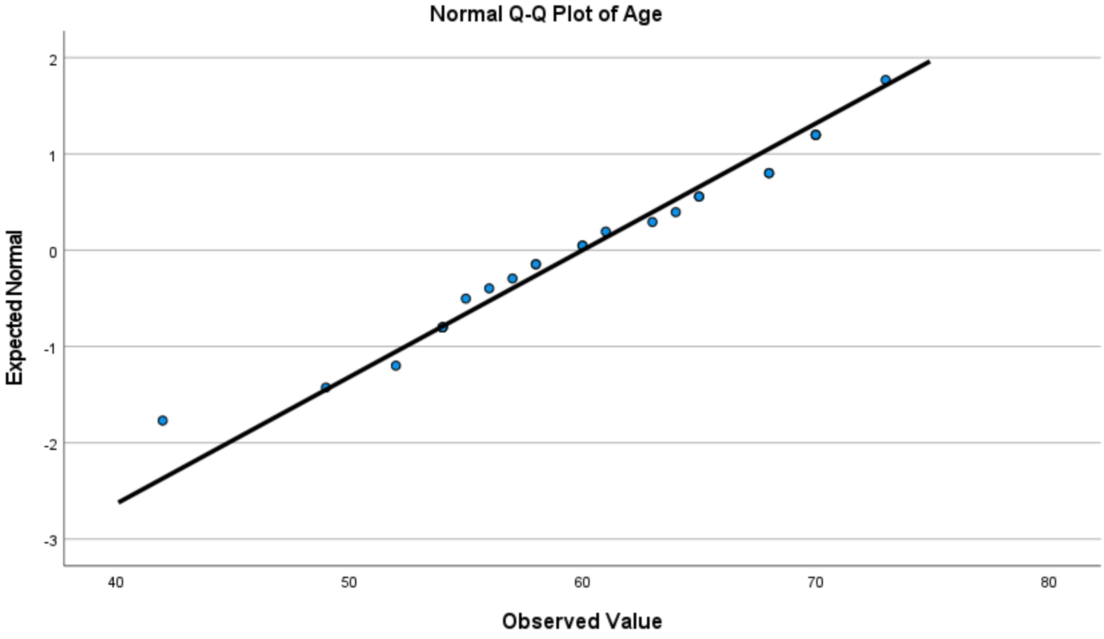

Figure 1. ***Normal Q-Q plot of age***

` This figure displays participants' normal distribution.

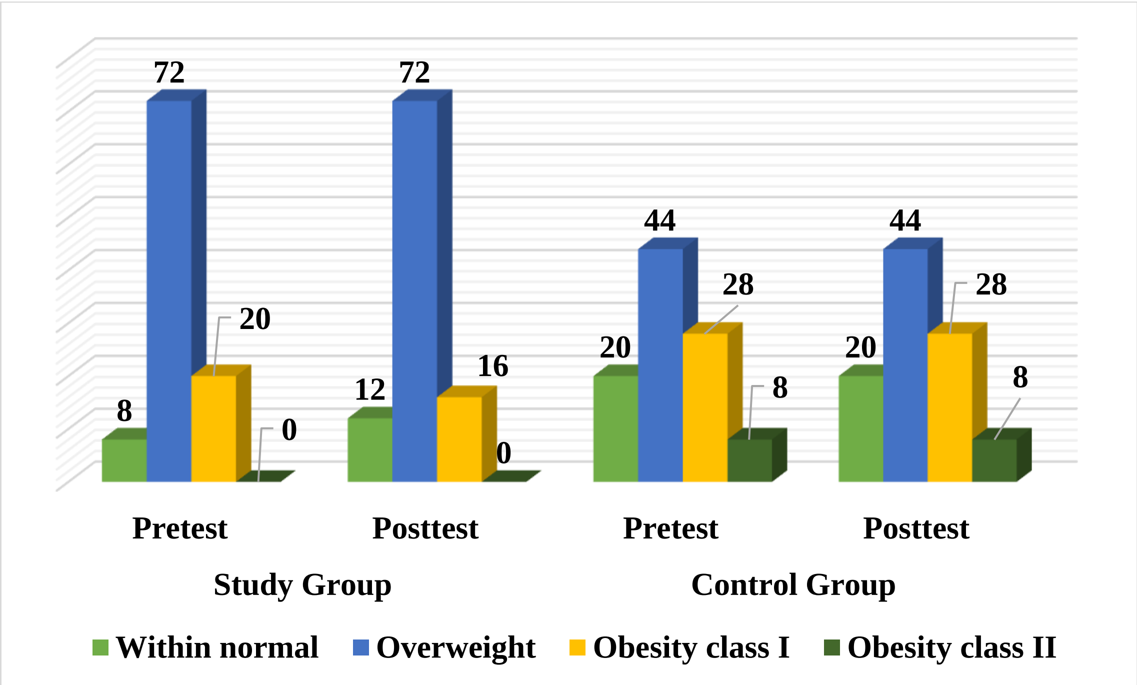

Figure 2. ***Participants' distribution according to their body mass index***

The study results demonstrate that most of the participants in the study group in the pretest time are overweight (*n = 18*; 72.0%), followed by those who have obesity class I (*n = 5*; 20.0%), and those who are within normal weight-to-height proportion (*n = 2*; 8.0%). In the posttest, most of are overweight (*n = 18*; 72.0%), followed by those who have obesity class I (*n = 4*; 16.0%), and those who are within normal weight-to-height proportion (*n = 3*; 12.0%). For the control group in the pretest and posttest time, less than half are overweight (*n = 11*; 44.0%), followed by those who have obesity class I (*n = 7*; 28.0%), those who are within normal weight-to-height proportion (*n = 5*; 20.0%), and those who have obesity class I (*n = 2*; 8.0%).

Table 4.4. ***Comorbidity for participants in the study and control groups***

	Study Group		**Control Group**		**p-value**
	Frequency(f)	Percent (%)	Frequency(f)	Percent (%)	
Other chronic disease					
Diabetes Mellitus	7	33.3	8	42.1	
Hypertension	4	19.1	7	36.8	.073
Both	10	47.6	4	21.1	
Total	21	100.0	21	100.0	

The study results reveal that two-fifth of participants in the study group experience both diabetes mellitus and hypertension (*n = 10*; 47.6%), followed by those who experience diabetes mellitus (*n = 7*; 28.0%), and those who experience hypertension (*n = 4*; 19.1%). For the control group, more than two-fifth experience diabetes mellitus (*n = 8*; 42.1%), followed by those who experience hypertension (*n = 7*; 36.8%), and those who experience both diabetes mellitus and hypertension (*n = 4*; 21.1%).

Table 4.5. *Cardiovascular parameters*

	Study Group		Control Group	
	Frequency(f)	Percent (%)	Frequency(f)	Percent (%)
Heart Rate				
60-90	18	72.0	25	100.0
91-100	4	16.0	0	0.0
101-120	3	12.0	0	0.0
Total	25	100.0	25	100.0
Pulse Rate (Beat per minute)				
60-90	18	72.0	23	92.0
91-100	6	24.0	2	8.0
101-120	1	4.0	0	0.0
Total	25	100.0	25	100.0
Systolic Blood Pressure (mm/Hg)				
100-119	2	8.0	8	32.0
120-140	10	40.0	9	36.0
141-160	9	36.0	7	28.0
≥ 161	4	16.0	1	4.0
Total	25	100.0	25	100.0
Diastolic Blood Pressure (mm/Hg)				
60-89	19	76.0	21	84.0
≥ 90	6	24.0	4	16.0
Total	25	100.0	25	100.0
Mean Arterial Pressure (mm/Hg)				
70-100	11	44.0	15	60.0
≥ 101	14	56.0	10	40.0
Total	25	100.0	25	100.0
Pulse Pressure (mm/Hg)				
< 40	2	8.0	2	8.0
40-60	8	32.0	15	60.0
≥ 61	15	60.0	8	32.0
Total	25	100.0	25	100.0
Cardiac Output (Liter per minute)				
4-8	6	24.0	12	48.0
8.1-10	11	44.0	8	32.0
≥ 10.1	8	32.0	5	20.0
Total	25	100.0	25	100.0
Respiratory Rate (breath/minute)				
< 16	1	4.0	3	12.0
16-20	14	56.0	15	60.0
21-26	10	40.0	7	28.0
Total	25	100.0	25	100.0

Oxygen Saturation				
80-89	3	12.0	1	4.0
90-95	12	48.0	9	36.0
≥ 96	10	40.0	15	60.0
Total	25	100.0	25	100.0

The study results display that the heart rate of most of participants in the study group ranges between 60-90 beats per minute (*n = 18*; 72.0%), followed by those whose heart rate ranges between 91-100 (*n = 5*; 20.0%), and those whose heart rate ranges between 101-120 (*n = 2*; 8.0%). For the control group, the heart rate for all ranges between 60-90 beats per minute (*n = 25*; 100.0%).

The pulse rate for most in the study group ranges between 60-90 beat per minute (*n = 18*; 72.0%), followed by those whose pulse rate ranges between 91-100 (*n = 6*; 24.0%), and one whose pulse rate ranges between 101-120 (*n = 1*; 4.0%). For the control group, the pulse rate for the majority ranges between 60-90 beats per minute (*n = 23*; 100.0%), followed by those whose pulse rate ranges between 91-100 (*n = 2*; 8.0%).

The systolic blood pressure for two-fifth of participants in the study groups ranges between 120-140 mm/Hg (*n = 10*; 40.0%), followed by those whose SBP ranges between 141-160 mm/Hg (*n = 9*; 36.0%), those who SBP is 161 mm/Hg or higher (*n = 4*; 16.0%), and those whose SPB ranges between 100-119 mm/Hg (*n = 2*; 8.0%). For the control group, the SBP for more than a third ranges between 120-140 mm/HG (*N = 9*; 36.0%), followed by those whose SPB ranges between 100-119 mm/Hg (*n = 8*; 32.0%), those whose SBP ranges between 141-160 mm/Hg (*n = 7*; 28.0%), and one whose SBP is 161 mm/Hg or higher (*n = 1*; 4.0%).

The diastolic blood pressure for two-fifths of participants in the study groups ranges between 60-89 mm/Hg (*n = 19*; 76.0%), followed by those whose DBP is 90 mm/Hg and higher (*n = 6*; 24.0%). For the control group, the DBP for the majority ranges between 60-89 mm/Hg (*n = 21*; 84.0%) compared to those whose DBP is 90 mm/Hg and higher (*n = 4*; 16.0%).

The mean arterial pressure for more than half of participants in the study group is 101 mm/Hg or higher (*n = 14*; 56.0%) compared to those whose pulse pressure ranges between 70-100 mm/Hg (*n = 11*; 44.0%). For the control group, the mean arterial pressure for most ranges between 70-100 mm/Hg (*n = 15*; 60.0%) compared to those whose pulse pressure is 101 mm/Hg or higher (*n = 10*; 40.0%).

The pulse pressure for most of participants in the study group is 61 mm/Hg or higher (*n = 15*; 60.0%), followed by those pulse pressure ranges between 40-60 mm/Hg (*n = 8*; 32.0%), and those whose pulse pressure is less than 40 mm/Hg (*n = 2*; 8.0%). For the control group, the pulse pressure for most ranges between 40-60 mm/Hg (*n = 15*; 60.0%), followed by those whose pulse pressure is 61 mm/Hg or higher (*n = 8*; 32.0%), and those whose pulse pressure is less than 40 mm/Hg (*n = 2*; 8.0%).

The cardiac output for more than two-fifths of participants in the study group ranges between 8.1-10 liter per minute (*n = 11*; 44.0%), followed by those whose cardiac output is 10.1 liter per minute or more (*n = 8*; 32.0%), and those whose cardiac output ranges between 4-8 liter per minute (*n = 6*; 24.0%). For the control group, the cardiac output for less than a half ranges between 4-8 liter per minute (*n = 12*; 48.0%), followed by those whose cardiac output ranges between 8.1-10.0 liter per minute (*n = 8*; 32.0%), and those cardiac output is 10.1 liter per minute or more (*n = 5*; 20.0%).

The respiratory rate for more than a half of participants in the study group ranges between 16-20 breath per minute (*n = 14*; 56.0%), followed by those who respiratory rate ranges between 21-26 breath per minute (*n = 10*; 40%), and one whose respiratory rate is less than 16 breath per minute (*n = 1*; 4.0%). For the control group, the respiratory rate for most ranges between 16-20 breath per minute (*n = 15*; 60.0%), followed by those who respiratory rate ranges between 21-26 breath per minute (*n = 7*; 28%), and those whose respiratory rate is less than 16 breath per minute (*n = 3*; 12.0%).

The oxygen saturation for less than a half of participants in the study group ranges between 90-95% (*n = 12*; 48.0%), followed by those whose oxygen saturation is 96% or above (*n = 10*; 40.0%), and those whose oxygen saturation ranges between 80-89% (*n = 3*; 12.0%). For the control group, the oxygen saturation for most is 96% or above (*n = 15*; 60.0%), followed by those whose oxygen saturation ranges between 90-95% (*n = 9*; 36.0%), and one whose oxygen saturation ranges between 80-89% (*n = 1*; 4.0%).

Table 4.5. ***Cardiovascular parameters* (*Continued*)**

	Study Group		**Control Group**	
	Frequency(f)	Percent (%)	Frequency(f)	Percent (%)
ECG Rhythm				
Regular	25	100.0	25	100.0
ECG Rate (Beat per minute)				
60-90	18	72.0	25	100.0
91-100	4	16.0	0	0.0
101-120	3	12.0	0	0.0
Total	25	100.0	25	100.0
Axis				
Normal	14	56.0	10	40.0
Right Axis Deviation	1	4.0	4	16.0
Left Axis Deviation	10	40.0	11	44.0
Total	25	100.0	25	100.0
P-wave Axis				
0-75	2	8.0	0	0.0
≥ 76	23	92.0	25	100.0
Total	25	100	25	100.0
P-R interval (ms)				
< 120	3	12.0	2	8.0
120 – 200	19	76.0	22	88.0
≥ 201	3	12.0	1	4.0
Total	25	100.0	25	100.0
QRS Wave ms)				
70-100	0	0.0	1	4.0
≥ 101	25	100.0	24	96.0
Total	25	100.0	25	100.0

ST Segment (mV)				
< 15	0	0.0	0	0.0
15-40	0	0.0	0	0.0
≥ 41	25	100.0	25	100.0
Total	25	100.0	25	100.0

ms: Mili second; mV: MilliVolt

The ECG rhythm is regular for all participants in both groups (*n = 25*; 100.0%).

The ECG rate for most of participants in the study group ranges between 60-90 beats per minute (*n = 18*; 72.0%), followed by those who ECG rate ranges between 91-100 beats per minute (*n = 4*; 16.0%), and those whose ECG rate ranges between 101-120 beats per minute (*n = 3*; 12.0%). The pulse rate for all participants in the control group ranges between 60-90 beats per minute (*n 25*; 100.0%).

The axis was normal for more than a half of participants in the study group (*n = 14*; 56.0%), followed by those with left axis deviation (*n = 10*; 40.0%). For the control group, more than two-fifths have left axis deviation (*n = 11*; 44.0%), followed by those whose axis is normal (*n = 10*; 40.0%), and those with right axis deviation (*n = 4*; 16.0%).

The p-wave axis for the vast majority of participants in the study group is 76° or greater (*n = 23*; 92.0%) compared to those whose p-wave axis ranges between 0-75° (*n = 2*; 8.0%). The p-wave axis for all participants in the control group is 76° or greater (*n = 25*; 100.0%).

The P-R interval for most of participants in the study group ranges between 120-200 ms (*n = 19*; 76.0%), followed by those whose P-R interval are both less than 120 ms and greater than 201 ms (*n = 3*; 12.0%) for each of them. For the control group, the P-R interval ranges between 120-200 ms (*n = 22*; 88.0%), followed by those whose P-R interval is less than 120 ms (*n = 2*; 8.0%), and one whose P-R interval is greater than 201 ms (*n = 1*; 4.0%).

The QRS wave for all participants in the study group is 101 ms or greater (*n = 25*; 100.0%). For the control group, the QRS for the vast majority is 101 ms or greater (*n = 24*; 96.0%) compared to one whose QRS is 100 ms (*n = 1*; 4.0%).

The ST segment for all participants in the study and control groups is 41 mV or greater (*n = 25*; 100.0%).

Table 4.6. ***Comparison of self-care ability for study and control groups***

Paired Samples Test								
Self-care ability	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Study Pretest – Posttest	-1.60000	2.78388	.55678	-2.74913	-.45087	-2.874	24	.008
Control Pretest – Posttest	.60000	2.19848	.43970	-.30749	1.50749	1.365	24	.185

df: Degree of freedom; Sig. Significance; Std. Deviation: Standard Deviation; Std. Error Mean: Standard Error Mean
t: T-Test

The study results reveal that there is a statistically significant difference in the self-care ability for participants in the study group (p-value = .008).

Table 4.7. ***Comparison of family and social ability for study and control groups***

Paired Samples Test								
Family and social ability	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Study Pretest – Posttest	-2.60000	2.92973	.58595	-3.80933	-1.39067	-4.437	24	.000
Control Pretest – Posttest	.20000	3.05505	.61101	-1.06106	1.46106	.327	24	.746

df: Degree of freedom; Sig. Significance; Std. Deviation: Standard Deviation; Std. Error Mean: Standard Error Mean
t: T-Test

The study results reveal that there is a statistically significant difference in the family and social ability for participants in the study group (p-value = .000).

Table 4.8. ***Comparison of movement ability for study and control groups***

Paired Samples Test								
Movement ability	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Study Pretest – Posttest	-.80000	1.87083	.37417	-1.57224	-.02776	-2.138	24	.043
Control Pretest – Posttest	.20000	1.75594	.35119	-.52482	.92482	.569	24	.574

df: Degree of freedom; Sig. Significance; Std. Deviation: Standard Deviation; Std. Error Mean: Standard Error Mean
t: T-Test

The study results reveal that there is a statistically significant difference in the movement ability for participants in the study group (p-value = .043)

Table 4.9. ***Comparison of lifting ability for study and control groups***

Paired Samples Test								
Lifting ability	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Study Pretest – Posttest	-1.00000	2.04124	.40825	-1.84258	-.15742	-2.449	24	.022
Control Pretest – Posttest	.40000	1.38444	.27689	-.17147	.97147	1.445	24	.161

df: Degree of freedom; Sig. Significance; Std. Deviation: Standard Deviation; Std. Error Mean: Standard Error Mean
t: T-Test

The study results reveal that there is a statistically significant difference in the lifting ability for participants in the study group (p-value = .022).

Table 4.10. ***Comparison of work ability for study and control groups***

Paired Samples Test								
Work ability	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Study Pretest – Posttest	-3.60000	2.29129	.45826	-4.54580	-2.65420	-7.856	24	.000
Control Pretest – Posttest	1.80000	2.84312	.56862	.62642	2.97358	3.166	24	.004

df: Degree of freedom; Sig. Significance; Std. Deviation: Standard Deviation; Std. Error Mean: Standard Error Mean
t: T-Test

The study results reveal that there are statistically significant differences in the work ability for participants in the study and control groups (p-value = .000, .004) respectively.

Table 4.11. ***Comparison of physical functional ability for study and control groups***

Paired Samples Test								
Physical Functional Ability	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Study Pretest – Posttest	-9.60000	6.75771	1.35154	-12.38945	-6.81055	-7.103	24	.000
Control Pretest – Posttest	3.20000	7.05337	1.41067	.28851	6.11149	2.268	24	.033

df: Degree of freedom; Sig. Significance; Std. Deviation: Standard Deviation; Std. Error Mean: Standard Error Mean t: T-Test

The study results reveal that there are statistically significant differences in the physical functional ability for participants in the study and control groups (p-value = .000, .033) respectively.

Table 4.12. ***Sex-wise differences in functional capacity for participants in the study group in the pretest time***

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Self-care ability	Equal variances assumed	.443	.512	.000	23	1.000	.00000	1.70251	-3.52192	3.52192
	Equal variances not assumed			.000	20.628	1.000	.00000	1.67142	-3.47974	3.47974
Family and social ability	Equal variances assumed	1.214	.282	-1.212	23	.238	-1.83333	1.51283	-4.96286	1.29619
	Equal variances not assumed			-1.137	15.304	.273	-1.83333	1.61221	-5.26374	1.59707
Movement ability	Equal variances assumed	7.907	.010	-1.190	23	.246	-.66667	.56037	-1.82587	.49254
	Equal variances not assumed			-1.468	14.000	.164	-.66667	.45426	-1.64095	.30762
Lifting ability	Equal variances assumed	.334	.569	-1.446	23	.162	-.83333	.57630	-2.02551	.35884
	Equal variances not assumed			-1.387	16.662	.184	-.83333	.60093	-2.10314	.43647
Work ability	Equal variances assumed	.334	.569	-.289	23	.775	-.16667	.57630	-1.35884	1.02551
	Equal variances not assumed			-.277	16.662	.785	-.16667	.60093	-1.43647	1.10314
Physical Functional Ability	Equal variances assumed	.520	.478	-.985	23	.335	-3.50000	3.55342	-10.85081	3.85081
	Equal variances not assumed			-.945	16.705	.358	-3.50000	3.70274	-11.32261	4.32261

df: Degree of freedom, F: F-statistics, Sig.: Significance, Std. Error Difference: Standard Error Difference

The study results reveal that there is no statistically significant difference in the functional capacity between sex groups in the pretest time.

Table 4.13. ***Sex-wise differences in functional capacity for participants in the study group in the posttest time***

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Self-care ability	Equal variances assumed	.000	1.000	.959	23	.347	1.00000	1.04257	-1.15672	3.15672
	Equal variances not assumed			.956	19.192	.351	1.00000	1.04654	-1.18894	3.18894
Family and social ability	Equal variances assumed	.378	.545	-.624	23	.539	-.83333	1.33469	-3.59435	1.92769
	Equal variances not assumed			-.617	18.702	.544	-.83333	1.34960	-3.66114	1.99447
Movement ability	Equal variances assumed	2.082	.163	-1.238	23	.228	-1.00000	.80757	-2.67059	.67059
	Equal variances not assumed			-1.210	17.920	.242	-1.00000	.82616	-2.73625	.73625
Lifting ability	Equal variances assumed	.000	1.000	.000	23	1.000	.00000	.85126	-1.76096	1.76096
	Equal variances not assumed			.000	19.192	1.000	.00000	.85449	-1.78726	1.78726
Work ability	Equal variances assumed	5.063	.034	-1.000	23	.328	-.83333	.83333	-2.55721	.89055
	Equal variances not assumed			-1.077	22.935	.293	-.83333	.77408	-2.43490	.76823
Physical Functional Ability	Equal variances assumed	.669	.422	-.526	23	.604	-1.66667	3.16609	-8.21623	4.88290
	Equal variances not assumed			-.509	17.219	.617	-1.66667	3.27327	-8.56596	5.23263

df: Degree of freedom, F: F-statistics, Sig.: Significance, Std. Error Difference: Standard Error Difference

The study results display that there is no statistically significant difference in the functional capacity between sex groups in the posttest time.

Table 4.14. ***Differences in functional capacity for participants in the study group between residency groups in the pretest time***

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Self-care ability	Equal variances assumed	5.072	.034	-.451	23	.656	-.87719	1.94433	-4.89935	3.14496
	Equal variances not assumed			-.595	15.254	.561	-.87719	1.47410	-4.01462	2.26024
Family and social ability	Equal variances assumed	3.477	.075	-1.213	23	.237	-2.10526	1.73521	-5.69482	1.48430
	Equal variances not assumed			-1.347	10.138	.207	-2.10526	1.56328	-5.58205	1.37152
Movement ability	Equal variances assumed	3.337	.081	-.806	23	.429	-.52632	.65311	-1.87738	.82475
	Equal variances not assumed			-1.455	18.000	.163	-.52632	.36168	-1.28617	.23354
Lifting ability	Equal variances assumed	.649	.429	.000	23	1.000	.00000	.69046	-1.42833	1.42833
	Equal variances not assumed			.000	18.000	1.000	.00000	.38236	-.80331	.80331
Work ability	Equal variances assumed	3.337	.081	.806	23	.429	.52632	.65311	-.82475	1.87738
	Equal variances not assumed			1.455	18.000	.163	.52632	.36168	-.23354	1.28617
Physical Functional Ability	Equal variances assumed	2.731	.112	-.725	23	.476	-2.98246	4.11440	-11.49374	5.52883
	Equal variances not assumed			-.981	16.341	.341	-2.98246	3.04071	-9.41756	3.45264

df: Degree of freedom, F: F-statistics, Sig.: Significance, Std. Error Difference: Standard Error Difference

The study results exhibit that there is no statistically significant difference in the functional capacity between residency groups in the pretest time.

Table 4.15. ***Differences in functional capacity for participants in the study group between residency groups in the posttest time***

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Self-care ability	Equal variances assumed	1.908	.180	-.802	23	.431	-.96491	1.20289	-3.45327	1.52345
	Equal variances not assumed			-.799	8.376	.446	-.96491	1.20722	-3.72716	1.79733
Family and social ability	Equal variances assumed	.053	.819	-2.185	23	.039	-3.07018	1.40494	-5.97651	-.16384
	Equal variances not assumed			-2.413	10.033	.036	-3.07018	1.27238	-5.90396	-.23639
Movement ability	Equal variances assumed	.251	.621	-.601	23	.554	-.57018	.94931	-2.53398	1.39363
	Equal variances not assumed			-.598	8.360	.566	-.57018	.95388	-2.75345	1.61310
Lifting ability	Equal variances assumed	.219	.644	.225	23	.824	.21930	.97539	-1.79844	2.23704
	Equal variances not assumed			.228	8.612	.825	.21930	.96192	-1.97174	2.41033
Work ability	Equal variances assumed	.219	.644	-.225	23	.824	-.21930	.97539	-2.23704	1.79844
	Equal variances not assumed			-.228	8.612	.825	-.21930	.96192	-2.41033	1.97174
Physical Functional Ability	Equal variances assumed	.326	.574	-1.306	23	.204	-4.60526	3.52512	-11.89753	2.68701
	Equal variances not assumed			-1.166	7.202	.281	-4.60526	3.94898	-13.89028	4.67975

df: Degree of freedom, F: F-statistics, Sig.: Significance, Std. Error Difference: Standard Error Difference

The study results reveal that there is no statistically significant difference in the functional capacity between residency groups in the posttest time.

Table 4.16. ***Differences in functional capacity for participants in the study group among smoking status groups in the pretest time***

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Self-care ability	Between Groups	44.835	2	22.418	1.389	.270
	Within Groups	355.165	22	16.144		
	Total	400.000	24			
Family and social ability	Between Groups	7.648	2	3.824	.256	.776
	Within Groups	328.352	22	14.925		
	Total	336.000	24			
Movement ability	Between Groups	4.571	2	2.286	1.214	.316
	Within Groups	41.429	22	1.883		
	Total	46.000	24			
Lifting ability	Between Groups	.000	2	.000	.000	1.000
	Within Groups	50.000	22	2.273		
	Total	50.000	24			
Work ability	Between Groups	4.571	2	2.286	1.214	.316
	Within Groups	41.429	22	1.883		
	Total	46.000	24			
Physical Functional Ability	Between Groups	85.451	2	42.725	.543	.589
	Within Groups	1730.549	22	78.661		
	Total	1816.000	24			

df: Degree of freedom, F: F-statistics, Sig.: Significance

The study results display that there is no statistically significant difference in the functional capacity between smoking status groups in the pretest time.

Table 4.17. ***Differences in functional capacity for participants in the study group among smoking status groups in the posttest time***

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Self-care ability	Between Groups	27.648	2	13.824	2.370	.117
	Within Groups	128.352	22	5.834		
	Total	156.000	24			
Family and social ability	Between Groups	11.209	2	5.604	.516	.604
	Within Groups	238.791	22	10.854		
	Total	250.000	24			
Movement ability	Between Groups	3.692	2	1.846	.440	.650
	Within Groups	92.308	22	4.196		
	Total	96.000	24			
Lifting ability	Between Groups	1.978	2	.989	.222	.803
	Within Groups	98.022	22	4.456		
	Total	100.000	24			
Work ability	Between Groups	1.978	2	.989	.222	.803
	Within Groups	98.022	22	4.456		
	Total	100.000	24			
Physical Functional Ability	Between Groups	31.648	2	15.824	.254	.778
	Within Groups	1368.352	22	62.198		
	Total	1400.000	24			

df: Degree of freedom, F: F-statistics, Sig.: Significance

The study results display that there is no statistically significant difference in the functional capacity between smoking status groups in the posttest time.

Table 4.18. ***Differences in functional capacity for participants in the study group among body mass index groups in the pretest time***

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Self-care ability	Between Groups	25.556	2	12.778	.751	.484
	Within Groups	374.444	22	17.020		
	Total	400.000	24			
Family and social ability	Between Groups	59.056	2	29.528	2.346	.119
	Within Groups	276.944	22	12.588		
	Total	336.000	24			
Movement ability	Between Groups	9.889	2	4.944	3.012	.070
	Within Groups	36.111	22	1.641		
	Total	46.000	24			
Lifting ability	Between Groups	17.500	2	8.750	5.923	.009
	Within Groups	32.500	22	1.477		
	Total	50.000	24			
Work ability	Between Groups	2.389	2	1.194	.603	.556
	Within Groups	43.611	22	1.982		
	Total	46.000	24			
Physical Functional Ability	Between Groups	405.722	2	202.861	3.165	.062
	Within Groups	1410.278	22	64.104		
	Total	1816.000	24			

df: Degree of freedom, F: F-statistics, Sig.: Significance

The study results display that there is a statistically significant difference in the lifting ability among body mass index groups in the pretest time (p-value = .006).

Table 4.19. ***Differences in functional capacity for participants in the study group among body mass index groups in the posttest time***

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Self-care ability	Between Groups	25.556	2	12.778	.751	.484
	Within Groups	374.444	22	17.020		
	Total	400.000	24			
Family and social ability	Between Groups	59.056	2	29.528	2.346	.119
	Within Groups	276.944	22	12.588		
	Total	336.000	24			
Movement ability	Between Groups	9.889	2	4.944	3.012	.070
	Within Groups	36.111	22	1.641		
	Total	46.000	24			
Lifting ability	Between Groups	17.500	2	8.750	5.923	.009
	Within Groups	32.500	22	1.477		
	Total	50.000	24			
Work ability	Between Groups	2.389	2	1.194	.603	.556
	Within Groups	43.611	22	1.982		
	Total	46.000	24			
Physical Functional Ability	Between Groups	405.722	2	202.861	3.165	.062
	Within Groups	1410.278	22	64.104		
	Total	1816.000	24			

df: Degree of freedom, F: F-statistics, Sig.: Significance

The study results display that there is no statistically significant difference in the functional capacity among body mass index groups in the posttest time.

Table 4.20. ***Differences in functional capacity for participants in the study group among other chronic disease groups in the pretest time***

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Self-care ability	Between Groups	52.679	2	26.339	1.521	.245
	Within Groups	311.607	18	17.312		
	Total	364.286	20			
Family and social ability	Between Groups	3.452	2	1.726	.141	.869
	Within Groups	220.357	18	12.242		
	Total	223.810	20			
Movement ability	Between Groups	3.988	2	1.994	.870	.436
	Within Groups	41.250	18	2.292		
	Total	45.238	20			
Lifting ability	Between Groups	1.310	2	.655	.524	.601
	Within Groups	22.500	18	1.250		
	Total	23.810	20			
Work ability	Between Groups	5.060	2	2.530	2.429	.116
	Within Groups	18.750	18	1.042		
	Total	23.810	20			
Physical Functional Ability	Between Groups	63.988	2	31.994	.500	.615
	Within Groups	1152.679	18	64.038		
	Total	1216.667	20			

df: Degree of freedom, F: F-statistics, Sig.: Significance

The study results display that there is no statistically significant difference in the lifting ability among other chronic disease groups in the pretest time.

Table 4.21. ***Differences in functional capacity for participants in the study group among other chronic disease groups in the posttest time***

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Self-care ability	Between Groups	10.238	2	5.119	.763	.481
	Within Groups	120.714	18	6.706		
	Total	130.952	20			
Family and social ability	Between Groups	12.024	2	6.012	.494	.618
	Within Groups	218.929	18	12.163		
	Total	230.952	20			
Movement ability	Between Groups	2.381	2	1.190	.300	.744
	Within Groups	71.429	18	3.968		
	Total	73.810	20			
Lifting ability	Between Groups	3.988	2	1.994	.466	.635
	Within Groups	76.964	18	4.276		
	Total	80.952	20			
Work ability	Between Groups	6.071	2	3.036	.939	.409
	Within Groups	58.214	18	3.234		
	Total	64.286	20			
Physical Functional Ability	Between Groups	49.702	2	24.851	.395	.679
	Within Groups	1131.250	18	62.847		
	Total	1180.952	20			

df: Degree of freedom, F: F-statistics, Sig.: Significance

The study results display that there is no statistically significant difference in the functional capacity among other chronic disease groups in the posttest time.

Chapter Five

Discussion of the Results

Chapter Five

Discussion of the Results

A review of the findings will be covered in chapter 5. Chapter four will be systematically interpreted including a discussion of participants' sociodemographic characteristics, smoking status, and a discussion of participants' normal distribution. Comorbidity for participants, cardiopulmonary parameters for participants, distribution according to their body mass index, and functional capacity, which will be bolstered by new research.

5.1. Discussion of Participants' demographic characteristics in the study and control groups:

Considering the sociodemographic traits shown in table (4-1) that are the mean age for participants in the study group is 60.0 ± 7.59; less than a third age 55–60 years (n = 8; 32.0%); for the control group, the mean age is 57.6 ± 8.38; more than a third age 49–54 years (n = 9; 36.0%).

Per Harisuddin et al., (2023), the study displays that the treatment group's average research subject age was 48.10 ± 9.81 years, while the control group's average age was 44.30 ± 6.80 years.

In the research of Zerang et al., (2022) Which was applied in cardiac surgery in 2020 at Razi Hospital in Birjand, Iran. Out of the 40 patients that were examined, 20 patients (or 50%) were placed in the incentive spirometry group and 20 patients (or 50%) in the DBE training group. Patients in the incentive spirometry group (p = 0.26) and the DBE group had mean ages of the differences were not statistically significant, but they were 65.4 ± 7.12 and 62.8 ± 7.22 years, respectively.

Qiu, et al., (2022) mention in the study group age n= 15.66 ± 8.28, while in the control group n=15.66 ± 8.28

Alwekhyan, et al., (2022) patients were randomized to either the control or intervention group. The mean age of the patients in the intervention group was 58.4 years and 62.2 years in the control group

In Sweaty, et al., (2021) investigation, demographic statistics were similar in between the two teams. The control group's average age was 54.3 ± 5.1 while the studied group's mean age was 54.4 ± 3.8, with a p-value of 0.961.

According to Bharathi, A. R. (2021) specific demographic variables among patients, including their frequency and percentage distribution with in terms of age, the bulk of the individuals (n = 18) (60%) were in the 40–59 age range.

This result supports the result of a randomized control trial that was conducted by Aweto, et al., (2020). The mean age of the participants in the IS was 54.47±9.77 years, while the control groups were 55.76±14.56 years.

Eltorai, et al., (2019) mention that the study " were randomized, the study group per protocol (112 men [77%]; mean age, 68.7 years; 95% CI, 67.2-70.2)

Age-related changes in the structure and function of the heart When the conduction system's cells aren't functioning properly, the heart rate lowers. The thickening of the heart's walls, or hypertrophy, causes the heart to enlarge and lose some of its ability to store blood. Regarding sex, table (4-1) indicates that there are significantly more males (n = 15; 60.0%) than females (n = 10; 40.0%) in the study group. Males make up more than half of the control group (n = 13; 52.0%) as opposed to females (n = 12; 48.0%).

Sweaty, et al., (2021) mention in the study the sex of males than females in the study group n=22(55.0%) compared with female n=18 (45.0%). For control the male n=21 (52.5%) while the female n=19 (47.5%).

The demographic characteristics' frequency and percentage distribution in patients with Bharathi AR., (2021) show that, in terms of sex, 16 (53.33%) of the participants were male and 14 (46.67%) were female.

The participants in the study of Aweto, et al., (2020) were 59 (25 males and 34 females). Eleven men and eighteen women finished the study in the control group, compared to fourteen men and sixteen women in the IS group.

Gender differences in heart structure and coronary arteries affect women's risk of developing coronary artery disease (CAD). Women have smaller hearts and arteries, and estrogen, a hormone with cardioprotective properties, increases the risk of CAD 10 years later in women.

The results mentioned in the table (4-1) regarding marital status, all participants in the study and control groups are married (*n = 25*; 100.0%) for each of them

The study of Schultz, et al., (2017) show more than two thirds of participants (n=4088, 68%) were married camper with other groups.

According to research by Zerang, et al., (2022) all patients in both groups were married (p = 1) when cardiac surgery was performed at Razi Hospital in Birjand, Iran in 2020.

According the participant characteristic in the table 4-1 appear with respect to residency, most in the study group reported that they have been living in urban areas (n = 19; 76.0%). For the control group, the majority reported that they have been living in urban areas (n = 21; 84.0%).

Bharathi, A. R. (2021) reveals that in the residential region, with the majority of subjects 16 coming from suburban and rural locations, respectively, 53.33% and 43.33% of these, only one (3.33%) came from an urban region.

5.2. Discussion of Participants' smoking status in the study and control group:

The result in table (4-2) mention study results displays that more than half of the participants in the study group reported that they never smoked (n = 13; 52.0%), For the control group, more than half reported that they never smoked (n = 13; 52.0%).

Kim, et al., (2022) The patient of the study was randomized between groups that showed the demographic and baseline characteristics of smoking status the Current smoker in the study group was n=15 (65.2) while appearing n=14 (60.9) in the control group.

Concerning smoking type, more than half of smokers in the study group reported that they have been smoking cigarettes (*n* = *7*; 58.3%), For the control group, more than half of smokers reported that they have been smoking cigarettes (*n* = *7*; 58.3%) in the study group.

In Sweaty, et al., (2021) In the study group (incentive spirometer group), the average smoker was n = 14 (35.0%), while the average non-smoker was n = 26 (65.0%). The control group's smoking rate was 16 (40.0%), but the non-smoking rate was 24 (60.0%), with a p-value of 0.644.

The results mentioned in the table (4-2) regarding number of cigarettes, most of smokers in the study group reported that they smoke 10-20 cigarettes per day (*n* = *9*; 75.0%). For the control group, smokers are equal in terms of smoking less than 10 cigarettes and 10-20 cigarettes per day (*n* = *6*; 50.0%) for each of them.

The study results that are shown in tables (4-2) with respect to duration of smoking, most of smokers in the study group reported that that they have been smoking for 10-20-years (*n* = *8*; 66.7%). For the control group, more than half reported that that they have been smoking for 10-20-years (*n* = *7*; 58.3%).

Smoking cigarettes can significantly impact the onset and severity of coronary artery disease (CAD) by releasing catecholamines, increasing blood pressure and heart rate, and narrowing coronary arteries due to nicotine acid. Smoking can also harm the vascular endothelium by increasing oxidation of low-density lipoprotein (ldl), increasing the likelihood of thrombus development, and raising blood levels of carbon monoxide, which can lead to reduced contractility and myocardial ischemia.

5.3. Discussion of participants' normal distribution in the study and control group:

The study results that are shown in Tables (4-3) display that the study participants are normally distributed (p-value = .604, .475) respectively.

Per Harisuddin, et al., (2023), The study comprised 20 participants in total, split ten people each were divided into two groups (treatment and control). At the conclusion of the study, every research subject in the treatment and control groups could finish.

5.4. Discussion of Participants' distribution according to their body mass index in the study and control group:

Regarding to the result of figure (2) the study results demonstrate that most of the participants in the study group in the pretest time are overweight (n = 18; 72.0%). In the posttest, most of them are overweight (n = 18; 72.0%). For the control group in the pretest and posttest time, less than half are overweight (n = 11; 44.0.

Harisuddin et al., (2023) Eighty percent of all study participants in both groups were obese in this investigation in the average body mass index (BMI) of the research subjects in the group receiving therapy was 27.29 ± 4.54 kg/m2, followed by those who have obesity class I n=6 (60%). For the group under control, 27.90 ± 4.83 kg/m2, followed by those who have obesity class I n=7 (70%).

In the study of Sweaty, et al., (2021) In the study group (IS group), the BMI category was overweight 24 (60.0%) in the study group and overweight 28 (70.0%) in the control group, with a p-value of 0.967. The BMI in the intervention group was 26.5±2.6, while in the control group it was 26.4±2.1.

The Aweto, et al., (2020) study shows that participants were divided into two groups at random, then carried out the study. The mean BMI about the participants in the IS and control groups was 25.50 ± 4.63 and 26.11 ± 4.07, respectively.

In the study of Corrêa, et al., (2011) baseline characteristics of randomized and screened patients conducted show in the result that the BMI in the study group was 27.3=+_3.2 in the study group while in the opposed group control was 28.2+-2.6.

As per the study conducted by Bilo, et al., (2012) within the age range of 24-61 years, Study A comprised of the individuals had a mean body mass index (BMI) of 22.9±2.8 kg/m2, with thirty males and nine females (77% and 23%). With the exception of a higher percentage of female individuals (16 (57%) versus 12 (43%)), Study B's population (n = 28) was similar to Study A's (age 38.9±10.6, BMI 22.9±2.8).

Obesity increases the risk of hypertension, diabetes, dyslipidemia, obstructive sleep apnea, metastases, and cardiovascular disorders due to higher morbidity rates. Obesity can also accelerate the development of coronary artery disease (CAD), especially in those with prior coronary heart disease. The type of obesity, particularly android obesity, is linked to diabetes and heart disease, while gynoid obesity is less metabolically active.

5.5. Discussion Comorbidity for participants in the study and control groups

Recording the participant's medical characteristics as listed in Table (4-4) The study results reveal that two-fifths of participants in the study group experience both diabetes mellitus and hypertension (n = 10; 47.6%). For the control group, more than two-fifths experience diabetes mellitus (n = 8; 42.1%).

Harisuddin et al., (2023) show the average Comorbidity for participants in the study was obesity and then hypertension with n=8 (80%), and n=8 (80%) respectively. for the control group was Obesity, hypertension, and then autoimmune with n=8 (80%), n=2 (20%), and n=2 (20%).

Bharathi A. R. (2021) clarified that taking into account co-morbid conditions, the majority of participants (n = 11; 36.67%) have both hypertension and diabetes mellitus of them, five (16.67%) had diabetes mellitus alone, while seven (23.33%) had hypertension. Among them, six (20%) had respiratory conditions. Just one person (3.33%) had hyperlipidemia.

Diabetes mellitus (DM) is a major risk factor for cardiovascular diseases (CVDS), with multiple pathways linked to its pathophysiology. Individuals with DM are more likely to develop CAD due to prothrombotic and hypercoagulable conditions, increased platelet thrombin generation, impaired fibrinolysis, and low-grade inflammation. Hyperinsulinemia, insulin resistance, and vascular calcification are common in DM patients, leading to atherosclerosis and thrombosis. Platelets play a crucial role in atherogenesis and its thrombotic sequelae.

Hypertension significantly impacts heart disease, stroke, heart failure, and kidney function. Its primary cause is the mechanical strain on blood vessels and the heart, leading to heart failure, congestive heart failure, and hypertensive vascular disease. This condition involves luminal narrowing of small arteries and arterioles, and fibromuscular thickening of the intima and media. High blood pressure also worsens atherosclerosis, particularly in coronary and cerebral vessels.

5.6. Discussion cardiopulmonary parameter for participants in the study and control groups

Regarding statistical analysis of Cardiovascular parameters for the study and control as appeared in table (4-5) The study results display that the heart rate of most of the participants in the study group ranges between 60-90 beats per minute (n = 18; 72.0%). For the control group, the heart rate for all ranges between 60-90 beats per minute (n = 25; 100.0%).

Zerang, et al., (2022) study found that the mean heart rate (HR) was 85.95 ±7.79, 83.35 ± 4.43, and 81.50 ± 4.56 (f= 3.91 p= 0.01*), respectively the days one, two, and three after the intervention (p>0.05) for the other group mean of heart rate (HR) was 82.15 ± 9.62 83.60 ± 9.73, and 84.85 ± 8.63 f= 4.78 p= 0.005*

In the study of Sweaty, et al., (2021) mention the study group (IS group) had a median of heart rate was 92 [86–105], but the control group's median of heart rate was 90 [82–104], with a p-value of 0.874.

Aweto, et al., (2020) report that the control group's heart rate was 75.83 ± 11.56 and the intervention group's heart rate was 74.90 ± 9.10, with a t-value of -0.342 and a p-value of 0.734.

According to the study of Bilo, et al., (2012) the mean heart rate was 79.3±11.3 in the study A while in study B was 83.1±12.3

Reduced heart rate is a method to reduce ischemic events in individuals with coronary artery disease (CAD) and lower angina symptoms by improving coronary flow and microcirculation. Higher heart rate is a risk factor for cardiovascular events in CAD and chronic heart failure patients, and a key component of cardiac arrhythmia development.

The statistical result about SBP and DBP appears in table (4-5) the systolic blood pressure for two-fifth of participants in the study groups ranges between 120-140 mm/Hg (n = 10; 40.0%), For the control group, the SBP for more than a third ranges between 120-140 mm/HG (N = 9; 36.0%). The diastolic blood pressure for two-fifths of participants in the study groups ranges between 60-89 mm/Hg (n = 19; 76.0%). For the control group, the DBP for the majority ranges between 60-89 mm/Hg (n = 21; 84.0%)

In the same study of Zerang et al., (2022), the DBP for the incentive spirometry group was 8.65 ± 0.74, 8.26 ± 0.69, and 8.25 ± 0.90 (f = 2.77, p = 0.05), whereas the mean SBP over a three-day period was 13.73 ±1.38, 13.18 ±1.32, and 12.93 ±1.32 (f = 8.09, p = < 0.001**). In contrast, the DBP mean was 1.75 ± 1.18, 8.16 ± 1.15, and 8.35 ± 1.15 f= 1.19 p= 0.10 for the other group over a three-day period. The SBP mean was 12.81 ± 1.42, 13.01 ± 1.30, and 12.72 ± 1.28 F= 0.35 p= 0.79.

Sweaty et al., (2021) the research shows that the systolic blood pressure of the IS Group and the Control Group with normal systolic blood pressure IS 100–140 millimeters of mercury (mmHg) and, as shown median 124 [117- 132], 123 [113- 127], and p-value = 0.256nd, so there were no statistically significant differences between the two groups pre-and-post. in the same study illustrates that the diastolic blood pressure of both the experimental group and the control group, which had normal diastolic blood pressure of 60–90 mmHg. The median values of 76 [72–81], 72 [65–82], and p-values = 0.120 indicate that there were no significant differences between the two groups before and after the intervention.

According to Aweto et al., (2020) the incentive spirometer group and control group had mean SBPs of 134.13 ± 15.66 and 135.72 ± 15.73, respectively, with t-values of -0.389 and p-values of =0.699. In contrast, the DBP, t- value 2.335 and p- value 0.024* for the incentive spirometer group and control group were 89.20 ± 6.94 and 83.83 ± 7.96, respectively.

In the study of Pramanik et al., (2016) discovered a significant drop in diastolic blood pressure (pre-test 70.48 mmHg vs. post-test 67.52 mmHg) and a significant decrease in systolic blood pressure (pre-test 117.44 mmHg vs. post-test 112.88 mmHg).

According to the study of Bilo et al., (2012) after the slow breathing session, there was a noticeable drop in SBP in both trials. the mean (Study A) was 118.5±16.0 but the mean in (Study B) was 115.0±14.5 with systolic blood pressure levels that, in study A, persisted below baseline after five minutes but did not after thirty minutes (Study B) of recovery, and reported that mean diastolic blood pressure was 68.7±14.1, and the corresponding changes in DBP were 78.3±9.5.

Elevated blood pressure increases the risk of cardiovascular disease. A target is less than 140/90 for people 60 and older, with a goal of keeping it under 150/90. High blood pressure can cause vessel walls to become rigid, leading to inflammatory reactions and vascular hypertrophy. This accelerates atherosclerosis, causing the left ventricle to work harder to push blood out of the body and into the arteries. Over time, hypertrophy can result in heart failure.

As shown in the Table, it shows that (4-5) the respiratory rate for more than half of the participants in the study group ranges between 16-20 breaths per minute (n = 14; 56.0%). For the control group, the respiratory rate for most ranges between 16-20 breaths per minute (n = 15; 60.0%).

The intervention group's mean relative returns (RR) were also 18.85 ± 1.81, 17.75 ± 1.68, and 17.30 ± 1.66 f= 7.33 p= < 0.001**, according to the results of the Zerang, et al., (2022) The mean values for the other group were 19.20 ± 1.77, 18.70 ± 2.47, and 19.65 ± 2.32 with f = 1.17 and p = 0.33.

According to a study by Sweaty, et al., (2021) the respiratory status was the difference in respiratory rate between the IS Group and the Control Group, with the IS Group median being 16 [14–15] and the Control Group median being 16 [15–16].

The study by Bharathi, A. R. (2021) contains the result. Twenty-five (83.3%) of the individuals had normal respiratory rates, meaning they breathed 12–22 times per minute. The remaining samples, or 5 (16.7%), exhibited tachypnea, or more than 22 breaths per minute. Not a single one of them experienced bradypnea, or less than 12 breaths per minute.

Thoughts regarding cardiovascular parameters slow, rhythmic breathing can improve respiratory and cardiovascular health as well as lower the harmful effects of stress on the body, increase parasympathetic tone, decrease sympathetic activity, and improve mental and physical well-being. Regular practice of rhythmic slow breathing can reduce heart rate variability, systolic, diastolic, and mean blood pressure in hypertensive individuals, as well as chemoreflex activation. Moreover, it may make baroreflex sensitivity higher.

According the result shown in table (4-5) the oxygen saturation for less than a half of participants in the study group ranges between 90-95% (n = 12; 48.0%),. For the control group, the oxygen saturation for most is 96% or above (n = 15; 60.0%),

The results of Sweaty, et al., (2021) demonstrate that there are notable variations in peripheral oxygen saturation (SPo2) between the study Group and the Control Group, with considerable disparities P-value = <0.001* indicates that the medians are 99 [98-99] and 99 [99-100], respectively.

Bilo, et al., (2012) found that slow breathing exercise significantly raised SpO2 (in Study A), it increased in Study B, it went from 81.0±4.2% to 88.6±4.5, both p<0.001), and in Study C, it went from 80.2±7.7% to 89.5±8.2%.

The rise in parasympathetic tone linked to deep, leisurely breathing and the drop in sympathetic tone can be explained by an increase in vagal tone, increased tissue oxygenation, sensitivity to baroreflex, and an interaction between the neurological system and slow breathing.

Based on the outcome displayed in table (4-5) the majority of study participants (n = 15; 60.0%) have a pulse pressure of 61 mm/Hg or above. The pulse pressure for most in the control group is 40–60 mm/Hg (n = 15; 60.0%).

Bilo, et al., (2012) mention in the study the mean pulse pressure in study A was 49.8±13.4, but it was 36.7±10.6 in study B, per the study by Bilo et al. (2012).

According the result shown in table (4-5) the ECG rate for most of participants in the study group ranges between 60-90 beats per minute (*n = 18*; 72.0%), followed by those who ECG rate ranges between 91-100 beats per minute (*n = 4*; 16.0%), and those whose ECG rate ranges between 101-120 beats per minute (*n = 3*; 12.0%). The pulse rate for all participants in the control group ranges between 60-90 beats per minute (*n 25*; 100.0%).

Pramanik et al. (2016) found that a slow-paced breathing exercise significantly reduced heart rate (p-value<0.05, 73.32 beats/min vs. 67.72 beats/min), systolic and diastolic blood pressure, and mean blood pressure (pre-test 85.97 mmHg vs. post-test 82.48 mmHg).

The ECG measures heartbeats in a steady sinus rhythm, with intervals like QRS, QT, RR, and PR. A drop in HR and blood pressure indicates a shift towards parasympathetic activity or a decrease in sympathetic activity.

Parasympathetic activity is predominant when the mind is calm and relaxed, as peripheral vascular resistance falls. This increase in parasympathetic activity lowers peripheral vascular resistance and diastolic blood pressure due to a drop in sympathetic tone in skeletal muscle blood vessels.

According the result shown in table (4-5) the axis was normal for more than a half of participants in the study group (n = 14; 56.0%), followed by those with left axis deviation (n = 10; 40.0%). For the control group, more than two-fifths have left axis deviation (n = 11; 44.0%), followed by those whose axis is normal (n = 10; 40.0%), and those with right axis deviation (n = 4; 16.0%).

The cardiac axis in ECGs ranges from -30° to 90°, with "right axis deviation" referring to a positive axis over 90° and "left axis deviation" referring to a negatively oriented axis over -30°. Leads I and II have a net positive QRS complex, while leads II have a negative one. Extreme axis deviation (-90° to 180°) is represented by a net negative QRS complex in both leads.

As shown in the Table, it shows that (4-5) the P-R interval for most of participants in the study group ranges between 120-200 ms (n = 19; 76.0%), followed by those whose P-R interval are both less than 120 ms and greater than 201 ms (n = 3; 12.0%) for each of them. For the control group, the P-R interval ranges between 120-200 ms (n = 22; 88.0%), followed by those whose P-R interval is less than 120 ms (n = 2; 8.0%), and one whose P-R interval is greater than 201 ms (n = 1; 4.0%).

Heart rate variability (HRV) is a function of the sympathetic nervous system (SNS) and parasympathetic nervous system (PNS). The SNS increases the rate of depolarization of sinoatrial node cells, while the PNS slows it down. The R-R interval, based on an ECG trace, is the most fundamental definition of HRV. The evolution of lung size during a ventilatory cycle causes HRV, with the R-R interval typically decreasing during inhalation and increasing during inhalation. Increased PNS activity and a relaxed phenotype are linked to higher HRV.

5.7. Discussion functional capacity for participants in the study and control groups

The result shown in tables (4-6)-table (4-11) appears to enhance the function capacity in the study group compared control group. whereas the self-care ability for the study sig(2-trailed)= .008 and control group sig(2-trailed)=.185, family and social ability for the study sig(2-trailed)=000 and control group sig(2-trailed)=.746, movement ability for study Sig. (2-tailed)=.043 and control groups Sig. (2-tailed)=.574, lifting ability for study Sig. (2-tailed)=.022and control groups Sig. (2-tailed)=.161, workability for study Sig. (2-tailed)=000 and control groups Sig. (2-tailed)=.004, and Comparison of physical functional ability for study Sig. (2-tailed)=.000 and control groups Sig. (2-tailed)=.033.

The study includes Sheraz et al., (2022). 64 individuals (71.9%) said they had "improved" and 25 (28.1%) thought they had "not improved" following phase I cardiac rehabilitation. Participants who reported their own improvement as having improved on average had a mean change in functional capacity of 71.9 ($p < 0.01$), while those who rated their own improvement as having not improved on average had a mean change in functional capacity of 28.1 ($p < 0.01$).

When ARAZI et al., (2021) evaluated the two groups at baseline, they discovered no discernible difference between them in terms of functional capacity (p =.68). On the 2-month posttest, however, there was no discernible intergroup difference in functional capacity (p =.43;).

Studies by Naik et al., (2018) demonstrate that there was no discernible change in the baseline stress, cardiovascular, and anthropometric scores between the study and control groups. The waist-hip ratio and body mass index (BMI) showed statistically significant changes after 12 weeks of slow breathing exercise; however, the mean values' reduction (0.16 kg/m2, 0.003) did not seem to have a clinically relevant impact on day-to-day functioning.

Regular, moderate exercise lowers triglyceride levels and increases HDL levels, reducing the risk of coronary events. Adults should engage in moderate-intensity aerobic activity for at least 75 minutes per week.

Chapter Six

Conclusions and Recommendations

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Conclusions and Recommendations

6.1. Conclusion

The conclusions based on the results presented and discussion

1. The majority of the study sample age ranged from (55 –60) years as opposed to the control group in the study group, the age range was (49 – 54) because altering the myocardium's structure, and hypertrophy weakens the contraction's force. There is a deleterious impact on cardiac output from each of these alterations. The valves can no longer close correctly because of stiffening. Heart murmurs are frequently observed in these years as a result of the ensuing blood flow backward.
2. Most of the study sample was male compared to females in the study and control group.
3. The results of this study demonstrated that most participant domains on the pretest had low functional capability.
4. The results of the study showed that the patient should be informed about the importance of their breathing pattern when using an incentive spirometer. Rather than training the patient to expand the lower chest during maximal inspiration should be done using the accessory muscles of inhalation. Rather than only expanding the upper chest, the patient's main goal should be to enlarge their lower rib cage.
5. The conclusion obtained from this study on the effect of deep breaths on cardiovascular parameters and the functional capacity of patients with CAD. According to the current study's findings, flow-oriented incentive spirometry can help with enhancing functional capacity and slightly significant improvements in cardiovascular parameters when compared to the study group that used flow-oriented incentive spirometry and the

control group in the post-test, and there are no significant side effects found in used.

6. From the result accept the researcher hypothesis and refused the null hypothesis

6.2. Recommendation

1. Increase numbers of participants in the future studies.
2. Conduct programs for nurses on the benefits of using an incentive respirator
3. Make pershore about the use of incentive spirometer for patients that help at home
4. Consequently, this methodology can be applied in subsequent research to examine long-term impacts for weeks or months. Because it is simple to use and the measurement is non-intrusive, this method is perfect for self-monitoring at home.

References

References:

- Alaparthi, G. K., Augustine, A. J., Anand, R., & Mahale, A. (2016). Comparison of Diaphragmatic Breathing Exercise, Volume and Flow Incentive Spirometry, on Diaphragm Excursion and Pulmonary Function in Patients Undergoing Laparoscopic Surgery: A Randomized Controlled Trial. *Minimally invasive surgery*, *2016*, 1967532. https://doi.org/10.1155/2016/1967532
- Alligood, M. R. (2017). *Nursing Theorists and Their Work-E-Book: Nursing Theorists and Their Work-E-Book*. Elsevier Health Sciences.
- Alwekhyan, S. A., Alshraideh, J. A., Yousef, K. M., & Hayajneh, F. (2022). Nurse-guided incentive spirometry use and postoperative pulmonary complications among cardiac surgery patients: A randomized controlled trial. *International journal of nursing practice*, *28*(2), e13023. https://doi.org/10.1111/ijn.13023
- Amin, R., Alaparthi, G. K., Samuel, S. R., Bairapareddy, K. C., Raghavan, H., & Vaishali, K. (2021). Effects of three pulmonary ventilation regimes in patients undergoing coronary artery bypass graft surgery: a randomized clinical trial. Scientific reports, 11(1), 6730. https://doi.org/10.1038/s41598-021-86281-4
- Arazi, T., Aliasgharpour, M., Mohammadi, S., Mohammadi, N., & Kazemnejad, A. (2021). Effect of a breathing exercise on respiratory function and 6-minute walking distance in patients under hemodialysis: a randomized controlled trial. *Journal of Nursing Research*, *29*(2), e146.
- ARAZI, Tajmohammad; ALIASGHARPOUR, Mansooreh; MOHAMMADI, Sepideh*; MOHAMMADI, Nooredin; KAZEMNEJAD, Anoushirvan. Effect of a Breathing Exercise on Respiratory Function and 6-Minute Walking Distance in Patients Under Hemodialysis: A Randomized Controlled Trial:

[RETRACTED]. Journal of Nursing Research 29(2):p e146, April 2021. | DOI: 10.1097/JNR.0000000000000423

- Ausili, D., Masotto, M., Dall'Ora, C., Salvini, L., & Di Mauro, S. (2014). A literature review on self-care of chronic illness: definition, assessment and related outcomes. *Professioni infermieristiche*, *67*(3), 180–189. https://doi.org/10.7429/pi.2014.673180
- Aweto, H. A., Obikeh, E. O., & Tella, B. A. (2020). Effects of incentive spirometry on cardiopulmonary parameters, functional capacity and glycemic control in patients with Type 2 diabetes. *Hong Kong Physiotherapy Journal*, *40*(02), 121-132.
- Bauersachs, R., Zeymer, U., Brière, J. B., Marre, C., Bowrin, K., & Huelsebeck, M. (2019). Burden of Coronary Artery Disease and Peripheral Artery Disease: A Literature Review. *Cardiovascular therapeutics*, *2019*, 8295054. https://doi.org/10.1155/2019/8295054
- Bellmann, B., Lin, T., Greissinger, K., Rottner, L., Rillig, A., & Zimmerling, S. (2020). The Beneficial Effects of Cardiac Rehabilitation. *Cardiology and therapy*, *9*(1), 35–44. https://doi.org/10.1007/s40119-020-00164-9
- Benjamin, E. J., Muntner, P., Alonso, A., Bittencourt, M. S., Callaway, C. W., Carson, A. P., Chamberlain, A. M., Chang, A. R., Cheng, S., Das, S. R., Delling, F. N., Djousse, L., Elkind, M. S. V., Ferguson, J. F., Fornage, M., Jordan, L. C., Khan, S. S., Kissela, B. M., Knutson, K. L., Kwan, T. W., … American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee (2019). Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association. *Circulation*, *139*(10), e56–e528. https://doi.org/10.1161/CIR.0000000000000659
- Bentley, T. G., D'Andrea-Penna, G., Rakic, M., Arce, N., LaFaille, M., Berman, R., ... & Sprimont, P. (2023). Breathing Practices for

Stress and Anxiety Reduction: Conceptual Framework of Implementation Guidelines Based on a Systematic Review of the Published Literature. *Brain Sciences*, *13*(12), 1612.

- Bernal-Utrera, C., Anarte-Lazo, E., Gonzalez-Gerez, J. J., De-La-Barrera-Aranda, E., Saavedra-Hernandez, M., & Rodriguez-Blanco, C. (2021). Could Physical Therapy Interventions Be Adopted in the Management of Critically Ill Patients with COVID-19? A Scoping Review. *International journal of environmental research and public health*, *18*(4), 1627. https://doi.org/10.3390/ijerph18041627
- Bharathi, A. R. (2021). Assess The Effectiveness of Deep Breathing Exercise with Incentive Spirometer on the Respiratory status of Cardio Thoracic and Vascular Patients. *Journal of Research in Medical and Dental Science*, 276-283.
- Bilo, G., Revera, M., Bussotti, M., Bonacina, D., Styczkiewicz, K., Caldara, G., ... & Parati, G. (2012). Effects of slow deep breathing at high altitude on oxygen saturation, pulmonary and systemic hemodynamics. *PloS one*, *7*(11), e49074.
- Birdee, G., Nelson, K., Wallston, K., Nian, H., Diedrich, A., Paranjape, S., ... & Gamboa, A. (2023). Slow breathing for reducing stress: The effect of extending exhale. *Complementary Therapies in Medicine*, *73*, 102937.
- Birnbaum, Y., Wilson, J. M., Fiol, M., de Luna, A. B., Eskola, M., & Nikus, K. (2014). ECG diagnosis and classification of acute coronary syndromes. *Annals of noninvasive electrocardiology : the official journal of the International Society for Holter and Noninvasive Electrocardiology, Inc*, *19*(1), 4–14. https://doi.org/10.1111/anec.12130
- Boren, J., Chapman, M. J., Krauss, R. M., Packard, C. J., Bentzon, J. F., Binder, C. J., ... & Ginsberg, H. N. (2020). Low-density lipoproteins cause atherosclerotic cardiovascular disease:

pathophysiological, genetic, and therapeutic insights: a consensus statement from the European Atherosclerosis Society Consensus Panel. *European heart journal*, *41*(24), 2313-2330.

- Brown JC, Gerhardt TE, Kwon E. Risk Factors for Coronary Artery Disease. [Updated 2023 Jan 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554410/
- Brown, J. C., Gerhardt, T. E., & Kwon, E. (2023). Risk Factors For Coronary Artery Disease. In StatPearls. StatPearls Publishing.
- Bruss, Z. S., & Raja, A. (2022, September 12). *Physiology, Stroke Volume - StatPearls - NCBI Bookshelf*. Physiology, Stroke Volume - StatPearls - NCBI Bookshelf. https://www.ncbi.nlm.nih.gov/books/NBK547686/#__NBK547686_ai__
- Buckberg, G. D., Nanda, N. C., Nguyen, C., & Kocica, M. J. (2018). What Is the Heart? Anatomy, Function, Pathophysiology, and Misconceptions. *Journal of cardiovascular development and disease*, *5*(2), 33. https://doi.org/10.3390/jcdd5020033
- Cervellin, G., & Rastelli, G. (2016). The clinics of acute coronary syndrome. *Annals of translational medicine*, *4*(10), 191. https://doi.org/10.21037/atm.2016.05.10
- Chang, Q., Liu, R., & Shen, Z. (2013). Effects of slow breathing rate on blood pressure and heart rate variabilities. *International journal of cardiology*, *169*(1), e6-e8.
- Cheng, K., Alhumood, K., El Shaer, F., & De Silva, R. (2021). The Role of Nicorandil in the Management of Chronic Coronary Syndromes in the Gulf Region. *Advances in therapy*, *38*(2), 925–948. https://doi.org/10.1007/s12325-020-01582-w
- Dahmardeh, H., & Amirifard, H. (2018). Evaluating the impact of self-care program based on Orem model on self-efficacy of patients

suffering from multiple sclerosis. *International Journal of Pharmaceutical and Phytopharmacological Research*, *8*(5), 88-93.

- DeMers, D., & Wachs, D. (2019). Physiology, mean arterial pressure.
- Drevenhorn E. (2018). A Proposed Middle-Range Theory of Nursing in Hypertension Care. *International journal of hypertension*, *2018*, 2858253. https://doi.org/10.1155/2018/2858253
- Egger, C. (2022). The autonomic nervous system. *Manual of Equine Anesthesia and Analgesia*, 110-118.
- Eltorai, A. E. M., Baird, G. L., Eltorai, A. S., Healey, T. T., Agarwal, S., Ventetuolo, C. E., Martin, T. J., Chen, J., Kazemi, L., Keable, C. A., Diaz, E., Pangborn, J., Fox, J., Connors, K., Sellke, F. W., Elias, J. A., & Daniels, A. H. (2019). Effect of an Incentive Spirometer Patient Reminder After Coronary Artery Bypass Grafting: A Randomized Clinical Trial. *JAMA surgery*, *154*(7), 579–588. https://doi.org/10.1001/jamasurg.2019.0520
- Ferrari, R., Censi, S., & Squeri, A. (2019). Treating angina. *European heart journal supplements : journal of the European Society of Cardiology*, *21*(Suppl G), G1–G3. https://doi.org/10.1093/eurheartj/suz190
- Ford, T. J., & Berry, C. (2020). Angina: contemporary diagnosis and management. *Heart (British Cardiac Society)*, *106*(5), 387–398. https://doi.org/10.1136/heartjnl-2018-314661
- Foroutan, B. (2023). A Review of Clinical Influencing Factors in the Selection of Cardiac Medications in the Elderly. *OBM Integrative and Complementary Medicine*, *8*(2), 1-11.
- Förstermann, U., & Sessa, W. C. (2012). Nitric oxide synthases: regulation and function. *European heart journal*, *33*(7), 829–837d. https://doi.org/10.1093/eurheartj/ehr304
- Franklin, E., & Anjum, F. (2023). Incentive spirometer and inspiratory muscle training. In *StatPearls [Internet]*. StatPearls Publishing.
- Fuchshuber, P. R., Greif, W., Tidwell, C. R., Klemm, M. S., Frydel, C., Wali, A., Rosas, E., & Clopp, M. P. (2012). The power of the

National Surgical Quality Improvement Program--achieving a zero pneumonia rate in general surgery patients. *The Permanente journal*, *16*(1), 39–45. https://doi.org/10.7812/TPP/11-127

- Ghorbani, A., Hajizadeh, F., Sheykhi, M. R., & Mohammad Poor Asl, A. (2018). The Effects of Deep-Breathing Exercises on Postoperative Sleep Duration and Quality in Patients Undergoing Coronary Artery Bypass Graft (CABG): a Randomized Clinical Trial. *Journal of caring sciences*, *8*(4), 219–224. https://doi.org/10.15171/jcs.2019.031
- Gillen C, Goyal A. Stable Angina. [Updated 2022 Dec 19]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK559016/
- Giuliano, C., Parmenter, B. J., Baker, M. K., Mitchell, B. L., Williams, A. D., Lyndon, K., Mair, T., Maiorana, A., Smart, N. A., & Levinger, I. (2017). Cardiac Rehabilitation for Patients With Coronary Artery Disease: A Practical Guide to Enhance Patient Outcomes Through Continuity of Care. *Clinical Medicine Insights. Cardiology*, *11*, 1179546817710028. https://doi.org/10.1177/1179546817710028
- Go, A. S., Mozaffarian, D., Roger, V. L., Benjamin, E. J., Berry, J. D., Borden, W. B., ... & Turner, M. B. (2013). Heart disease and stroke statistics—2013 update: a report from the American Heart Association. *Circulation*, *127*(1), e6-e245.
- Goldberger, J. J., Arora, R., Buckley, U., & Shivkumar, K. (2019). Autonomic Nervous System Dysfunction: JACC Focus Seminar. *Journal of the American College of Cardiology*, *73*(10), 1189–1206. https://doi.org/10.1016/j.jacc.2018.12.064
- Hadaya, J., & Ardell, J. L. (2020). Autonomic Modulation for Cardiovascular Disease. *Frontiers in physiology*, *11*, 617459. https://doi.org/10.3389/fphys.2020.617459

- Haïssaguerre, M., Nademanee, K., Hocini, M., Cheniti, G., Duchateau, J., Frontera, A., Sacher, F., Derval, N., Denis, A., Pambrun, T., Dubois, R., Jaïs, P., Benoist, D., Walton, R. D., Nogami, A., Coronel, R., Potse, M., & Bernus, O. (2019). Depolarization versus repolarization abnormality underlying inferolateral J-wave syndromes: New concepts in sudden cardiac death with apparently normal hearts. *Heart rhythm*, *16*(5), 781–790. https://doi.org/10.1016/j.hrthm.2018.10.040
- Hajar R. (2017). Risk Factors for Coronary Artery Disease: Historical Perspectives. *Heart views : the official journal of the Gulf Heart Association*, *18*(3), 109–114. https://doi.org/10.4103/HEARTVIEWS.HEARTVIEWS_106_17
- Hajar, R. (2016). Framingham contribution to cardiovascular disease. *Heart views: the official journal of the Gulf Heart Association*, *17*(2), 78.
- Hamasaki H. (2020). Effects of Diaphragmatic Breathing on Health: A Narrative Review. *Medicines (Basel, Switzerland)*, *7*(10), 65. https://doi.org/10.3390/medicines7100065
- Harisuddin, H., Subadi, I., Sulistiawati, N.N., Andriati., Melaniani, S. 2023. The effect of exercise using incentive spirometry on heart rate variability in patients after COVID-19 infection. Bali Medical Journal 12(1): 483-489. DOI: 10.15562/bmj.v12i1.3992
- He, Z., Luo, J., Lv, M., Li, Q., Ke, W., Niu, X., & Zhang, Z. (2023). Characteristics and evaluation of atherosclerotic plaques: an overview of state-of-the-art techniques. *Frontiers in Neurology*, *14*, 1159288.
- Herawati, I., Mat Ludin, A. F., M, M., Ishak, I., & Farah, N. M. F. (2023). Breathing exercise for hypertensive patients: A scoping review. *Frontiers in physiology*, *14*, 1048338. https://doi.org/10.3389/fphys.2023.1048338

- Hinkle, J. L., & Cheever, K. H. (2018). *Brunner and Suddarth's textbook of medical-surgical nursing*. Wolters kluwer india Pvt Ltd.
- Hoesny, R., Alim, Z., & Darmawati, D. (2020). The Effect of Deep Breathing Therapy on the Blood Pressure of Hypertension Patients in Health Centre. Journal of Health Science and Prevention, 3(3S), 127–130. https://doi.org/10.29080/jhsp.v3i3S.285
- Homan TD, Bordes SJ, Cichowski E. Physiology, Pulse Pressure. [Updated 2023 Jul 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482408/
- Hughes, A. M., Sanderson, E., Morris, T., Ayorech, Z., Tesli, M., Ask, H., ... & Davies, N. M. (2022). Body mass index and childhood symptoms of depression, anxiety, and attention-deficit hyperactivity disorder: A within-family Mendelian randomization study. *Elife*, *11*, e74320.
- Hung, M. Y., Kounis, N. G., Lu, M. Y., & Hu, P. (2020). Myocardial Ischemic Syndromes, Heart Failure Syndromes, Electrocardiographic Abnormalities, Arrhythmic Syndromes and Angiographic Diagnosis of Coronary Artery Spasm: Literature Review. *International journal of medical sciences*, *17*(8), 1071–1082. 124 https://doi.org/10.7150/ijms.43472
- Ibanez, B., James, S., Agewall, S., Antunes, M. J., Bucciarelli-Ducci, C., Bueno, H., Caforio, A. L. P., Crea, F., Goudevenos, J. A., Halvorsen, S., Hindricks, G., Kastrati, A., Lenzen, M. J., Prescott, E., Roffi, M., Valgimigli, M., Varenhorst, C., Vranckx, P., Widimský, P., & ESC Scientific Document Group (2018). 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). *European*

heart journal, *39*(2), 119–177. https://doi.org/10.1093/eurheartj/ehx393

- Jat K. R. (2013). Spirometry in children. *Primary care respiratory journal : journal of the General Practice Airways Group*, *22*(2), 221–229. https://doi.org/10.4104/pcrj.2013.00042
- Kavitha, S., & Sujatha, B.K. (2018). Effect Of Deep Breathing Exercise on Cardiac Parameters in Young Adults. Paripex Indian Journal Of Research, 7.
- Kenny, J. E., & Kuschner, W. G. (2013). Pneumothorax caused by aggressive use of an incentive spirometer in a patient with emphysema. *Respiratory care*, *58*(7), e77–e79. https://doi.org/10.4187/respcare.02130
- Khademian, Z., Ara, F. K., & Gholamzadeh, S. (2020). The effect of self care education based on orem's nursing theory on quality of life and self-efficacy in patients with hypertension: a quasi-experimental study. *International journal of community based nursing and midwifery*, *8*(2), 140.
- Khademian, Z., Ara, F. K., & Gholamzadeh, S. (2020). The effect of self care education based on orem's nursing theory on quality of life and self-efficacy in patients with hypertension: a quasi-experimental study. International journal of community based nursing and midwifery, 8(2), 140.
- Khademian, Z., Kazemi Ara, F., & Gholamzadeh, S. (2020). The Effect of Self Care Education Based on Orem's Nursing Theory on Quality of Life and Self-Efficacy in Patients with Hypertension: A Quasi-Experimental Study. *International journal of community based nursing and midwifery*, *8*(2), 140–149. https://doi.org/10.30476/IJCBNM.2020.81690.0
- Kim, S. Y., Lee, J. P., Shin, W. R., Oh, I. H., Ahn, J. Y., & Kim, Y. H. (2022). Cardiac biomarkers and detection methods for myocardial

infarction. *Molecular & cellular toxicology*, *18*(4), 443–455. https://doi.org/10.1007/s13273-022-00287-1

- King J, Lowery DR. Physiology, Cardiac Output. [Updated 2023 Jul 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470455/
- Kobiyama, K., & Ley, K. (2018). Atherosclerosis. *Circulation research*, *123*(10), 1118–1120. https://doi.org/10.1161/CIRCRESAHA.118.313816
- Kumar, A. S., Alaparthi, G. K., Augustine, A. J., Pazhyaottayil, Z. C., Ramakrishna, A., & Krishnakumar, S. K. (2016). Comparison of flow and volume incentive spirometry on pulmonary function and exercise tolerance in open abdominal surgery: a randomized clinical trial. *Journal of clinical and diagnostic research: JCDR*, *10*(1), KC01.
- Kumar, P., & Clark, M. L. (2012). *Kumar and Clark's clinical medicine E-Book*. Elsevier health sciences.
- Kvarstein, E. H., Frøyhaug, M., Pettersen, M. S., Carlsen, S., Ekberg, A., Fjermestad-Noll, J., Ulvestad, D. A., Gikling, E. L., Hjermann, E., Lindberget, K., Omvik, S., Eikenæs, I. U., Hummelen, B., Morken, K. T. E., Wilberg, T., & Pedersen, G. A. F. (2023). Improvement of personality functioning among people treated within personality disorder mental health services. A longitudinal, observational study. *Frontiers in psychiatry*, *14*, 1163347. https://doi.org/10.3389/fpsyt.2023.1163347
- Kwiecinski, J., Tzolos, E., Fletcher, A. J., Nash, J., Meah, M. N., Cadet, S., Adamson, P. D., Grodecki, K., Joshi, N., Williams, M. C., van Beek, E. J. R., Lai, C., Tavares, A. A. S., MacAskill, M. G., Dey, D., Baker, A. H., Leipsic, J., Berman, D. S., Sellers, S. L., Newby, D. E., … Slomka, P. J. (2022). Bypass Grafting and Native Coronary

Artery Disease Activity. *JACC. Cardiovascular imaging*, *15*(5), 875–887. https://doi.org/10.1016/j.jcmg.2021.11.030

- Lehrer, P. M., & Gevirtz, R. (2014). Heart rate variability biofeedback: how and why does it work?. *Frontiers in psychology*, *5*, 756. https://doi.org/10.3389/fpsyg.2014.00756
- Liu, C. J., Tsai, W. C., Chu, C. C., Muo, C. H., & Chung, W. S. (2019). Is incentive spirometry beneficial for patients with lung cancer receiving video-assisted thoracic surgery?. *BMC pulmonary medicine*, *19*(1), 121. https://doi.org/10.1186/s12890-019-0885-8
- Lu, M. L., Nwakile, C., Bhalla, V., De Venecia, T., Shah, M., & Figueredo, V. M. (2015). Prognostic significance of abnormal P wave morphology and PR-segment displacement after ST-elevation myocardial infarction. *International journal of cardiology*, *197*, 216–221. https://doi.org/10.1016/j.ijcard.2015.06.055
- Ma, X., Yue, Z. Q., Gong, Z. Q., Zhang, H., Duan, N. Y., Shi, Y. T., Wei, G. X., & Li, Y. F. (2017). The Effect of Diaphragmatic Breathing on Attention, Negative Affect and Stress in Healthy Adults. *Frontiers in psychology*, *8*, 874. https://doi.org/10.3389/fpsyg.2017.00874
- Madapaddy, S. (2021). *Learn ECG in a Day: A Systematic Approach*. Jaypee Brothers Medical Publishers.
- Mahmood, S. S., Levy, D., Vasan, R. S., & Wang, T. J. (2014). The Framingham Heart Study and the epidemiology of cardiovascular disease: a historical perspective. *Lancet (London, England)*, *383*(9921), 999–1008. https://doi.org/10.1016/S0140-6736(13)61752-3
- McCraty, R., & Shaffer, F. (2015). Heart rate variability: new perspectives on physiological mechanisms, assessment of self-regulatory capacity, and health risk. *Global advances in health and medicine*, *4*(1), 46-61.

- Meleis, A. I. (2011). Theoretical nursing: Development and progress. Lippincott Williams & Wilkins.
- Mensah, G. A., Roth, G. A., & Fuster, V. (2019). The global burden of cardiovascular diseases and risk factors: 2020 and beyond. *Journal of the American College of Cardiology*, *74*(20), 2529-2532.
- Morales, D. R., Lipworth, B. J., Donnan, P. T., Jackson, C., & Guthrie, B. (2017). Respiratory effect of beta-blockers in people with asthma and cardiovascular disease: population-based nested case control study. *BMC medicine*, *15*(1), 18. https://doi.org/10.1186/s12916-017-0781-0
- Muga, M. A., Owili, P. O., Hsu, C. Y., & Chao, J. C. (2019). Association of lifestyle factors with blood lipids and inflammation in adults aged 40 years and above: a population-based cross-sectional study in Taiwan. *BMC public health*, *19*(1), 1346. https://doi.org/10.1186/s12889-019-7686-0
- Nahid, R., Hossein, M., & Akram, P. (2022). An Integrated Review of the Application of Orem's Self-Care Theory in Care of Diabetic Patients. *Journal of Diabetic Nursing*, *10*(2).
- Naik, G. S., Gaur, G. S., & Pal, G. K. (2018). Effect of Modified Slow Breathing Exercise on Perceived Stress and Basal Cardiovascular Parameters. *International journal of yoga*, *11*(1), 53–58. https://doi.org/10.4103/ijoy.IJOY_41_16
- Naz, S. (2017). Application of dorothea orem's theory into nursing practice.
- Noble, D. J., & Hochman, S. (2019). Hypothesis: Pulmonary Afferent Activity Patterns During Slow, Deep Breathing Contribute to the Neural Induction of Physiological Relaxation. *Frontiers in physiology*, *10*, 1176. https://doi.org/10.3389/fphys.2019.01176
- Ogobuiro, I., Wehrle, C. J., & Tuma, F. (2023). Anatomy, Thorax, Heart Coronary Arteries. In *StatPearls*. StatPearls Publishing.

- Olvera Lopez E, Ballard BD, Jan A. Cardiovascular Disease. [Updated 2023 Aug 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK535419/
- Open Resources for Nursing (Open RN); Ernstmeyer K, Christman E, editors. Nursing Advanced Skills [Internet]. Eau Claire (WI): Chippewa Valley Technical College; 2023. Chapter 7 Interpret Basic ECG. Available from: https://www.ncbi.nlm.nih.gov/books/NBK594493/
- Pencina, M. J., Navar, A. M., Wojdyla, D., Sanchez, R. J., Khan, I., Elassal, J., D'Agostino, R. B., Sr, Peterson, E. D., & Sniderman, A. D. (2019). Quantifying Importance of Major Risk Factors for Coronary Heart Disease. *Circulation*, *139*(13), 1603–1611. https://doi.org/10.1161/CIRCULATIONAHA.117.031855
- Pleil, J. D., Ariel Geer Wallace, M., Davis, M. D., & Matty, C. M. (2021). The physics of human breathing: flow, timing, volume, and pressure parameters for normal, on-demand, and ventilator respiration. *Journal of breath research*, *15*(4), 10.1088/1752-7163/ac2589. https://doi.org/10.1088/1752-7163/ac2589
- Pramanik, T., Shrestha, P., Tako, R. K., Bajracharya, S., Chalise, A., & Pandit, R. (2016). Transient Effect of Slow Pace Breathing Exercise on Blood Pressure, Heart Rate and Pulmonary Function Tests. *Nepal Med Coll J*, *18*(1-2), 48-50.
- Qiu, T., Li, Y., Zhang, J., Hou, X., Wu, Y., Xu, Y., ... & Qian, J. (2022). A Cross-Sectional Study on the Application of IS in Perioperative Pulmonary Function Training in Spine and Orthopedics. *Computational Intelligence and Neuroscience*, *2022*.
- Rasam, S. A., Apte, K. K., & Salvi, S. S. (2015). Infection control in the pulmonary function test laboratory. *Lung India: Official Organ of Indian Chest Society*, *32*(4), 359.

- Regmi M, Siccardi MA. Coronary Artery Disease Prevention. [Updated 2023 Aug 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK547760/
- Renault, J. A., Costa-Val, R., Rosseti, M. B., & Houri Neto, M. (2009). Comparison between deep breathing exercises and incentive spirometry after CABG surgery. *Revista brasileira de cirurgia cardiovascular : orgao oficial da Sociedade Brasileira de Cirurgia Cardiovascular*, *24*(2), 165–172. https://doi.org/10.1590/s0102-76382009000200012
- Rietberg, M. B., Veerbeek, J. M., Gosselink, R., Kwakkel, G., & van Wegen, E. E. (2017). Respiratory muscle training for multiple sclerosis. *The Cochrane database of systematic reviews*, *12*(12), CD009424. https://doi.org/10.1002/14651858.CD009424.pub2
- Rippe J. M. (2018). Lifestyle Strategies for Risk Factor Reduction, Prevention, and Treatment of Cardiovascular Disease. *American journal of lifestyle medicine*, *13*(2), 204–212. https://doi.org/10.1177/1559827618812395
- Roth, G. A., Mensah, G. A., & Fuster, V. (2020). The Global Burden of Cardiovascular Diseases and Risks: A Compass for Global Action. *Journal of the American College of Cardiology*, *76*(25), 2980–2981. https://doi.org/10.1016/j.jacc.2020.11.021
- Roth, G. A., Mensah, G. A., Johnson, C. O., Addolorato, G., Ammirati, E., Baddour, L. M., ... & Fuster, V. (2020). GBD-NHLBI-JACC Global Burden of Cardiovascular Diseases Writing Group. Global burden of cardiovascular diseases and risk factors, 1990-2019: update from the GBD 2019 study. *J Am Coll Cardiol*, *76*(25), 2982-3021.
- Rousan, T. A., & Thadani, U. (2019). Stable Angina Medical Therapy Management Guidelines: A Critical Review of Guidelines from the

European Society of Cardiology and National Institute for Health and Care Excellence. *European cardiology*, *14*(1), 18–22. https://doi.org/10.15420/ecr.2018.26.1

- Russell, M. E., Scott, A. B., Boggero, I. A., & Carlson, C. R. (2017). Inclusion of a rest period in diaphragmatic breathing increases high frequency heart rate variability: Implications for behavioral therapy. *Psychophysiology*, *54*(3), 358–365. https://doi.org/10.1111/psyp.12791
- Russo, M. A., Santarelli, D. M., & O'Rourke, D. (2017). The physiological effects of slow breathing in the healthy human. *Breathe*, *13*(4), 298-309.
- Said, S. A., Bloo, R., de Nooijer, R., & Slootweg, A. (2015). Cardiac and non-cardiac causes of T-wave inversion in the precordial leads in adult subjects: A Dutch case series and review of the literature. *World journal of cardiology*, *7*(2), 86–100. https://doi.org/10.4330/wjc.v7.i2.86
- Sattar Y, Chhabra L. Electrocardiogram. [Updated 2023 Jun 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK549803/
- Sattar Y, Chhabra L. Electrocardiogram. [Updated 2023 Jun 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK549803/
- Schultz, W. M., Hayek, S. S., Samman Tahhan, A., Ko, Y. A., Sandesara, P., Awad, M., Mohammed, K. H., Patel, K., Yuan, M., Zheng, S., Topel, M. L., Hartsfield, J., Bhimani, R., Varghese, T., Kim, J. H., Shaw, L., Wilson, P., Vaccarino, V., & Quyyumi, A. A. (2017). Marital Status and Outcomes in Patients With Cardiovascular Disease. *Journal of the American Heart Association*, *6*(12), e005890. https://doi.org/10.1161/JAHA.117.005890

- Seri, I. (2018). *Hemodynamics and cardiology: Neonatology questions and controversies*. Elsevier Health Sciences.
- Sevoz-Couche, C., & Laborde, S. (2022). Heart rate variability and slow-paced breathing:when coherence meets resonance. *Neuroscience and biobehavioral reviews*, *135*, 104576. https://doi.org/10.1016/j.neubiorev.2022.104576
- Shah, A. S., El Ghormli, L., Vajravelu, M. E., Bacha, F., Farrell, R. M., Gidding, S. S., ... & Urbina, E. M. (2019). Heart rate variability and cardiac autonomic dysfunction: prevalence, risk factors, and relationship to arterial stiffness in the treatment options for type 2 diabetes in adolescents and youth (TODAY) study. *Diabetes Care*, *42*(11), 2143-2150.
- Shahjehan RD, Bhutta BS. Coronary Artery Disease. [Updated 2023 Aug 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK564304/
- Sheraz, S., Ayub, H., Ferraro, F. V., Razzaq, A., & Malik, A. N. (2022). Clinically Meaningful Change in 6 Minute Walking Test and the Incremental Shuttle Walking Test following Coronary Artery Bypass Graft Surgery. *International Journal of Environmental Research and Public Health*, *19*(21), 14270.
- Sigamani, A., & Gupta, R. (2022). Revisiting secondary prevention in coronary heart disease. *Indian Heart Journal*.
- Singh A, Museedi AS, Grossman SA. Acute Coronary Syndrome. [Updated 2023 Jul 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459157/
- So, M. W., Heo, H. M., Koo, B. S., Kim, Y. G., Lee, C. K., & Yoo, B. (2012). Efficacy of incentive spirometer exercise on pulmonary functions of patients with ankylosing spondylitis stabilized by tumor

necrosis factor inhibitor therapy. *The Journal of rheumatology*, *39*(9), 1854–1858. https://doi.org/10.3899/jrheum.120137

- Sokol, G., Vilozni, D., Hakimi, R., Lavie, M., Sarouk, I., Bat-El Bar, Dagan, A., Ofek, M., & Efrati, O. (2015). The Short-Term Effect of Breathing Tasks Via an Incentive Spirometer on Lung Function Compared With Autogenic Drainage in Subjects With Cystic Fibrosis. *Respiratory care*, *60*(12), 1819–1825. https://doi.org/10.4187/respcare.04008
- Spagnolo, P., Tzouvelekis, A., & Bonella, F. (2018). The Management of Patients With Idiopathic Pulmonary Fibrosis. *Frontiers in medicine*, *5*, 148. https://doi.org/10.3389/fmed.2018.00148
- Stary, H. C., Chandler, A. B., Dinsmore, R. E., Fuster, V., Glagov, S., Insull Jr, W., ... & Wissler, R. W. (1995). 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*, *92*(5), 1355-1374.
- Sweity, E. M., Alkaissi, A. A., Othman, W., & Salahat, A. (2021). Preoperative incentive spirometry for preventing postoperative pulmonary complications in patients undergoing coronary artery bypass graft surgery: a prospective, randomized controlled trial. *Journal of Cardiothoracic Surgery*, *16*(1), 1-11.
- Theofilis, P., Oikonomou, E., Chasikidis, C., Tsioufis, K., & Tousoulis, D. (2023). Pathophysiology of Acute Coronary Syndromes-Diagnostic and Treatment Considerations. *Life (Basel, Switzerland)*, *13*(7), 1543. https://doi.org/10.3390/life13071543
- Timmis, A., Vardas, P., Townsend, N., Torbica, A., Katus, H., De Smedt, D., ... & Achenbach, S. (2022). European Society of Cardiology: cardiovascular disease statistics 2021. *European Heart Journal*, *43*(8), 716-799.

- Toor, H., Kashyap, S., Yau, A., Simoni, M., Farr, S., Savla, P., ... & Yau, A. C. L. (2021). Efficacy of incentive spirometer in increasing maximum inspiratory volume in an out-patient setting. *Cureus*, *13*(10).
- Tsao, C. W., Aday, A. W., Almarzooq, Z. I., Alonso, A., Beaton, A. Z., Bittencourt, M. S., ... & American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. (2022). Heart disease and stroke statistics—2022 update: a report from the American Heart Association. *Circulation*, *145*(8), e153-e639.
- Tutor, D. M. N. (2921). Assess the Effectiveness of Deep breathing Exercise with Incentive Spirometer on Patients Who Undergone Cardio Thoracic and Vascular Surgery in Selected Hospital Chennai.
- Vacchi, C., Sebastiani, M., Cassone, G., Cerri, S., Della Casa, G., Salvarani, C., & Manfredi, A. (2020). Therapeutic Options for the Treatment of Interstitial Lung Disease Related to Connective Tissue Diseases. A Narrative Review. *Journal of clinical medicine*, *9*(2), 407. https://doi.org/10.3390/jcm9020407
- Van de Wetering-van Dongen, V. A., Kalf, J. G., van der Wees, P. J., Bloem, B. R., & Nijkrake, M. J. (2020). The Effects of Respiratory Training in Parkinson's Disease: A Systematic Review. *Journal of Parkinson's disease*, *10*(4), 1315–1333. https://doi.org/10.3233/JPD-202223
- Verma, A. K., Sun, J. L., Hernandez, A., Teerlink, J. R., Schulte, P. J., Ezekowitz, J., Voors, A., Starling, R., Armstrong, P., O'Conner, C. M., & Mentz, R. J. (2018). Rate pressure product and the components of heart rate and systolic blood pressure in hospitalized heart failure patients with preserved ejection fraction: Insights from ASCEND-HF. *Clinical cardiology*, *41*(7), 945–952. https://doi.org/10.1002/clc.22981

- Walker, B. R., & Colledge, N. R. (2013). *Davidson's principles and practice of medicine e-book*. Elsevier Health Sciences.
- Wang, M. H., & Yeh, M. L. (2019). Respiratory training interventions improve health status of heart failure patients: A systematic review and network meta-analysis of randomized controlled trials. *World journal of clinical cases*, *7*(18), 2760–2775. https://doi.org/10.12998/wjcc.v7.i18.2760
- Wang, X., & Khalil, R. A. (2018). Matrix metalloproteinases, vascular remodeling, and vascular disease. *Advances in pharmacology*, *81*, 241-330.
- Wei, G. X., Li, Y. F., Yue, X. L., Ma, X., Chang, Y. K., Yi, L. Y., Li, J. C., & Zuo, X. N. (2016). Tai Chi Chuan modulates heart rate variability during abdominal breathing in elderly adults. *PsyCh journal*, *5*(1), 69–77. https://doi.org/10.1002/pchj.105
- Wu, Q., Liu, L., Jiang, X., Hu, Y. Y., Liang, Q. S., He, Z. S., ... & Wang, X. H. (2020). Effect of voluntary breathing exercises on stable coronary artery disease in heart rate variability and rate-pressure product: a study protocol for a single-blind, prospective, randomized controlled trial. *Trials*, *21*, 1-11.
- Wu, Z., & McGoogan, J. M. (2020). Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA*, *323*(13), 1239–1242. https://doi.org/10.1001/jama.2020.2648
- Young, J. W., Jr, & Melander, S. (2013). Evaluating symptoms to improve quality of life in patients with chronic stable angina. *Nursing research and practice*, *2013*, 504915. https://doi.org/10.1155/2013/504915
- Zaccaro, A., Piarulli, A., Laurino, M., Garbella, E., Menicucci, D., Neri, B., & Gemignani, A. (2018). How Breath-Control Can Change

Your Life: A Systematic Review on Psycho-Physiological Correlates of Slow Breathing. *Frontiers in human neuroscience*, *12*, 353. https://doi.org/10.3389/fnhum.2018.00353

- Zerang, F., Amouzeshi, A., & Barkhordari-Sharifabad, M. (2022). Comparison of the effect of incentive spirometry and deep breathing exercises on hemodynamic parameters of patients undergoing coronary artery bypass graft surgery: A Clinical Trial. *Journal of Vascular Nursing*, *40*(3), 134-139.

Appendices

Appendix A

Ethical consideration

Ministry of Higher Education and Scientific Research
University of Karbala / College of Nursing
Scientific Research Ethics Committee

Ethical Committee Code: UOK.CON.24.031
Date: 10 / 1 / 2024

Research Ethical Approval Form

Title of the research project	
In the English language	**In the Arabic language**
Effect of Slow Deep Breathing Exercises by using Incentive Spirometry on Cardio-pulmonary Parameters, Electrocardiographic Findings and Functional Capacity among Patients with Coronary Artery Disease	أثر تمارين التنفس العميق البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية-الرئوية، نتائج تخطيط القلب، والقدرة الوظيفية بين مرضى الشريان التاجي

Data About the Main Researcher /Student:

Full Name	Scientific Title	Mobile Number	Email
Zahra Abdulmunem Ahmed	Academic Nurse /Kerbala Health Directorate	07800436230	zahraa.a.m.ahmed@gmail.com

Data About the Co-author /Supervisor:

Full Name	Scientific Title	Mobile Number	Email
Assist. Prof . Dr. Hussam Abbas Dawood	Assist. Prof . Dr.	07827375710	hussam.a@uokerbala.edu.iq

Study objectives

1. Determine the effects of slow deep breathing exercises by using incentive spirometry on cardio-pulmonary parameter among patients with coronary artery disease
2. Investigate the effects of slow deep breathing exercises by using incentive spirometry on electrocardiographic finding among patients with coronary artery disease
3. Evaluate the effects of slow deep breathing exercises by using incentive spirometry on functional capacity among patients with coronary artery disease
4. To find out the relationship between effect of slow deep breathing exercises by using incentive spirometry on the patient's cardio-pulmonary parameters, electrocardiographic findings and functional capacity and with their demographical characteristics

Time and Setting of the Study

Karbala Center for Cardiology, Surgery, and Cardiac Consultation — 1/10/2022-19/3/24

Study Design

The design of study is Quasi_Experimental

Sampling method and sample size

Non-probability sample and the sample size is 50

Statement of Ethical Commitment

I am Zahra Abdulmunem Ahmed pledge to conduct the research in accordance with what was mentioned in the protocol above and to commitment that all rules set by the ethical policy are followed in my research process. I also make a commitment to abide by ethical principles, moral values, law and instruction of the institutions. My research carries no bias for ethnicity, gender, regional aspects and is totally impartial and objective. I will have taken an informed consent from participants, and to provide clarifications and information about the study to the sample members. I deal with the data of the sample members in complete confidentiality.

Name and signature of the researcher

Recommendation of the College's Research Ethical Committee

☑ **Agreement to conduct the study** ☐ **Disagreement to conduct the study**

Instructor Dr. Sajidah Saadoon Oleiwi
Member

Ass. Prof. Dr. Zeki Sabah Musihb
Member

Ass. Prof. Dr. Ghazwan Abdalhussein
Member

Ass. Prof. Dr. Hassan Abdullah Athbi
Chairman of the Committee

Appendix B

Arrangement of University of Kerbala / Collage of Nursing

Republic of Iraq
Ministry of higher education & scientific research
University of Karbala
College of Nursing
Graduate studies Division

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جـــامعة كربلاء
كـلية التـمريـض
شعبة الدراسات العليا

التاريخ : 2 / 1 / 2023

العدد : د ع / 1

الى / دائرة صحة كربلاء المقدسة / مركز التدريب و التنمية البشرية

م/ تسهيل مهمة

تحية طيبة...

يرجى التفضل بالموافقة على تسهيل مهمة طالبة الماجستير السيدة **(زهراء عبد المنعم احمد)** لإنجاز رسالتها الموسومة :

Effect of Slow Deep Breathing Exercises by using Incentive Spirometry on Cardio-pulmonary Parameters, Electrocardiographic Findings and Functional Capacity among Patients with Coronary Artery Disease.

((أثر تمارين التنفس العميق البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية-الرئوية، نتائج تخطيط القلب، والقدرة الوظيفية بين مرضى الشريان التاجي)).

وهي احدى طلبة الدراسات العليا / الماجستير في كليتنا / للعام الدراسي (2022-2023) .

... مع التقدير ...

أ.م.د. سلمان حسين فارس الكريطي
معاون العميد للشؤون العلمية و الدراسات العليا
2 / 1 / 2023

نسخة منه الى :-
- مكتب السيد المعاون العلمي المحترم.
- شعبة الدراسات العليا.
- دائرة صحة كربلاء المقدسة .

العنوان : العراق - محافظة كربلاء المقدسة - حي الموظفين - جامعة كربلاء
Mail: nursing@uokerbala.edu.iq websitnursing.uokerbala.edu.iq

Appendix C

Arrangement of Ministry of Health /Kerbala Health Department / Training and Human Development Center

وزارة الصحة
دائرة صحة كربلاء
مركز التدريب والتنمية البشرية
لجنة البحوث

وزارة الصحة العراقية
Iraqi Ministry of Health
Founded 1920

استمارة رقم ٢٠٢١/٠٣

رقم القرار ٠٠١٤

تاريخ القرار١٦/١/٢٠٢٣

قرار لجنة البحوث

درست لجنة البحوث في دائرة صحة كربلاء مشروع البحث ذي الرقم ٠٠١٤ ٢٠٢٣/كربلاء) المعنون

لانجاز بحثها الموسوم

(اثر تمارين التنفس البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية- الرئوية ، نتائج تخطيط القلب ،والقدرة الوظيفية بين مرضى الشريان التاجي)

والمقدم من الباحثة:- (زهراء عبد المنعم احمد)

الى شعبة ادارة المعرفة / وحدة ادارة البحوث في مركز التدريب والتنمية البشرية في دائرة صحة كربلاء بتاريخ ١٦/١/٢٠٢٣ وقررت:

قبول مشروع البحث اعلاه كونه مستوفيا للمعايير المعتمدة في وزارة الصحة والخاصة بتنفيذ البحوث ولا مانع من تنفيذه في مؤسسات الدائرة.

الدكتورة
تقوى خضر عبد الكريم
طبيبة اختصاص

مقرر لجنة البحوث

16/01/2023

المرفقات:

-Choose an item.

ملاحظات:

- تم تخويل عضو لجنة البحوث (د.تقوى خضر عبد الكريم) او مقرر اللجنة (د.نعيم عبيد طلال) للتوقيع على هذا القرار استنادا الى النظام الداخلي للجنة البحوث.
- الموافقة تعني ان مشروع البحث قد استوفى المعايير الاخلاقية والعلمية لإجراء البحث والمعتمدة في وزارة الصحة، اما التنفيذ فيعتمد على التزام الباحث بتعليمات المؤسسة الصحية التي سينفذ فيها البحث.

Appendix D

Arrangement of Karbala Center for Cardiac Diseases and Surgery

جمهورية العراق

محافظة كربلاء المقدسة
دائرة صحة كربلاء المقدسة
مركز التدريب والتنمية البشرية
شعبة ادارة المعرفة / وحدة ادارة البحوث

Holy Karbala governorate
Karbala Health Department
General manager's office
Training and Human Development Center

لعدد: ٥٩

لتاريخ / ١٦ / ١ / ٢٠٢٣

إلى / جامعة كربلاء المقدسة / كلية التمريض

الموضوع /تسهيل مهمة

تحية طيبة....

كتابكم المرقمد.ع.١ في ٢٠٢٣/١/٢

نود إعلامكم بأنه لا مانع لدينا من تسهيل مهمة طالبة ماجستير(زهراء عبد المنعم حمد) لإنجاز بحثها الموسوم:

(اثر تمارين التنفس البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية- الرئوية ، نتائج تخطيط القلب ،والقدرة الوظيفية بين مرضى الشريان التاجي) في مؤسستنا الصحية وبأشراف الدكتور (احمد قاسم الحيدري) على ان لا تتحمل دائرتنا اي نفقات مادية مع الاحترام ٠

الدكتورة
تقوى خضر عبد الكريم
مدير مركز التدريب والتنمية البشرية
٢٠٢٣/١/١٦

نسخة منه الى
- مركز كربلاء المقدسة لامراض وجراحة القلب اجراء اللازم مع الاحترام ٠

Appendix E

Expert s list

مكان العمل	التخصص	اللقب العلمي	اسم الخبير	ت
كلية التمريض / جامعة الكوفة	تمريض بالغين	أستاذ	د. راجحة عبد الحسن حمزة	١.
كلية التمريض/ جامعة بابل	تمريض بالغين	أستاذ	د. سحر أدهم علي	٢.
كلية التمريض / جامعة كربلاء	تمريض البالغين	أستاذ	د. فاطمة مكي محمود	٣.
كلية التمريض / جامعة الكوفة	تمريض بالغين	أستاذ مساعد	د. محمد عبد الكريم	٤.
كلية التمريض / جامعة الكربلاء	تمريض بالغين	أستاذ مساعد	د. حسن عبد الله	٥.
كلية التمريض / جامعة الكوفة	تمريض بالغين	أستاذ مساعد	د. ابراهيم علوات كاظم	٦.
كلية التمريض / جامعة الصفوه	تمريض بالغين	مدرس	د. عامر محمد غبيش	٧.
مركز كربلاء لأمراض وجراحه القلب	دكتور اختصاص طب امراض القلب والعلاج القسطاري	طبيب اختصاص	د. احمد قاسم الحيدري	٨.
مركز كربلاء لأمراض وجراحه القلب	دكتور اختصاص طب امراض القلب والعلاج القسطاري	طبيب اختصاص	د. صالح يحيى صالح	٩.
كلية التمريض / جامعة العميد	تمريض بالغين	أستاذ مساعد	د. ضياء كريم عبد علي	١٠.

Appendix F1

Need assessment

تقييم احتياجات المرضى

تقييم معارف المرضى حول التنفس العميق البطيء وجهاز التنفس الحافز

ت	الأسئلة	يعرف		لا يعرف	
		الاجابات	نسبتها	الاجابات	نسبتها
1	ما هو التنفس العميق البطيء؟ ما الفائدة؟ وما اهمية؟	3	30%	7	70%
2	ما هو جهاز التنفس الحافز؟	1	10%	9	90%
3	ما هي فوائد التنفس باستخدام جهاز التنفس الحافز؟	1	10%	9	90%
4	كم مرة ينبغي استخدام مقياس التنفس الحافز؟	1	10%	9	90%
5	ماذا تمثل الكرات في مقياس التنفس المحفّز؟	1	10%	9	90%
6	هل يؤثر التنفس البطيء على المعاملات القلبية- الرئوية؟	3	30%	7	70%
7	هل التنفس العميق يعالج ادراب كهربائية القلب؟	1	10%	9	90%
8	هل يقلل التنفس العميق من معدل ضربات القلب؟	3	30%	7	70%
9	ماذا يحدث للجسم أثناء التنفس العميق؟	3	30%	7	70%
10	هل التنفس يؤثر على جوده الحياة؟	2	20%	8	80%
	المجموع الكلي	19	19%	81	81%

Appendix F_2

الرجاء التوقيع أسفل الصفحة كي تشهد بان:

بعد ان تم شـرح وتوضـيح جميع التسـاؤلات من قبل الباحثة **(زهراء عبد المنعم احمد)** بخصـوص بحثها الموسوم (**أثر تمارين التنفس العميق البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية-الرئوية، نتائج تخطيط القلب، والقدرة الوظيفية بين مرضى الشريان التاجي**)، تم توضـيح فائدة البحث واهميته العلمية.، كما وان المعلومات الناتجة عن مشـاركتك سـوف تعامل بسـرية تامة وان هذه المعلومات ونتائجها هي للأغراض العلمية فقط.

ولأجل هذا فاني اوقع على مشاركتي في هذ البحث

توقيع المشارك **توقيع الباحث**

التاريخ

/ / /

Appendix G

The Study Instrument

Demographic / Medical Characteristics

Age		
Gender	Male	
	Female	

Marital status	Single	
	Married	
	Divorced	
	Widow	

Residency	urban	
	rural	

Smoking status	Never	
	Before	
	Currently	
Smoking type	Hookah	
	Cigarette	
	Electronic Cigarette	
Number of cigarettes / hookahs per day		
Duration of smoking in years		

Weight	Kg
Height	Cm
Other Chronic Diseases	

Cardio-pulmonary parameter

Heart Rate	
Pulse Rate	

Blood Pressure	Systolic Blood Pressure	
	Diastolic Blood Pressure	
Rate Pressure		
Mean Arterial Pressure		
Pulse Pressure		
Cardiac Output		

Respiratory Rate	
Oxygen Saturation	

Electrocardiographic Findings

Rate	

Rhythm	Regular	
	Irregular	

Axis	Normal	
	Right Axis Deviation	
	Left Axis Deviation	

P-wave	
P-R interval	
QRS- wave	
ST-segment	
T-wave	

Physical Functional Ability Questionnaire (FAQ5)

To calculate the total score, circle the numbers 1-4 in each group that best represents your ability, add the numbers, and multiply by 5 out of 100.

Self-care ability assessment	
1. Require total care - for bathing, toilet, dressing, moving and eating	5
2. Require frequent assistance	10
3. Require occasional assistance	15
4. Independent with self-care	20

Family and social ability assessment	
1. Unable to perform any - chores, hobbies, driving, sex and social activities	5
2. Able to perform some	10
3. Able to perform many	15
4. Able to perform all	20

Movement ability assessment	
1. Able to get up and walk with assistance, unable to climb stairs	5
2. Able to get up and walk independently, able to climb one flight of stairs	10
3. Able to walk short distances and climb more than one flight of stairs	15
4. Able to walk long distances and climb stairs without difficulty	20

Lifting ability assessment	
1. Able to lift up to 10# occasionally	5
2. Able to lift up to 20# occasionally	10
3. Able to lift up to 50# occasionally	15
4. Able to lift over 50# occasionally	20

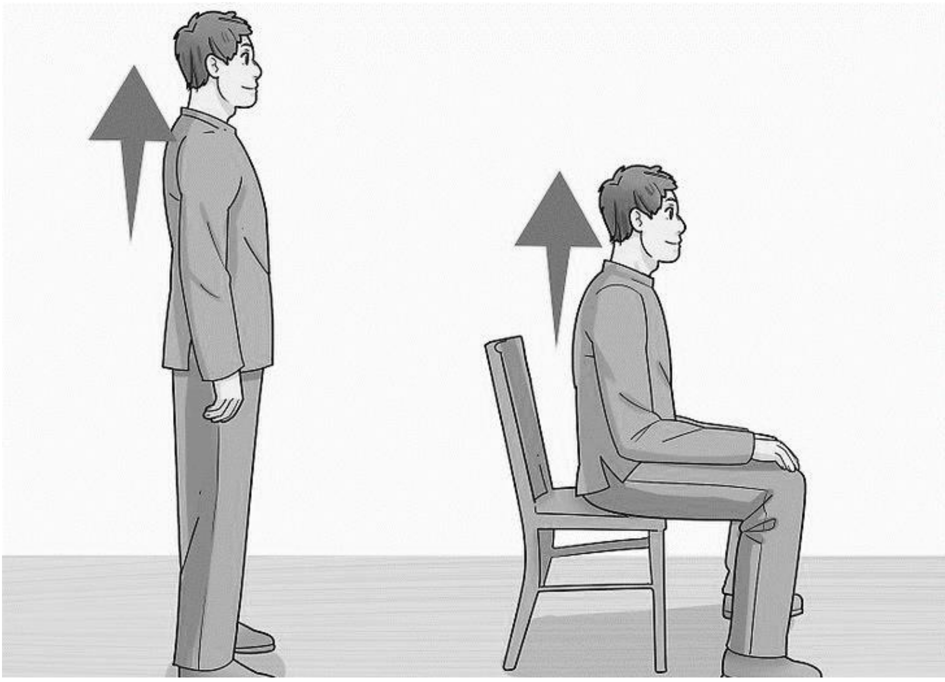
Work ability assessment	
1. Unable to do any work	5
2. Able to work part-time and with physical limitations	10
3. Able to work part-time or with physical limitations	15
4. Able to perform normal work	20

Physical Functional Ability (FAQ5) Score ------------100

Appendix H

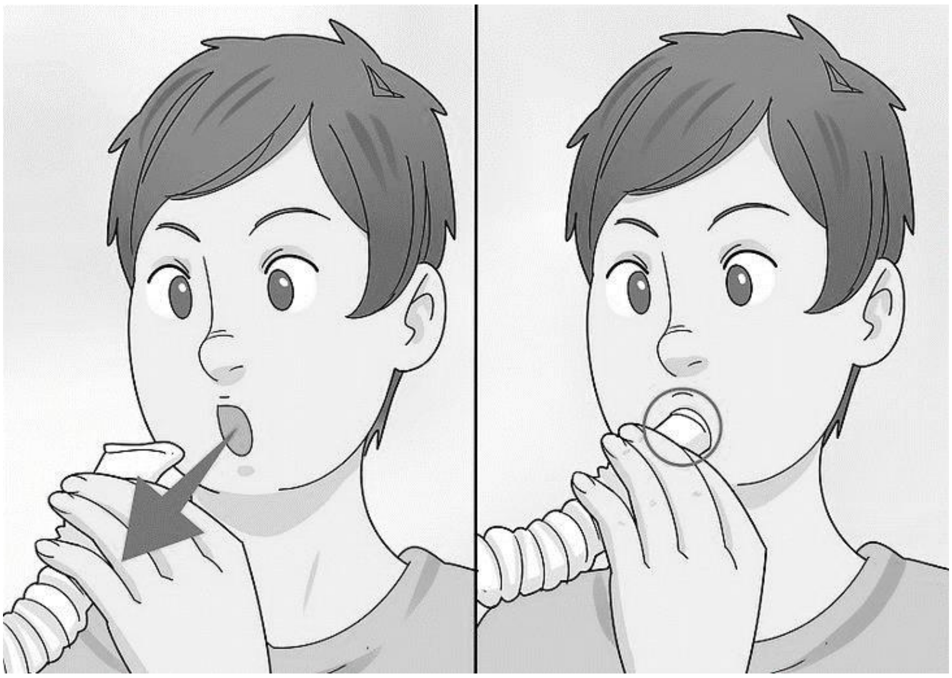
Step of Technique or Treatment use of incentive spirometer according to Alaparthi, et al., (2016).

Step 1

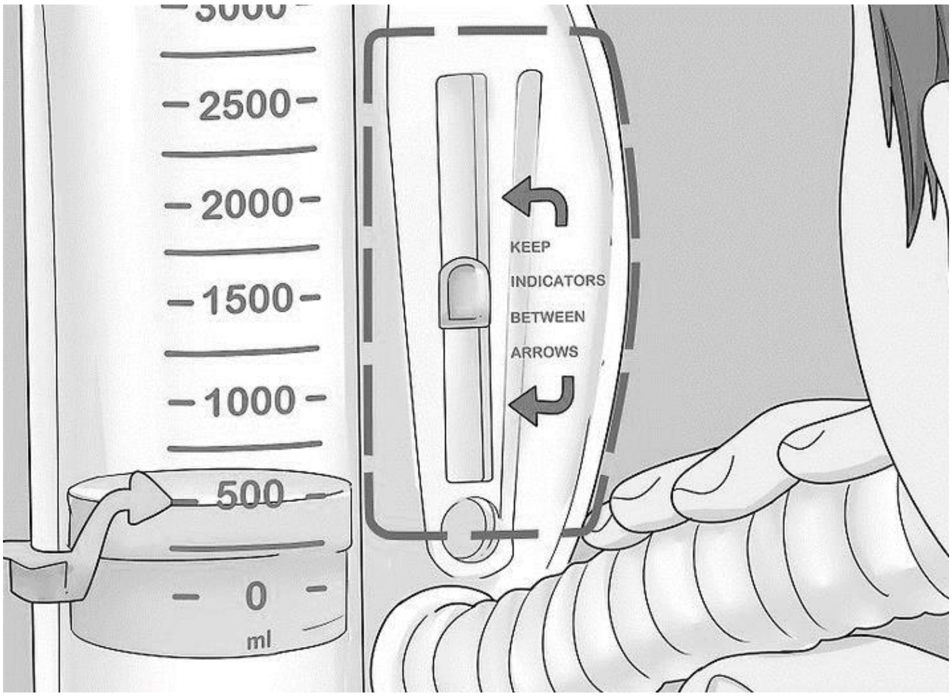


Step 2

Step 3

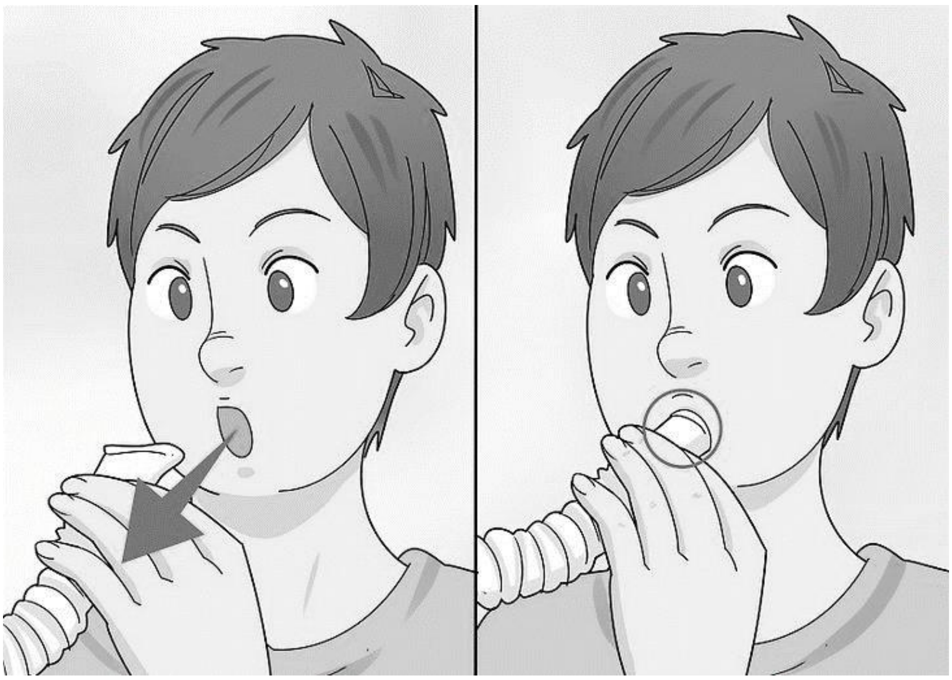


Step 4

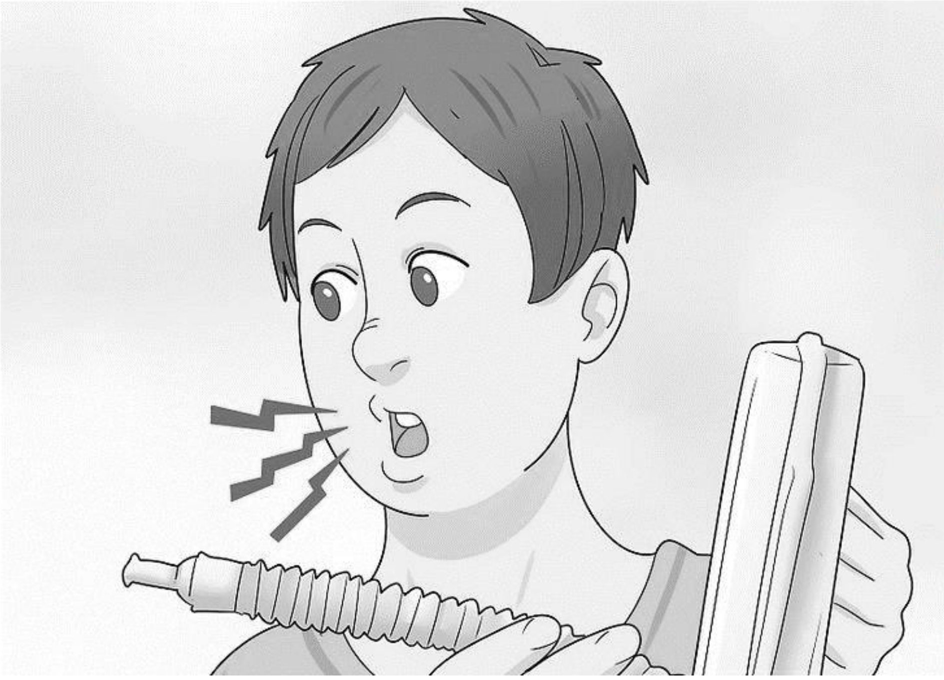

3000
2500
2000
1500
1000
500
0
ml
KEEP
INDICATORS
BETWEEN
ARROWS

Step 5

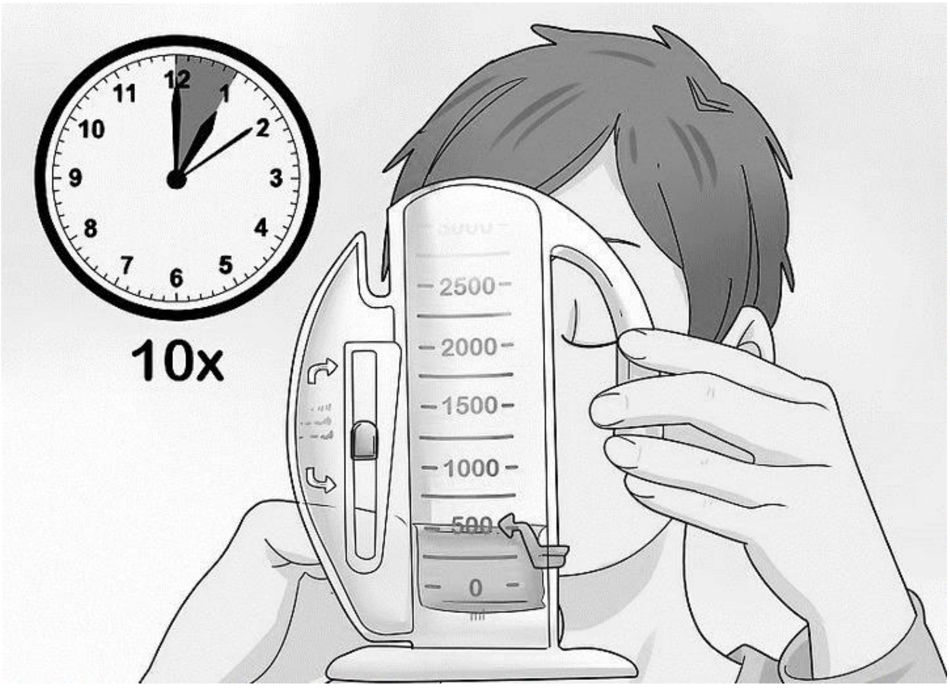
Step 6



Step 7



Step 8



Appendix H

The statistician certificates

Republic of Iraq
Ministry of higher education & scientific research
University of Karbala
College of Nursing
Graduate studies Division

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جـــامعة كربلاء
كـلية التـمريـض
شعبة الدراسات العليا

إقرار الخبير الإحصائي

أشهد بأن الرسالة الموسومة :

" أثر تمارين التنفس العميق البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية-الرئوية، نتائج تخطيط القلب، والقدرة الوظيفية بين مرضى الشريان التاجي"

"Effect of Slow Deep Breathing Exercises by using Incentive Spirometry on Cardio-pulmonary Parameters, Electrocardiographic Findings and Functional Capacity among Patients with Coronary Artery Disease"

قد تم الإطلاع على الإسلوب الإحصائي المتّبع في تحليل البيانات و إظهار النتائج الإحصائية وفق مضمون الدراسة و لأجله وقعت .

توقيع الخبير الإحصائي :

الإسم و اللقب العلمي : أ.م.د ايناس عبد الكاظم محمد

الإختصاص الدقيق : احصاء تطبيقي

مكان العمل : جامعة كربلاء / كلية الادارة والاقتصاد

التاريخ : 28/ 1 / 2024

العنوان : العراق - محافظة كربلاء المقدسة – حي الموظفين - جامعة كربلاء
Mail: nursing@uokerbala.edu.iq website: nursing.uokerbala.edu.iq

Appendix I

The Linguistics certificates

Republic of Iraq Ministry of higher education & scientific research University of Karbala College of Nursing Graduate studies Division	جمهورية العراق وزارة التعليم العالي والبحث العلمي جـــامعة كربلاء كـلية التـمريـض شعبة الدراسات العليا

إقرار الخبير اللغوي

أشهد بأن الرسالة الموسومة :

" أثر تمارين التنفس العميق البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية-الرئوية، نتائج تخطيط القلب، والقدرة الوظيفية بين مرضى الشريان التاجي"

"Effect of Slow Deep Breathing Exercises by using Incentive Spirometry on Cardio-pulmonary Parameters, Electrocardiographic Findings and Functional Capacity among Patients with Coronary Artery Disease "

قد جرى مراجعتها من الناحية اللغوية بحيث أصبحت بإسلوب علمي سليم خالٍ من الأخطاء اللغوية و لأجله وقعت .

توقيع الخبير اللغوي :

الإسم و اللقب العلمي : أ.م.د توفيق مجيد احمد

الإختصاص الدقيق : علم اللغة التطبيقي

مكان العمل : جامعة كربلاء / كلية التربية للعلوم الانسانية

التاريخ : ٣٠ / ١ / **2024**

العنوان : العراق - محافظة كربلاء المقدسة – حي الموظفين - جامعة كربلاء
Mail: nursing@uokerbala.edu.iq website: nursing.uokerbala.edu.iq

الخلاصة

تحدث حالة تعرف باسم مرض الشريان التاجي عندما لا تتلقى عضلة القلب ما يكفي من الدم أو الأكسجين الناتج عن اللويحات التي تتشكل في تجويف الشريان التاجي. يزود ذلك القلب بالدم، وهي عضلة تحتاج إلى تمرينات هوائية لإنتاج ما يكفي من أدينوسين ثلاثي الفوسفات لمواصلة الانقباض. وينجم عن انسداد الشريان التاجي ويتميز بعدم التوازن في العرض والطلب على الأكسجين. هدفت الدراسة إلى دراسة تأثير تمارين التنفس البطيء والعميق باستخدام قياس التنفس الحافز على المعلمات القلبية الرئوية، ونتائج تخطيط كهربية القلب، والقدرة الوظيفية لدى مرضى الشريان التاجي. شملت الدراسة خمسين مشاركاً، تم تقسيمهم إلى مجموعتين: السيطرة والدراسة. لتقييم تأثير تمارين التنفس العميق البطيء، تم استخدام أداة قياس التنفس الحافز، والتي تتضمن أربعة أجزاء. كل جزء لديه العديد من العناصر. تم الحصول على صلاحية الأداة من قبل لجنة نقاد مكونة من ١٠ أشخاص، في حين تم تقييم موثوقية الأداة باستخدام نهج الاختبار وإعادة الاختبار. تم إجراء تحليل البيانات باستخدام الإحصائيات الاستنتاجية والوصفية. بعد ثلاثة أسابيع من التدخل، إعادة اختبار القدرة الوظيفية التي تم التحقيق فيها بين مجموعتين. أظهرت نتائج الدراسة أهمية كبيرة في القدرة الوظيفية مع القدرة على الرعاية الذاتية، والقدرة الأسرية والاجتماعية، والقدرة على الحركة، والقدرة على الرفع، والقدرة على العمل، والقدرة الوظيفية البدنية، بقيمة (P-value= 0.000). وخلصت الدراسة إلى أن قياس التنفس الحافز الموجه نحو التدفق كان مفيدا في تحسين القدرة الوظيفية مقارنة بين مجموعة التحكم ومجموعات الدراسة، مع عدم وجود آثار جانبية كبيرة. يمكن تطبيق هذه المنهجية في الأبحاث المستقبلية لدراسة التأثيرات طويلة المدى على مدار أسابيع أو أشهر، وهي مناسبة للمراقبة الذاتية في المنزل نظرًا لبساطتها وطبيعتها غير التدخلية.

University of Kerbala

جامعة كربلاء

كلية التمريض

أثر تمارين التنفس العميق البطيء باستخدام مقياس التنفس الحافز في المؤشرات القلبية-الرئوية، نتائج تخطيط القلب، والقدرة الوظيفية بين مرضى الشريان التاجي

رسالة مقدمة

من قبل

زهراء عبد المنعم احمد

الى

جامعة كربلاء - كلية التمريض

فرع تمريض البالغين

كجزء من متطلبات الحصول على شهادة الماجستير في علوم التمريض

بأشراف

الأستاذ ا لمساعد

الدكتور حسام عباس داود

اذار / ٢٠٢٤ **شعبان / ١٤٤٥**