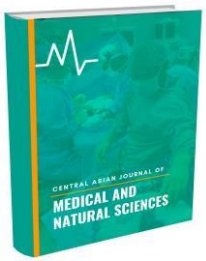

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Article

The Effectiveness of Foot Massage on Pulmonary Parameters among Patients with Acute Coronary Syndrome

Zainab Sabah Sagheer[1], Hussam Abbas Dawood[2]

1. Nursing Collage, University of Kerbela, Karbala, Iraq
* Correspondence: zainab.sabah@s.uokerbala.edu.iq
2. Nursing Collage, University of Kerbela, Karbala, Iraq
* Correspondence: hussam.a@uokerbala.edu.iq

Abstract: Acute coronary syndrome (ACS) is a significant health burden in the USA, affecting over a million patients each year. The fatal illness known as ACS is one of the main reasons people go to emergency rooms. Moreover, this disease is one of the leading causes of death worldwide with a 25% fatality rate. Unstable angina (UA), non-ST-segment-elevation myocardial infarction (NSTEMI), or ST-segment-elevation myocardial infarction (STEMI) are all grouped together under the term ACS. The aim of the present study is to determine the effectiveness of foot massage on pulmonary parameters among patients with acute coronary syndrome. A quasi-experimental study was conducted in Karbala center for cardiac diseases and surgery from December 25th 2023, to May 11th 2024. The sampling of a non-probability purposive contained 60 patients with severe coronary syndrome; the sampling separated into groups of intervention and control. At the group of intervention, the patients are instructed to performed four-step foot massage similarly 5 minutes for each foot. While at the group of control, the patients just take the treatment of routine medical. The pulmonary parameters were checked in the two groups before, after 5 min, and 10 min after the foot massage. The mechanism of study contained of two parts: the one part inclusive clinical data and the socio demographics of patient, and the part two was used to evaluate the pulmonary parameters by use the physiological parameters chick list. Statistical tests were conducted using the software SPSS for Microsoft Windows version 24, with a level of significance of 5% (p value < 0.05). That are a significant statistical differences between the mean of the pulmonary parameters readings for the study group while there is no significant statistical difference between the mean of the readings of the pulmonary parameters for the control group. The study found that the foot massage is effective for improving the respiratory rate and oxygen saturation (SPO2).

Keywords: Acute Coronary Syndrome, Pulmonary Parameters, Foot Massage

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1. Introduction

Globally, cardiovascular disease is the leading cause of death. Data from the World Health Organization show 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 [1]. acute coronary syndrome (ACS) is a significant health burden in the USA, affecting over a million patients each year [2].

ACS is a life-threatening disorder that needs to be treated immediately. It is caused by a disruption in the coronary circulation and can be fatal if treatment is not received in a timely manner. According to the American Heart Association, around 40.5% of people have cardiovascular disease, and 34% of those people pass away from the condition each

year [3]. The fatal illness known as ACS is one of the main reasons people go to emergency rooms. Moreover, this disease is one of the leading causes of death worldwide with a 25% fatality rate [4].

Unstable angina (UA), non-ST-segment-elevation myocardial infarction (NSTEMI), or ST-segment-elevation myocardial infarction (STEMI) are all grouped together under the term (ACS), which is a significant aspect of IHD. Because of 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 therapies—preferably percutaneous coronary intervention—or coronary artery bypass grafting, 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 [5].

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 MI development by raising blood pressure, heart rate, respiratory rate, and dyspnea [6].

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 [7].

One treatment that is thought to be helpful is foot massage [8]. 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 [9]. The study aims to assess the effectiveness of foot massage on pulmonary parameters among patients with acute coronary syndrome.

2. Materials and Methods

The Study Design

The current study used a quasi-experimental design. It was carried out to assess the effectiveness of foot massage on pulmonary parameters among patients with acute coronary syndrome. This study was initiated from December 25th, 2023, to May 11th, 2024.

Ethical Considerations

This research was confirmed by the Committee of Scientific Research at the Nursing College of Karbala University, (code: uok.con.23.012, Decision no: 2023.11.14) Iraq. The trial protocol received approval for registration in the Iranian Registry of Clinical Trial (IRCT) on May 11,2024. The registration reference (IRCT20240124060784N2: Trial Id 76642, Membership number 60784).

Setting of the Study

The study was conducted in Kerbala Center for Cardiac Diseases and Surgery.

The Study Sample

Sixty patients 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 (purposeful) technique of sampling.

The selection criteria were designed as follows:

Inclusion Criteria:

1. All patient Those who are surgical diagnosed with acute coronary syndrome.
2. Participants with Iraqi nationality.
3. Patient between age 18 and over.

Exclusion Criteria:

1. Patients could have foot problems (such as callus, corn, fungal skin infection, previous scars, diabetic foot or known neuropathy).
2. Patient who have amputation in lower extremity.

Materials & Measures

An instrument was developed to investigate the effectiveness of foot massage on pulmonary parameters among patients with acute coronary syndrome, which consists of two sections: The first section is concerned with the patient's socio-demographic and clinical data, which include (age, gender, material status, educational level, and occupational status, smoking status, height, weight, medications used for chronic diseases, if any, chronic diseases). Physiological parameters scale contains objective physiological data that was obtained from the participants. Respiratory rate (RR) and Saturation of Oxygen (SpO2) of the participants.

Procedure: After reviewing the prior studies and instructional resources, the researcher implemented the intervention. Therefore, this interventional protocol includes basic procedure foot massage, all patients were explained the procedure and written informed consent.

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 client were 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 [10].

1. While the other thumb was softly massaging the entire sole of the foot, one hand was used to hold the foot.
2. 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.
3. Between the thumb and toes, the base of each finger was grasped, pulled along, and bent outward.
4. The fingers were bent backward and forward while also being separately pulled to one side in a balanced manner.

Statistical analysis

The study data were investigated and analyzed using the IBM program Statistical Package of Social Sciences Version 26, using both a descriptive statistical procedure (e.g., frequency, percentage, and mean of score) and One way ANOVA test and independent sample t test. A p-value of <0.05 was determined to be statistically significant.

3. Results

According to Table (1), In both the study group and the control group, two-thirds of the patients are between the ages of 50 and 69; this accounts for 60% of the study group and 63.3% of the control group. 76.7% of the study group and 73.3% of the control group are males. While the majority of patients in the study (83.3%) and control groups (80%), respectively, are married. Furthermore, this study exposed that 40% of study group and 36.7% of the control group are no reading or writing. According to this study, the patients were had free business about 40% in the group of study and 30% in the group of control. Finally, with regard to smoking, this study shows that almost 50% of the patients enrolled in the study and control groups and 46.7% of the patients in the control group currently smoke.

Table 1. Socio-Demographic Characteristics

Socio-Demographic Characteristics		**Control Group**		**Study Group**		**P-Value (Sig)**
		f.	%	f.	%	
Age (Per Years) Mean ± SD 59. 9 ± 11.7	30-49	3	10.0	7	23.3	.822 (NS)
	50-69	19	63.3	18	60.0	
	70-89	8	26.7	5	16.7	
	Total	**30**	**100.0**	**30**	**100.0**	
Sex	Male	22	73.3	23	76.7	.770 (NS)
	Female	8	26.7	7	23.3	
	Total	**30**	**100.0**	**30**	**100.0**	
Marital Status	single	1	3.3	0	0	.846 (NS)
	married	24	80.0	25	83.3	
	Separate	2	6.7	2	6.7	
	Widower	3	10.0	3	10.0	
	Total	**30**	**100.0**	**30**	**100.0**	
Educational Level	No reading or writing	11	36.7	12	40.0	.873 (NS)
	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	
	Total	**30**	**100**	**30**	**100.0**	
Occupation Status	retired	6	20.0	4	13.3	.323 (NS)
	Housewife	9	30.0	6	20.0	
	government employee	2	6.7	5	16.7	
	idle	4	13.3	3	10.0	
	free business	9	30.0	12	40.0	
	Total	**30**	**100.0**	**30**	**100.0**	
Smoking Status	never	12	40.0	7	23.3	.387

	previously	4	13.3	8	26.7	(NS)
	currently	14	46.7	15	50.0	
	Total	**30**	**100.0**	**30**	**100.0**	

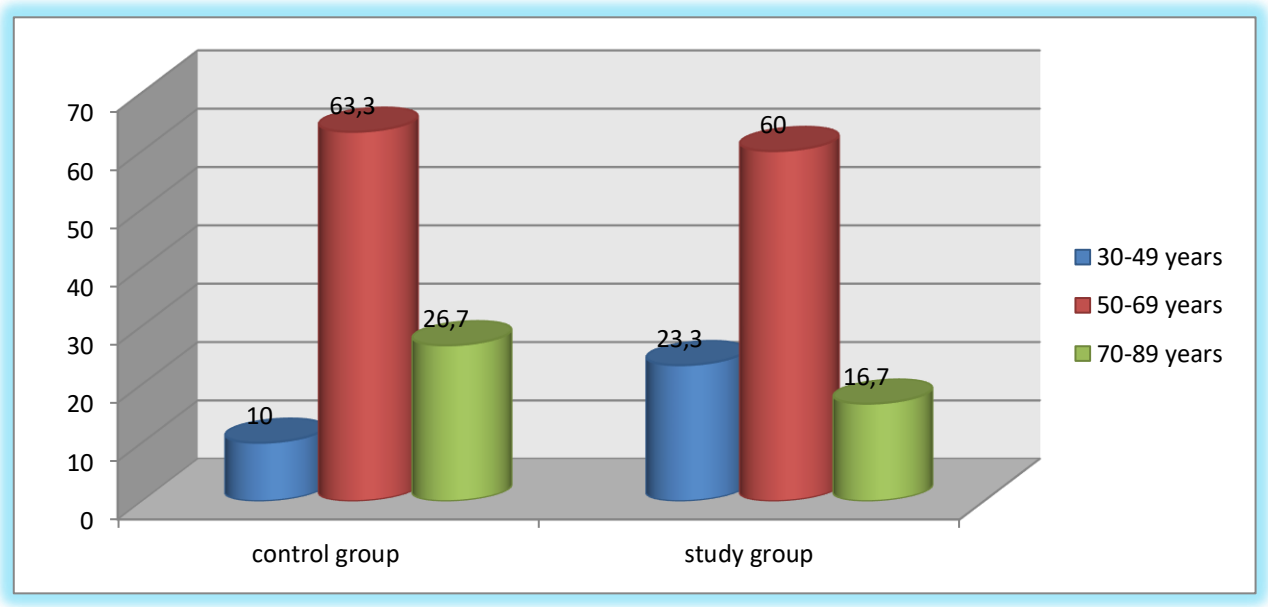

Figure 1. Percent of the distribution of participants according to age group

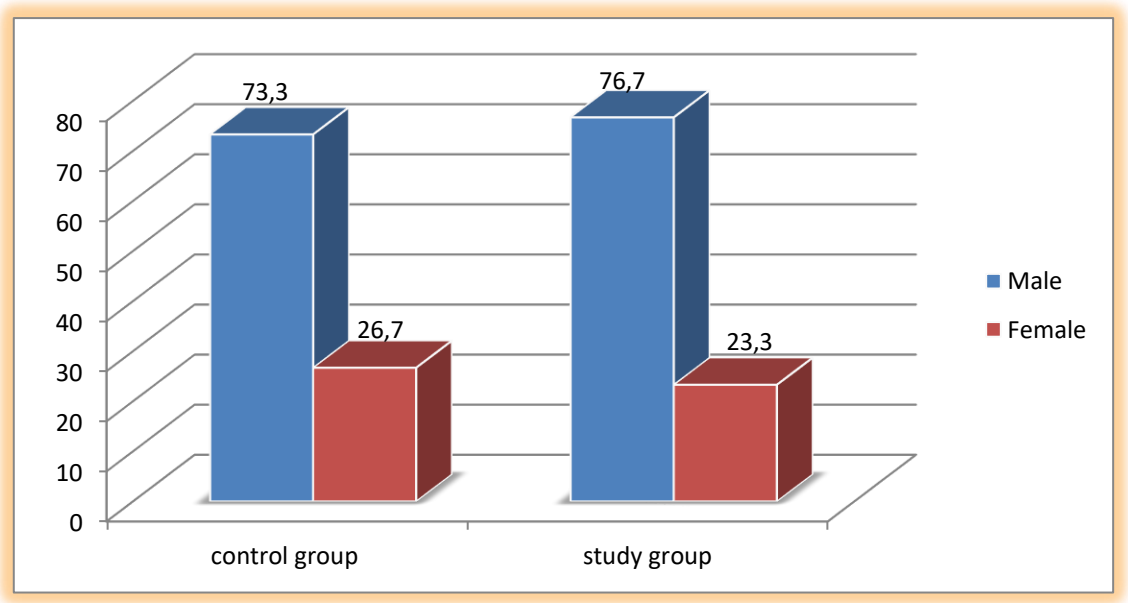

Figure 2. Percent of the distribution of participants according to sex group

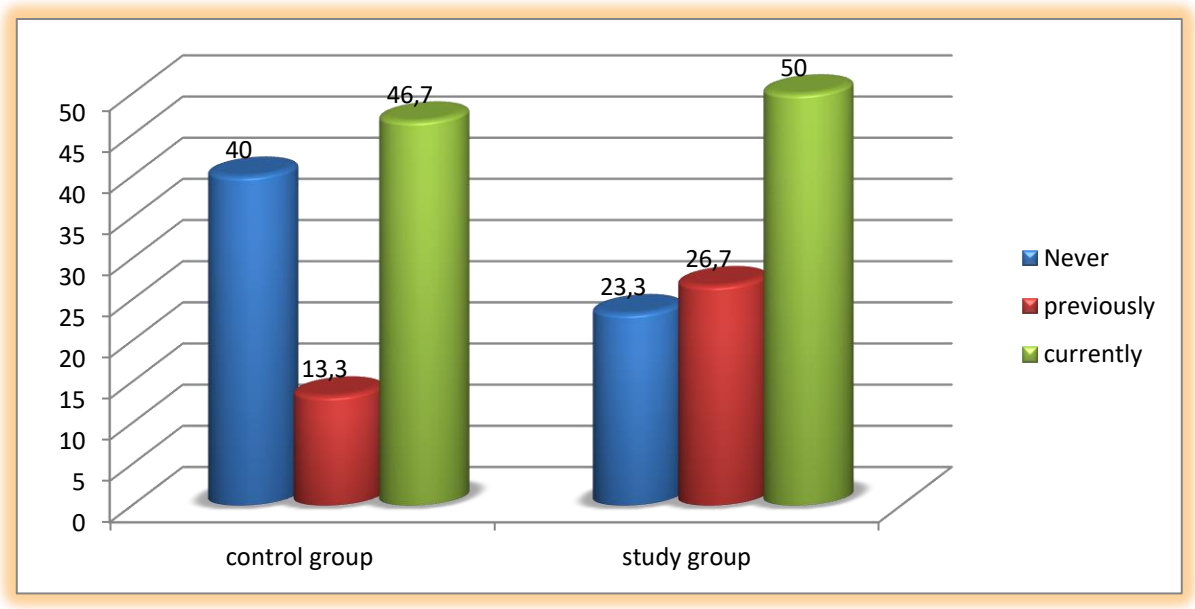

Figure 3. Percent of the distribution of participants according to smoking status

Table (2) shows that 66.7% of patients in the control group and 56.7% of patients in the experimental group were overweight. 43.3% of patients in the study group and 63.3% in the control group were suffering from HTN and DM. Finally, about medications for chronic illnesses, this study shows that 60% of patients in the control group and 36.7% of patients in the study group took antihypertensive and anti-diabetic medications.

Table 2. Clinical data

Clinical data		**Control Group**		**Study Group**		**P-Value**
		f.	%	f.	%	**(Sig)**
Body mass index	Normal	7	23.3	10	33.3	.855 (NS)
	Over Weight	20	66.7	17	56.7	
Mean ± SD	Obesity Class I	3	10.0	2	6.7	
27.31 ± 5.33	Obesity Class II	0	0	1	3.3	
	Total	**30**	**100.0**	**30**	**100.0**	
chronic diseases	None	3	10.0	1	3.3	.381 (NS)
	HTN	5	16.7	10	33.3	
	DM	3	10.0	6	20.0	
	HTN And DM	19	63.3	13	43.3	
	Total	**30**	**100.0**	**30**	**100.0**	
Medications used for chronic diseases	None	3	10.0	2	6.6	.178 (NS)
	Antihypertensive Drugs	5	16.7	11	36.7	
	Anti-Diabetic Drugs	4	13.3	6	20.0	
	Antihypertensive & Anti Diabetic Drugs	18	60.0	11	36.7	

Total	**30**	**100.0**	**30**	**100.0**

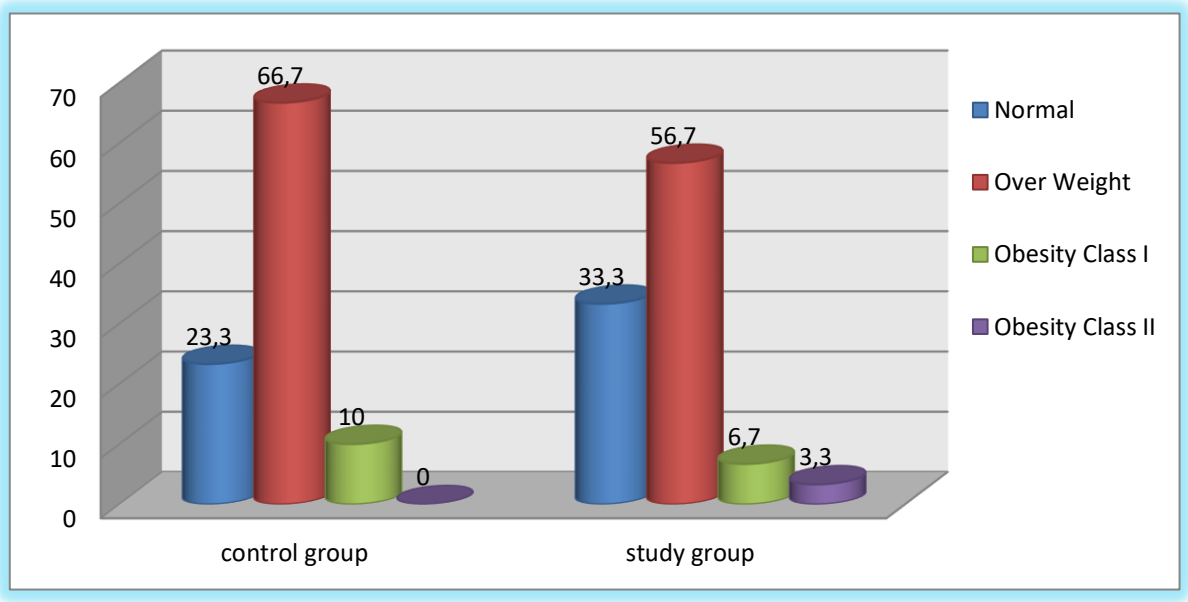

Figure 4. Percent of the distribution of participants according to BMI

Table 3. Comparison between the mean of the readings of pulmonary parameters, for the 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.)**
RR (breath/m)	23.20	20.83	19.67	.030 (S)	22.33	24.33	26.67	.4820 (NS)
SpO_2 (%)	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).

This table shows that are a significant statistical differences between the mean of the pulmonary parameters readings for the study group, while there is no significant statistical difference between the mean of the readings of pulmonary parameters for the control group.

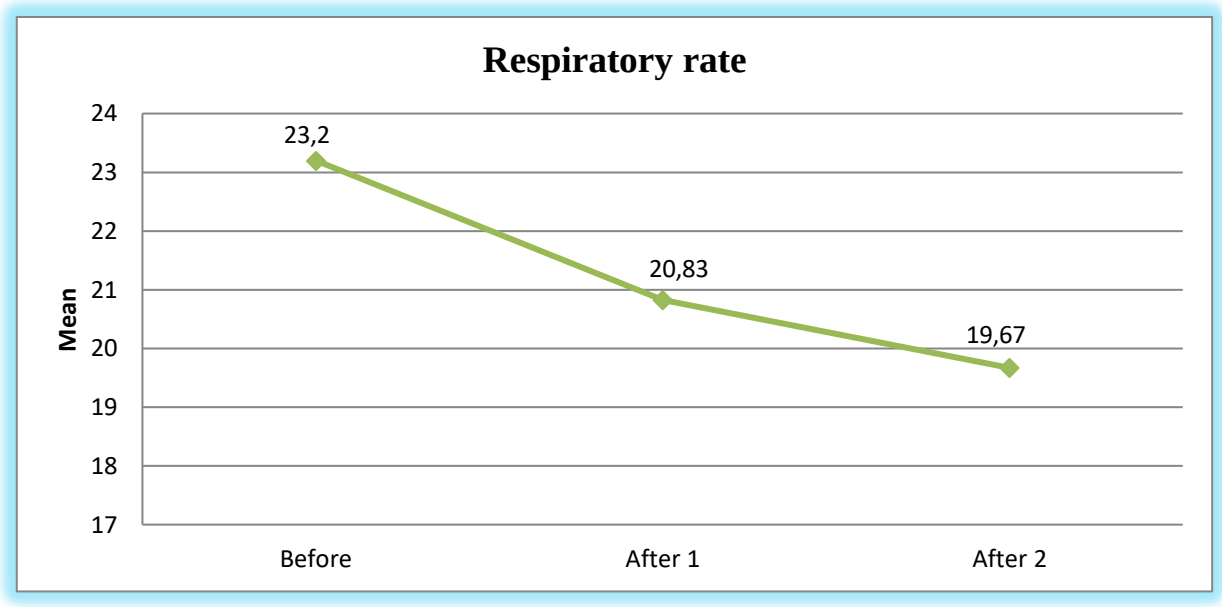

Figure 5. Differences of the respiratory rate mean in three measures

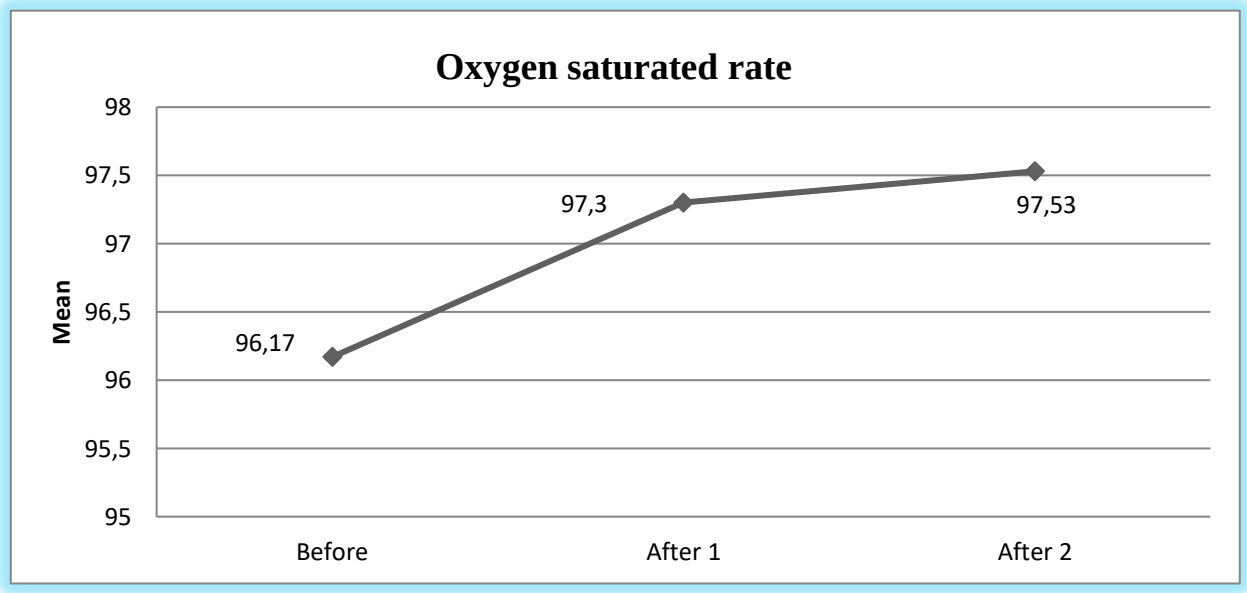

Figure 6. Differences of the oxygen saturated rate mean in three measures

As shown in Figure (5) to (6) this study finds that there are differences in the mean of RR, and SpO2 (%) 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 pulmonary parameters affected by applying massage.

4. Discussion

Discussion of the Patients' Socio-Demographic Characteristics Acute Coronary Syndrome

Regarding the social-demographic characteristics of the patients participating in this study the result in Table 1 indicates that about two-thirds of the patients participating in the study and control groups are contained by the age variable of 50-69 years old and counted for 60% for the study group, and 63.3% for the control group. Randomized clinical

trial [11], The effects of hand and foot surface stroke massage on pain intensity and anxiety level in hospitalized patients with acute coronary syndrome. That reported the mean age of the patients was 62.16 ± 10.47 years, ranging from 42 to 84 years. The research believes that the process of aging is ever-changing. As one ages, the body's anatomy and physiology will alter due to degeneration, which will impact the body's capacity to handle declining organ function and bodily resistance.

Regarding sex variable this study explains that 76.7% of the participants were men, 23.3% were women in the experimental group, 73.3% were men in the control group, and 26.7% were women. The finding this study disagree with a study done by [12] which stated that the prevalence of acute coronary syndrome had a higher incidence rate in women than in men, accounting for 51.7% women in the group of control and in the group of intervention 38.3% women while the rest were men. [3] 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 the study group and 65.7% male in the control group and the rest were female.

Regarding the marital status the greater percentage (83.3%) and (80%) of the patients who participated in the study and control groups respectively are married. These result are agree with a study conducted by [13], Which stated that the married, in the group of intervention accounting for 93.3% and 96.7% in the group of control.

Furthermore, Educational levels of the participants in this study exposed that 40% of study group and 36.7% of the control group are no reading or writing. These findings are disagree with a study conducted by [14], which stated that the Under diploma high, Accounting for 50% were under diploma in the intervention group and 56.25% in the control group.

As an occupational status this study indicates that the patients were had free business about 40% in the group of study and 30% in the group of control. as well as. This result is inconsistent with the randomized controlled trail that was conducted by [15], The study result show 40,6% of patient intervention group and about (59.4 %) in the control group were employed.

Finally, regarding smoking this study indicates that about half of the patients participating in the study and control groups are currently smoke and accounted for 50% for the study group, and 46.7% for the control group. This result is consistent with the study conducted by [16], The study Result show (43.7%) of patient intervention group and about (51.5%) in the control group were currently smoke.

Discussion of Acute Coronary Syndrome Patients' Clinical Data

Table (2) indicates the BMI accounting for 56.7% of patients in the study group and 66.7% in the control group had over weight. The result of this study agrees with the results of a study by [17], in Qatar, The study Result show 37.3% in the control group and about 42.5% in the intervention group were Overweight. Whereas the result of study conducted by [18], disagree with the study accounting for 36.8% in the control group and 52.6% in the intervention group were Normal weight.

Regarding the chronic diseases of the participants in this study exposed that 43.3% of patients in the study group and 63.3% in the control group were suffering from HTN and DM. This result is inconsistent with the study that was conducted by [19], The study Result show 63.3% in the intervention group and 36.7% in the control group were suffering from HTN.

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. This result is disagree with the study that was presented by [4], The study finding display 27.6% in the study group and 16.1% in the control group were using antihypertensive drugs.

Discussion of the Comparison Between the Mean of the Readings of Physiological Parameters, for the Study Group and Control Group

Table 3 shows that are a significant statistical differences between the mean of the pulmonary parameters RR, and SPO2 readings for the study group, while there is no significant statistical difference between the mean of the readings of pulmonary parameters for the control group, that is meaning the pulmonary 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 [20], The effect of foot massage on pain severity, hemodynamic parameters, and mechanical ventilation weaning time among patients in critical care settings. The study's results showed the highly statistically significant differences between the intervention group and control regarding all the hemodynamic parameters as follows: respiratory rate ($P \leq 0.001$); and oxygen saturation ($P = 0.025$). And the study conducted in Iran by [3], Effect of hand and foot surface stroke massage on anxiety and vital signs in patients with acute coronary syndrome: A randomized clinical trial. They reported that the changes in the vital signs which included systolic blood pressure, diastolic blood pressure, pulse rate, and respiratory rate, of the participants in the case group showed a significant difference compared with the control group.

5. Conclusion

The results of the present study indicated that performing the foot massage for five minutes for each foot is more effective to improve the pulmonary parameters for patients with acute coronary syndrome.

6. Recommendation

More research is needed to confirm the effectiveness of foot massage on selected physiological parameters.

7. Conflict of Interest

Nothing will happen to hurt anybody.

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