



*University of Kerbala*

*College of Nursing*

***Effectiveness of Foot Massage on Physiological Parameters  
among Patients with Acute Coronary Syndrome***

*A Thesis Submitted*

*to*

*The Council of College of Nursing /University of Kerbala,*

*in*

*Partial Fulfillment of the Requirements for the Degree of Master of Science  
in the Nursing*

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*Dhu al-Hijja - 1445 A.H*

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

((وَلَقَدْ آتَيْنَا دَاوُودَ وَسُلَيْمَانَ عِلْمًا وَقَالَا الْحَمْدُ لِلَّهِ

الَّذِي فَضَّلَنَا عَلَى كَثِيرٍ مِنْ عِبَادِهِ الْمُؤْمِنِينَ))

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## Dedication

*I dedicate my effort and work to:*

- ❖ Who inspired me with knowledge and the ability to work...  
**Allah**
  
- ❖ To the person who provided me with generosity, strength, and dignity... **My dear father**
  
- ❖ To the person who provided me with love, tenderness, giving and loyalty... **My dear mother**
  
- ❖ To my bond, my joy and my honor ... **My dear brothers and sisters**
  
- ❖ My dear and my life partner... **My husband "Karar"**
  
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## Abstract

**Background:** The term used to describe patients presenting signs of myocardial infarction or ischemia is acute coronary syndrome. The acute coronary syndrome is one of the most common cardiac conditions requiring hospital admission globally. There are three forms of this syndrome: unstable angina, myocardial infarction with ST segment elevation, and myocardial infarction without ST segment elevation.

**Objectives:** To assess of the physiological parameters (heart rate, respiration, mean arterial blood pressure, pulse pressure, peripheral oxygen saturation) for patients suffer from acute coronary syndrome. Examine the effects of foot massage on acute coronary syndrome patients' physiological indicators.

**Methodology:** A quasi-experimental study design was conducted between Sep, 25, 2023 to June, 20, 2024. At the Karbala center for cardiac diseases and surgery in Kerbala holy city. A nonprobability (purposeful) technique of sampling, consists of sixty patients undergoing acute coronary syndrome, separated into two groups: control and foot massage groups. The data were collected using physiological parameters scale. The scale validity was investigated by panel of thirteen experts and reliability by pilot study. After the data were input into the SPSS program, both descriptive and inferential statistics were used to analyze the data.

**Results:** The two-thirds of the patients participating in the study and control groups are within the age groups of 50-69 years old and accounted 63.3%, 60% for the control and study group respectively. The males in the study group are 76.7% and in control group are 73.3%. Although the greater ratio (83.3%) and (80%) of the patients who participated in a study group and control group respectively are married. The study revealed a significant statistical differences between the mean of the all



cardiopulmonary parameters indications for the study group except indication of pulse pressure after foot massage, at a p-value of  $\leq 0.05$ .

**Conclusions:** Foot massage is effective to enhance and improve the physiological indicators in individuals with acute coronary syndrome.

**Recommendations:** The researcher recommended that hospitals should make foot massage a regular part of their care.

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## List of Abbreviations

<i>Items</i>	<i>Meaning</i>
<b>ACEIs</b>	Angiotensin-Converting Enzyme Inhibitors
<b>ACS</b>	Acute Coronary Syndrome
<b>AHA</b>	American Heart Association
<b>AMI</b>	Acute Myocardial Infarction
<b>AMI</b>	Acute Myocardial Infarction
<b>ANOVA</b>	One Way Analysis of Variance
<b>ARBs</b>	Angiotensin Receptor Blockers
<b>BMI</b>	Body Mass Index
<b>BP</b>	blood pressure
<b>CA</b>	Coronary Artery
<b>CABG</b>	Coronary Artery Bypass Graft
<b>CAD</b>	Coronary Artery Disease
<b>CCU</b>	Cardiac care unit
<b>CHD</b>	Coronary Heart Disease
<b>CKD</b>	Chronic Kidney Disease
<b>CK-MB</b>	Creatine Kinase-Muscle and Brain Fraction
<b>CO</b>	Cardiac Output
<b>CVD</b>	Cardiovascular Diseases

<b>D.C</b>	District of Columbia
<b>DALYs</b>	Disability-Adjusted Life Years
<b>DAPT</b>	Dual Antiplatelet Therapy
<b>DBP</b>	Diastolic Blood Pressure
<b>DM</b>	Diabetes Mellitus
<b>ECG</b>	Electrocardiogram
<b>EFT</b>	Emotional Freedom Technique
<b>EP</b>	Emergency Physician
<b>ESC</b>	European Society of Cardiology
<b>F</b>	Frequency
<b>FVI</b>	Face Validation Index
<b>HF</b>	Heart Failure
<b>HR</b>	Heart Rate
<b>HS</b>	Highly Significant
<b>hs-Tn</b>	High-Sensitivity Troponin
<b>HTN</b>	Hypertension
<b>ICN</b>	Council of Nurses
<b>IHCA</b>	In-hospital cardiac arrest
<b>IHD</b>	Ischemic Heart Disease
<b>JNC 8</b>	The Eighth Joint National Committee
<b>LDL-C</b>	Low-Density Lipoprotein Cholesterol
<b>MAP</b>	Mean Arterial Pressure
<b>MI</b>	Myocardial Infarction
<b>MRI</b>	Magnetic Resonance Imaging
<b>MS</b>	Means of Score
<b>MVP</b>	Mean Venous Pressure
<b>NS</b>	Non-Significant
<b>NSTEMI</b>	Non-ST-Segment-Elevation Myocardial Infarction
<b>NTE-ACS</b>	Do Not Have ST-Elevation ACS
<b>NT-proBNP</b>	N-terminal fraction of brain natriuretic peptide
<b>PCI</b>	Percutaneous Coronary Intervention

<b>PP</b>	Pulse Pressure
<b>RAAS</b>	Renin-Angiotensin-Aldosterone System
<b>RR</b>	Respiratory Rate
<b>S</b>	Significant
<b>SA</b>	Stable Angina
<b>SBP</b>	Systolic Blood Pressure
<b>SD</b>	Standard Deviation
<b>S-FVI-UA</b>	Scale-Level Face Validity Index Based on the Universal Agreement
<b>SPO2</b>	Arterial Oxygen Saturation
<b>SPSS</b>	Statistical Package Of Social Sciences
<b>STEMI</b>	ST-Segment-Elevation Myocardial Infarction
<b>UA</b>	Unstable Angina
<b>UA</b>	Universal Agreement
<b>UAP</b>	Unstable Angina Pectoris
<b>UFH</b>	Unfractionated Heparin
<b>UGIB</b>	Upper gastrointestinal bleeding
<b>US</b>	United States
<b>VTA</b>	Ventricular Tachyarrhythmia
<b>WHO</b>	World Health Organization

### List of Symbols

<i>Items</i>	<i>Meaning</i>
<b>&amp;</b>	And
<b>&lt;</b>	Less than
<b>&gt;</b>	More than
<b>≤</b>	Equal or less than
<b>%</b>	Percentage





# *Chapter One*

## *Introduction*

## ***Chapter One: Introduction***

### **1.1. Introduction**

The term acute coronary syndrome is used to describe patients who exhibit symptoms of myocardial infarction or ischemia. There are three types of this syndrome: unstable angina, myocardial infarction with ST segment elevation, and myocardial infarction without ST segment elevation (Khaledifar, 2022).

One of the most common cardiovascular events requiring hospitalization worldwide is acute coronary syndrome (ACS). The disease defined as the sudden absence of oxygenated blood in the coronary arteries due to thrombosis, rupture of atherosclerotic plaque in the coronary arteries (Žiubrytė et al., 2018).

Acute coronary syndrome is a life-threatening illness that requires immediate treatment. It is caused by impaired circulation and can be fatal if not treated in time. According to the American Heart Association (AHA), about 40.5% of people have heart disease and 34% of them die from this disease every year (Alimohammad et al., 2018).

One of the leading causes of admission to emergency rooms is ACS, a deadly condition. Furthermore, this illness has a 25% mortality rate, making it one of the biggest causes of death globally (Veiskaramian et al., 2021). Acute coronary syndrome is a significant health issue that primarily affects middle-aged and older people, while it can also impact younger age groups and significantly alter their way of life (Fathi, 2020).

A major component of ischemic heart disease is ACS, which includes unstable angina, non ST-segment-elevation myocardial infarction (NSTEMI) and ST-segment-elevation myocardial infarction (STEMI). Due to improvements in primary prevention, lifestyle

modifications, and medical developments, the death rate from ACS has declined in recent decades, but rates are still high. Reperfusion therapy, such as percutaneous coronary intervention or coronary artery bypass grafting, are recommended, in the event that thrombolysis is not an option—are effective treatments for ACS. Timely beginning of necessary treatment to limit cardiac damage is essential for the efficacy of ACS treatment (van Oosterhout et al., 2020).

Furthermore, these patients experience a variety of frightening conditions, including: (1) potentially fatal illnesses; (2) the possibility of another MI; and (3) a fear of the unknown. These discomforts hasten the release of catecholamines and trigger physiological reactions that may exacerbate myocardial infarction (MI) development by raising blood pressure, heart rate, respiratory rate, and dyspnea (Bahrami et al., 2017).

Massage therapy is among the most often used supplementary treatment. Massage is regarded as a fundamental nursing intervention and a crucial component of health care. It assists patients in achieving their psychological and physical demands (Hasheminia et al., 2021).

Massage entails applying organized or unstructured pressure, as well as tension, motion, and vibration, to the body, either manually or with the use of mechanical tools. The benefits of receiving a massage include the body's metabolic rate slowing down, regularized respiration, and a return to normal heart rate. It is simple to state that massage therapy's ability to promote relaxation can aid in the reduction of pain and anxiety (Rodrigues, 2018). The head, neck, shoulders, back, abdomen, hands, and feet can all be massaged (Mohamed et al., 2020).

Therapeutic massage is one of the most often used non-pharmacological procedures in complementary treatment. It ranks third among complementary therapies in terms of how frequently patients utilize it.

Therapeutic massage involves methodically and scientifically

manipulating the body's soft tissues and muscles to support maintenance, performance, healing, and the achievement of health outcomes. These outcomes include resolving anxiety and stress, improving blood circulation, promoting the digestive system and its function, stimulating the lymphatic system, enhancing the function of the autonomic nervous system, lowering blood pressure and heart rate, and releasing endorphins to relieve pain and induce sleep (Shehata et al., 2021).

One treatment that is thought to be helpful is foot massage (Lee et al., 2017). Because foot massage has a beneficial effect on blood pressure, pulse rate, and respiratory system function, it is a massage therapy that can be administered to patients with vascular problems and life-threatening illnesses. The soft tissue soles of the feet can be manipulated during a foot massage; specific spots are not emphasized (Putu et al., 2023).

A massage of the foot region can trigger the release of hormones like endorphins, which will have a calming impact and lower blood pressure and anxiety. If the massage is performed at a certain place, the body will release a number of hormones, including bradykinin, histamine, and serotonin. These hormones cause capillary and arteriolar dilatation, which improves blood vessel circulation in small blood vessels and relaxes tense muscles. The gradual decrease in blood pressure that results from this process (Calisanie & Preannisa, 2022).

Currently, there are several methods for treating hypertension, and massage therapy is one of them. Massage techniques help to ease muscle tension, regulate the body's energy flow, and promote healthy blood circulation. Some studies have demonstrated that massage can lower blood pressure in people with mild and moderate hypertension, despite experts' belief that massage techniques will not have much of an effect on severe hypertension (Fitriani et al., 2019).

## **1.2. Importance of the Study :**

Globally, cardiovascular disease is the leading cause of death. Data were collected from the world health organization(WHO) showed that cardiovascular disease claimed the lives of about 17.9 million individuals, or 31% of all deaths. With 371 deaths per 100,000 people annually from cardiovascular disease, Indonesia has the 32nd-highest death rate worldwide (Setiawan& Rahayu, 2021).

Coronary artery disease (CAD) is the common term for coronary atherosclerotic disease, which is characterized by a significant narrowing of the coronary arteries and an inadequate blood flow to the myocardium. The acute symptoms of CAD, such as unstable angina (myocardial ischaemia without necrosis), NSTEMI and STEMI, are referred to as ACSs (Vogel et al.,2019).

Acute coronary syndrome, which include unstable angina, NSTEMI, and STEMI, are defined by an abrupt decrease in the heart's blood flow. Over 7 million people worldwide are thought to receive an Acute coronary syndrome diagnosis each year, with over 1 million of those patients being admitted to united states hospitals (Bhatt et al., 2022).

Although cardiovascular disease is the primary cause of morbidity and mortality for both sexes, there are differences in the pathophysiology and clinical presentation of the disease between men and women that have been extensively studied and may have an impact on treatment and results. According to observational studies, atypical symptoms are reported more frequently by women with ACS compared to males. comorbidities, advanced age. They also show a lower likelihood of identifying high-risk characteristics and plaque rupture during angiography (Khan et al., 2018).

An increasing number of individuals are seeking massage therapy to enhance the movement of structures such as muscles and

subcutaneous tissues by applying mechanical tension. Massage therapy has various advantages, such as the stimulation of skin, tendons, and muscle fibers; decrease in swelling; and promotion of blood flow and lymphatic circulation. Because of this, massage therapy offers many advantages, such as improving sleep quality and speeding up the healing process, alleviating tension and anxiety, and relaxing muscles. Furthermore, patients may experience an increase in mobility after receiving massage therapy, which can aid in their ability to perform daily activities and speed up the recovery process (Ren et al., 2021).

### **1.3. The Problem Statement :**

Globally, cardiovascular illnesses are the leading cause of death, with CAD emerging as the leading cause of both death and disability (Chandrababu et al., 2020). Worldwide, it is estimated that about 7 million people have an ACS diagnosis each year (Bhatt et al., 2022).

According to the 2016 heart disease and stroke statistics update by the American Heart Association, around 15.5 million individuals in America are affected by coronary heart disease (CHD). One American is projected to suffer a MI every 42 seconds, and the condition's prevalence is estimated to climb with age for both females and males. Among the 785,000 Americans expected to experience a MI this year, nearly half will go on to have another one, as reported by the AHA (Sugumar et al., 2023).

Regarding to the AHA, coronary artery disease is the leading cause of mortality worldwide. It is responsible for 35–60% of deaths annually. Statistics from Iran's Ministry of Health and Education indicate that in 2012, cardiovascular diseases accounted for almost 39% of all deaths. By 2030, this rate is expected to rise by 44.8% (Khaledifar, 2022).

Over 20 million presentations to emergency departments in Europe and North America are made up of patients presenting with

suspected ACS, making them a significant population in emergency rooms across the world (Neumann et al., 2020).

Acute coronary syndrome is a significant health burden in the USA, affecting over a million patients each year (Sánchez-de-la-Torre et al., 2020). Acute coronary syndrome are thought to be the primary cause of death worldwide and the largest contributor to disability-adjusted life years in both developed and developing nations (Martínez-Sánchez et al., 2017).

Medical professionals have authorized treatments that successfully lower hemodynamic parameters, anxiety, and stress in patients with cardiovascular disease, according to a literature study. Therapies such as guided imagery, massage, yoga, emotional freedom technique( EFT), biofeedback, mindfulness-based CBT, music therapy, and acupressure are all part of this resources of therapies (Veiskaramian et al., 2021).

#### **1.4. Research Question:**

What is the effect of foot massage on physiological parameters in patients with acute coronary syndrome ?

#### **1.5. The Study Hypothesis:**

A.H0: There is no significant effect of foot massage on the physiological parameters.

B. H1: Foot massage has a significant effect on the physiological parameters.

#### **1.6. The Study Objectives:**

**1.6.1.** To assess the physiological parameters ( heart rate , respiration , mean arterial blood pressure, pulse pressure ,peripheral oxygen saturation) among patients with acute coronary syndrome.

**1.6.2.** Determine the effectiveness of foot massage on physiological parameters (heart rate ,respiration ,mean arterial blood pressure, pulse

pressure ,peripheral oxygen saturation ) among patients with acute coronary syndrome.

**1.6.3.** To find out the relationship between change in physiological parameters with demographic characteristics and medical data for patients with acute coronary syndrome.

## **1.7. Definitions of Terms:**

### **1.7.1. Foot Massage**

#### **Theoretical Definition:**

Is a type of massage therapy that works by applying pressure to the patient's feet, rubbing, squeezing, and twisting them to promote blood circulation and relax the muscles (Putu et al., 2023).

#### **Operational Definition:**

Is a type of massage treatment that can aid in relaxation and improvement the physiological parameters.

### **1.7.2.Physiological Parameters:**

#### **Theoretical Definition:**

Cardiovascular factors, such as blood pressure and systemic vascular resistance, regulate organ and systemic blood flow and, consequently, the flow of oxygen to the tissues (Seri, 2018).

#### **Operational Definition:**

It indicates to the parameters measured in the present study, which consist of the heart rate, respiration, mean arterial pressure, pulse pressure, peripheral oxygen saturation.

### **1.7.3. Acute Coronary Syndrome:**

#### **Theoretical Definition:**

Are characterized by an abrupt reduction in the blood flow to the heart, which include unstable angina, NSTEMI and STEMI (Eriksson et al., 2024).



**Operational Definition:**

Include ST-segment elevation myocardial infarction, non-ST-segment elevation myocardial infarction and unstable angina.



***Chapter Two***

***Review of Literature***

## **Chapter Two**

### **Review of Literature**

This chapter offers an overview of several studies and concepts that aid in understanding the subject of the present study.

#### **2-1 Theoretical Framework**

##### **2-1-1 The Virginia Theorist: Virginia Avenel Henderson**

Virginia Henderson was a nursing theorist, known as the Nightingale of modern nursing, was born in Kansas city, Missouri. She obtained her nursing diploma from the Army school of nursing at Walter Reed hospital in Washington, district of Columbia (D.C) in 1921. Following her graduation, she worked at the Henry street visiting nurse service for a period of two years. In 1923, she commenced her career as a nursing instructor at the Norfolk Protestant Hospital in Virginia. In 1929, she enrolled in teachers college at Columbia university to pursue a bachelor's degree, which she obtained in 1932. Subsequently, she pursued a master's degree, which she earned in 1934. Subsequently, she became a faculty member at Columbia university, where she remained until 1948. Afterward, she transitioned to Yale university school of nursing, assuming the role of a research associate.

She was honored with multiple accolades, including honorary doctoral degrees from the Catholic university of America, Pace university, university of Rochester, university of Western Ontario, and Yale university. In 1939, she edited Harmer's renowned nursing textbook for its fourth edition and subsequently authored the fifth edition, which included her own distinct interpretation of nursing in 1991. Henderson passed away on March 19, 1996 (Ahtisham & Jacoline, 2015).

**2-1-2 The Need Theory (Virginia Henderson)**

"Need Theory" by theorist Virginia Henderson had a profound impact on the field of nursing. Patients should be able to care for themselves once they leave the hospital, according to this view, which places an emphasis on patient autonomy. Patients with terminal illnesses are also emphasized in the notion as having peaceful death. Henderson's method emphasizes attending to the patient's fundamental human needs and outlines the nurse's responsibility to do so in the event that the patient is unable of doing so (Khan, 2023).

Henderson presented the 14 fundamental human needs upon which nursing care is based and reaffirmed the significance of art in nursing. A nurse's duties extend to assisting those in good health as well as those who are ill. While attending to matters of need and healing (or while facing death peacefully). Even while the patient may not require assistance if they possess the requisite qualities—such as self-confidence, motivation, or knowledge—the nurse is nevertheless obligated to assist the patient in gaining independence as soon as feasible. In addition, the International Council of Nurses (ICN) uses and disseminates Henderson's definition of nursing, which is still in use today all across the globe. According to Henderson (1966) in *The Nature of Nursing: A definition and Its Implications for Practice, Research, and Education*, the foundation of nursing care is based on fourteen fundamental human needs:

1. Normally breathe.
2. Drink and eat enough..
3. bodily waste removal (Elimination).
4. Moving and keeping posture.
5. Rest and sleep.
6. Choosing the correct outfits; Choose between removing or wearing clothes.

7. Keep your body temperature within normal ranges by making changes to your clothes and the surroundings.
8. Keeping the body clean, correctly decorating, and skin-protecting.
9. Avoid engaging in actions that have the potential to cause harm to both individuals and the natural surroundings.
10. Capable of communicating and expressing emotions, wants, worries, and points of view to others.
11. Worship in accordance with his personal convictions.
12. Work so you may feel accomplished.
13. Engage in a variety of leisure activities.
14. Learn, explore, or satiate interests that promote self-improvement and well health while also making use of the resources for healthcare that are available.

The fourteen fundamental human needs can be categorized into four groups: biological, psychological, sociological, and spiritual. Points 1-9 encompass the biological needs component, points 10 and 14 encompass the psychological needs component, point 11 encompasses spiritual needs, and points 12 and 13 encompass the sociological needs component (Rista et al., 2022).

In nursing, Henderson's hypothesis has found numerous applications. Throughout the patient's hospital stay, Henderson watched the several tasks performed by nurses. The 14-assumption "Nursing Need Theory" guides the nurse's actions to help the patient meet their most basic human needs. In order to determine if a nurse's care was effective and what interventions were necessary to meet the patient's needs, these concepts are fundamental (Khan, 2023).

Henderson's model is based on four main ideas: the person, their health, their environment, and nursing. However, not all of these ideas are clearly defined. Henderson says that a "person" is anyone who needs nursing care, not just care for a sickness. The word "health" isn't used

directly, but it means keeping all parts of a person in balance. It's not clear what "the environment" means, but one of the 14 parts of its plan is keeping a supportive environment. "Nursing," the last idea in the metaparadigm, doesn't have a clear meaning, but it has to do with the nurse who helps the patient become independent through the 14 components that are talked about (Gligor & Domnariu, 2020).

### **2.1.3. Application of Need Theory :**

Henderson incorporated the principles of essential human needs, Physiological processes, cultural influences, and interpersonal communication, resulting in a comprehensive framework that addresses the diverse requirements of patients. Her classification of the fourteen constituent elements effectively caters to patient requirements across several areas, while remaining easily applicable in a therapeutic environment. Furthermore, it is more succinct when compared to other models. It is relevant to various aspects of the client-nurse relationship. It can efficiently meet the needs of patients and explain the responsibilities of nurses in detail. The design effectively encompasses the components of the nursing process. Henderson's need theory is compatible with Maslow's hierarchy of human requirements. Overall, this theory is highly compatible and adaptable for nursing care and practice in diverse clinical contexts (Ahtisham & Jacoline, 2015) .

The primary premise of the model is that the nurse provides care for the patient until he is capable of self-care once more. Additionally, it presupposes that the nurse remains dedicated to the patient throughout this duration. She holds the belief that the primary duty of a nurse is to assist individuals, whether they are ill or in good health, in carrying out activities that promote the preservation of health or the process of recuperation (Gligor & Domnariu, 2020).

The Henderson's model are related to the nursing metaparadigm (person, health, environment, nursing), and when applicable this study regarding this model by using nursing metaparadigm :

- ❑ Person: Patient suffering from acute coronary syndrome.
- ❑ Health: Foot massage for five minutes .
- ❑ Environment: Cardiac care unit (CCU).
- ❑ Nursing: Caring .

## **2.2. Acute Coronary Syndrome Overview**

Coronary artery disease (CAD) is a serious issue for the health of the general population and medical professionals. It is a common and leading cause of mortality on a global scale. In contrast, CAD accounts for 1 in 4.8 fatalities and is the main cause of mortality in the United States; in Europe, it accounts for 20% of all deaths and causes 1.8 million deaths yearly. It is the primary cause of mortality in this group and accounts for one-third of all fatalities among women. It ranks as the fourth most prevalent cause of death, accounting for 10.68% of all deaths, with males making up 12.47% and females 8.19% of the total (Siddika, 2024).

Cardiovascular diseases are the leading cause of mortality in both males and females. and are among the most common causes of death worldwide. Ischemic heart disease caused 185 million disability-adjusted life years (DALYs) and 9.44 million deaths globally in 2021. Age standards vary from country to country. The leading cause of cardiovascular disease (CVD) is ischemic heart disease (IHD), which manifests as acute coronary syndrome (ACS) (Sharma et al., 2023).

The worldwide prevalence of coronary artery disease (CAD) and ACS is a major public health issue. Epidemiologists have shown that these diseases affect many people and have a significant impact on health care systems. CAD is characterized by narrowing or blockage of the arteries that carry oxygen and nutrients to the heart. It accounts for a large percentage of

cardiovascular deaths and is the leading killer worldwide. From benign forms such as unstable angina to more severe forms such as myocardial infarction, acute coronary syndrome encompasses a wide range of clinical presentations. Plaque breakdown, erosions, and calcified nodules are the main pathophysiological mechanisms leading to ACS (Theofilis et al., 2023).

Unstable angina, acute myocardial infarction (AMI), or sudden cardiac arrhythmia can result from thrombosis causing severe thrombosis or occlusion of blood vessels, which in turn causes myocardial a It hard comes ACS is a widespread disease concept (Kimura et al., 2019) . The frequency of ACS in Iraqi Kurdistan has increased significantly in recent years (Mohammad et al., 2020).

The prognosis of patients with ACS can be defined by several biomarkers, many of which have already been used in routine clinical practice. Severe myocardial ischemia despite left ventricular systolic dysfunction may be the cause of elevated N-terminal brain natriuretic peptide (NT-proBNP) levels. ACS patients with elevated NT-proBNP levels do not have a poor prognosis, with risk the presence of mortality is increased, left ventricular systolic in addition to the onset of complications according to the current guidelines of the European society of cardiology (ESC), prognosis based on NT-proBNP should be considered in patients with ACS ( class IIa, level B) high-sensitivity troponin (hs-Tn)-I in comparison to (hs-Tn)-T mortality risk appears to be an equivalent indicator (Bauer & Toušek , 2021) .

Myocardial infarction occurs when there is an imbalance between oxygen supply and demand, resulting in cardiac cell death through significant and prolonged ischemia. Electrocardiogram (ECG) or electrocardiogram (EKG) traces distinguish STEMI from non-STEMI. Transmural ischaemia, which affects the entire thickness of the



myocardium, is the cause of STEMI, while non-ST elevation myocardial infarction (NSTEMI) does not (Vogel et al.,2019).

In nations with high per capita wealth, the rate of STEMI diagnosis in acute coronary syndrome is falling (Bergmark et al., 2022). Every year, over one million people in the US end up in the hospital because to ACS, making it one of the leading causes of death and disability globally. We summarize the most important results from the area of ACS, with the majority of these results appearing in publications during the last two years. We have chosen major studies with important clinical consequences from among over a thousand original papers (Eisen et al., 2016) .

Men and women with acute coronary syndrome have significantly different clinical presentations, comorbidities, cardiovascular risk factors, and healthcare service quality (Mehilli& Presbitero , 2020).

Symptoms experienced by women with acute coronary syndrome differ from those experienced by males with ACS, according to some prior research. Furthermore, different research highlights how ACS symptoms in men and women are similar. It is common practice to classify female ACS symptoms as "atypical" if they differ from male symptoms. The inclusion and exclusion criteria of previous systematic reviews on sex differences in symptoms of patients with acute coronary syndrome have varied, and there has been a lack of standardization in data gathering methods. The creation of standardized data collection surveys is an effort by recent research to address these concerns (van Oosterhout et al.,2020).

Many changes occur in one's life as a result of stress. The patient's vital signs fluctuate, and they start to feel anxious. Among the most noticeable symptoms of ACS are changes in vital signs, anxiety, a sense of impending death, and suffocation. Myocardial injury is more severe in people with ACS when blood pressure is high because the heart has to work harder to pump blood throughout the body (Ghanbari et al., 2022).

### **2.3.Types of Acute Coronary Syndrome :**

#### **2.3.1. ST-Segment Elevation Myocardial Infarction :**

STEMI was defined as left bundle-branch block, ST-segment elevation  $\geq 1\text{mm}$  (0.1mV) in  $\geq 2$  contiguous lines on a 12-lead ECG, or continuous chest pain lasting for at least 20 minutes that was treated within 24 hours after the beginning of symptoms. While transthoracic echocardiography and invasive coronary angiography were performed on all study participants, the treating physician decided which other diagnostic imaging modalities to use, including transesophageal echocardiography, optical coherence tomography, magnetic resonance imaging, computed tomography, and histological analysis (Popovic et al., 2024).

ST segment elevation myocardial infarction (STEMI) continues to be a significant contributor to premature mortality on a worldwide basis. Despite recent progress, there are ongoing debates surrounding the most effective approach to managing this condition. The majority of STEMI occur when atherosclerotic plaques rupture, leading to the blockage of blood vessels owing to the formation of blood clots. The amount of damage to the heart muscle that occurs as a result depends on the specific region of the heart supplied by the blocked vessel, the length of time the blockage persists, and the presence of collateral blood vessels (Choudhury et al., 2016).

The average incidence rate of STEMI among patients admitted to the hospital has been shown to range from 18 to 34 cases per 100,000 adult hospitalizations. The most extensive study on the subject revealed a rate of 27 cases per 100,000. Community hospitals in the United States receive around 34 million inpatient admissions annually. Therefore, it is approximated that there are a minimum of 10,000 cases of in-hospital STEMI annually in the US alone (Levine et al., 2018).

While the risk of non-ST-elevation myocardial infarction (NSTEMI) has slightly increased, the number of individuals presenting with STEMI

has declined significantly over the past few decades. From 1997 to 2005, the incidence rates of STEMI declined from 121 to 77 per 100,000, but NSTEMI somewhat increased from 126 to 132 per 100,000. Total rates of STEMI have decreased due to increased knowledge of coronary risk factors and major shifts in public health policy that place an emphasis on primary prevention tactics for the control and prevention of coronary artery disease (Mitsis& Gragnano, 2021).

While it seems like the percentage of patients presenting later than 12 hours after the start of symptoms has dropped over decades, between 10% and 12% of STEMI patients still present later than that (Cho et al., 2021).

Transmural myocardial ischaemia is a common symptom of STEMI, which often occurs when a thrombus (blood clot) forms on a coronary atherosclerotic plaque and completely blocks off an epicardial coronary artery. When a patient experiences chest discomfort and there is persistent ST-segment elevation in two or more physically contiguous ECG leads, it is likely that they have a STEMI (Vogel et al.,2019).

The following are the electrocardiogram criteria for STEMI according to the ACA/AHA guidelines and the universal task force from 2013:

- A new ST elevation of at least 2 mm in men or 1.5 mm in women in leads V2-V3, and/or 1 mm in additional adjacent chest or limb leads, measured at the J-point in at least two adjacent leads.
- AVR presenting with multi-lead ST-depression and concurrent ST elevation
- ST-depression in at least two precordial leads (V1–V4).

The emergency physician (EP) is responsible for starting the process of cardiac catheterization and urgent percutaneous coronary intervention (PCI) if any of the following conditions are fulfilled (Tewelde& Mattu, 2021).

**2.3.2. Non-ST-Segment Elevation Myocardial Infarction :**

Acute MI is mostly caused by non-ST-segment elevation myocardial infarction (NSTEMI), which is extremely common. Chest pain with signs of acute myocardial damage (acute increase and decline in cardiac troponin I [cTnI] concentrations) is a common manifestation. Non-ST-segment elevation alterations on electrocardiography (ECG) may also be present (Shanmuganathan et al., 2024).

Among patients with CAD, NSTEMI ranks high in terms of mortality. Compared to individuals with STEMI, those with NSTEMI are more likely to have undesirable long-term outcomes and multi-vessel coronary artery lesions (Chen et al., 2019).

Significant difficulties arise while treating non-ST-segment elevation myocardial infarction (NSTEMI) in the elderly population, especially in patients who are weak. Although invasive cardiac treatments have a lot to offer, there are hazards involved. Moreover, a number of variables other than the acute coronary event affect the prognosis of individuals with frailty (Sanchis et al., 2024).

Nearly two-thirds of all ACS hospital admissions are due to NSTEMI, an incidence that has risen dramatically during the last several decades (Malta Hansen et al., 2018).

The diagnosis of NSTEMI is made when a patient exhibits troponin elevation and symptoms that are indicative of ACS, but has no ECG changes that would indicate a STEMI. The main distinction between unstable angina and NSTEMI is whether or not a detectable troponin leak is evidenced (Basit et al., 2023).

Nearly three quarters of the one million people diagnosed with ACS in the US each year do not have ST-elevation ACS (NTE-ACS). While STEMI rates have been falling, NSTEMI-ACS rates have been rising due to

an older population, increased diabetes rates, and chronic kidney disease (CKD) (Hedayati et al., 2018).

Although NSTEMI and UA share a common pathogenesis, the presence of certain biomarkers and the intensity of symptoms allow for their separation. In myocardial infarction, chest pain is more intense. Additionally, indicators of myocardial necrosis are generated a few hours after chest pain begins in NSTEMI, but not in UA. Cardiovascular troponins T and I and creatinine kinase-muscle and brain fraction (CK-MB) are the components of these biomarkers (Mirza et al., 2018).

### **2.3.3. Unstable Angina**

One kind of ACS is unstable angina (UA), a clinical condition that falls somewhere in the middle between stable angina (SA) and acute myocardial infarction (AMI) (Li et al., 2022). The patient suffers from unstable angina pectoris (UAP), a chronic condition characterized by recurrent episodes of left chest discomfort resembling a pressing, stabbing, or crushing sensation. Symptoms of chest discomfort, which may travel down the body and into the left arm, tend to flare up when you're moving but go away once you stop (El Haque et al., 2021).

One clinical condition known as UA—myocardial ischemia at rest or during modest exertion—affects 10% of individuals with acute coronary syndromes (ACS) and is thought to be associated with no immediate myocardial necrosis or damage. Other distinctive clinical features include angina that lasts longer than 20 minutes at rest, angina that is becoming more frequent, lasting longer, or having a lower threshold, angina that starts suddenly, severe angina, or angina that follows a recent MI episode. Because of the close pathophysiological relationship between myocardial infarction and UA (plaque erosion plays a significant role in both), these conditions are included in the ACS spectrum (Budzianowski et al., 2024).

When blood and oxygen cannot adequately reach the heart, a condition known as UA develops. This can lead to chest pain or

discomfort. It can precede a heart attack and is associated with ACSs (Goyal& Zeltser, 2022).

The yearly mortality and morbidity rate from UA is higher than that from SA . The most common cause of UA is plaque rupture, which is in turn caused by plaque fatigue and increased activity of plaque lesions. Plaque exposure at high shear flow sites significantly increases the risk of thrombosis, and ulcerated surfaces with high concentrations of cholesteryl ester have the most significant thrombogenic effect. Patients with UA often experience elevated levels of serum fibrinassociated antigen, D-dimer, and fibrinopeptides, which are symptoms of active thrombosis. In contrast, patients with SA do not show these changes, which can cause the coronary artery to become completely blocked as the condition worsens over time, increasing the risk of myocardial infarction and potentially sudden death (Li et al., 2022).

#### **2.4.Epidemiology of Acute Coronary Syndrome**

Cardiovascular disease (CVD) is the leading cause of death and illness globally, with a significant proportion of this burden affecting countries with lower incomes. ACS frequently serves as the initial clinical presentation of CVD. According to data from 2019, there were around 5.8 million newly reported instances of ischemic heart disease in the 57 member nations of the European Society of Cardiology (ESC). The age-standardized incidence estimate per 100,000 individuals was 293.3, with an interquartile range of 195.8 to 529.5. CVD continues to be the leading cause of mortality among ESC member countries, resulting in about 2.2 million deaths in females and 1.9 million deaths in males in the most recent year for which data is available. Ischemic heart disease is the leading cause of death in CVD, accounting for 38% of CVD deaths in women and 44% in men (Byrne et al., 2024).

CHD is a leading cause of death and morbidity worldwide. Although ACS appears mainly in older people, it can also affect younger individuals, and the incidence of ACS has been steadily increasing in this age group (Sawada., 2020).

Epidemiological studies have shown that ACS is a leading cause of death in women. Because of the effects of estrogen, women are more likely than men to develop CHD after 10 years. Moreover, serious clinical events such as myocardial infarction or sudden death occur after the age of 20 years in women compared to men. Over the last two decades, there has been a steady increase of 1.3% on average in the annual mortality of girls with CHD (Liu et al., 2020).

The incidence of diabetes mellitus (DM) in patients with ACS is increasing, with rates ranging from 20% to 40%, this increase can be attributed to the increasing epidemiology of DM and the increased survival of individuals with DM. The global registry of the ACS included 16,116 individuals from regions as diverse as North and South America, Europe, Australia, and New Zealand, and approximately 25% of these patients were diagnosed with DM. The medical conditions for which a significant proportion of DM patients are notable in this register are hypertension, myocardial infarction (MI), stroke, angina, heart failure (HF), percutaneous coronary intervention (PCI), coronary artery bypass graft (CABG). ) and compared with individuals without DM (Katsiki & Papanas, 2020).

Despite significant advances in the diagnosis and treatment of ACS, cardiovascular disease remains a leading cause of death worldwide, with nearly half of these deaths attributable to IHD Each year can be attributed that IHD is the leading cause of disability mortality worldwide. There are significant differences in the rates of revascularization and long-term mortality after ACS around the world. The prevalence of STEMI among ACS is declining in high-income countries (HIC). This decrease can be attributed to two main factors. Firstly, there are secular trends in patient

risk profiles, such as the decreasing rates of smoking in western Europe and north America. Secondly, the increasing use of high-sensitivity troponin (hsTn) assays for diagnosing NSTEMI is also contributing to this decline. However, the rates of death that occur in the hospital for patients with STEMI who also experience shock are still rather significant, especially when cardiac arrest is included (Bergmark et al., 2022).

CVD are the leading cause of mortality globally, and their incidence continues to increase worldwide. Each year, around 17.3 million individuals succumb to CVD, and projections indicate that this figure will increase to 23.6 million by the year 2030. CVD is becoming increasingly common in Asia, the middle eastern countries, and Iran. Annually, Iran sees 3.6 million hospitalizations, with a notable portion of patients experiencing cardiovascular issues and requiring admission to intensive care units (Ghadicolaei et al., 2019).

According to the epidemiological data from the United States, over 12 million individuals are affected by CAD and more than one million experience MI annually, resulting in roughly 466,000 fatalities attributed to CAD. IHD is the leading cause of death among cardiovascular illnesses, responsible for almost nine million global deaths in 2016, as reported by the World Health Organization (WHO). Among IHDs, ACS is the primary cause of death globally and the main contributor to the overall illness burden in high-income nations. ACS is the primary cause of death in the Asia-Pacific region, responsible for over half of the worldwide burden of the illness (Nabovati et al., 2023).

## **2.5. Risk Factors Of Acute Coronary Syndrome**

Several established risk factors for ACS include:

- Smoking, elevated cholesterol levels, and psychological stress (Murali, 2023).



- Additional significant risk factors include alcohol intake, an unhealthy diet, lack of regular exercise, psychological variables, and blood Apo lipoprotein level (Qader & Saka, 2024).
  - Both hypertension and type 2 DM are important risk factors for ACS worldwide (Aqeel et al., 2023).
- It has been identified as the most widespread risk factor in obesity (Mirza et al., 2018).
  - Being 65 years of age or older or having a history of first-degree coronary artery disease in the family is a common risk factor (Nohria & Viera, 2024).

## **2.6. Signs and Symptoms of Acute Coronary Syndrome**

The symptoms of ACS can vary from person to person and are not easy to diagnose. In addition, men and women may have different symptoms (Mirzaei, 2019). Both the American Heart Association (AHA) and the European Society of Cardiology (ESC) have identified common and uncommon signs and symptoms of ACS (Allana et al. , 2018).

ACS symptoms are classified as specific and nonspecific. Distress, chest pain radiating to upper limbs, and diaphoresis are common manifestations. The latter, which is more common in women, includes symptoms such as difficulty breathing, irregular heartbeat, fatigue, tiredness, oral and neck pain, vomiting, digestive issues, decreased appetite, nausea and inflammation is associated with rare symptoms of ACS are difficult to link to heart problems , and difficult to classify. This delay in conducting diagnostic tests and providing early therapies results in a higher incidence of consequences, such as cardiogenic shock and mortality (Mendez et al., 2020).

The majority of patients with ACS experience chest pain while at rest (79% of men and 74% of women). However, a small percentage of patients (about 40% of men and 48% of women) also exhibit nonspecific

symptoms, like dyspnea, either alone or in conjunction with chest pain (Bhatt et al., 2022).

Chest discomfort is the prevailing symptom in individuals with ACS, regardless of their age at the time of diagnosis. Nevertheless, women have a higher frequency of symptoms other than the usual chest discomfort, such as weakness, dyspnea, and malaise. In the national registry of myocardial infarction, over 1 million patients with ACS were studied. The odds of women compared to men presenting with atypical symptoms were 1.03, with a 95% confidence interval of 1.02 to 1.04 for patients aged 75-84 years. For patients younger than 45 years, the odds increased to 1.30, with a 95% confidence interval of 1.23 to 1.36 (Mehilli, & Presbitero, 2020).

### **2.7. Complication of the Acute Coronary Syndrome**

- An uncommon yet dangerous complications of ACS is stroke (Rashid et al., 2020).
- Ventricular tachyarrhythmia (VTA), particularly prolonged ventricular tachycardia and ventricular fibrillation, is a rare but severe complication from ACS ( Yahud et al., 2021).
- Bleeding is a frequently occurring non-cardiac complication of ACS ( Marques Pires et al., 2021).
- In-hospital cardiac arrest (IHCA) is a rare but potentially fatal complication of ACS ( Li et al., 2019).
- Cardiogenic shock is a serious complication of ACS that has significant fatality rates, even with prompt reperfusion and improved therapy for advanced heart failure (Noaman et al., 2020).
- Left ventricular (LV) systolic dysfunction (Shrivastava, 2019).
- Acute kidney injury (Frydman et al., 2023).
- The most significant and deadly consequence of ACS is myocardial injury or death, which can cause a further episode of ACS, myocardial rupture, or a variety of different problems (Dani et al., 2023).
- Heart failure (Rodríguez-Jiménez et al., 2018).

- Upper gastrointestinal bleeding (UGIB) ( Pioppo et al., 2021).
- Atrial fibrillation is a frequently seen condition that can have negative effects in the short and long term for patients with ACS (Butt et al., 2022).

### **2.8. Assessment and Diagnostic Procedure**

Cardiac nursing examination and health history gathers physical and psychosocial information to determine physical examination, diagnostic test options, and treatment options During history taking, the nurse asks the patient for chief complaints and a comprehensive assessment of current illness history, signs and symptoms does In addition, the nurse assesses the patient's past health history, family history, personal and social history, and assesses the patient's overall emotional well-being ( Fares et al., 2019).

Elevated cardiac troponin levels in the context of acute ischemia are indicative of myocardial infarction (MI), a subtype of acute coronary syndrome that results in damage to the heart muscle. The primary cause of death in the US is coronary artery disease. Although chest pain is a typical presentation for MI patients, there are a number of non-cardiac reasons of this discomfort, therefore the diagnosis cannot always be established based only on the patient's first symptoms. Rapid electrocardiography, serum cardiac troponin tests, and a review of risk factors and presenting signs and symptoms are all part of the evaluation process for a potential MI. It might also be helpful to utilize a validated risk score, such the Thrombolysis in Myocardial Infarction score. It is recommended to do electrocardiography within ten minutes of the presentation. elevation of ST When two contiguous leads on an electrocardiogram show ST segment elevation, MI is diagnosed. Non-ST elevation ACS can be diagnosed when there is no ST segment elevation. For a diagnosis to be made, cardiac troponin levels must be raised; a 20% rise or fall in this measure is indicative of MI. Further testing may further lower the risk of coronary artery disease in some people

with negative electrocardiography results and normal cardiac biomarkers. While stress myocardial perfusion studies, exercise treadmill testing, stress echocardiography, and computed tomography are noninvasive options, cardiac catheterization remains the gold standard for identifying coronary artery disease (Barstow, 2017).

Existing emergency department management systems for patients with suspected ACS are based on four main diagnostic modalities: clinical history, ECG findings, cardiac symptom levels, and stress test results (Abdou & Abass, 2021).

The diagnosis of ACS is based on the patient's clinical symptoms, ECG findings, and the presence of biochemical markers of myocardial damage. Other diagnostic modalities, such as ECG or cardiac magnetic resonance imaging (MRI), may help identify regional wall motion abnormalities and other signs of myocardial infarction in patients with suspected ACS (Bergmark et al., 2022).

Electrocardiogram changes suggestive of possible ACS include ST segment depression, ST segment elevation, inverted T waves, or the presence of Q waves (Nohria & Viera, 2024).

## **2.9. Medical Therapy:**

### **2.9.1. Antithrombotic Therapy:**

#### **2.9.1.a. Antiplatelet Agents**

Dual antiplatelet treatment (DAPT) is the administration of two distinct medications together with the goal of preventing platelets from activating and aggregating, which in turn prevents the development of thrombi. These days, the phrase refers to taking aspirin plus a P2Y12 inhibitor at the same time, which is essential for treating acute coronary syndromes (Russo et al., 2024).

Dual antiplatelet therapy in patients with ACS aims to inhibit platelet function and reduce the risk of acute and chronic bleeding DAPT in

the first weeks after percutaneous revascularization fatigue lowering the risk of stent thrombosis (Tersalvi et al., 2020).

Patients with acute coronary syndrome are recommended antiplatelet treatments; however, the benefits of therapy, i.e., lowering the risk of recurrent cardiovascular events, must be balanced against the possible risk of significant bleeding (Cohen & Jones, 2024).

Antiplatelet therapy is an important part of the management of patients with ACS. Several new antiplatelet agents have recently been introduced. Latest guidelines recommend the use of the potent antiplatelet drugs prasugrel and ticagrelor in combination with aspirin after ACS. Although significant progress has been made in these therapies, the risk of thrombosis and bleeding remains high. These risks greatly influence clinicians when making treatment decisions for each patient (Marcucci et al., 2019).

Antiplatelet therapy is an important mainstay of anticoagulant therapy in these patients. Although clopidogrel has shown efficacy in the treatment of ACS in several clinical trials and real-world scenarios, this antiplatelet agent does have some drawbacks that Clopidogrel is less absorbed, if the comparatively, it acts later, and is more variable in response to patients. Approximately 15% to 30% of individuals have been found to respond poorly to the drug, resulting in poorly controlled platelet function. Another potent P2Y<sub>12</sub> antiplatelet agent, ticagrelor, has been developed. Two newer antiplatelet agents have rapid onset and cessation of action, and more reliable antiplatelet efficacy compared to clopidogrel, prasugrel and ticagrelor administration significantly reduced ischemia events and cardiovascular mortality in patients diagnosed with ACS (Esteve -Pastor et al., 2018).

Antiplatelet drugs reduce the chances of bleeding and associated outcomes such as death and heart disease. Platelet activation and accumulation in response to internal blood vessels is an important aspect of

abnormal cardiovascular system function, known as ACS. Many treatments that inhibit platelet function to combat this issue focus on specific membranes found in platelets. Antiplatelet drugs are classified as oral and parenteral drugs, and oral drugs are further classified according to mechanism of action. Aspirin, a cyclooxygenase inhibitor, was the first line of antiplatelet therapy. Other oral antiplatelet therapies include clopidogrel, ticagrelor, prasugrel, cilostazol, and dipyridamole.

Over the past several years, antiplatelet therapy has evolved, leading to new agents that are more effective and enhance outcomes for patients with ACS. Current guidelines recommend the use of potent antiplatelet agents such as prasugrel and ticagrelor in combination with aspirin. This article provides a comprehensive review of the use of platelets in the treatment of ACS. The review will focus on various antiplatelet agents, mechanisms of action, efficacy and safety issues in the management of ACS. The review will review the current state of the field, with recommendations made more recently, recent clinical trials, and advances in antiplatelet therapy including treatment. This provides valuable insights into the future direction of antiplatelet therapy in this area (Abubakar et al., 2023).

### **2.9.1.b. Anticoagulant Agent**

According to reports, 1-2 percent of the population need long-term anticoagulant treatment. Since direct oral anticoagulants have a safer profile than vitamin K antagonists, more patients—between 68 and 79% of all anticoagulated patients in Europe and the US—are now getting direct oral anticoagulants. This increase in prevalence has occurred in recent decades. While patients using direct oral anticoagulants are less likely than those on vitamin K antagonists to experience hemorrhagic complications, individuals taking anticoagulant treatment nevertheless face difficult clinical circumstances due to probable bleeding and unforeseen surgical

procedures. Noteworthy, during the acute phase, prompt care of these individuals is crucial (Pozzi et al., 2024).

The three main anticoagulants currently in use are enoxaparin, unfractionated heparin (UFH), and bivalirudin. Enoxaparin has more consistent pharmacokinetics compared to UFH, resulting in a more predictable anticoagulant effect (Guedeney & Collet 2021).

Oral agents, such as enoxaparin, bivalirudin, fondaparinux, or unfractionated heparin, are strongly recommended for treatment within the first 48 hours after the procedure or until completion of PCI. For example, a patient who is scheduled to undergo an invasive procedure and needs immediate admission to the catheterization laboratory for PCI will benefit from treatment with unfractionated heparin or bivalirudin while a scheduled patient to be the treatment method would be best suited for enoxaparin or fondaparinux called fondaparinux. The benefits of prolonged anticoagulation after ablation have not been well established.

Antihypertensive drugs administered soon after ACS decrease the incidence of recurrent thrombotic episodes but increase the risk of bleeding (Rodriguez & Harrington, 2021).

### **2.9.2. Statin Therapy**

The use of statins for secondary prevention after ACS is an area of intense investigation in cardiology. Statins have effectively lowered low-density lipoprotein cholesterol (LDL-C), a key risk factor for atherosclerosis through several randomized trials. Although controversy persists around the topic, statins have been found to be safe it is indeed and appropriate are permitted (Huber et al., 2019).

Early statin therapy in individuals with ACS was associated with reduced mortality during hospital stay. Moreover, there is evidence that statin therapy provides clinical benefit over LDL-C lowering alone. These additional benefits, known as pleiotropic effects, can be beneficial soon after receiving ACS. They include promoting plaque stabilization,

increasing endothelial function, reducing inflammation, and reducing the potential for bleeding (Ioannidis et al., 2024).

### **2.9.3. Beta Blockers**

Routine use of beta blockers after myocardial infarction is recommended. On the other hand, the recommendations of the guidelines are somewhat different. When used appropriately, beta blockers are highly recommended by the American College of Cardiology and the American Heart Association for all patients with ST-segment elevation myocardial infarction (Peck et al., 2021).

According to estimates, 2 million people in the US and Europe suffer from an acute myocardial infarction each year. Due to the dearth of recent large-scale randomized trials and consensus recommendations about the length of beta-blocker therapy following myocardial infarction, many patients are now on lifetime medication, putting this class of medications among the most prescribed globally. With a prescription rate that has above 90% in the majority of Western registries, beta-blocker treatment is not only the standard of care for patients following myocardial infarction but also a quality indicator of secondary prevention. Pre-modern myocardial reperfusion and pharmacotherapy studies provide the basis for the benefit of beta-blocker medication in myocardial infarction patients. The risks of heart failure and myocardial infarction have sharply decreased as a result of early coronary reperfusion therapy. However, this has raised concerns about the potential benefits of lifetime beta-blocker treatment in patients who have a preserved left ventricular ejection fraction and no other primary indication for beta-blocker therapy.

Although the research has been conflicting, recent big countrywide registries have frequently shown that beta blocker medication may not be beneficial in the long run for these individuals. There is insufficient data from a randomized study to assess the late cessation of



beta-blockers when left ventricular dysfunction or chronic heart failure are not present (Silvain et al., 2024).

Beta blockers are often prescribed for people with coronary heart disease who have not yet been diagnosed with MI. According to all current guidelines, beta blockers have a well-defined role in the prevention of secondary ACS. This is especially true when the left ventricle is dysfunctional. Beta-blockers increase the prognosis of vascular disease by reducing oxygen requirement and reducing ischemia, reducing ventricular remodeling, and preventing malignant arrhythmias and sudden death (Timóteo et al., 2018).

#### **2.9.4. Angiotensin-Converting Enzyme Inhibitors and Angiotensin Receptor Blockers:**

In addition to their antihypertensive benefits, research on the physiological effects of angiotensin receptor blockers (ARBs) and ACEIs has demonstrated a reduction in cardiac remodeling, fibrosis, and inflammation. The therapeutic indications for ACEIs and ARBs have been significantly increased by evidence from big clinical studies; these medications are now first line therapy for the treatment of hypertension, chronic renal disease, stroke, diabetes mellitus, and post myocardial infarction. As a result, ACEIs and ARBs are used by a large number of high-risk patients who arrive for noncardiac surgery.<sup>2</sup> The renin-angiotensin system (RAS) pharmacology and basic physiology will become increasingly important in the perioperative setting with the introduction of angiotensin receptor neprilysin inhibitors (ARNIs) for the treatment of patients with chronic heart failure (Shrimpton et al., 2020).

Several randomized clinical trials have shown that angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) can effectively reduce mortality and reduce the risk of recurrent MI, therefore, are common prescribe these medications for all patients with ACS , unless there are contraindications (Chen et al., 2022).

### **2.9.5. Inhibitors of Renin–Angiotensin–Aldosterone Axis:**

Various drugs such as ACEIs, angiotensin-II type 1 blockers (ARBs), aldosterone receptor antagonists, and more recently direct renin inhibitors all work together to block the renin-angiotensin-aldosterone system (RAAS), a major therapeutic target in heart failure in the edge of (Nehme & Zibara, 2017).

The RAAS system, which regulates extracellular volume, blood pressure (BP), and plasma sodium concentration, is composed of numerous coagulation factors, enzymes, and peptides. In response to a decrease in arterial blood pressure, a decrease in sodium chloride, or sympathetic nerve activity, the kidneys hydrolyze the angiotensinogen receptor renin to form angiotensin I. ACE is a protein found in the kidneys, lymph nodes, and lungs in response to angiotensin conversion I to angiotensin II This approx. The smooth muscle in the arteries and veins constricts in response to this chemical, and the adrenal gland cortex releases aldosterone, which maintains a normal concentration of sodium and potassium in the kidneys (Naveed et al., 2021).

Some examples of RAAS blockers are angiotensin-converting enzyme inhibitors, direct renin inhibitors, aldosterone receptor antagonists, and angiotensin receptor blockers. Trapping the RAAS system may help patients suffering from high blood pressure, acute MI, CHD, chronic renal disease, stroke, and diabetic nephropathy. The kidney's juxtaglomerular cells secrete the hormone enzyme renin, which plays a role in converting angiotensinogen to angiotensin I. The process of angiotensin I–angiotensin II conversion occurs in the presence of ACE. Several pathways allow angiotensin-II to increase blood pressure. In terms of hypertension medication prescribing worldwide, ACEIs rank first. Based on evidence-based clinical practice guidelines issued by the Eighth Joint National Committee (JNC 8), they are indicated as first-line antihypertensive medication for hypertensive patients with comorbidities such as diabetes,

ischemic heart disease, heart failure, and chronic kidney disease (Maideen et al., 2022) (Hundemer & Sood,2021).

As per the current guidelines, it is recommended to use either an ACE inhibitor or an ARB to block the RAAS system in all patients who have STEMI. This recommendation also applies to all patients with ACS who have arterial hypertension, chronic kidney disease, diabetes, or reduced left-ventricular ejection fraction (Tscharre et al., 2021).

### **2.10. Overview of Foot Massage :**

The term "massage" originates from the Greek word "massein," which signifies the action of kneading. The Arabic term "mass" or "mas'h," which refers to gently applying pressure, is also synonymous with the word "massage" (Harris et al., 2018).

The term "massage" originates from a combination of Arabic, Greek, Indian, and French etymologies, which collectively refer to the act of touching or washing. Both the Bible and the Holy Quran describe massage as the act of applying oil to the skin through rubbing. The most distinctive feature of massage treatment is its non-verbal communication, which holds inherent value. Massage treatment elicits reverence, confidence, and understanding just via tactile contact, without the need for spoken communication (Gholami-Motlagh et al., 2016).

Massage, an adjunctive/interdisciplinary therapeutic approach, has been employed for about 3000 years to address the symptoms of diverse ailments. Various theories in the literature have proposed positive effects of massage. Massage is believed to enhance the synthesis of serotonin, for instance. This has proven to be efficacious in elevating serotonin and dopamine levels, hence leading to the production of endorphins and inhibiting the transmission of detrimental signals to the brain (Demirci et al., 2022) .

Massage stimulates the parasympathetic nerve system, leading to a reduction in blood pressure, heart rate, and breathing ultimately inducing a state of calm (Harris et al., 2018).

Existing information suggests that massage has four primary advantageous effects: stress and anxiety reduction, pain alleviation, assistance in tissue regeneration, and enhancement of immunity. While the precise mechanisms via which massage delivers these health impacts remain incompletely known, there is sufficient data to substantiate certain informed hypotheses.

- **Alleviate anxiety and stress:** Massage is thought to induce relaxation by activating the parasympathetic division of the autonomic nervous system, which helps restore the body's equilibrium after experiencing a stressful "fight-or-flight" response. A solitary session of massage therapy can substantially reduce salivary cortisol levels and heart rate, whereas repeated sessions of massage therapy seem to decrease diastolic blood pressure. Massage therapy also increases the levels of serotonin and dopamine in the body. This elucidates the reason why individuals typically experience a sense of well-being immediately following a massage, and undergoing several massage sessions aids in mitigating symptoms of anxiety and depression.
- **Relieve pain:** The activation of non-painful sensations supplied through the major nerve fibers to the spinal cord can block the nerve "gates" that receive painful information. Massage is a powerful mechanical stimulus that effectively activates the mechanism to suppress pain perceptions, known as "closing the gates". Massage exerts a mechanical force that triggers a series of neurophysiological reactions in both the peripheral and central nervous systems. These reactions include the release of B-endorphin and anandamide, reduction in temporal summation, changes in inflammatory mediators, and stimulation of autonomic responses. The

intricate interplay between several factors results in the documented therapeutic effects of pain reduction.

- **Facilitate tissue regeneration:** Injury to skeletal muscle initiates a cascade of events involving inflammation, which leads to the repair and regeneration of the damaged tissue. Massage stimulates a mechanical process that decreases the infiltration of mast cells into cells, hence reducing inflammation and swelling. The process involves the transformation of the M1 macrophage into the M2 macrophage, resulting in the release of anti-inflammatory substances that promote tissue regeneration and improved functional recovery.
- **Enhance the immunity:** In addition to modifying the inflammatory signaling pathway, massage therapy also impacts the innate immune system, particularly the function of natural killer cells. The efficacy of massage therapies in enhancing natural killer cell activity is observed, despite the absence of any change in the quantity of natural killer cells. Increased natural killer cell activity contributes to strengthening the body's ability to defend against infections and malignancies (Ooi & Pak, 2020).

A foot massage has gained popularity in recent years as a means to increase peripheral circulation, control nerves, blood vessels, and cells in an exchange the network, and mechanically support the displacement of venous and lymphatic fluid. Because of its low cost, ease of application, and little side effects, foot massage is a popular choice. People suffering from primary hypertension have had their blood pressure reduced after receiving a foot massage (Sitoresmi et al., 2020).

As a form of passive exercise, foot massage has the potential to alleviate stress by decreasing activity in the sympathetic nervous system, which in turn lowers blood pressure and improves blood circulation. Reflexively, when nerve receptors are triggered, arteries widen (Calisanie & Preannisa, 2022).

### **2.11. The Effect of Foot Massage on Physiological Parameters**

Vital signs, which are frequently assessed by nurses, serve as primary indications of the proper functioning of the circulatory, respiratory, neurological, and endocrine systems (Sheikh et al., 2017).

Mean Arterial Pressure (MAP) is the result of the heart contracting against the resistance of blood vessels, as calculated by the following formula: The equation is  $MAP = CO \times SVR$ .

In contrast, MAP is calculated as diastolic blood pressure (DBP) plus (systolic blood pressure (SBP) - DBP)/3 or  $([2 \times DBP] + SBP)/3$ .

\* The cardiac output, or CO, is calculated by multiplying the stroke volume by the HR.

\* The systemic vascular resistance, or SVR, is calculated as  $[80(MAP - MVP)]/CO$ , where MVP is the mean venous pressure, which is calculated as either the mean right atrial pressure or the central venous pressure (Suneja & Sanders, 2017).

Blood vessel dilatation is aided by the hormone histamine, which is produced in response to massage. This leads to enhanced cellular oxygenation, nutrition delivery, and blood flow. An equilibrium state for the body is achieved when blood flows smoothly, which has a soothing and revitalizing impact on every part of the body. Not only that, but foot massage therapy has the potential to influence the body's systems in a way that promotes relaxation, normalizes blood circulation, and lessens anxiety (Calisanie & Preannisa, 2022).

Among the many effleurages used in massage is the foot massage. Blood oxygen saturation levels were shown to rise, heart rate and respiration rate to fall, and MAP to drop, after a foot massage, according to many studies (Permana & Lindayani, 2021). And it successfully reduces diastolic and systolic blood pressure (Sitoresmi et al., 2020).

**2-12 Previous Studies:****First Study:**

Sayari & Nobahar (2024), conducted a randomized clinical trial study in Iran to assess effect of foot reflexology massage on physiological indices in patients with acute myocardial infarction. The sampling methods was purposeful and group assignment was done randomly in coronary care unit at Shahid Rajaei hospital, Karaj. Ninety patients with acute myocardial infarction were assigned in three experimental, placebo and control groups. Foot reflexology intervention was done on three consecutive days, each time 20 minutes. Physiological indicators including vital sign, blood oxygen saturation and cardiac rhythm were recorded before, immediately after and 20 minutes later for each group. The results were in three periods, the percentage of blood oxygen saturation in experimental group was increasing ( $P < 0.001$ ), but there was no significant difference between the placebo and control groups. Incremental changes in blood oxygen saturation immediately and 20 minutes after intervention were significantly different from the pre-intervention in three groups. In all cases, the increase in the intervention group was higher ( $P < 0.001$ ). But these changes were not significant in 20 minutes after the procedure in compare to the immediately after intervention in three groups. Changes in vital sign and cardiac rhythm were not significantly different between the three groups in different times. These findings indicate that foot reflexology massage increased blood oxygen saturation. Therefore, it is recommended to use this simple and cost effective method to improve oxygenation in patients with acute myocardial infarction.

**Second study:**

Putu et al, (2023), conducted a quasi-experimental study in Indonesia to assess the effect of foot massage therapy on patient's non-invasive hemodynamic status in the intensive care unit. The sample consisted of 12 participants utilizing a method of purposive sampling.

Hemodynamic measures were done 30 minutes after a 30-minute foot massage. The findings indicated that the non-invasive hemodynamic state of patients in the intensive care unit, foot massage treatment was shown to have significant effects. This included a decrease in respiratory frequency ( $p=0.002$ ), a decrease in MAP ( $p=0.002$ ), a decrease in heart rate ( $p=0.002$ ), and an increase in oxygen saturation ( $p=0.002$ ). In order to achieve a balance between oxygen and carbon dioxide in the tissues, it causes a relaxation response that prompts the sympathetic nervous system to become less active and increases the activity of the parasympathetic nerves. This causes the heart rate and blood pressure to drop and the respiratory rate to return to normal.

### **Third Study :**

Permana & Lindayani (2021), a quasi-experimental design including a single group, pre- and post-tests was employed to investigate the effect of foot massage on hemodynamic among patients admitted to the intensive care unit in a basic public hospital in Garut, Indonesia's West Java. From electronic vital sign monitors, the researcher collected each participant's systolic blood pressure, diastolic blood pressure, and heart rate right before and after each session. The mean age of the thirty patients who were recruited was 41.7 (SD=3.10), and 63.3% of them were female. After a 30-minute intervention, researchers discovered that foot massage significantly improves mean arterial pressure, heart rate, respiration rate, and oxygen saturation at the second time measurement ( $p<0.05$ ). finalized of The hemodynamic state of patients admitted to the critical care unit is improved by foot massage. Future research on control treatment and disease-associated variables is required, utilizing a rigorous methodology and a sizable sample size.



**Fourth Study:**

Anil & Saloni (2020), sixty patients were divided into two groups at random in a quasi-experimental research. After four hours of analgesic medication delivery, the experimental group received foot massages (10 minutes on each foot), whereas the control group's investigator just stood by the bedside and spoke for 20 minutes. Three time intervals (immediate, 30 minutes, and 60 minutes) following foot massage were used to assess blood pressure and heart rate using an automated blood pressure monitor.

The findings of the study showed significant differences between the two groups when monitoring blood pressure and heart rate over time. Compared with the control group, the experimental group showed statistically significant increases in heart rate ( $p=0.002$ ), diastolic blood pressure ( $p=0.001$ ), and systolic blood pressure ( $p=0.004$ ) greatly reduced. 0.00), systolic blood pressure also decreased significantly ( $p=0.001$ ) after 60 minutes of treatment. Discovered for patients recovering from abdominal surgery and other procedures, foot massage is an inexpensive, safe, effective, and simple nursing intervention that can be used to reduce pain, heart rate, and blood pressure.

**Fifth Study :**

Babatabar-darzi et al, (2019), a randomized, controlled, double-blind, three-group clinical trial study was carried out in the hospitals in Jamaran and Baqiyatallah in Tehran, Iran in 2011–2012. The purpose of the study was to identify the effect of foot reflexology massage on the physiological parameters during chest tube removal after open heart surgery. According to the findings, after the chest tube was removed, the intervention group's heart and breathing rates significantly decreased ( $P<0.0001$ ). Over different time periods, there was no significant difference ( $P<0.05$ ) in the mean systolic blood pressure and oxygen saturation % changes among the three groups. The outcomes of the study indicate

Reflexology massage of the feet can be a helpful and simple nursing intervention during the thoracic tube extraction procedure following coronary artery bypass graft surgery. It effectively lowers the heart rate and breathing rate to normal values. However, further research is required to validate these conclusions.

**Sixth Study:**

Sheeja & Beevi (2019), a quasi-experimental study in India, this research's goal is to assess the effectiveness of foot massage and Mitchell's relaxation technique on physiological and psychological parameters of patients undergoing elective angioplasty. Purposive sampling was used to create a two-group pre-test and post-test design, and 30 research participants who met the inclusion requirements were randomly assigned to one of two groups. Group 1 received foot massages, while Group 2 spent three days at 7 a.m. and 7 p.m. using Mitchell's relaxation technique. The data were gathered using a stress rating scale, a socio-demographic and clinical profile datasheet, and other tools. On the third day following the six interventions, a post-test was administered. The results of the study that the physiological and psychological markers were effectively lowered by foot massage. The study's conclusion in patients having elective angioplasty, foot massage is shown to be more helpful than Mitchell's relaxation approach in lowering blood pressure, heart rate, and stress level. These therapies can be used in conjunction with standard nursing interventions.

**Seventh Study:**

Rodrigues (2018), an experimental study in Bengaluru in India, conducted to assess the effectiveness of foot and hand massage on postoperative pain, anxiety and selected physiological parameters among postoperative open heart surgery patients in cardiothoracic intensive care units of selected hospitals of Mangaluru . Data was collected by using Demographic and Clinical data and Physiological Parameter Checklist. First twenty samples were assigned to the experimental group and the

second twenty samples to the control group using the purposive sampling technique. On days 1, 2, and 3, a pre-test was administered before to a 30-minute intervention (massage) in the morning and evening. Twenty minutes following the pre-test, the intervention was administered. On day 1, day 2, and day 3, post-tests were given in the morning and evening, 30 and 60 minutes following the intervention. The findings of this study was a significant change in the post-test two scores of respirational rate on Day two morning ( $t=3.120$ ,  $p<0.001$ ) and evening ( $t=3.237$ ,  $p<0.001$ ). There was a significant alteration in the post-test two scores of breathing on day three morning ( $t=3.159$ ,  $p<0.001$ ) and evening ( $t=2.598$ ,  $p<0.05$ ) between study and control group. Significant change in the post-test one scores of heart rate on Day one (morning  $t=2.818$ ,  $p<0.05$ , evening ( $t=2.65$ ,  $p<0.05$ ) between the study and control group was also discovered. According to the study's findings, giving patients massages on the hands and feet was an efficient non-pharmacological way to help them feel less anxious and in pain after open heart surgery.

**Eighth Study:**

A randomized clinical trial in Iran, Alimohammad et al, (2018), examined the effect of hand and foot surface stroke massage on anxiety and vital signs in patients with acute coronary syndrome: A randomized clinical trial. The study involved seventy patients with acute coronary syndrome. The participants were randomly allocated to the intervention and control groups. The two groups' vital signs were taken prior to, just after, sixty minutes, and ninety minutes after the intervention. The patients' vital signs were monitored and noted on a checklist. The study's outcome was Before the intervention, the patients' systolic and diastolic blood pressure, pulse rate, and breathing rate did not change significantly. The mean variations in blood pressure, heart rate, and breathing rate were significant after the intervention, nevertheless. Finally As a nursing intervention, hand and foot massage can help patients' vital signs to be more regulated and attenuated.

**Ninth Study :**

Abdi et al, (2016), this study looks at how foot massage affects CCU patients' heart rates and blood pressure. Through convenience sampling, 60 patients were included in this clinical experiment and randomly assigned to one of two groups: intervention (n = 30) or control (n = 30). For twenty minutes, each patient in the intervention group received foot massages; the control group was given standard medical attention. Vital signs and a questionnaire on demographics were used to gather data. The results of the Paired T test indicated significant changes between the diastolic and systolic blood pressure means, while the experimental group's pulse rate showed a significant difference before and after foot massage (P0.05). In conclusion heart patients experience comfort and hemodynamic balance after receiving foot massages.



***Chapter Three***

***Methodology***

## **Chapter Three**

### **Methodology**

Chapter three analyzes and explains the structure of the research methodology. The study design, administrative agreements, and ethical considerations, setting and sample of the study, steps of the study, the study instruments and scoring, testing of instrument validity and reliability, pilot study, data collection, statistical analysis, and limitations of the study are illustrated in detail in the current chapter.

#### **3.1 The Study Design:**

A quantitative quasi-experimental, pretest- posttest / control group design, have been carried out in the present study, which is conducted between Sep, 25, 2023 to June, 20, 2024 to determine the effectiveness of foot massage on physiological parameters among patients with acute coronary syndrome. The student investigator used the quasi-experimental design because there is no randomization in the present study.

#### **3.2. Administrative Agreements:**

Before conducting the study, the student investigator gets an administrative agreement to get permission to conducted the study, these agreements include the following:

- An official authorization was obtained from the Nursing college council / University of Kerbala to approve the study proposal (see appendix AI).
- An official authorization was obtained from Ministry of health /center of human Development and training /Karbala health directorate on 22 November 2023(see appendix AII).

#### **3.3 Ethical Considerations:**

Firstly, the researcher obtained an ethical agreement from the ethic committee in college of nursing / University of Kerbala to

perform the present study (see appendix B). After the administrative agreements are obtained, the researcher takes patients' agreement to participate in the present study. That because the ethical consideration is one of the most essential principles in conducting nursing research. The right to anonymity and it is assumed that each of them has the freedom to discontinue the study at any time(see appendix C) .

### **Clinical Trial Protocol for the Iranian Registry of Clinical Trials:**

The research proposal registered in the IRCT with registration number IRCT20240124060784N1. Registration date: April 4, 2024(see appendix D).

#### **3.4. Setting of the Study:**

The study was conducted in Karbala Center for Cardiac Diseases and Surgery that contains a cardiac resuscitation unit, a cardiology ward, and cardiac operating theaters and the whole center contains 35 bed.

#### **3.5. The Study Sample:**

Sixty patient with acute coronary syndrome assigned among foot massage and control groups. There were 30 patients for these one of two groups, while control group only received the usual care, the other group were to perform an interventional protocol. Sample had been picked through a nonprobability purposive sampling, in this method of selection, the student investigator uses their own judgment in order to select participants from the population to take part in the research project.

#### **The Selection Criteria were Designed as Follows:**

##### **3.5.1. Inclusion Criteria:**

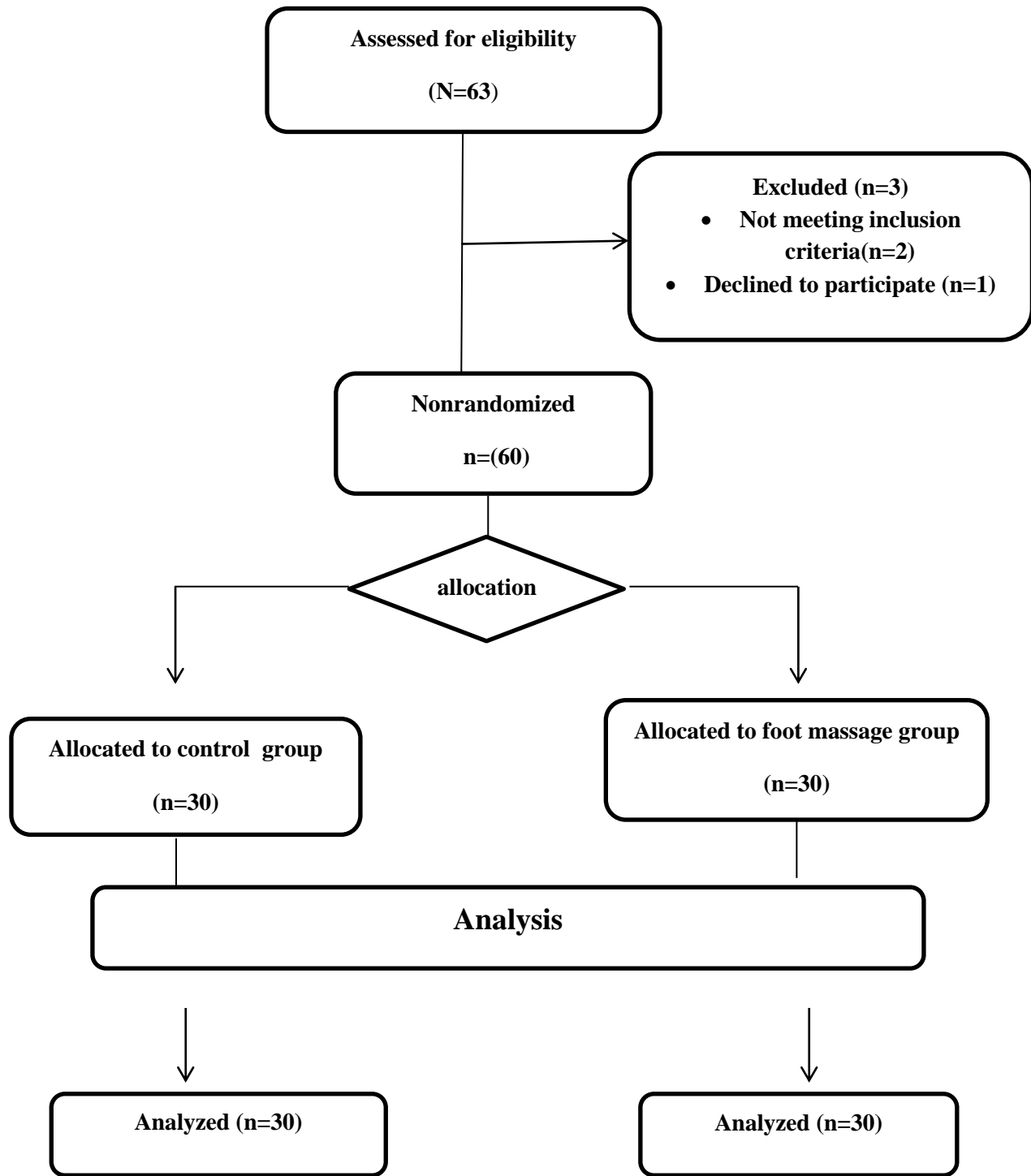
1. All patient who are medically diagnosed with acute coronary syndrome .
2. Patient between age 18 and older .

3. Conscious patient, able to communicate verbally, and able to make decision.

**3.5.2.Exclusion Criteria:**

1. Patient who declined to enroll in the study and who have discontinuing to intervention.
2. The patient may be suffering from problems with their feet (such as a callus, corn, fungal infection of the skin, old scars, diabetic foot, or neuropathy).
3. Patient who have amputation in lower extremity.





**Figure 1. Flowchart of sample recruiting**

### 3.6. Steps of the Study:

**There are Many Steps Performed in the Study as Following:**

#### 3.6.1. Interventional Protocol:

The student investigator carried out the intervention after going over the educational references and previous research. This interventional strategy was created. Therefore, this interventional protocol includes basic procedure foot massage, all patients were explained the procedure and written informed consent. Participants were separated fairly into two groups: [intervention group (G1; n =30)] and [control group (G2; n=30)]. The intervention group instructed to apply foot massage was applied for five minutes, each foot was massaged for five minutes. And followed four steps of foot massage, all of the four steps was given one minute and fifteen seconds of massage, which was five minutes in total, the physiological parameters of the patient were measured by electronic vital signs monitors and documented before the massage and then the massage was implemented for five minutes. And re-recorded the physiological parameters in the five and ten minutes after the end of five minutes of foot massage. After putting a pillow under the patient's feet and positioning them in a supine position at a 30-degree angle to their head, and lubricated the hand with olive oil and began the massage by followed the four steps (Hemmatpour et al., 2020).

- 1- With one hand, the sole of the foot was grasped, and the toes were checked to ensure they were directed upward. Then pressure was applied to the back of the foot by running the thumb slowly into each groove created by the tendons connecting the ankle to the toes.
- 2- While the other thumb was softly massaging the entire sole of the foot, one hand was used to hold the foot.
- 3- The fingers were bent backward and forward while also being separately pulled to one side in a balanced manner.

4- Between the thumb and toes, the base of each finger was grasped, pulled along, and bent outward.

All participants continued to receive their conventional therapy.

### **3.6.2. Control Group:**

The control group includes thirty patients in Kerbala Center for Cardiac Diseases and Surgery. The researcher did not provide any intervention to participant ; instead, they received pre-test and post-test assessments after five and ten minutes as did the other group, and they will be compared to the other group in the study. Then patients in all groups were evaluated prior to the intervention (pre-test assessment) and after five and ten minutes (post-test assessment) by using the physiological parameters scale.

### **3.6.3. Study Instrument:**

The researcher uses the existing scientific literature to support the adoption and development of an evaluation tool, to investigate the effectiveness of foot massage on physiological parameters among patients with acute coronary syndrome. The final copy of the study instrument consists of the following parts:

#### **3.6.3.1: Socio-Demographic Characteristics:**

This part of instrument was composed the participant Socio-Demographic that include (6) items, such as (sex, age, material status, degree of education, smoking status, and occupation ).

#### **3.6.3.2: Clinical Data:**

The patient's clinical characteristics comprises of (4) items, which include: height, weight , medications used for chronic diseases, if any, chronic diseases (see appendix FI).

### 3.6.3.3 The Rating and Scoring for the Body Mass Index (BMI):

An individual's estimated body fat can be determined using their height and weight and the statistical measure known as body mass index (BMI). This applies to both males and females of any age. It is calculated by dividing the person's weight in kilos by their square meter of height (Weir & Jan, 2019).

We used the Centers for Disease Control and Prevention's definitions to classify the patients (Kaplan et al., 2020).

1. normal (BMI, 18.5–24.9 kg/m<sup>2</sup>),
2. overweight (BMI, 25.0–29.9 kg/m<sup>2</sup>),
- class 1 obesity (BMI, 30.0–34.9 kg/m<sup>2</sup>).
- class 2 obesity (BMI, 35.0–39.9 kg/m<sup>2</sup>).
- class 3 or severe obesity (BMI,  $\geq$ 40.0 kg/m<sup>2</sup>).

### 3.6.3.4 Physiological Parameters:

The physiological parameters contains objective physiological data that was obtained from the participants. The systolic and diastolic blood pressures, the mean arterial pressures, the heart rates, and the pulse pressures, respiratory rate, and arterial oxygen saturation of the participants (see appendix FII).

## 3.7. Testing of Instrument Validity and Reliability:

### 3.7.1. The Validity of the Study Instrument:

The validity of the study instrument is assessed to establish its ability to accurately measure the intended data. Instrument verification demonstrates the proficiency of tool in identification of the phenomenon under study. The validation process considered the outcome of research. Verification of research refers about how thoroughly a study explores the assumption and provides evidence for the study's conceptual framework. A group of thirteen specialists with a minimum of 7 years of professional expertise in the

topic field revised the study instrument. The research instrument's content, simplicity, relevance, design, and application were all requested to be evaluated by each expert participant.

### 3.7.1.1 Face Validity

Is used to describe how well a test seems to measure the things it is supposed to measure. Strong face validity would be demonstrated by a test where the majority of respondents agree that the items seem to measure the things the test is supposed to evaluate (Johnson,2021). In order to establish the face validity, a panel of specialists examines the questionnaire for clarity, relevance, and adequate measurement of the relevant concepts. The researcher distributed questioners to seven experts who have at least 7 years of professional experience in the fields they specialize in, including(2) faculty members from the university of Kerbela's college of nursing, (1) expert from the Kufaa university, (1) from the university of Al Ameen, (2) expert from the Karbala center for cardiac diseases and surgery and (1) from the university of Babylon's college of nursing (see appendix G). The validity process conducted face to face manner through interview. This step include offering the domain of the item to the panel of the raters before submitting their evaluation of these items reviewer were asked to review the item completely. reviewers are asked to written comment to enhance comprehending and simplicity of each item. The suggestions of the experts have also been considered. The study instrument has been finalized and is ready to be used as a valid tool to measure the phenomena under investigation.

**a- Physiological Parameters:** There were seven experts, and the experts who accepted on each question were( 7,7,7,7,7,7). Each item had universal agreement (UA), and it was (1,1,1,1,1, and 0). I-FVI for each item was (1,1,0.85,1,1and 1). The Parameters S-FVI-Ave based on an Average Method, the scales levels of face validation index (FVI) value

was (0.97), which is acceptable for FVI. S-FVI- Universal Agreement its definition was "Scale-Level Face Validity Index Based on the Universal Agreement) Method" it had one score. A proportion of the paragraphs that 7 experts agreed were relevant on average was (0.83) (see appendix HI).

### 3.7.1.2 The Validation of Content:

Defined as how the elements of the questionnaire connect to and express the intended concept for the evaluation of a certain subject. The researcher validated the content and created the content validity index. The following actions were done in order to implement the content validity process:

- Developing of the validation based on the evaluation of experts who had a thorough knowledge of the procedure and objectives.
- The researcher spreads questionnaires to six experts who have at least 14years of professional experience in the fields they specialize in. These specialists comprised (2) from the University of Baghdad's nursing college and (2) from the University of Kerbala's nursing college and (1) authorized from the University of Al-Safwa, in addition to(1) from the Kufaa University (see appendix G).
- An expert meeting with researchers allowed for face-to-face content validity testing.
- Furthermore, determine the content validity index (CVI) using the formula below.

**a- Physiological Parameters:** number of experts was (6) and they all approved on each question (6,6,6,6,6,and 6). Every item's UA were (1-1-1-1-1 and 1). For each item, the item level content validity index (I-CVR) was 1, 1, 1, 1, 1, and 1. This scale's S-CVI-Ave, which is the content validation index based on an average approach, was (1), and the CVI viewed this result as acceptable (Yusoff, 2019). presents S-CVI\UA as a "scale-level content validity index based on the universal

agreement method" where (1) the average proportion of relevant items among 6 experts is one (see appendix HII).

### 3.7.2. Reliability of the Study Instrument:

The degree to which a measurement of a phenomenon yields consistent and steady results is known as reliability. Repeatability is another issue related to reliability. For instance, a scale or test becomes reliable if it consistently produces the same result when measured again under similar conditions. The reliability testing is essential for the reason that it pertains to the consistency of the components of a measuring instrument. When the scale's components measure the same thing, and "hang together," the scale has accepted internal consistency dependability. When evaluating internal consistency, the most common indicator to use is the Cronbach Alpha coefficient (Taherdoost, 2016). The Researcher assesses the reliability of scale using internal consistency (the alpha Cronbach ) as indicated in Table (3-1):

**The Table 3-1 Study Instrument Reliability**

N O	Scale	Actual Value	Acceptable value	Assessment
1	Physiological parameters	0.75	0.70	accepted

The findings show that the research tool may be relied to measure the phenomenon under study on the same population at any point in the future.

### 3.8. Pilot Study:

The pilot study is conducted on (10) patients, who are selected purposefully. These patients were medically diagnosed with acute

coronary syndrome. They have been selected from Karbala center for cardiac diseases and surgery the pilot study performed from 31/ January / 2024 to 5/ February / 2024 .

### **3.8.1. The Purposes of a Pilot Study are to:**

1. Determine the stability and clarity of the study instrument.
2. Determine the time required to collect data for each patient.
3. Discover the obstacles that may occur during the data collection process.
4. Assess the patient- researcher cooperation.

### **3.8.2. Pilot Study Result :**

- 1- Indicate that study instrument was clear and understandable .
- 2- The socio-demographic and clinical information section, along with scale took between (15 to 20) minutes to complete.

### **3.9. The Collection of Data:**

Researchers used interview to measure physiological parameters as part of their data collection process. The data was gathered between 19<sup>th</sup> , February. 2024 to 25<sup>th</sup>, March. 2024. It has been completed through a face to face interview by using an Arabic version of the questionnaire. The researcher need time (20-25)minutes to gathered data completely from each patient.

### **3.10. Statistical Analysis:**

The data from the current study were analyzed using the statistical software packages SPSS version 25 and Microsoft Excel 2010. Both descriptive and inferential data analysis methods were employed .

#### **3.10.1. Descriptive Statistics:**

To determine the overall finding of the sample and to compare the variables, tables were created using the frequency (F), Percentage



%; summary statistics including means of score (MS) & standard deviation (SD).

$\% = \text{Frequencies} / \text{Sample size} * 100 = \% = \text{Percentage}$

A-Mean of Scores: The mean of scores is used to assess patients' physiological parameters.

### **3.10.2. The Inferential Statistics:**

The inferential statistics are adopted to test study hypothesis as follow:

A- The analysis of variance statics was used one way analysis of variance (ANOVA), used to find out what makes two groups different.

B- The t-test for independent samples that used to compare between the study & control groups responses at pre and post- test.

C- A p-value lower than 0.05 was judged statistically significant.

### **3.11. Study Limitations:**

1- Because the study was conducted in one place, the sample size was small, making it difficult to generalize the findings to other patients in diverse settings.

2- Study did not control for confounding factors such as (treatment, stress and etc )that sometimes effect on the results of it.



***Chapter Four***

***The Results***

## Chapter Four

### The Results

The data analysis results reported in this chapter are consistent with the initial goal, which is to determine the effectiveness of foot massage on physiological indicators [heart rate(HR), systolic blood pressure (SBP),diastolic blood pressure(DBP), mean arterial pressure(MAP), pulse pressure(PP), respiratory rate(RR), and oxygen saturation rate(SPO2)] among patients with acute coronary syndrome. These results organized as follows:

**Table (4-1): Distribution of Participants According to Their Socio-Demographic Characteristics:**

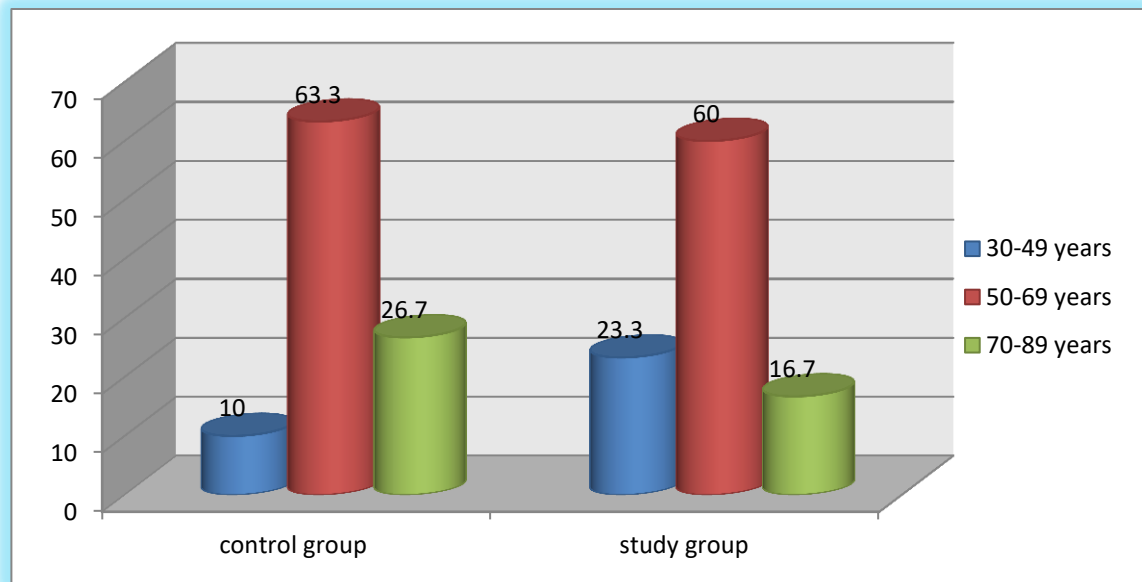
Socio-Demographic Characteristics		Control Group		Study Group		P-Value (Sig)
		f.	%	f.	%	
<b>Age (Per Years)</b> Mean $\pm$ SD 59.9 $\pm$ 11.7	30-49	3	10.0	7	23.3	<b>.822 (NS)</b>
	50-69	19	63.3	18	60.0	
	70-89	8	26.7	5	16.7	
	<b>Total</b>	<b>30</b>	<b>100.0</b>	<b>30</b>	<b>100.0</b>	
<b>Sex</b>	Male	22	73.3	23	76.7	<b>.770 (NS)</b>
	Female	8	26.7	7	23.3	
	<b>Total</b>	<b>30</b>	<b>100.0</b>	30	100.0	
<b>Marital Status</b>	single	1	3.3	0	0	<b>.846 (NS)</b>
	married	24	80.0	25	83.3	
	Separated	2	6.7	2	6.7	
	Widowed	3	10.0	3	10.0	
	<b>Total</b>	<b>30</b>	<b>100.0</b>	30	100.0	
<b>Educational Level</b>	No reading or writing	11	36.7	12	40.0	<b>.873 (NS)</b>
	Reading and writing	2	6.7	1	3.3	
	Primary level	7	23.3	7	23.3	
	Secondary level	6	20.0	6	20.0	

	Institute	4	13.3	3	10.0	
	Collage and above	0	0	1	3.3	
	<b>Total</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100.0</b>	
<b>Occupation Status</b>	retired	6	20.0	4	13.3	<b>.323 (NS)</b>
	Housewife	9	30.0	6	20.0	
	governme nt employee	2	6.7	5	16.7	
	idle	4	13.3	3	10.0	
	free business	9	30.0	12	40.0	
	<b>Total</b>	<b>30</b>	<b>100.0</b>	<b>30</b>	<b>100.0</b>	
<b>Smoking Status</b>	never	12	40.0	7	23.3	<b>.387 (NS)</b>
	previously	4	13.3	8	26.7	
	currently	14	46.7	15	50.0	
	<b>Total</b>	<b>30</b>	<b>100.0</b>	<b>30</b>	<b>100.0</b>	

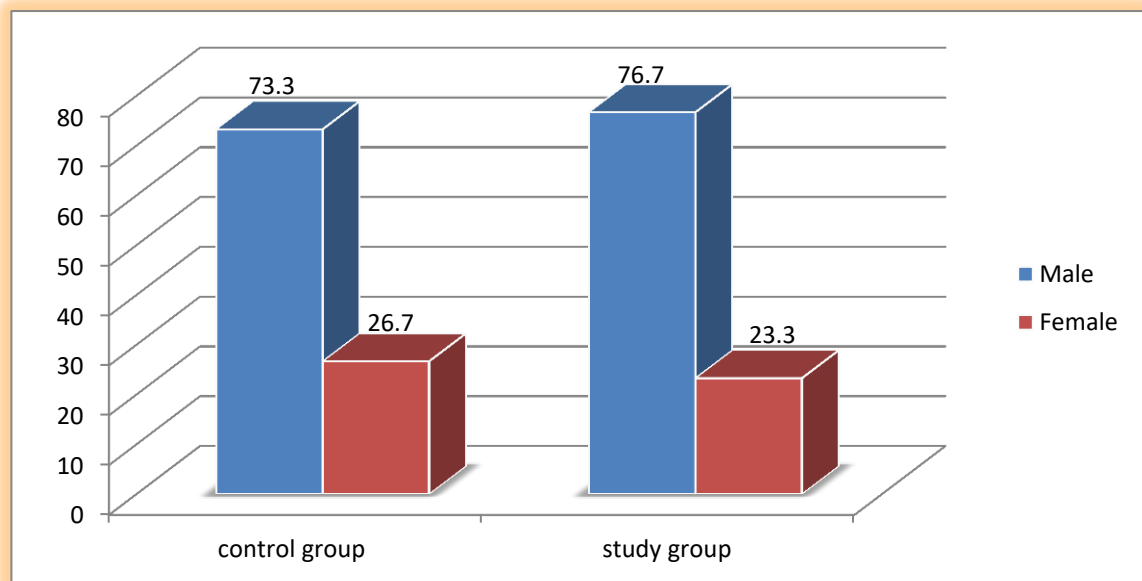
*f. (frequency); % (percentage) NS: Non-Significant (P value >0.05); S: Significant (P value ≤0.05 - > 0.01)*

Table (4-1) indicated that approximately two-thirds of the patients in both the study and control groups are within the age range of 50-69 years old. Specifically, 60% of the study group and 63.3% of the control group belong to this age range. The male population constitutes 76.7% of the study group and 73.3% of the control group. Married patients made up 83.3% of the study group participants and 80% of the control group patients, according to the study. Moreover, this study showed that 36.7% of the control group and 40% of the study group do not read or write.

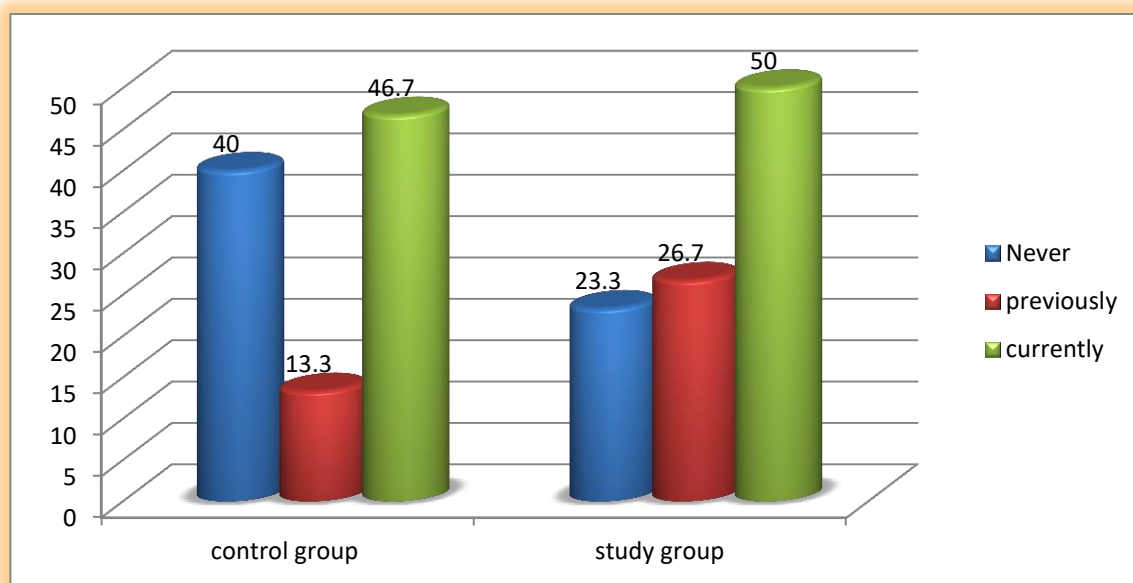
As an occupational status this study indicates that 40% of patients in study group and 30 % of the control group who have free business. Finally, regarding smoking this study indicates that about half of the patients participating in the study and control groups are currently smoke and the study group included 50% of the total, whereas the control group accounted for 46.7%.



**Figure (4-1): Percent of the Distribution of Participants According to Age Variable**



**Figure (4-2): Percent of the Distribution of Participants According to Sex Variable**



*Figure (4-3): Percent of the Distribution of Participants According to Smoking Status*

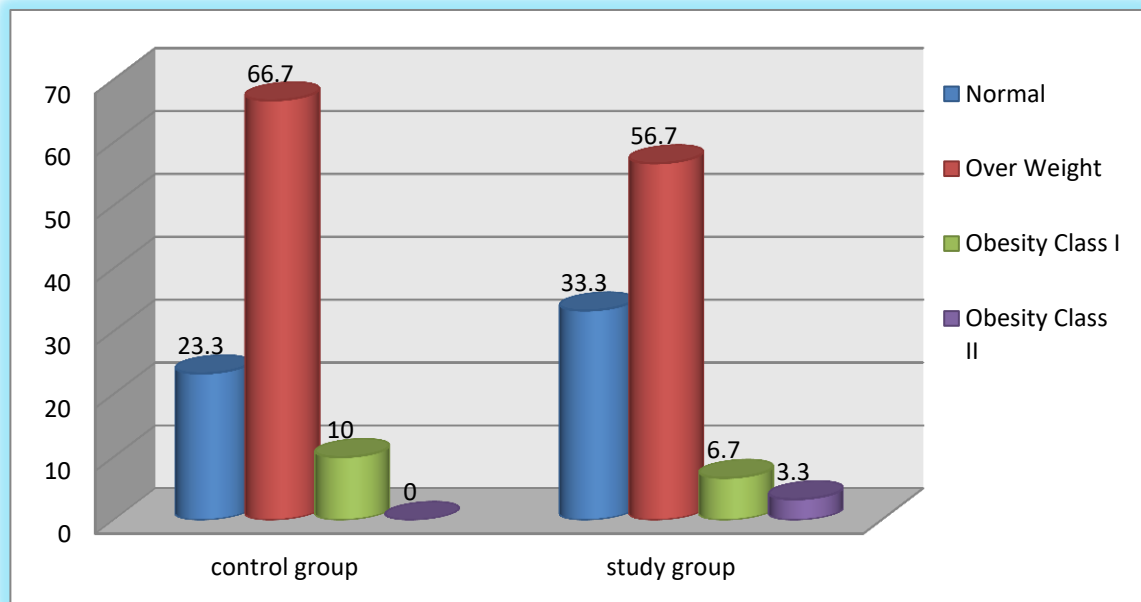
*Table (4-2): Distribution Of Participants According to Their Clinical Data:*

Clinical data		Control Group		Study Group		P-Value (Sig)
		f.	%	f.	%	
<b>Body mass index</b> Mean $\pm$ SD 27.31 $\pm$ 5.33	Normal	7	23.3	10	33.3	<b>.855 (NS)</b>
	Over Weight	20	66.7	17	56.7	
	Obesity Class I	3	10.0	2	6.7	
	Obesity Class II	0	0	1	3.3	
	<b>Total</b>	<b>30</b>	<b>100.0</b>	<b>30</b>	<b>100.0</b>	
<b>chronic diseases</b>	None	3	10.0	1	3.3	<b>.381 (NS)</b>
	HTN	5	16.7	10	33.3	
	DM	3	10.0	6	20.0	
	HTN And DM	19	63.3	13	43.3	
	<b>Total</b>	<b>30</b>	<b>100.0</b>	<b>30</b>	<b>100.0</b>	
<b>Medicatio</b>	None	3	10.0	2	6.6	<b>.178 (NS)</b>
	Antihyperte	5	16.7	11	36.7	

<b>ns used for chronic diseases</b>	nsive Drugs				
	Anti-Diabetic Drugs	4	13.3	6	20.0
	Antihypertensive & Anti Diabetic Drugs	18	60.0	11	36.7
	<b>Total</b>	<b>30</b>	<b>100.0</b>	<b>30</b>	<b>100.0</b>

f. (frequency); % (percentage) NS: Non-Significant (P value >0.05); S: Significant (P value ≤0.05 - > 0.01)

Clinical data table (4-2) indicates 56.7% of patients in the study group and 66.7% in the control group had over weight. 43.3% of patients in the study group and 63.3% in the control group were suffering from hypertension (HTN) and DM. Finally, regarding medications used for chronic diseases this study indicates that 36.7% of patients in the study group and 60 % in the control group were using antihypertensive & anti diabetic drugs.



**Figure (4-4): Percent of the Distribution of Participants According to BMI**

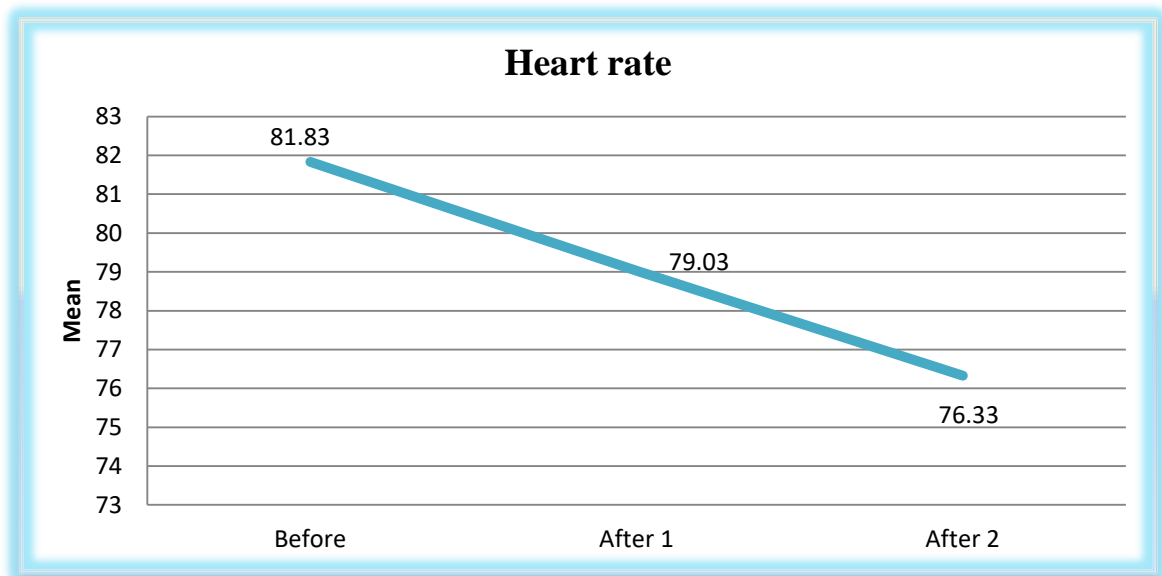
**Table (4-3) Comparison Between the Mean of the Readings of Physiological Parameters, to Study Group and Control Group:**

Variables	Study group				Control group			
	before	after 1	after 2	p-value (Sig.)	Before	After 1	After 2	p-value (Sig.)
<b>HR (beats/minute)</b>	81.83	79.03	76.33	.000 (HS)	78.50	82.40	84.67	.021 (S)
<b>SBP (mmHg)</b>	139.40	132.23	131.90	.000 (HS)	127.20	130.97	138.83	.329 (NS)
<b>DBP (mmHg)</b>	82.37	78.60	77.73	.000 (HS)	77.67	81.93	81.83	.684 (NS)
<b>MAP (mm Hg)</b>	101.13	96.40	95.67	.000 (HS)	94.17	97.70	97.50	.132 (NS)
<b>Pulse pressure (mm Hg)</b>	57.03	53.63	54.17	.107 (NS)	49.53	49.03	57.00	.562 (NS)
<b>RR (breath\m)</b>	23.20	20.83	19.67	.030 (S)	22.33	24.33	26.67	.4820 (NS)
<b>SpO<sub>2</sub> (%)</b>	96.17	97.30	97.53	.001 (HS)	95.70	95.20	94.43	.077 (NS)

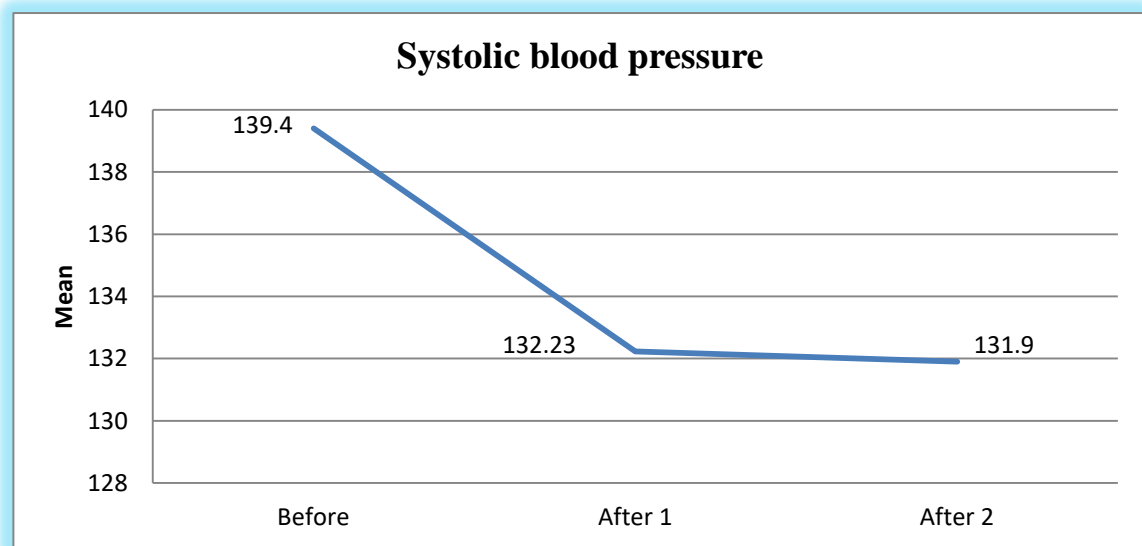
*Before: before implementing the intervention; after 1: 5 minutes after implementing the intervention; after 2: 10minutes after implementing the intervention; NS: Non-Significant (P value >0.05); S: Significant (P value ≤0.05- > 0.01) ; HS : Highly Significant (P value ≤0.01).*

Table (4-3) shows a significant statistical differences of mean of all cardiopulmonary parameters readings for the study group except reading of pulse pressure, while no significant statistical difference of mean of readings all cardiopulmonary parameters for the control group except the reading of heart rate, that is meaning the cardiopulmonary parameters of the study group affected and enhancing after implementing the intervention, while in control group is not. wherefore, the research hypothesis (H1) was accepted and the null hypothesis (H0) was rejected.

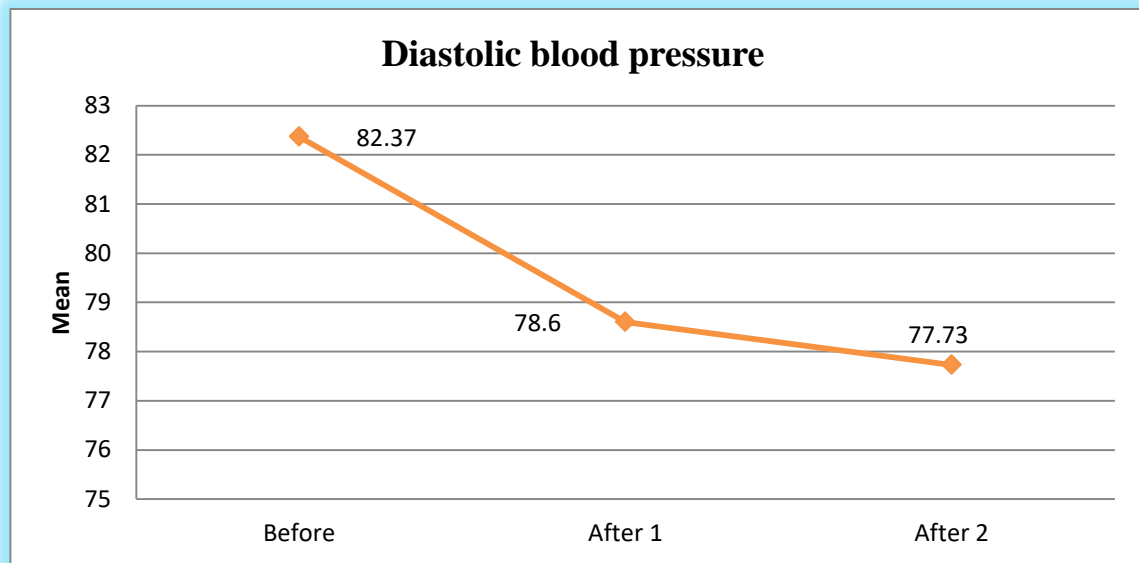




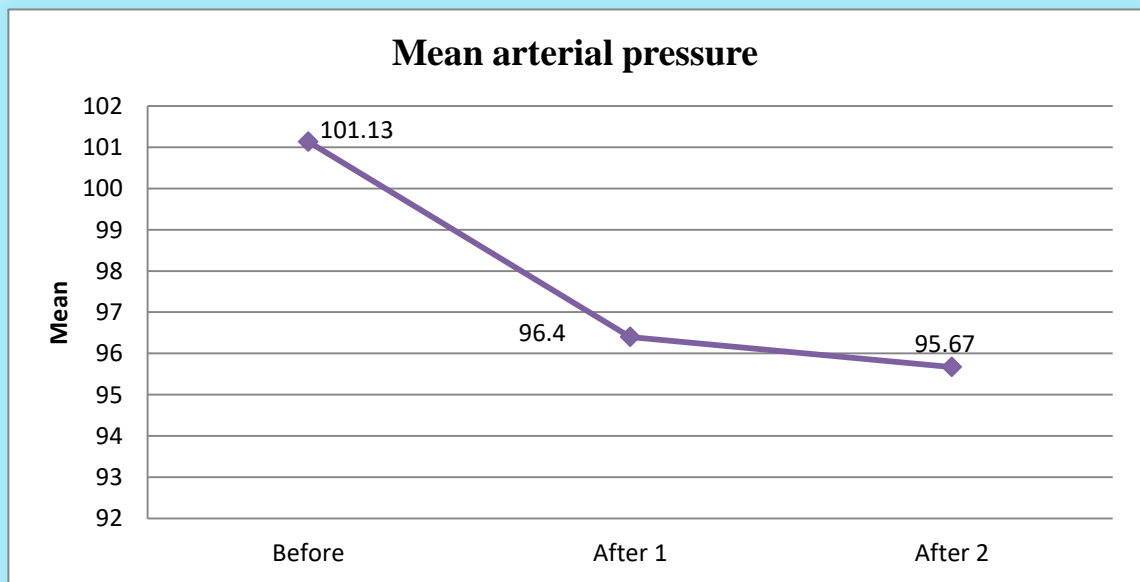
*Figure (4-5): Differences of the Heart Rate Mean in Three Measures*



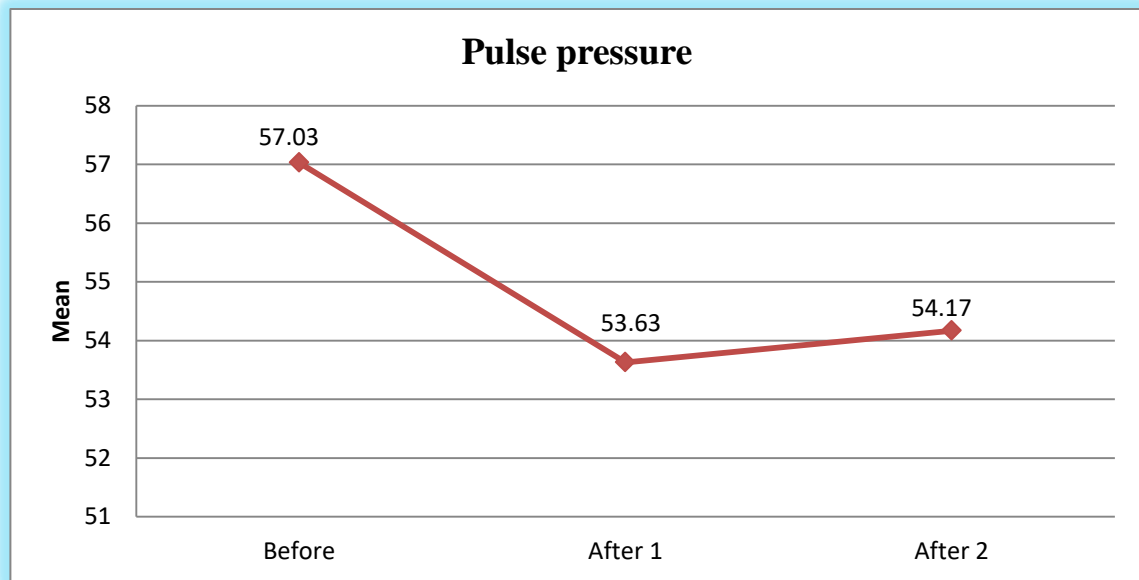
*Figure (4-6): Differences of the Systolic Blood Pressure Mean in Three Measures*



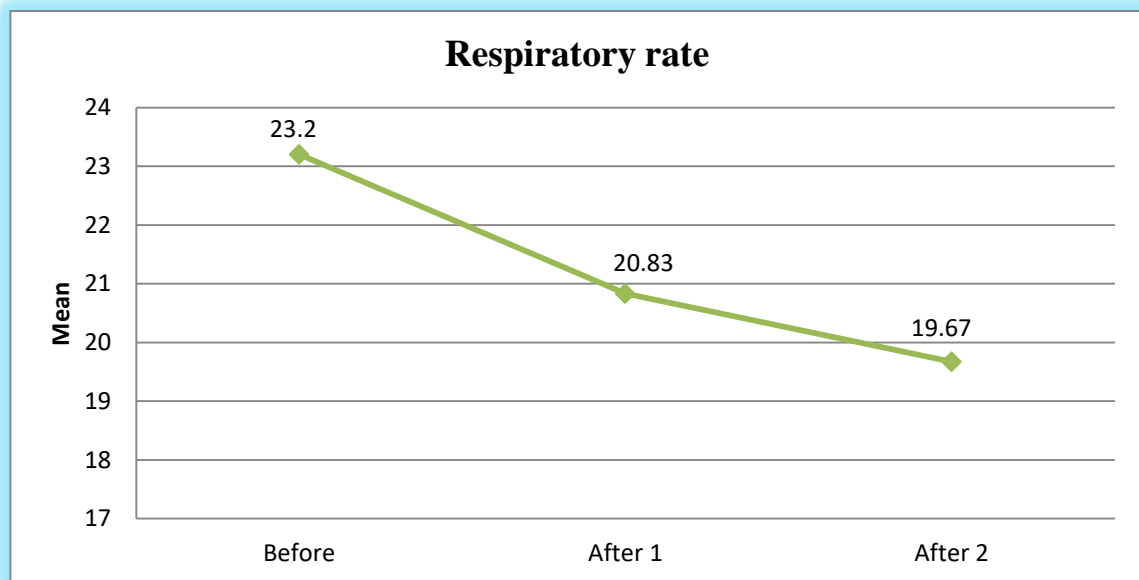
*Figure (4-7): Differences of the Diastolic Blood Pressure Mean in Three Measures*



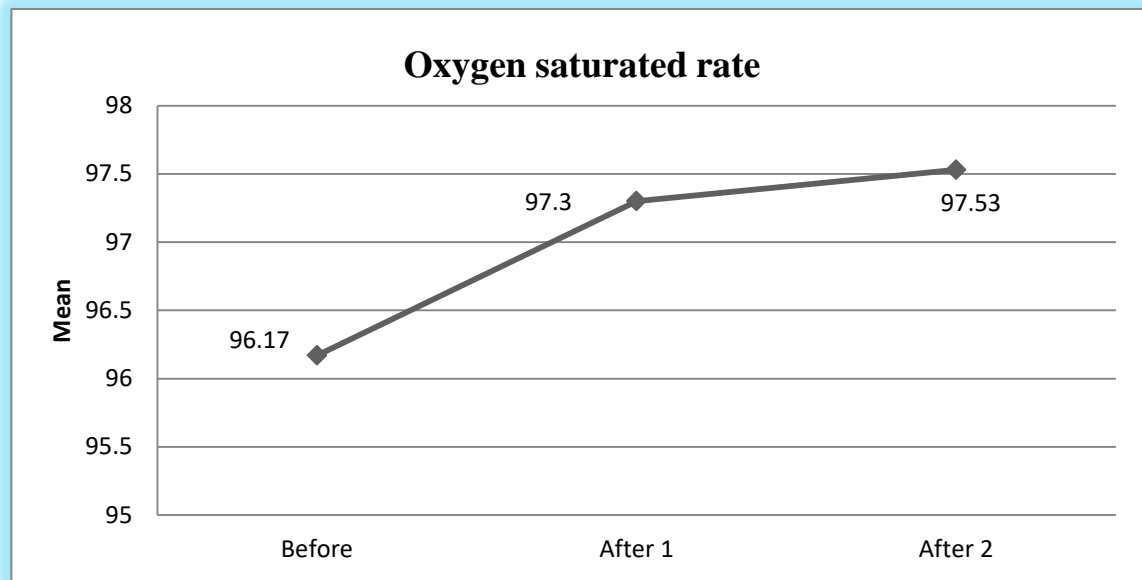
*Figure (4-8): Differences of the Mean Arterial Pressure Mean In Three Measures*



*Figure (4-9): Differences of the Pulse Pressure Mean in Three Measures*



*Figure (4-10): Differences of The Respiratory Rate Mean in Three Measures*



***Figure (4-11): Differences of the Oxygen Saturated Rate Mean in Three Measures***

As shown in figures (4-5) to (4-11) this study finds that there are differences in the mean of HR, SBP, DBP, MAP, RR, and SpO<sub>2</sub> (%) in three measures (before applying massage, 5 minutes after applying massage, and 10 minutes after applying massage) among patients in the study group, that mean these cardiopulmonary parameters affected by applying massage.

Table (4-4): Relationship Between Physiological Parameters and Demographic Characteristics &amp; Clinical

## Data

Demographic characteristics & clinical data	HR		SBP		DBP		MAP		PP		RR		SPO2	
	p-value	Sig.	p-value	Sig.	p-value	Sig.	p-value	Sig.	p-value	Sig.	p-value	Sig.	p-value	Sig.
Age	.596	NS	.836	NS	.566	NS	.336	NS	.337	NS	.714	NS	.516	NS
Sex	.616	NS	.129	NS	.215	NS	.218	NS	.817	NS	.548	NS	.677	NS
Marital Status	.500	NS	.456	NS	.128	NS	.189	NS	.578	NS	.817	NS	.524	NS
Educational Level	.211	NS	.956	NS	.103	NS	.551	NS	.144	NS	.523	NS	.071	NS
Occupation Status	.957	NS	.268	NS	.125	NS	.801	NS	.789	NS	.066	NS	.138	NS
Smoking Status	.396	NS	.726	NS	.891	NS	.677	NS	.322	NS	.097	NS	.236	NS
Body Mass Index	.285	NS	.652	NS	.050	S	.098	NS	.274	NS	.012	S	.002	S
Chronic Diseases	.444	NS	.433	NS	.224	NS	.088	NS	.099	NS	.493	NS	.084	NS
Medications Used for Chronic Diseases	.550	NS	.672	NS	.305	NS	.119	NS	.124	NS	.688	NS	.065	NS

Significant ( $P$  value  $\leq 0.05$  -  $> 0.01$ ); NS: Non-Significant ( $P$  value  $> 0.05$ ); HS : Highly Significant ( $P$  value  $\leq 0.01$ ).

One way ANOVA test and independent sample t test show a statistically significant relationships between enhancement in the DBP and BMI at p-value of (.050). Also this study finds a statistically significant relationship between the enhancement in the respiratory rate and BMI at p-value of (.012). The study show a statistically significant relationship between the improvements in the oxygen saturated rate and BMI at p-value of (.002). Finally, this study did not indicate any statistical relationship between cardiac parameters (heart rate, systolic blood pressure, mean arterial pressure, and pulse pressure) and all categories of socio-demographic characteristics and clinical data.



# **Chapter Five**

**Discussion ,Conclusions, and  
Recommendations**

## **Chapter Five**

### **Discussion of the Study Results**

It is possible to improve the physiological parameters of patients suffer from acute coronary syndrome to help lower the cost, mortality rate, and length of hospital stay. A sixty participants joined in this study who had acute coronary syndrome to assess the effect of the massage of foot on physiological parameters among patients with acute coronary syndrome.

#### **5.1.Discussion of the Patients' Socio-Demographic Characteristics Acute Coronary Syndrome :**

This study represent the patients participating social-demographic characteristics result in table (4-1) showed that about 66% of patients in intervention and control groups are between the ages of 50 and 69. More specifically, this age group comprises sixty percent of the intervention group and sixty-three percent of the control group. Randomized clinical trial Hasheminia et al. (2021), “the effects of hand and foot surface stroke massage on pain intensity and anxiety level in hospitalized patients with acute coronary syndrome”. The mean age of the participants was  $62.16 \pm 10.47$  years, with a range of 42 to 84 years. The researcher opinion is the elderly patients are the most vulnerable to acute coronary syndrome because they are more likely to have chronic conditions like diabetes and hypertension, to be sedentary, to have higher levels of cholesterol and triglycerides building up in their blood vessels, and to have less elastic arterial walls.

According to the study's sex variable, an experimental group consisted of 76.7% men and 23.3% women, while a control group included 73.3% men and 26.7% women. The results of this study disagree with study done by Ghadicolaei et al. (2019) according to which



women had a greater incidence rate of acute coronary syndrome than males, the control group consisted of 51.7% women and 48.3% males, whereas the intervention group had 38.3% women and the remaining participants were men. And the study conducted by Alimohammad et al. (2018), the finding agree with the study which stated that the incidence rate in male had high than in female , accounting for 54.3% male in study group and 65.7% male in control group and the remaining participants were female.

Regarding marital status, both the study group (83.3%) and the control group (80%) have married patients as their majority, these result are agree with a study conducted by Partovi et al. (2019), which stated that the married, the intervention group accounted for 93.3% and the control group accounted for 96.7%.

Furthermore, educational levels of participants in this study exposed that 40% , 36.7% of study group and control group respectively are no reading or writing. These results are disagree with a study done by Ghanbari et al. (2022), which stated that an under diploma high, accounting for 50% were under diploma in intervention group and 56.25% in control group.

The researcher opinion that education level may increase knowledge of acute coronary syndrome risk factors, which helps to lower the incidence of ACS; as a result, the incidence of primary school and no reading or writing is greater than that of advanced education. It was noted that in contrast to the educated populace.

As an occupational status this study indicates that patients accounting 40%, 30 % of study and control groups respectively who have free business. as well as, this result is inconsistent with the randomized controlled trail that was conducted by Sahrayi Zarghi et al. (2020), the study result show 40,6% of patient intervention group and about (59.4 %) in the control group were employed .

Finally, regarding smoking status this study indicates that about 50% of patients in a study group and a control group were smoking, accounted 46.7% in control group and 50% in study group. This result is consistent with the study conducted by Shim& Hwang (2017), The study Result show (43.7%) of patient intervention group and about (51.5%) in the control group were smoking .

## **5.2. Discussion of Acute Coronary Syndrome Patients' Clinical Data:**

Table (4-2) shows that 56.7% of participants in intervention group and 66.7% in control group were classified as overweight based on their body mass index (BMI). The study result agrees with the results of a study by El Hajj et al. (2023), in Qatar, The study result show 37.3% in control group and about 42.5% in intervention group were overweight. Whereas disagree with the result of study conducted by Weibel et al. (2016), that normal weight were high ratio accounting for 52.6% in study group and 36.8% in control group.

Regarding the chronic diseases of the participants in this study exposed that 43.3% of participants in a study group and 63.3% in a control group were suffering from hypertension (HTN) and diabetes mellitus (DM). This result is inconsistent with the study that was conducted by Partovi et al. (2018), the study result show 63.3% in an intervention group and 36.7% in a control group were suffering from HTN.

Finally, regarding medications used for chronic diseases this study indicates that 36.7% of participants in a study group and 60 % in a control group were using antihypertensive & anti diabetic drugs. This result is disagree with the study that was presented by Veiskaramian et al. (2021), the study finding display 27.6% in intervention group and 16.1% in control group were using antihypertensive drugs.

### **5.3. Discussion of the Comparison Between the Mean of the Readings of Physiological Parameters, for the Study Group and Control Group:**

Table (4-3) shows that there are significant statistical variances between mean of all cardiopulmonary parameters(HR, SBP, DBP, MAP, RR, and SPO2 ) readings for the study group except reading of pulse pressure, although there are no statistically significant differences between the mean of the readings of all cardiopulmonary parameters for a control group except the reading of pulse rate, it is meaning that the cardiopulmonary parameters of the study group affected and enhancing after implementing the intervention, while in control group is not.

These results are consistent with those of Sliman et al. (2020), “the effect of foot massage on pain severity, hemodynamic parameters, and mechanical ventilation weaning time among patients in critical care settings”. All of hemodynamic parameters, including SBP (P =0.03), HR (P =0.044), DBP (P =0.038), RR (P ≤0.001), and SaO2 (P =0.025), significant alterations were seen between study group and control group in the study. And the study conducted in Iran by Alimohammad et al. (2018), a randomized clinical trial, “effect of hand and foot surface stroke massage on anxiety and vital signs in patients with acute coronary syndrome”. They reported that the changes in the cardiopulmonary parameters which involved “systolic blood pressure, pulse rate, diastolic blood pressure, and respiratory rate” of the participants in intervention group exposed a significant difference compared with control group.

In regarding mean arterial pressure (MAP) the study’s result shows statistically significant variations in the study group's mean reading. These result agree with study done by Azami et al. (2015), “the impacts of short-term foot massage on mean arterial pressure of neurosurgical patients hospitalized in intensive care units”. The study

findings indicated that short-term foot massage had a significant impact on reducing MAP.

While as regarding the pulse pressure the study's result shows statistically no significant alteration in study group and control group. These result inconsistent with study conducted by Lu et al. (2011), "Foot reflexology can increase vagal modulation, decrease sympathetic modulation, and lower blood pressure in healthy subjects and patients with coronary artery disease". This study findings explicated that pulse pressure was decreased significantly after foot reflexology in study and control groups of participants.

#### **5.4. Discussion of the Association Between Physiological Parameters and Demographic Characteristics & Clinical Data:**

Table (4-4): exposed that there is a statistically significant relationships between the improvement in the DBP and BMI at p-value of (.050). These results agree with study conducted in India by Dua et al. (2014), "body mass index relates to blood pressure among adults". This study results explicated that statistically significant positive correlation between DBP and BMI among males and females, respectively.

There is a statistically significant link between the improvement in respiratory rate and BMI at a p-value of (.012), as shown in table (4-4) of this study. Additionally, the study found a statistically significant correlation ( $p = .002$ ) between the reductions in body mass index and increases in oxygen saturation rate. These results inconsistent with study conducted in Saudi Arabia by Al-Garni, (2022), "evaluate the distribution of oxygen saturation in asymptomatic adults and to find the effect of body mass index in oxygen saturation values in Aseer region, Saudi Arabia". The results of this study indicate that there is no relationship between body mass index and SpO<sub>2</sub>.

Finally, this study did not indicate any statistical relationship between cardiac indicators (heart rate, mean arterial pressure, pulse

pressure, and systolic blood pressure) and all categories of demographic characteristics and clinical data. These results consistent with study done by Rodrigues, (2018), “effectiveness of foot and hand massage on postoperative pain, anxiety and selected physiological parameters among postoperative open heart surgery patients in cardiothoracic intensive care units of selected hospitals of Mangaluru”. They explained that research findings showed that no association between the physiological parameters and demographic characteristics, including age, sex, status of marriage, and occupation.

### **5.5.Conclusions:**

#### **The Results of This Study Show That:**

1. About two-thirds of participants in study and control groups are within the age groups of 50-69 years old and about more than half percentage of them were males, married and no reading or writing, free business and regarding smoking, half percent of the participants in the study are smoking. And the participants were suffering from HTN and DM and using antihypertensive & anti diabetic drugs.
2. With the exception of the pulse pressure reading, all cardiopulmonary parameters mean values for the research group show a significant statistical difference. However, there is no significant statistical difference in the mean values of all cardiopulmonary parameters for the control group, except for the heart rate reading.
3. The physiological parameters of the study group affected and enhancing after implementing the foot massage for five minutes, while in control group is not.
4. The (H1) alternative hypothesis was accepted and the (H0) null hypothesis was rejected.
5. The foot massage is effects on physiological parameters among patients with acute coronary syndrome.

6. There are statistically significant relationship between the improvement in diastolic blood pressure and BMI and a statistically significant relationship between the enhancement in respiratory rate and BMI, also this study revealed statistically significant relationship between improvements in the oxygen saturation rate and BMI.
7. Finally, no significant association between any of the demographic variables or clinical data and the cardiac indicators (heart rate, systolic blood pressure, pulse pressure, and MAP) was found in study and control groups.

### **5.6. Recommendations:**

The researcher recommended the following based on the study's results and conclusion:

1. An identical study should be conduct with a larger sample size and a probability sampling method to establish more accurate generalization.
2. The researcher recommended to conduct a study with long time assessment after foot massage.
3. The researcher recommended that hospitals may make foot massage a regular part of their care.
4. All nurses benefit from enrollment in a training course about foot massage methods and its importance.



# References

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# **Appendices**

## Appendix AI

### Research Committee Decision

Ministry of Health & Environment  
Karbala Health Directorate  
Training and Human Development Center  
Research Committee



Form number 53

Decision number:2023239

Date 22/11/2023

#### Research committee decision

The Research Committee of Karbala Health Directorate has examined the research protocol number( 2023239Karbala) entitled:

"فاعلية تدليك القدم على المؤشرات الفسيولوجية بين مرضى متلازمة الشريان التاجي الحادة"


**Effectiveness of Foot Massage on physiological parameters among patients with Acute coronary Syndrome**

Submitted by researchers: **Zainab Sabah Sagheer**

to the research and Knowledge Management Unit at the Training and Human Development Center of Karbala Health Directorate on 22/11/2023

The unit has decided to:

\* Accept the above-mentioned research protocol as it meets the standards adopted by the Ministry of Health for the implementation of research, and there is no objection to implementing it in the Directorate's institutions.

  
Rapporteur of the committee

22/11/2023



#### Notes:

- The committee member (Dr. Taqwa Khudhur Abdulkareem)/ committee rapporteur (Dr. Naeem Obaid. Talal) were authorized to sign this decision on behalf of the remaining members of the committee under the rules of procedures of the research committee.
- The research committee approval means that the research project submitted to the aforementioned committee has fulfilled the ethical and methodological standards adopted by the Ministry of Health for conducting a research. As for the implementation of the research, it depends on the researchers adherence to the instructions of the health institution in which the research will be implemented as well as the laws, instructions and recommendations in force that govern the practice of medical and health action in Iraq.

Appendix AII

Arrangement of University of Kerbala \ Collage of Nursing

Republic of Iraq Ministry of higher education & scientific research University of Kerbala College of Nursing Graduate studies Division		جمهورية العراق وزارة التعليم العالي والبحث العلمي جامعة كربلاء كلية التمريض شعبة الدراسات العليا
التاريخ: 2023 / 11 / 14		العدد : د.ع / 345

الى / دائرة صحة كربلاء المقدسة - مركز التدريب و التنمية  
البشرية  
م/ تسهيل مهمة  
تحية طيبة...  
يرجى التفضل بالموافقة على تسهيل مهمة طالبة الدراسات العليا / الماجستير  
(زينب صباح صغير) في كليتنا للعام الدراسي (2023-2024) لغرض جمع العينات  
الخاصة برسالتها الموسومة:  
" فاعلية تدليك القدم على المؤشرات الفسيولوجية بين مرضى متلازمة الشريان التاجي  
الحادة "  
" Effectiveness of Foot Massage on Physiological Parameters  
among Patients with Acute Coronary Syndrome"  
\*\* مع التقدير \*\*  
أ.م.د. سلمان حسين فارس الكريطي  
معاون العميد للشؤون العلمية و الدراسات العليا  
2023 / 11 / 14  
نسخة منه الى:  
- مكتب السيد معاون العمي المحترم .  
- شعبة الدراسات العليا .  
العنوان : العراق - محافظة كربلاء المقدسة - حي الموظفين - جامعة كربلاء  
Mail: nursing@uokerbala.edu.iq website:  


## Appendix AIII

## Administrative Arrangement of Ministry of Health / Karbala Health Department /in Karbala Center for Cardiac Diseases and Surgery

Holy Karbala Governorate  
Karbala Health Directorate  
Training and Human Development Center  
Research and Knowledge Management  
Division

جمهورية العراق

محافظة كربلاء المقدسة  
دائرة صحة كربلاء المقدسة  
مركز التدريب والتنمية البشرية  
شعبة ادارة البحوث والمعرفة

العدد: ٢٢١١  
التاريخ: ٢٠٢٣ / ١١ / ٢٢

إلى / جامعة كربلاء/ كلية التمريض

الموضوع /تسهيل مهمة

صحة كربلاء المقدسة  
دائرة التدريب  
قسم التنمية البشرية

تحية طبية....  
كتابكم المرقم (ع.د/ ٣٤٥ في ٢٠٢٣/١١/١٤)  
نود إعلامكم بأنه لا مانع لدينا من تسهيل مهمة طالبة الدراسات العليا/ الماجستير(زينب صباح صغير) لانجاز بحثها:  
"فاعلية تدليك القدم على المؤشرات الفيسيولوجية بين مرضى متلازمة الشريان التاجي الحادة"  
Effectiveness of Foot Massage on physiological parameters among patients with Acute coronary Syndrome  
في مؤسستنا الصحية/ مركز كربلاء لامراض وجراحة القلب وبإشراف الدكتور ( مشتاق طالب) على ان لا تتحمل دانتنا اي نفقات مادية مع الاحترام

الطبيب الاستشاري  
د. حيدر محمد حيدر العطار  
الدكتور  
تقوى خضر عبد الكريم  
مدير مركز التدريب والتنمية البشرية  
٢٠٢٣/١١/٢٢

نسخة منه الى  
مركز كربلاء لامراض وجراحة القلب/ اجراء اللازم مع الاحترام.  
مركز التدريب والتنمية البشرية/ شعبة ادارة البحوث والمعرفة مع الاوليت



## Appendix B

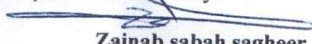
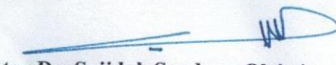



# Ethical Consideration

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



uok.con.23.012  
Ethical Committee Code:  
Date: 14/11/2023

### Research Ethical Approval Form

Title of the research project			
In the English language		In the Arabic language	
Effectiveness of Foot Massage on Physiological Parameters among Patients with Acute Coronary Syndrome		فاعلية تدليك القدم على المؤشرات الفسيولوجية بين مرضى متلازمة الشريان التاجي الحادة	
Data About the Main Researcher /Student:			
Full Name	Scientific Title	Mobile Number	Email
Zainab Sabah Sagheer	Master student	07818739384	zainabalmosawi@gmail.com
Data About the Co-author /Supervisor:			
Full Name	Scientific Title	Mobile Number	Email
Dr.Hussam Abbas Dawood	Ass. Professor	07827375710	hussam.a@uokerbala.edu.iq
Study objectives			
<ul style="list-style-type: none"> <li>• To assess of the physiological parameters ( heart rate , Respiration , Mean arterial blood pressure ,peripheral oxygen saturation) among patients with acute coronary syndrome.</li> <li>• Determine the effectiveness of foot massage on physiological parameters (heart rate ,respiration ,mean arterial blood pressure ,peripheral oxygen saturation ) among patients with acute coronary syndrome.</li> <li>• To find out the relationship between change in physiological parameters with demographic characteristics and medical data for patients with acute coronary syndrome.</li> </ul>			
Time and Setting of the Study			
October 2023-Agust 2024 /karbala center for cardiac diseases and surgery.			
Study Design			
Quasi-experimental design.			
Sampling method and sample size			
Sampling method: purposive sampling/ size of sampling :sixty patients will participate in the study , the participants will be assigned into two group , thirty participants of experimental group and thirty participants of control group .			
Statement of Ethical Commitment			
<p>The study will be conducted in accordance with what was mentioned in the protocol above and to commitment that all rules set by the ethical committee are followed in present research process. The researcher also makes a commitment to abide by ethical principles, moral values, law and instruction of the institutions. There is no bias will be during collecting the data, gender, regional aspects and is totally impartial and objective. The researcher will have taken an informed consent from the participants, and provide clarifications and information about the study to the sample members. The researcher deals with the data of the sample members in complete confidentiality.</p>			
 <b>Zainab sabah sagheer</b> Name and signature of the researcher			
Recommendation of the College's Research Ethical Committee			
<input type="checkbox"/> Agreement to conduct the study	<input type="checkbox"/> Disagreement to conduct the study		
 <b>Instructor Dr. Sajidah Saadoon Olewi</b> Member	 <b>Ass. Prof. Dr. Zeki Sabah Musihb</b> Member		
 <b>Ass. Prof. Dr. Ghazwan Abdalhussein</b> Member	 <b>Ass. Prof. Dr. Hassan Abdullah Athbi</b> Chairman of the Committee د.م.د. حسن عبد الله عديبي اختصاص تهرريض صحة الباقين		

Appendix C

Written Consent to Participate in the research

موافقة خطية للمشاركة في بحث

الرجاء التوقيع أسفل الصفحة كي تشهد بان:

بعد ان قامت طالبة الماجستير (زينب صباح صغير) بشرح وتوضيح جميع التساؤلات بخصوص بحثه الموسوم (فاعلية تدليك القدم على المؤشرات الفسيولوجية بين مرضى متلازمة الشريان التاجي الحادة), حيث اطلعتني صاحب البحث عن فائدة بحثه واهميته العلمية. كما واطلعتني ان مشاركتي هذه هي تطوع مني وبمحض ارادتي وان بإمكانني رفض المشاركة او سحبها متى شئت ولأي سبب كان, او ان ارفض الاجابة على اي سؤال, كما ان مشاركتي بالبحث لن تحملني اي نفقات او مسائلة من شئنها الضرر بمهنتي او شخصيتي, كما ان المعلومات الناتجة عن مشاركتي سوف تعامل بسرية تامة ولن يطلع عليها اي شخص وان هذه المعلومات ونتائجها هي للأغراض العلمية فقط ولن تكون هناك اي اشارة الى شخصي او عائلتي في اي منشور عن هذه الدراسة.

ولأجل هذا فاني اوقع على مشاركتي في هذا البحث

يرجى كتابة التاريخ بجانب التوقيع

توقيع المشارك ..... التاريخ 20 \ 2 \ 2024

توقيع الباحث ..... التاريخ 20 \ 2 \ 2024

**Appendix D**

**The Iranian Registry of Clinical Trials Approval**

Effectiveness of foot massage on physiological parameters among patients with acute coronary syndrome

✓ Approved

Trial Id	75846
IRCT Id	IRCT20240124060784N1
Registration date	2024-04-04, 1403/01/16
Registration date	2024-04-04, 1403/01/16
Membership number	60784

**Appendix EI**

**Applying Foot Massage**



**Appendix EII**

**Applying Foot Massage**



**Appendix EIII**  
**Applying Foot Massage**



**Appendix EIV**  
**Applying Foot Massage**



**Appendix FI**  
**The Study Instrument**

• **Socio-Demographic Characteristics & Clinical Data**

1. Age

2. Sex            Male                        Female           

3. Material status: Single                        Married           

                          Separate           

                          Widower           

4. Educational level : No reading or writing           

  Reading and writing           

  Primary level           

  Secondary level           

  Institute           

  College or above           

5. Occupation status :            Retired           

  Housewife           

  Government employee           

  Unemployed           

  Free business           

6. Smoking status:

never           

previous           

currently



7. Weight  kg
8. Height  cm
9. Medications used for chronic diseases, if any
10. chronic diseases

**Appendix FII**

**The Study Instrument**

Physiological parameters	Before foot massage	After five minutes	After ten minutes
Heart rate			
Blood pressure	Systolic blood pressure		
	Diastolic blood pressure		
Mean arterial pressure			
Pulse pressure			
Respiratory rate			
Oxygen Saturation%			



**Appendix HI**

**Face Validity of the Physiological parameters**

	1	2	3	4	5	6	7	ne	N	I-FVI	UA
<b>1.</b>	1	1	1	1	1	1	1	7	7	1	1
<b>2.</b>	1	1	1	1	0	1	1	6	7	0.857143	0
<b>3.</b>	1	1	1	1	1	1	1	7	7	1	1
<b>4.</b>	1	1	1	1	1	1	1	7	7	1	1
<b>5.</b>	1	1	1	1	1	1	1	7	7	1	1
<b>6.</b>	1	1	1	1	1	1	1	7	7	1	1
<b>Proportion relevance</b>	1	1	1	1	0.83	1	1			0.97619	0.833

**Appendix HII**

**Content Validity of the Physiological parameters**

	1	2	3	4	5	6	ne	N	I-CVI	UA
<b>1.</b>	1	1	1	1	1	1	6	6	1	1
<b>2.</b>	1	1	1	1	1	1	6	6	1	1
<b>3.</b>	1	1	1	1	1	1	6	6	1	1
<b>4.</b>	1	1	1	1	1	1	6	6	1	1
<b>5.</b>	1	1	1	1	1	1	6	6	1	1
<b>6.</b>	1	1	1	1	1	1	6	6	1	1
<b>Proportion relevance</b>	1	1	1	1	1	1			1	1

## Appendix I

### The Statistical Opinion

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  
جامعة كربلاء  
كلية التمريض  
شعبة الدراسات العليا

#### إقرار الخبير الإحصائي

أشهد بأن الرسالة الموسومة :

" فعالية تدليك القدم على المؤشرات الفسيولوجية بين مرضى متلازمة الشريان التاجي  
الحادة "

" Effectiveness of Foot Massage on Physiological Parameters among Patients  
with Acute Coronary Syndrome "

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

توقيع الخبير الإحصائي :

الإسم و اللقب العلمي : د. محمد فاضل محمد

الإختصاص الدقيق : إحصاء و إحصائيات

مكان العمل : جامعة كربلاء كلية التمريض

التاريخ : ٢٠٢٤ / ٤ / ٢١

العنوان : العراق - محافظة كربلاء المقدسة - حي الموظفين - جامعة كربلاء

Mail: nursing@uokerbala.edu.iq

website: nursing.uokerbala.edu.iq

## Appendix J

### The Linguist's Opinion

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  
جامعة كربلاء  
كلية التمريض  
شعبة الدراسات العليا

#### إقرار الخبير اللغوي

أشهد بأن الرسالة الموسومة :

" فعالية تدليك القدم على المؤشرات الفسيولوجية بين مرضى متلازمة الشريان التاجي الحادة "  
" Effectiveness of Foot Massage on Physiological Parameters among Patients with  
Acute Coronary Syndrome "

قد جرى مراجعتها من الناحية اللغوية بحيث أصبحت بإسلوب علمي سليم خالي من  
الأخطاء اللغوية ولأجله وقعت .



توقيع الخبير اللغوي :

الإسم و اللقب العلمي : م.م. د. عامر كتمان عواد  
الإختصاص الدقيق : اللغة الأدبية - علم اللغة

مكان العمل : جامعة كربلاء | كلية التمريض - قسم اللغة

البريد الإلكتروني

التاريخ : 2024 / 7 / 4

العنوان : العراق - محافظة كربلاء المقدسة - حي الموظفين - جامعة كربلاء

Mail: nursing@uokerbala.edu.iq

website: nursing.uokerbala.edu.iq

أداة الدراسة

البيانات الديموغرافية - الاجتماعية والصحية:

1. العمر: ..... سنة

2. الجنس: ذكر  انثى

3. الحالة الاجتماعية:

أعزب/ باكر  متزوجة  أرمل/ة   
مطلق/ة  منفصل/ة

4. المستوى التعليمي:

لا يقرأ ولا يكتب  يقرأ ويكتب  ابتدائية  متوسطة   
اعدادية  معهد  كلية فما فوق

5- الحالة المهنية:

متقاعد   
ربة بيت   
موظف حكومي   
عاطل   
اعمال حرة

6- حالة التدخين :

ابدا   
سابقا   
حديثا

7- الوزن  كغ

8- الطول  سم

9- الادوية المستخدمة للأمراض المزمنة ان وجدت

10- امراض مزمنة اخرى ان وجدت :

أداة الدراسة

المؤشرات الفسيولوجية :

المؤشرات الفسيولوجية	قبل المساج	بعد 5 دقائق من المساج	بعد 10 دقائق من المساج
معدل نبضات القلب			
ضغط الدم			ضغط الدم الانقباضي
			ضغط الدم الانبساطي
متوسط الضغط الشرياني			
ضغط النبض			
معدل التنفس			
معدل تشبع الاوكسجين %			

## المستخلص

**خلفية البحث:** المصطلح المستخدم لوصف المرضى الذين تظهر عليهم علامات احتشاء عضلة القلب أو نقص التروية هو متلازمة الشريان التاجي الحادة. تعد متلازمة الشريان التاجي الحادة واحدة من أكثر حالات القلب شيوعًا التي تتطلب دخول المستشفى على مستوى العالم. هناك ثلاثة أشكال لهذه المتلازمة: "الذبحة الصدرية غير المستقرة، واحتشاء عضلة القلب مع ارتفاع الجزء ST، واحتشاء عضلة القلب دون ارتفاع الجزء ST".

**الأهداف:** تقييم المؤشرات الفسيولوجية (معدل ضربات القلب، التنفس، متوسط ضغط الدم الشرياني، ضغط النبض، تشبع الأكسجين المحيطي) للمرضى الذين يعانون من متلازمة الشريان التاجي الحادة. دراسة آثار تدليك القدم على المؤشرات الفسيولوجية لمرضى متلازمة الشريان التاجي الحادة.

**منهجية البحث:** دراسة شبه تجريبية أجريت في الفترة ما بين 25 سبتمبر 2023 إلى 20 يونيو 2024 في مركز كربلاء لأمراض وجراحة القلب في مدينة كربلاء المقدسة. أسلوب غير احتمالي (هادف) لأخذ العينات، يتكون من ستين مريضاً يعانون من متلازمة الشريان التاجي الحادة، مقسمين إلى مجموعتين: مجموعة المراقبة ومجموعات تدليك القدم. تم جمع البيانات باستخدام مقياس المعلمات الفسيولوجية. تم التحقق من صدق المقياس من قبل لجنة مكونة من ثلاثة عشر خبيراً وثباته من خلال دراسة تجريبية. وبعد إدخال البيانات في برنامج SPSS تم استخدام الإحصاء الوصفي والاستنتاجي لتحليل البيانات.

**النتائج:** ثلثي المرضى المشاركين في مجموعتي الدراسة والسيطرة هم ضمن الفئات العمرية من 50-69 سنة وتمثل 63.3%، 60% لمجموعة المراقبة والدراسة على التوالي. بلغت نسبة الذكور في مجموعة الدراسة 76.7% وفي المجموعة الضابطة 73.3%. بالرغم من أن النسبة الأكبر (83.3%) و (80%) من المرضى الذين شاركوا في مجموعة الدراسة والمجموعة الضابطة على التوالي هم متزوجون. كشفت الدراسة عن وجود فروق ذات دلالة إحصائية بين متوسطات جميع قراءات المعلمات القلبية الرئوية لمجموعة الدراسة باستثناء قراءة ضغط النبض بعد تدليك القدم، عند قيمة  $p \geq 0.05$ .

**الاستنتاجات:** تدليك القدم فعال في تعزيز وتحسين المؤشرات الفسيولوجية لدى المرضى المصابين بمتلازمة الشريان التاجي الحادة.

**التوصيات:** وأوصى الباحث بأن تجعل المستشفيات تدليك القدم جزءًا منتظمًا من رعايتها.





جامعة كربلاء  
كلية التمريض

فاعلية تدليك القدم على المؤشرات الفسيولوجية بين مرضى متلازمة  
الشريان التاجي الحادة

رسالة مقدمة

الى

مجلس كلية التمريض / جامعة كربلاء،

استكمالاً جزئياً لمتطلبات الحصول على درجة الماجستير في علوم التمريض

كتبت بواسطة

زينب صباح صغير

بإشراف

أ.م.د. حسام عباس داود