



## Effect of Change Position and Back Massage on Physiological Parameters for Patients with Back Pain Post-Cardiac Catheterization.

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### ABSTRACT

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**Background:** Back pain is frequently reported following cardiac catheterization. This is mainly due to the prolonged bed rest prescribed post-cardiac catheterization, ranging from 3 to 6 h (Masoudi et al.,2017).

**Objectives:** To determine the effect of change position and back massage on physiological parameters for patients with back pain post-cardiac catheterization.

**Methodology:** A quasi-experimental design was conducted on patients divided into two study groups. A non-probability (homogenous purposive sample) of (90) patients is included in the present study (30 patients for the study group1,30 patients for study group 2 and 30 patients for the comparison group) where study group 1 received the change position protocol and study group 2 received the change position and back massage. All patients are post-cardiac catheterization and have back pain.

**Results:** Improvement in physiological parameters for patients with back pain in study groups compared with those participants in the comparison group and between the pre-test and three readings of the post-test in the study groups.

**Conclusion:** Implementing the change position and back massage for patients post-cardiac catheterization who have back pain is an effective approach to improve physiological parameters.

**Recommendations:** Future studies should be conducted to determine the effectiveness of the intervention strategy on improving physiological parameters, particularly back pain in combination with other interventions to compare current study's impact with another intervention method for patients with back pain post-cardiac catheterization

**Keywords:** Effect, cardiac catheterization, change position and back massage, back pain, physiological parameters.

### INTRODUCTION

Cardiac catheterization remains the standard for the evaluation of hemodynamics and considers the conclusive procedure for the investigation of many forms of coronary artery disease (CAD), despite the fact that many noninvasive diagnostic

techniques have been widely used for the diagnosis and treatment of CAD (Aljanabi & Hassan, 2022).

After cardiac catheterization, patients are often advised to spend around 6 hours on complete bed rest (Jassim & Hassan, 2022). According to studies,

back discomfort is the most frequent complaint following cardiac catheterization (CC), and this is recommended to reduce the risk of bleeding. The patient should rest flat with their feet straight and refrain from making sudden movements (Waheed & Hassan, 2021).

Back pain is a common consequence following CC and is associated with immobility and a limited range of motion. If a patient experiences persistent back pain, it may have a negative impact on their recovery from treatment by causing anxiety, exhaustion, impatience, discomfort, and disturbed sleep while they are hospitalized (Niknam et al., 2021).

In patients who are in pain or who believe that their suffering won't be eased, endocrine/hormone systems are in control of the bodily stress response. This response may increase heart rate, blood pressure, and cardiac oxygen consumption, which raises the possibility of vascular problems (Watson et al., 2022).

The adverse effect of back pain leads to many harmful effects including increased heart rate, blood pressure, and myocardial workload dysrhythmia. Lying on the back for a long time imposes pressure, and causes cellular ischemia and pain in the lumbar and the back. Therefore, patients intend to change their position so as to reduce pain and discomfort (Fathi, 2017).

Chaiyagad et al., (2022) reported that complementary therapies to manage or alleviate back pain, these therapies have many noninvasive techniques and are simple with fewer side effects when compared to drugs, complementary therapies are used as an adjuvant therapy alongside conventional medical treatments to enhance overall health and promote faster recovery of the non-pharmacological therapy for patients with back pain include change position and back massage.

Changes in patients' positions after CC may lead to a stable hemodynamic condition by lowering pain without increasing complications, enhancing

comfort and satisfaction levels, and reducing tiredness and back discomfort without increasing bleeding and hematoma (Neshabouri et al., 2020).

Massage is effective in relieving back pain, which ranks third among complementary therapies in terms of the frequency with which patients utilize them, and is one of the most often used complementary medical treatments in the USA (Elsaman, 2022).

Nursing role in maintaining back pain either independently or collaboratively with other professional teams to use pain assessment tools, pain management strategies, and use non-pharmacological therapy including changing position and back massage for patients post cardiac catheterization to provide optimal patient care and reduce the vascular complication especially back pain (Chaiyagad & Ruaisungnoen, 2021).

❖ **The study hypotheses:** Changing position and back massage is effective for patients after cardiac catheterization in improving physiological parameters after arterial sheath removal.

## AIMS OF THE STUDY

To determine the effect of change position and back massage on physiological parameters for patients with back pain post-cardiac catheterization.

## METHODOLOGY

**Design of the Study:** The quasi-experimental design (Nonequivalent control group) has been executed in the current study to determine the efficacy of a change position and back massage on the improvement of physiological parameters (Heart rate, Blood pressure, Respiratory rate, and pain) for patients with back pain post-cardiac catheterization which was conducted from 19th September 2022 to 26th June 2023.

**Sampling and Sample of the Study:** The researcher use nonprobability (homogenous purposive sample) of 90 patients post-cardiac catheterization who have

back pain at AL-Najaf Center for Cardiac Surgery and Cardiac Catheterization.

**Determinations of Sample Size:** The researcher uses the parameters power, significance, and effect size) to determine the adequate sample size; Therefore, the appropriate sample size for this study was determined to be (90) participants based on the variables.

**The Study Group:** The groups of the current study included (study group 1 received the change position protocol and study group 2 received the change position and back massage protocol) where patients in the study groups received the intervention three times where the first intervention at the (first hour after arterial sheath removal) for patients with back pain, the second intervention (post second hour from the first intervention), and third intervention (post third hour from second intervention). And doing evaluation after each intervention so occur three evaluations (post-test I, post-test II, and post-test III) sequentially.

Where change position protocol applies according to at the first hour: Place the patient in a supine position with the head elevated to 15-30 degrees, second hour: Place the patient in the supine position with the head elevated to 30-45 degrees, and third hour: Place the patient in a side-lying position with the head elevated to 45 degrees. The physiological parameters improved significantly after the application of the program.

And Protocol change position and back massage perform as first and second hours the intervention was similar to the study group 1 the patients only received changed positions. And third hour when place patient in a side-lying position doing back massage for 15-20 minutes and can repeat the massage depending on the score of pain evaluated after each massage.

**The Comparison Group:**

Thirty patients were on usual nursing care and treatment. After an arterial sheath removal, the physiological parameters increased in the comparison group with the treatment routine.

**The Study Instrument:** the researcher has adopted an assessment tool to achieve each of the study objectives. This tool consists of four parts: Part I: Socio-Demographic Data consists of (5) items, which include: age, gender marital status, educational level, and body mass index (BMI); Part II: Clinical Characteristics consists of (3) items, which include: Duration of the present intracardiac catheterization (min), Previous history of cardiac catheterization, and History of cardiac surgery; Part III: Assessment of Patient's Back Pain Using Numerical Analogues Scale (NAS) included the numerical scale used for the evaluation of back pain intensity where the patients were asked to determine the rate of back pain according to the line and numbers, scored back pain and Part IV: Vital Signs which includes heart rate; respiratory rate, and systolic and diastolic blood pressure. The vital signs measure before and after the application of the intervention.

**The Validity of the Study Instrument:**

The face validity of the nursing intervention program and the study instrument is determined through the use of a panel of (13) experts, who have more than ten years of experience in their scientific field to examine the content, instrument, and sufficiency of the questionnaire to evaluate the concepts of interest in the nursing intervention program. Additionally, an expert's mean years of experience is (17.2) years.

**Reliability of the Study Instrument:**

**The Reliability:** As a result of the study instrument's global and stable standard and the experts' absence of suggested modifications, the reliability of the current study's study instrument has not been assessed.

**physiological parameters measurement:**

The researcher uses the center instrumentation to determine the physiological parameters these are the sphygmomanometer, stethoscope, pulse, and monitor.

**Ethical Considerations:** A legal, governmental agreement obtained the ethical study approval before conducting the study according to the standards for conducting research with human beings from the National Research Ethics Committee (NREC). In addition, before beginning data collection confirm informed consent for participation rights to protect the patient and the researcher's rights, where participation right includes the following elements the researcher, introducing himself and his identity to the subject, explaining the study's goals and advantages, and confirms the patient's identity and information will be kept secret. participants' freedom to withdraw from the research at any moment and their participation in it being voluntary.

**Method of Data Collection:** The researcher used face-to-face interviews to collect socio-demographic and clinical data from patients. As for back pain post-cardiac catheterization, in the current study used the Numeric analogous scale (NAS) to assess the level of back pain for all participants before the application of the intervention, and use the vital signs were checked hourly to identify improvement in vital signs and back pain Also, the study compared the level of back pain before and after the application of the program. The data collection method started from 23rd November 2022 to 22nd December 2022.

**Statistical Analyses:** The data of the present study are analyzed through the application of Statistical Package of Social Sciences (SPSS) version 20, and Microsoft Excel 2019 using both descriptive and inferential data analysis approaches as follows:

- **Descriptive Data Analysis:** Presented as tables, frequencies, and percentages, Graphic presentation by using bar charts (Statistical figures), Statistical mean, and standard deviation.
- **Inferential Data Analysis:** Statistical tests were applied according to the distribution and type of variables, which include one-way analysis of variance (ANOVA).

## RESULTS

Table (1) shows the distribution of demographic characteristics among the study sample of both study and control groups. The results show that (43.3%) of the study sample are (61 and more) years old, (53.3%) are female, and (66.7%) of them are single patients in study group 1. In study group 2, the study results indicate that (43.3%) of the study sample are (61 and more) years old, (53.3%) are female and (63.3%) of them are married. Concerning the control group participants, the study results indicate that (43.3%) of the study sample (51 – 60) years old, (56.7%) are female and (70.0%) of them are married. The majority of the patients in study group 1, study group 2, and the control group present with a body mass index of 30 and more (obese).

Table (2) shows that (80.0%) of patients in study group 1 are spend less than 30 min duration in the cardiac catheterization unit, and (63.3%) of patients don't have history of cardiac catheterization.

In study group 2, the study results indicate that (86.7%) of patients spend less than 30min duration in the cardiac catheterization unit, (and 66.7%) of patients don't have a history of cardiac catheterization.

Concerning the control group participants, the study results indicate that (100.0%) of patients spend less than 30min duration in the cardiac catheterization unit, (and 73.3%) of patients don't have a history of cardiac catheterization.

Table (3) shows that there is a reduction in back pain among patients in study group 1, and study group 2 compared with the control group.

Table (4) shows that there is a reduction in the HR among patients in study group 1, and study group 2 after applying the study programs compared with the control group.

Table (5) shows that there is a reduction in SBP among patients in the study group 1, study group 2 after applying the study programs compared with the control group.

Table (6) shows that there is a reduction in Diastolic Blood Pressure (DBP) among patients in the change position, change position and back massage groups after applying the study programs compared with the control group.

Table (7) shows that there is a reduction in the respiratory rate among patients in study group 1, study group 2 after applying the study programs comparing with control group.

Table (8) shows that there is a significant difference in the Studied Parameters at the pre-test, post-test 1, post-test 2 and post-test 3 in the patients after change position program (i.e. there is a significant improvement in the Studied Parameters in a group of change position (study group) compared with the control group).

Table (9) shows that there is a significant difference in the Studied Parameters at the pre-test, post-test 1, post-test2 and post-test3 in the patients after receiving a change position and back massage program (study group 2) (i.e. there is a significant improvement in the Studied Parameters in a group of change position and back massage compared with the control group).

Table (10) shows that there is a non-significant difference in the Studied Parameters within the control group at the pre-test, post-test 1, post-test2 and post-test3 (i.e. there is a non-significant improvement in the Studied Parameters in the control group compared with the study group).

## DISCUSSION

The primary outcome of the present study is to examine the efficacy of changing position and back massage on study parameters post-cardiac catheterization. The present study findings indicate that there is a reduction in the vital signs among patients in the studied groups after applying for the study program. This result is supported by Hajbaghery et al., (2014), who concluded that massage therapy has beneficial effects on the

parameters of patients hospitalized in coronary care units by reducing vital signs and pain scores.

Massage induces a sense of comfort and relaxation and then endorphins may be secreted, vessels would be dilated, the blood flow increases within the superficial vessels of the body, and blood pressure will be reduced. The reduction of heart rate after the massage may also be related to the anxiolytic and Para sympathomimetic effects of massage.

Another study conducted by Kardan et al., (2022) suggested that an increase in vital signs such as blood pressure and heart rate may indicate an increase in patients' cortisol levels due to increased pain.

Hassan et al., (2019) noted in their study that there was a decrease in the study group's pain levels following the massage interventions in relation to the sessions of massage therapy following cardiac catheterization.

The interventions shorten the length of rest in the same position for a long time and produce mechanical pressure, which may help to enhance blood flow by boosting arterial pressure and increase muscle warmth via friction, which is all related to back discomfort caused by extended immobility.

Mert Boğa & Öztekin, (2019), concluded that changing position decreased back pain and vital signs without causing any vascular complications. This is due to long-term immobilization imposing tension, and causing cellular ischemia and pain in the lumbar and the back. therefore, positioned with the head of the bed significantly inclined and supported into a semi-seated position reported less pain in the back.

Generally, the results of the present study indicate that there is a significant difference in the studied parameters throughout different periods in the patients after receiving the change position program. This result is consistent with a study conducted by Fereidouni et al., (2019) they reveal that lower patient

back pain ratings were associated with the use of positioning only without the addition of medications.

Examining the impact of interventional programs on the alterations and stability of vital signs is the main goal of the current investigation. According to the study's findings, the study group had higher vital signs during the pre-test. The results of the study showed that, in comparison to participants in the control group, the vital signs and back pain of the study groups had improved following the execution of the interventional program. (i.e. there is a substantial improvement in the vital signs reading in the change position and change position & back massage groups compared with those in the control group).

Additionally, Heravi et al. (2015) came to the conclusion in their study that while there was no statistically significant difference in the study groups' hemodynamic parameters before the intervention, there was a statistically significant decrease in those parameters when compared to the control group following the interventional program, with the exception of diastolic blood pressure.

Sesay et al., (2015) revealed in their investigation following catheterization, the systolic and diastolic blood pressure and heart rate in the control group are significantly greater than those in the intervention group. This outcome is the result of a linear and significant relationship between changes in hemodynamic parameters and pain, whereby an increase in pain level causes an increase in parameters. The inotropic, chronotropic, and dromotropic impacts on the heart rate and respiration rate that catecholamine release has on the quality of pain are supported by this finding. Then, the systolic blood pressure rose. Hence, adjustments in positioning have a greater favorable impact on the pain signals than they do on changes in the vital indicators.

## CONCLUSION

The study concluded that the change of position and back massage for 3 hours with continuous follow-up is an effective way to improve physiological parameters post-cardiac catheterization.

## RECOMMENDATIONS:

The results of the study can be used as a baseline in subsequent studies in the same setting to assess the effectiveness of changing positions and change position & back massage in improving physiological parameters for patients with back pain post-cardiac catheterization.

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**Conflicts of interest:** The authors declare no conflict of interest.

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## TABLES AND FIGURES

Table (1): Demographic Characteristics of Study Sample of both study and control groups:

Demographics Data	Rating and Intervals	Statistics	Groups			
			Study group 1	Study group 2	Control	
Age/ years	≤ 30	Freq.	0	0	3	
		%	0.0%	0.0%	10.0%	
	31 – 40	Freq.	2	2	0	
		%	6.7%	6.7%	0.0%	
	41 – 50	Freq.	5	4	4	
		%	16.7%	13.3%	13.3%	
	51 – 60	Freq.	10	11	13	
		%	33.3%	36.7%	43.3%	
	61 and more	Freq.	13	13	10	
		%	43.3%	43.3%	33.3%	
Mean (Std. Dev.)			57.10 (9.9)	58.77 (10.2)	56.5 (12.0)	
Gender	Male	Freq.	30	30	30	
		%	100.0%	100.0%	100.0%	
	Female	Freq.	14	14	13	
		%	46.7%	46.7%	43.3%	
		Freq.	16	16	17	
		%	53.3%	53.3%	56.7%	
		Freq.	30	30	30	
		%	100.0%	100.0%	100.0%	
	Marital Status	Single	Freq.	20	0	21
			%	66.7 %	0.0%	70.0%
Married		Freq.	0	19	0	
		%	0.0%	63.3%	0.0%	
Divorced		Freq.	2	2	0	
		%	6.7%	6.7%	0.0%	
Widow		Freq.	8	9	9	
		%	26.7%	30.0%	30.0%	
		Freq.	30	30	30	
		%	100.0%	100.0%	100.0%	
Body Mass Index	Obese	Freq.	14	13	15	
		%	46.7%	43.3%	50.0%	
	Overweight	Freq.	12	12	13	
		%	40.0%	40.0%	43.3%	
	Normal	Freq.	4	5	2	
		%	13.3%	16.7%	6.7%	
	Thin/ underweight	Freq.	0.0	0.0	0.0	
		%	0.0%	0.0%	0.0%	
			Freq.	30	30	30
			%	100.0%	100.0%	100.0%

%= percentage, freq. = frequency, S.D = stander deviation, study group 1 =change position, study group 2 =change position and back massage.

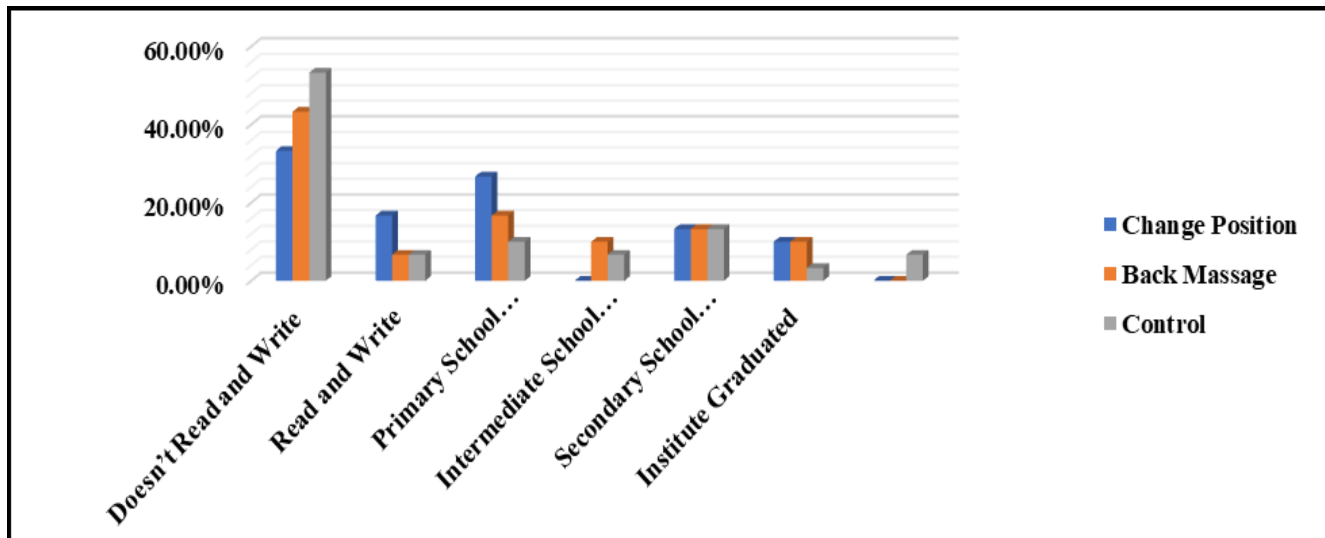


Figure (1): Education Levels of the Study Sample

Table (2): Study Sample Clinical Characteristics

Clinical Data	Rating and intervals	Statistics	Groups		
			Study group 1	Study group 2	Control
Duration of the present intra-cardiac catheterization	<= 30(min)	Freq.	24	26	30
		%	80.0%	86.7%	100.0%
	31-60(min)	Freq.	6	4	0
		%	20.0%	13.3%	0.0%
		Freq.	30	30	30
		%	100.0%	100.0%	100.0%
Previous history of cardiac catheterization	Yes	Freq.	11	10	22
		%	36.7%	33.3%	73.3%
	No	Freq.	19	20	8
		%	63.3%	66.7%	26.7%
		Freq.	30	30	30
		%	100.0%	100.0%	100.0%

%= percentage, freq. = frequency, study group 1 =change position, study group 2 =change position and back massage.

**Table (3):** Statistical Summary of back Pain among Different Studied Groups throughout Different Periods of Measurements

Groups	Periods of Measurements	N	Mean	S.D	S.E
Study group 1	Pre-Test	30	6.5	1.4	0.3
	Post-Test1	30	5.3	1.5	0.3
	Post-Test2	30	3.1	1.2	0.2
	Post-Test3	30	0.6	0.7	0.1
	<b>Total</b>	<b>120</b>	<b>3.9</b>	<b>2.6</b>	<b>0.2</b>
Study group 2	Pre-Test	30	6.9	1.7	0.3
	Post-Test1	30	5.5	1.8	0.3
	Post-Test2	30	2.6	1.3	0.2
	Post-Test3	30	0.0	0.2	0.0
	<b>Total</b>	<b>120</b>	<b>3.8</b>	<b>3.0</b>	<b>0.3</b>
Control	Pre-Test	30	6.3	1.4	0.3
	Post-Test1	30	6.5	1.6	0.3
	Post-Test2	30	6.1	1.3	0.2
	Post-Test3	30	6.4	1.5	0.3
	<b>Total</b>	<b>120</b>	<b>6.3</b>	<b>1.4</b>	<b>0.1</b>

S. D=stander deviation, S. E=stander error, study group 1 =change position, study group 2 =change position, and back massage.

**Table (4):** The Heart Rate among Different Studied Groups throughout Different Periods of Measurements

Groups	Periods of Measurements	N	Mean	S.D	S.E
Study group 1	Pre-Test	30	89.3	15.3	2.8
	Post-Test1	30	79.1	16.9	3.1
	Post-Test2	30	76.5	19.2	3.5
	Post-Test3	30	73.5	18.5	3.4
	<b>Total</b>	<b>120</b>	<b>79.6</b>	<b>18.3</b>	<b>1.7</b>
Study group 2	Pre-Test	30	82.4	17.7	3.2
	Post-Test1	30	74.1	11.3	2.1
	Post-Test2	30	74.5	10.6	1.9
	Post-Test3	30	72.6	10.3	1.9
	<b>Total</b>	<b>120</b>	<b>75.9</b>	<b>13.2</b>	<b>1.2</b>
Control	Pre-Test	30	86.7	15.7	2.9
	Post-Test1	30	86.3	13.4	2.4
	Post-Test2	30	87.6	14.0	2.6
	Post-Test3	30	89.2	14.0	2.6
	<b>Total</b>	<b>120</b>	<b>87.5</b>	<b>14.2</b>	<b>1.3</b>

S. D=stander deviation, S. E=stander error, N=number, study group 1 =change position, study group 2 =change position, and back massage.

**Table (5):** The Systolic Blood Pressure among Different Studied Groups throughout Different Periods of Measurements

Groups	Periods of Measurements	N	Mean	S.D	S.E
Study group 1	Pre-Test	30	135.6	15.6	2.8
	Post-Test1	30	130.5	13.8	2.5
	Post-Test2	30	127.5	11.8	2.2
	Post-Test3	30	122.7	9.7	1.8
	<b>Total</b>	<b>120</b>	<b>129.1</b>	<b>13.6</b>	<b>1.2</b>
Study group 2	Pre-Test	30	141.6	18.8	3.4
	Post-Test1	30	131.6	15.7	2.9
	Post-Test2	30	129.3	10.9	2.0
	Post-Test3	30	124.8	7.6	1.4
	<b>Total</b>	<b>120</b>	<b>131.8</b>	<b>15.1</b>	<b>1.4</b>
Control	Pre-Test	30	134.6	13.9	2.5
	Post-Test1	30	136.9	11.1	2.0
	Post-Test2	30	136.3	11.6	2.1
	Post-Test3	30	135.8	10.5	1.9
	<b>Total</b>	<b>120</b>	<b>135.9</b>	<b>11.7</b>	<b>1.1</b>

S. D=stander deviation, S. E=stander error, N=number, study group 1=change position, study group 2=change position and, back massage.

**Table (6):** The Diastolic Blood Pressure among Different Studied Groups throughout Different Periods of Measurements

Groups	Periods of Measurements	N	Mean	S.D	S.E
Study group 1	Pre-Test	30	87.8	8.8	1.6
	Post-Test1	30	83.1	7.5	1.4
	Post-Test2	30	79.6	9.2	1.7
	Post-Test3	30	77.6	8.8	1.6
	<b>Total</b>	<b>120</b>	<b>82.0</b>	<b>9.3</b>	<b>0.9</b>
Study group 2	Pre-Test	30	84.1	9.2	1.7
	Post-Test1	30	81.1	10.2	1.9
	Post-Test2	30	80.9	7.8	1.4
	Post-Test3	30	74.6	6.7	1.2
	<b>Total</b>	<b>120</b>	<b>80.2</b>	<b>9.1</b>	<b>0.8</b>
Control	Pre-Test	30	86.8	11.5	2.1
	Post-Test1	30	83.8	10.9	2.0
	Post-Test2	30	82.6	10.8	2.0
	Post-Test3	30	87.0	7.2	1.3
	<b>Total</b>	<b>120</b>	<b>85.0</b>	<b>10.3</b>	<b>0.9</b>

S.D=stander deviation, S.E=stander error, N=number, study group 1=change position, study group 2= change position and back massage.

**Table (7):** The Respiratory rate among Different Studied Groups throughout Different Periods of Measurements

Groups	Periods of Measurements	N	Mean	S.D	S.E
Study group 1	Pre-Test	30	19.1	5.0	0.9
	Post-Test1	30	15.6	4.8	0.9
	Post-Test2	30	15.1	5.1	0.9
	Post-Test3	30	14.2	4.3	0.8
	<b>Total</b>	<b>120</b>	<b>16.0</b>	<b>5.1</b>	<b>0.5</b>
Study group 2	Pre-Test	30	20.1	4.4	0.8
	Post-Test1	30	14.2	3.8	0.7
	Post-Test2	30	13.7	3.6	0.7
	Post-Test3	30	13.1	3.5	0.6
	<b>Total</b>	<b>120</b>	<b>15.3</b>	<b>4.7</b>	<b>0.4</b>
Control	Pre-Test	30	19.9	4.8	0.9
	Post-Test1	30	19.9	4.1	0.8
	Post-Test2	30	19.3	3.5	0.6
	Post-Test3	30	20.4	5.6	1.0
	<b>Total</b>	<b>120</b>	<b>19.9</b>	<b>4.6</b>	<b>0.4</b>

S. D=stander deviation, S. E=stander error, N=number ,study group 1 =change position, study group 2 =change position and back massage.

**Table (8):** Analysis of Variance (one-way ANOVA) of the Studied Parameters Throughout Different Periods of Measurements among the Study Participants after Receiving the Change Position Program

Parameters	Statistics	Sum of Squares	d.f	Mean Square	F	p-value
Back Pain	Between Groups	608.4	3.0	202.8	132.2	.0001
	Within Groups	178.0	116.0	1.5		
	<b>Total</b>	<b>786.4</b>	<b>119.0</b>			
Heart Rate	Between Groups	4246.1	3.0	1415.4	4.6	.004
	Within Groups	35694.7	116.0	307.7		
	<b>Total</b>	<b>39940.8</b>	<b>119.0</b>			
Systolic Blood Pressure	Between Groups	2631.4	3.0	877.1	5.3	.002
	Within Groups	19377.0	116.0	167.0		
	<b>Total</b>	<b>22008.3</b>	<b>119.0</b>			
Diastolic Blood Pressure	Between Groups	1790.2	3.0	596.7	8.1	.0001
	Within Groups	8547.8	116.0	73.7		
	<b>Total</b>	<b>10338.0</b>	<b>119.0</b>			
Respiratory Rate	Between Groups	416.3	3.0	138.8	6.0	.001
	Within Groups	2673.7	116.0	23.0		
	<b>Total</b>	<b>3090.0</b>	<b>119.0</b>			

freq.=frequency, p-value= probability, d. f= degree of freedom, S= significant.

**Table (9):** Analysis of Variance (one-way ANOVA) of the Studied Parameters Throughout Different Periods of Measurements among the Study Participants after Receiving the Change position and Back Massage

Parameters	Statistics	Sum of Squares	d.f	Mean Square	F	p-value
Back Pain	Between Groups	844.2	3.0	281.4	142.4	.0001 S
	Within Groups	229.3	116.0	2.0		
	<b>Total</b>	<b>1073.5</b>	<b>119.0</b>			
Heart Rate	Between Groups	1740.0	3.0	580.0	3.5	.017 S
	Within Groups	19134.3	116.0	165.0		
	<b>Total</b>	<b>20874.4</b>	<b>119.0</b>			
Systolic Blood Pressure	Between Groups	4550.5	3.0	1516.8	7.8	.0001 S
	Within Groups	22528.2	116.0	194.2		
	<b>Total</b>	<b>27078.7</b>	<b>119.0</b>			
Diastolic Blood Pressure	Between Groups	1429.7	3.0	476.6	6.5	.0001 S
	Within Groups	8519.6	116.0	73.4		
	<b>Total</b>	<b>9949.3</b>	<b>119.0</b>			
Respiratory Rate	Between Groups	938.7	3.0	312.9	21.0	.0001 S
	Within Groups	1724.8	116.0	14.9		
	<b>Total</b>	<b>2663.5</b>	<b>119.0</b>			

freq.=frequency, p-value= probability, d. f= degree of freedom, S= significant.

**Table (10):** Analysis of Variance (one-way ANOVA) of the Studied Parameters Throughout Different Periods of Measurements among the Control Group

Parameters	Statistics	Sum of Squares	d.f	Mean Square	F	p-value
Back Pain	Between Groups	3.1	3.0	1.0	0.5	.689 NS
	Within Groups	243.2	116.0	2.1		
	<b>Total</b>	<b>246.3</b>	<b>119.0</b>			
Heart Rate	Between Groups	146.6	3.0	48.9	0.2	.869 NS
	Within Groups	23777.1	116.0	205.0		
	<b>Total</b>	<b>23923.7</b>	<b>119.0</b>			
Systolic Blood Pressure	Between Groups	80.7	3.0	26.9	0.2	.902 NS
	Within Groups	16301.7	116.0	140.5		
	<b>Total</b>	<b>16382.4</b>	<b>119.0</b>			
Diastolic Blood Pressure	Between Groups	436.4	3.0	145.5	1.4	.248 NS
	Within Groups	12102.5	116.0	104.3		
	<b>Total</b>	<b>12538.9</b>	<b>119.0</b>			
Respiratory Rate	Between Groups	20.6	3.0	6.9	0.3	.807 NS
	Within Groups	2447.8	116.0	21.1		
	<b>Total</b>	<b>2468.4</b>	<b>119.0</b>			

freq.=frequency, p-value= probability, d. f= degree of freedom, NS= not significant.