



EFFECT OF CARDIAC REHABILITATION ON MYOCARDIAL FUNCTION IN HYPOTENSIVE AND HYPERTENSIVE PATIENT

Physiotherapy

Grishma Luhar*	Master Of Physiotherapy, Venus Institute Of Physiotherapy, Swarnim Startup & Innovation University, Gandhinagar, Gujarat, India. *Corresponding Author
Dr. Kosha Gor	Master Of Physiotherapy In Cardiopulmonary Sciences, Assistant Professor, Venus Institute Of Physiotherapy, Swarnim Startup & Innovation University, Gandhinagar, Gujarat, India.
Dr. Mohammed Soheli Quadri	Master Of Physiotherapy In Cardiorespiratory, Ph.d Scholar, Associate Professor, Venus Institute Of Physiotherapy, Swarnim Startup & Innovation University, Gandhinagar, Gujarat, India
Dr. Arvind Kumar Chauhan	Master Of Physiotherapy In Orthopedics, Mba, Ph.d., Principal & Professor, Venus Institute Of Physiotherapy, Swarnim Startup & Innovation University, Gandhinagar, Gujarat, India.

ABSTRACT

Background: Directed Exercise cardiac Rehabilitation programs have been suggested to all patients specially patients with hypotensive and hypertension on post myocardial infarction for many years. However limited information is available on the usefulness of exercise rehabilitation programs in MI. **Aim:** The aim of this study was to evaluate the outcome of directed exercise training on MI patients by measuring both physical and physiological factors. **Methodology:** Convenient sampling was done for the selection of participants. they were randomly assigned to the training program group (n=15) or the non- training group (n=15). patient aged 45 to 70 yrs. Group 1 was received a training program. In this group Aerobic cardiovascular training was perform by patients in this training we included stretching, treadmill, ergometer, rowing, stepping, dumbbell or weight training with Duration and frequency of program, duration of session are 20 days(4week with 5 treatment days and 2 days break) 2 times/week 20min. intensity was 60% to 70% of age-adjusted HR reserve. According to ACSM guideline. Group 2 was not received any type of training program as well as not perform home exercise by patients **Result ::** The results from the study showed that a 20 days exercise rehabilitation program in myocardial infarction with hypotensive and hypertension patient are effective in rehabilitation to improve heart function and quality of life in patient. **Conclusion:** The data were analyzed using the paired t test. During the between group comparison, group1(Shaker Group) showed greater improvement than Group2(Masako Group).

KEYWORDS

Myocardial function, aerobic training, functional capacity, cardiac rehabilitation., hypertensive and hypotensive.

INTRODUCTION

• About Myocardial Functioning:

Myocardial functioning refers to the performance of the heart muscle (myocardium) in pumping blood throughout the body. It is a critical determinant of overall cardiovascular health, encompassing parameters such as myocardial contractility, cardiac output, and ejection fraction¹. Efficient myocardial function ensures that oxygenated blood reaches tissues and organs, facilitating their proper function.

• About Hypotension & Hypertension:

Hypotension, defined as abnormally low blood pressure, can impair myocardial function by reducing the perfusion pressure needed for adequate blood flow to the heart and other vital organs². This condition can lead to symptoms such as dizziness, fainting, and in severe cases, shock³. Conversely, hypertension, characterized by consistently high blood pressure, forces the heart to work harder to pump blood, potentially leading to hypertrophy of the heart muscle and eventual heart failure if left unmanaged⁴. Both hypotensive and hypertensive states pose significant risks to myocardial health and overall cardiovascular function.

Blood Pressure Category	Systolic mm Hg (upper #)	and	Diastolic mm Hg (lower #)
Normal	less than 120	and	less than 80
Prehypertension	120-139	or	80-89
High Blood Pressure (Hypertension) Stage 1	140-159	or	90-99
High Blood Pressure (Hypertension) Stage 2	160 or higher	or	100 or higher
Hypertensive Crisis (Emergency care needed)	Higher than 180	or	Higher than 110

Fig: 1 Blood Pressure Category

• About Cardiac Rehabilitation:

Cardiac rehabilitation is a comprehensive intervention designed to improve cardiovascular health in patients with heart conditions. It includes structured exercise programs, education on heart-healthy

living, and counselling to reduce stress and improve mental health⁵. Research indicates that cardiac rehabilitation can enhance myocardial function, reduce morbidity and mortality, and improve quality of life in patients with various cardiovascular conditions, including those with hypotension and hypertension⁶.

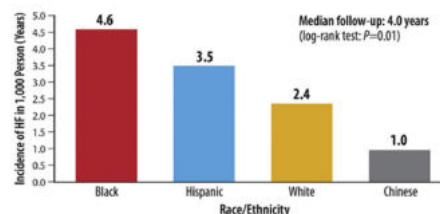


Fig: 2 Hf Incidence Rates By Race / Ethnicity

• About The Heart Failure Society Of America (hfsa):

Cardiac failure, commonly known as heart failure, occurs when the heart is unable to pump blood effectively, leading to inadequate blood flow to meet the body's needs. The Heart Failure Society of America (HFSa) defines it as a complex clinical syndrome resulting from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood⁷. Quality of life in heart failure patients is often significantly compromised, and interventions like cardiac rehabilitation are essential in managing the condition and improving patient outcomes⁸.

• About World Health Organization Quality Of Life:

The World Health Organization Quality of Life (WHOQOL) assessment tool is widely used to measure quality of life across various domains, including physical health, psychological health, social relationships, and environment⁹. In the context of cardiac rehabilitation, WHOQOL helps evaluate the effectiveness of rehabilitation programs in enhancing the overall well-being of patients with cardiovascular diseases¹⁰.

Need of study

The heart is unable to regenerate heart muscle after a heart attack and lost cardiac muscle. After MI the heart undergoes extensive myocardial remodelling through the accumulation of fibrous tissue which distorts tissue structure, increase tissue stiffness and account for ventricular dysfunction. Risk after MI there are 80% episodes occur within 12 hours cause patient dead, recurrent MI, heart failure, arrhythmias, angina and stroke. Previous studies have shown positive effects of cardiac rehabilitation program on MI in Hypotensive and Hypertensive patients but combination and comparison to its effects are unknown; so present study is conducted to find out comparative effectiveness of cardiac rehabilitation on MI in Hypotensive and Hypertensive.

Objective Of The Study

To evaluate the effect of aerobic training among post myocardial Infarction with hypotensive and hypertensive patients.

To compare the effect of aerobic training and no training among post Myocardial Infarction with hypotensive and hypertension patients

Study Design And Study Setting:

- **Study Site:-** Different Hospitals of Ahmedabad
- **Study Design:** Randomization Method used to generate the random allocation
- **Study Population:** patients with hypotensive-hypertension
- **Sampling Method:** Double blinding Random Sampling
- **Sample Size:** sample size was calculated by using G power software 3.1.9.4. Calculated sample size keeping α error 0.05 (to achieve 95% confidence level) and β error of 0.2 (to achieve 80% of power) the calculated sample size was 40.
- **Study Duration:** 4weeks with 5 treatment days and 2 days break

Selection Criteria:

1. Inclusion Criteria:- Were conducted in humans at least 40-70 years of age with hypotensive-hypertension. Randomly assigned patients to intervention and concurrent control groups. Patient has sufficient, physical and mental ability to understand instruction and cooperate throughout session, able to communicate properly, those without cognitive deficit. (Mini Mental Scale Examination more than 22).

2. Exclusion Criteria:- Other cardiac condition, Other medical and surgical condition Excluded the patient with mental illness

Material Used:-

- Assessment sheet Pen/pencil
- Stop watch Chair Table
- Consent form Sphygmomanometer Scales

Methodology:

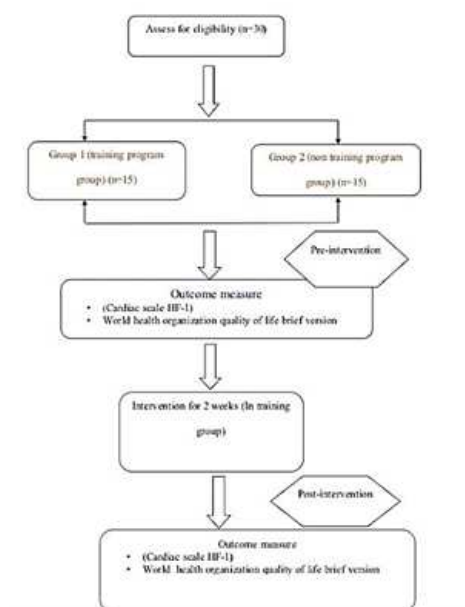


Chart: 1 Flow Chart

Patients were divided into two groups. Group 1:- patients received training program.

Group 2:- patients not received any training program.

Group 1 was received a training program. In this group Aerobic cardiovascular training was perform by patients in this training we included stretching, treadmill, ergometry, rowing, stepping, dumbbell or weight training with Duration and frequency of program, duration of session are 20 days(4week with 5 treatment days and 2 days break) 2 times/week 20min. intensity was 60% to 70% of age-adjusted HR reserve According to ACSM guideline.

Group 2 was not received any type of training program as well as not perform home exercise by patients

Statistical Analysis:-

Data was collected using Cardiac HF-1 and WHOQOL -BREF SCALES which is an excellent diagnostic tool, all the collected forms was file and access was restricted to research only, data was enter in Microsoft excel worksheet (2007), data was cross check for any data entry error.

Descriptive data was presented as: qualitative data as frequency/percentage, quantitative data as mean & SD with 95% of confidence of interval for normal distribution data or median and IQR for non normal distribution data.

Analytical Statistics:- quantitative data, unpaired t test was apply to find the significance of intervention and to find effect of cardiac rehabilitation program on myocardial function in patient with hypotensive-hypertension.

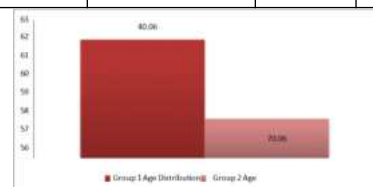
Paired t test was apply to find statistical difference between 'pre' and 'post' reading of outcome variable by using SPSS version 23 software. 'P' value of <0.05 consider statistically significant (P*).

Independent t test was used to compare the Cardiac HF-1 and WHOQOL-BREF SCALES between 2 groups by using SPSS version 23 software.

RESULT

Table 1: Age Distribution For Patients In Groups 1 (Training Group) and Group 2 (Non Training Group)

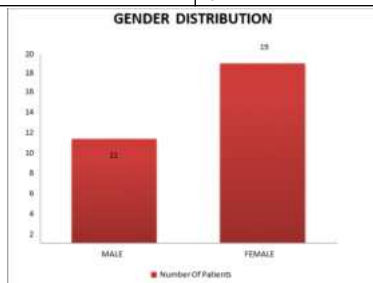
GROUP	GROUP 1 (Training Group)		GROUP 2 (Non Training Group)	
	MEAN VALUE	STANDARD DEVIATION	MEAN VALUE	STANDARD DEVIATION
AGE (YEAR)	40.06	±4.36	70.06	±10.57



Graph 1: Age Distribution For Patients In Groups 1 (Training Group) and Group 2 (Non Training Group)

Table 2: Gender Distribution Of The Patients With Hypo-Hypertension

GENDER	NUMBER OF PATIENTS
MALE	11
FEMALE	19



Graph 2: Gender Distribution Of Patients With Hypo-Hypertension**Table 3: Myocardial Perfusion (%) of the Patients with Hypo-Hypertension**

Groups	Myocardial Perfusion
Group 1 (Training Program)	21%
Group 2 (Non Training Program)	12%

Table 4: Comparison Of Pre-Post Mean Value For Cardiac scale HF-1 Within Group 1 (Training Program Group).

MRI (Training Program Group).	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN	t VALUE	p VALUE (p*)
Pre - Training	15.9333	±4.23365	1.09312	8.258	< 0.0001*
Post - Training	11.5333	±4.67312	1.20660		

p* –value < 0.05 significant, p-value > 0.05 non-significant

**Graph 4:** Comparison of Pre-Post Mean Value for Cardiac scale HF-1 within Group 1 (Training Program Group).**Table 5: Comparison of Pre-Post Mean Value For Cardiac scale HF-1 Within Group 2 (Non Training group)**

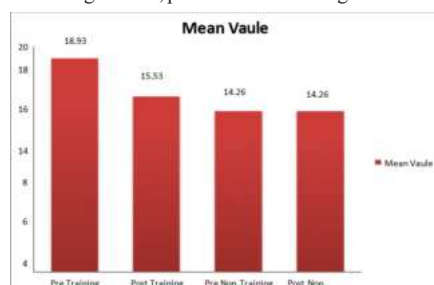
MRI (NON TRAINING GROUP)	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN	t VALUE	p VALUE (p*)
Pre – training	12.26	±5.47	1.41	6.95	<0.0001*
Post – training	12.26	±5.47	1.41		

p* –value < 0.05 significant, p-value > 0.05 non-significant

**Graph 5:** Comparison Of Pre-Post Mean Value for Cardiac scale HF-1 within Group 2 (Non Training Group).**Table 6: Comparison Of Pre-Post Mean Value of Cardiac scale HF-1 Between Group 1(Training Group) and Group 2(Non training Group)**

POST INTERVENTION VALUE (EAT-10)	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN
Shaker group (GROUP 1)	15.5333	±4.67312	1.20660
Masako group (GROUP 2)	14.2666	±5.12510	1.32330

p* –value < 0.05 significant, p-value > 0.05 non-significant

**Graph 6:** Comparison of Cardiac scale HF-1 Pre- Post score Between Groups (Training group & Non Training group) Among Patients With Hypo-Hypertension.**Table 7: Comparison Of Pre-Post Mean Value For WHOQOL - BREF Within Group 1 (Training Program Group).**

MRI (Training Program Group).	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN	t VALUE	p VALUE (p*)
Pre - Training	15.9333	±4.23365	1.09312	8.258	< 0.0001*
Post - Training	11.5333	±4.67312	1.20660		

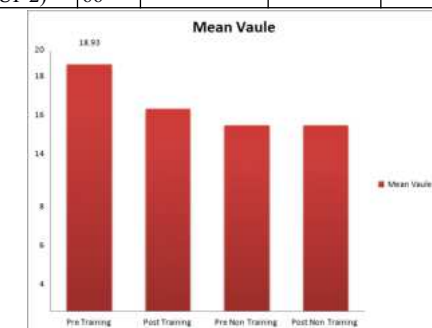
**Graph 8:** Comparison Of Pre-Post Mean Value For WHOQOL-BREF Within Group 1 (Training Program Group).**Table 8: Comparison of Pre-Post Mean Value For WHOQOL-BREF Within Group 2 (Non Training group)**

MRI (NON TRAINING GROUP)	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN	t VALUE	p VALUE (p*)
Pre – training	11.26	±5.47	1.41	6.95	<0.0001*
Post – training	11.26	±5.47	1.41		

p* –value < 0.05 significant, p-value > 0.05 non-significant

**Graph 8:** Comparison Of Pre-Post Mean Value for WHOQOL-BREF within Group 2 (Non Training Group).**Table 9: Comparison Of Pre-Post Mean Value of WHOQOL-BREF Between Group 1(Training Group) and Group 2(Non training Group)**

POST INTERVENTION VALUE (EAT-10)	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN	t VALUE	p VALUE (p)
Shaker group (GROUP 1)	15.5333	±4.67312	1.20660	1.983	<0.067
Masako group (GROUP 2)	14.2666	±5.12510	1.32330		



Graph 9: Comparison of WHOQOL-BREF Pre- Post score Between Groups (Training group & Non Training group) Among Patients With Hypo-Hypertension

DISCUSSION

The present study was undertaken to determine the efficiency of cardiac rehabilitation (Aerobic Training) on patients with myocardial infarction. Patients with myocardial infarction are at a high risk of developing Hypotensive-Hypertension, which can have a negative impact on their quality of life.^{1,27,36,37} This study included 30 myocardial infarction patients diagnosed by an cardiologist/physician. Cardiac scale HF-1 and WHOQOL- BREF were used before and after the intervention protocol to assess the severity of myocardial infarction and quality of life.

Table 1 Shows, the mean age of patients in Group 1 was 40.0667 ± 4.36 years, and the mean age of patients in Group 2 was 70.0667 ± 10.57 years. According to B.B.Hamidon et al,¹¹ Hypotensive-Hypertension increases with normal aging, owing to structural changes in heart that result in decreased pumping function and average cardiac output $11,15,23,30$. Patients over the age of 65 year are at risk of having a myocardial infraction.^{20,40} Hypotensive-Hypertension is a common complication in Hypotensive-Hypertension patients. $9,17,19,26,29$

Table 2 shows that 19 of the 30 patients were female and 11 were male. The total number of females overtaken the total number of males. However, both genders were equally affected by myocardial infarction.^{31,32,35,38}

Table 3 depicts Myocardial Perfusion of patients with Hypo-Hypertension followed by myocardial infarction. Out of 30 patients, in group 1 average 21% Myocardial perfusion and in group 2 average 12% Myocardial perfusion. Previous literature suggests that aerobic training increase the myocardial perfusion.

Table 4 compares the mean value for the Cardiac scale HF-1 within group 1 (Training Group). The mean value of the Cardiac scale HF-1 before intervention was 18.93 ± 4.23 , and the mean value after intervention was 15.53 ± 4.67 . Thus the present study concluded the Cardiac scale HF- 1 improve after the 4 weeks of Training, suggesting that aerobic training provides benefits in myocardial infarction patients. Aerobic training, according to Ole Jhoan Kemi et al,⁹ is exercise training completely restored aerobic capacity and partly or fully restores creatine and adenylate kinases, whereas losartan alone further reduced these enzymes in contrast losartan reduced left ventricle diastolic pressure, whereas exercise training had neutral effect.

Table 5 compares the mean value of the Cardiac scale HF-1 and WHOQOL-BREF scale within Group 2 (Non training Group). The mean value of the Cardiac scale HF-1 before intervention was 14.26 ± 5.47 , and the mean value after intervention was 14.26 ± 5.47 . As a result, the current study concluded that the Cardiac scale HF-1 were remaining same after 4 weeks of intervention.

Table 6 shows a comparison of mean values for the Cardiac scale HF-1 and WHOQOL-BREF between group 1 (Training Group) and 2 (Non Training Group). The mean value of the Cardiac scale HF-1 after intervention in group 1 (Training Group) was 15.53 ± 4.67 , and the mean value of the Cardiac scale HF-1 after intervention in group 2 (Non Training Group) was 14.26 ± 5.47 . So, the current study concludes that the Cardiac scale HF-1 and WHOQOL-BREF were improve after 4 weeks of intervention, but group 1 (Training Group) shows greater improvement than group 2 (Non Training Group), As a result, the current study concludes that aerobic training improved heart function and quality of life in myocardial infarction patients.

Aerobic exercise improves at cellular level cardiomyocyte fractional shortening diastolic relaxation and calcium handling improves in myocardial infarction patients. Aerobic exercises, losartan unloading the heart and training by increasing metabolic capacity. Although losartan alone mildly increased vo_2 max as well as enhance energy metabolism and transfer and increased aerobic capacity may be several mechanism by which exercise training reduces morbidity and mortality in myocardial infarction.

However, Aerobic exercise is known to enhance feeling of energy and

improve quality of life and heart function. It also improves experiences of anxiety, depression and pain and can improve sleep quality. Overall, aerobic exercise can contribute to improved physiology, which can attenuate the alterations associated with myocardial infarction.

CONCLUSION

We aimed in this study to determine the probability of getting cardiac arrest in patient with known history of panic attack. This study included 150 patients with history of panic attack were screened as per inclusion criteria. DSM-IV use for each participants to evaluate probability . The data were analyzed and result obtained that there were higher chance to develop cardiac attack in patient with history of panic attack. The study concluded according to DSM-IV criteria anxiety and panic attack consist more percentage that other categories it indicate the patient has a more chance to cardiac arrest with the history of panic attack. Moreover, DSM-IV criteria suggest that the there are changes in autonomic nervous system its common in panic attacks and anxiety so it directly develop risk of cardiac arrest.

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