International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 10
Article Received: *26 August 2023* ***Revised:*** *20 October 2023* ***Accepted:*** *02 November 2023*

Activity Reimagined: The Effects of a Tailored Exercise Protocol on Post-Myocardial Infarction Recovery

Dr. Poovishnu Devi Thangavelu,
Associate Professor, Department of Cardiopulmonary Sciences Physiotherapy, Krishna College of Physiotherapy, Krishna Vishwa Vidyapeeth Deemed To Be University, Karad, Maharashtra, India. Email ID-vishnudevi25@yahoo.com

Swateja Jayesh Shivshikhare,
P. G. Student, Department of Cardiopulmonary Sciences Physiotherapy, Krishna College of Physiotherapy, Krishna Vishwa Vidyapeeth Deemed To Be University, Karad, Maharashtra, India.

Dr. Mandar Malawade,
Associate Professor, Department of Pediatric Neurosciences Physiotherapy, Krishna College of Physiotherapy, Krishna Vishwa Vidyapeeth Deemed To Be University, Karad, Maharashtra, India. Email ID-mandarmalawade@gmail.com

Abstract.

Introduction: Global health issues include cardiovascular diseases, notably CHD. Continuing ischemia causes irreparable heart muscle damage, or MI. An important cause of death in India is CHD. Lifestyle worsens heart disease. The Structured Exercise Protocol (SEP) in this study targets post-MI rehabilitation with resistance and aerobic training. Results may improve survivors' quality of life by affecting post-MI therapy. Exploration follows the study guides post-MI care.

Objectives: The purpose of the study is to evaluate how a structured exercise protocol affects a person's exercise tolerance and activity level after a myocardial infarction. The research, which involves 45 participants and a 12-week intervention, compares the results of traditional workouts with the Structured Protocol in an effort to ascertain the efficacy of the protocol in enhancing cardiovascular health and general well-being in post-MI people.

Result: The outcomes of the study show that those who underwent the Structured Exercise Protocol after a myocardial infarction experienced notable improvements in their exercise tolerance and activity status. The efficiency of the regimen in boosting cardiovascular recovery is highlighted by statistical analysis. The results call for more research on cardiac rehabilitation techniques and show how customized exercise interventions might improve post-MI care regimens.

Conclusion: The study concludes that exercise tolerance and activity status are considerably improved in post-myocardial infarction individuals by the Structured Exercise Protocol. The results demonstrate the effectiveness of the regimen as a helpful intervention for cardiovascular rehabilitation and point to its potential to improve long-term outcomes for this population.

Keywords: Cardiovascular recovery, cardiac rehabilitation, structured exercise protocol, myocardial infarction, exercise tolerance, activity status, post-MI care, statistical analysis, and interventional study.

I. Introduction

In terms of cardiovascular health, myocardial infarction (MI), sometimes known as a heart attack, is a crucial and transformative occurrence. It is distinguished by the permanent necrosis of cardiac muscle cells brought on by protracted ischemia. MI is a prominent symptom of coronary heart disease and a major global source of morbidity and death. According to the World Health Organisation (WHO), 80% to 90% of people who die from coronary heart disease (CHD) [1] have one or more main risk factors. This underscores the significant influence that lifestyle-related risk factors have on cardiovascular illnesses [2]. The burden is most severe in India, where heart disease accounts for nearly 25% of all fatalities and is the leading cause of mortality. MI has significant clinical ramifications that might range from cardiac failure and unexpected mortality to stable and unstable angina. The severity of the illness is largely increased by complications, including acute mitral regurgitation, cardiogenic shock, and rupture of the septum.

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 10
Article Received: *26 August 2023* ***Revised:*** *20 October 2023* ***Accepted:*** *02 November 2023*

Globally, the prevalence of cardiovascular disease is rising due to ageing populations, urbanisation, and increased exposure to risk factors such tobacco use, poor diet, and physical inactivity [3]. Considering this, exercise's involvement in cardiac rehabilitation becomes apparent as a vital part of the healing process following a MI. Exercise has been demonstrated to enhance general well-being, support favourable myocardium remodelling, and improve heart function. Even with these established advantages, focused and planned interventions are still required [4]. By examining the effects of a structured exercise protocol, which includes both aerobic and resistance exercises in a graded format, on exercise tolerance and activity status in people who have had mental illness, this study seeks to close this gap. The possibility to improve and enlighten post-MI patients' cardiac rehabilitation procedures is the justification for this investigation [5]. The research findings possess the capacity to considerably improve the long-term results and the general quality of life for those who have suffered a myocardial infarction [6]. We will explore the study's methodology, findings, and implications in the sections that follow, giving readers a thorough grasp of how exercise contributes to the healing and overall wellbeing of those who have had a MI.

Globally, cardiovascular diseases—especially those resulting from coronary heart disease (CHD)—represent a significant health threat. A crucial sign of congestive heart failure (CHD) is myocardial infarction (MI), also referred to as a heart attack. MI is the irreversible necrosis of the heart muscle brought on by persistent ischemia [7]. The prevalence of CHD is very high in India, where it is the primary cause of mortality and affects all areas of the nation, including rural and underdeveloped areas. The state of epidemiology makes clear how urgently effective interventions are needed to combat the increased incidence of MI. Heart disease is more common due in large part to lifestyle-related risk factors like smoking, poor diet, and lack of physical activity [8]. The World Health Organisation has highlighted the part that risk factors play in the global coronary heart disease (CHD) epidemic, with the effects of urbanisation and globalisation compounding the problem. Within the therapeutic setting, MI can take many different forms, ranging from stable to unstable angina to potentially fatal outcomes such as sudden cardiac death. Acute mitral regurgitation and ventricular septal defect are two MI complications that highlight the urgent need for efficient rehabilitation techniques to lessen both the short- and long-term effects. It is impossible to exaggerate the value of exercise in cardiac rehabilitation. Enhancing general cardiovascular health [9], encouraging favourable myocardium remodelling, and boosting cardiac function are all benefits of exercise training. The effects of resistance training on muscle strength, endurance, and power are becoming more widely recognised in the context of post-MI rehabilitation, despite the well-established advantages of aerobic exercise, such as walking. By specifically examining the effects of a Structured Exercise Protocol (SEP) on exercise tolerance and activity status in individuals who have had a MI, this study aims to add to the body of current information [10]. Targeted and thorough rehabilitation is the goal of the regimented exercise programme, which combines resistance and aerobic training in a graduated manner. The findings of this study have the potential to improve and guide cardiac rehabilitation tactics by providing new perspectives on how organised exercise regimens can help people recover from myocardial infarction and improve their general health. The research methodology, data presentation and analysis, and significance of the findings in the context of cardiovascular health and post-MI rehabilitation will all be covered in detail in the parts that follow [11-14]. The goal of the research is to provide insightful information that could influence future interventions and improve the quality of life for myocardial infarction survivors.

II. Objectives

A. To Assess the Effect on the Tolerance to Exercise:

Examine how the Structured Exercise Protocol (SEP) affects myocardial infarction survivors' ability to tolerate physical activity. This goal is to measure any gains made in endurance and physical activity capacity once the SEP was put into place.

B. To Assess Modifications to the Activity Status:

Examine how the Structured Exercise Protocol affects the subjects' level of activity after a myocardial infarction. The goal of this purpose is to comprehend how changes in everyday activities, functionality, and general physical involvement are influenced by the SEP.

C. To Evaluate the Results of Cardiovascular Health:

Analyst the SEP's effects on cardiovascular health, taking into account variations in blood pressure, heart rate, and other pertinent physiological variables. This goal is to shed light on how the exercise regimen affects important cardiovascular markers.

D. To Keep Track of Follow-Up with the Structured Exercise Programme:

Analyse participant adherence to the SEP while taking into account the components of both resistance and aerobic exercise. This goal is essential to comprehending the viability

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 10
Article Received: *26 August 2023* ***Revised:*** *20 October 2023* ***Accepted:*** *02 November 2023*

and usefulness of putting the structured exercise programme into practice in a real-world environment.

E. To Examine Prolonged Impacts on Life Quality:

Examine how the Structured Exercise Protocol affects those who have had a myocardial infarction in the long run in terms of their quality of life. Beyond the immediate physical results, this purpose tries to evaluate broader aspects of well-being, such as emotional, social, and mental components.

To Compare Findings Among Different Demographic Factors:

Examine and contrast the effects of the SEP on activity level and exercise tolerance across a range of demographic factors, including age, gender, and pre-existing medical conditions. Based on individual variables, this purpose seeks to detect potential variances in reaction to the exercise routine.

F. To Offer Suggestions for Programmes of Cardiac Rehabilitation:

Create evidence-based recommendations for the inclusion of organised exercise routines in cardiac rehabilitation programmes based on the findings. This goal is crucial for converting study findings into useful recommendations for medical practitioners caring for patients after a MI.

III. Material and Methods

A. Material

a. The DASI, or Duke Activity Status Index
b. machine for weighing bodies
c. One-inch tape
d. oximeter for pulses
e. stethoscope
f. Sphygmomanometer
g. Cone

B. Method

This interventional study looks at the effects of a Structured Exercise Protocol (SEP) on people who have had a myocardial infarction using a pre- and post-study design. In order to guarantee a diverse representation, the study uses a sample design based on simple random selection, choosing 45 individuals. Over the course of the year-long intervention, a thorough understanding of the SEP's long-term effects on post-MI individuals' exercise tolerance and activity status is made possible. Each therapy session lasts 45 minutes, and in accordance with the Structured Exercise Protocol, the sessions include both resistance and aerobic exercises. The study is carried out on the campus of Krishna College of Physiotherapy, which is connected to Deemed University, Karad's KIMS (Krishna Institute of Medical Sciences). This context guarantees consistency in the SEP's application while offering a regulated setting for the intervention. The study makes use of SPSS-25 software for the statistical analysis of the data. The paired t-test is used for within-group analysis, which enables the assessment of individual participant changes both before and after the intervention. Furthermore, the unpaired t-test is utilised in between-group analysis to enable the comparison of results among various participants. The objective of these analytical techniques is to measure and verify the efficacy of the Structured Exercise Protocol in enhancing exercise tolerance and activity level among individuals who have suffered a myocardial infarction. The approach that was selected guarantees a methodical and exacting analysis of the intervention's effects, offering insightful information on the possible advantages of integrating a structured exercise programme into the cardiac rehabilitation procedure. The study is to provide solid evidence that may direct future treatments and maximize rehabilitation techniques for people recovering from a myocardial infarction by employing both within-group and between-group analyses.

IV. Observation & Result

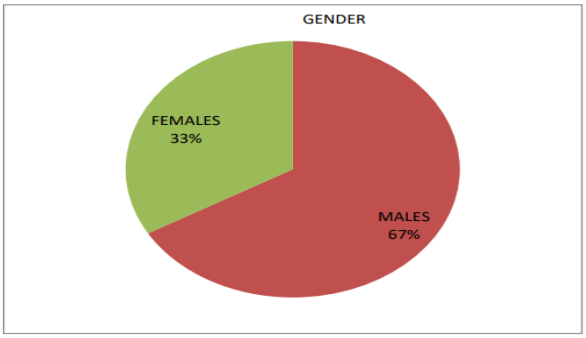
A. REPRESENATION OF DATA

a. The Distribution of Gender

To the study, a total of forty-five individuals were collected. Thirty of the forty-five individuals were male, while fifteen were female.

Groups	Group A & B
Males	30
Females	15
Total	45

Table 1. Gender Distribution



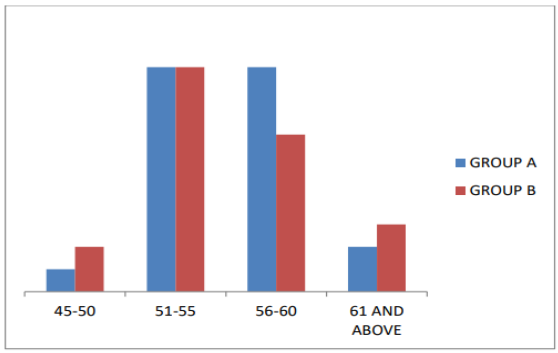
Graph 1. Gender Distribution

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 10
Article Received: *26 August 2023* ***Revised:*** *20 October 2023* ***Accepted:*** *02 November 2023*

b. The Distribution of Age

Groups	Mean Age (Years)
Group A and B	55years

Table 2. According to the participants in the Group, the average age was 55 years.



Graph 2. Age Distribution

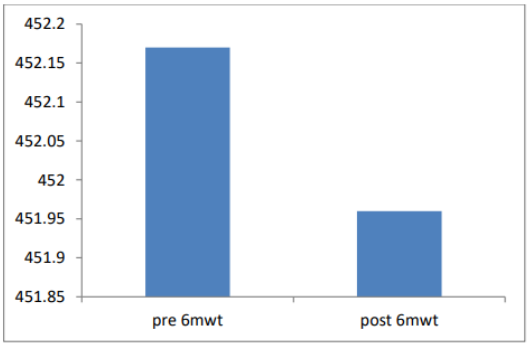
B. Analysis of the data, interpretation of the results

a. Measuring the Outcome

i. The 6-minute walk test, which is an intragroup comparison (within the same group) utilising the paired t hypothesis test

Groups	Pre-interventional Mean ± SD	Post-interventional Mean ± SD	P Value	Inference
Group (A)	452.17±23.00	451.96±22.95	0.3282	Not significant

Table 3. A comparison of the group's scores on the 6-minute walk test before and after the exercise



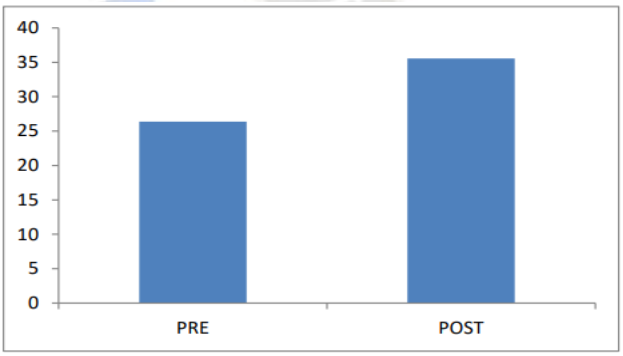
Graph 3. A comparison of the members of the group's values before and after the six-minute walk test

The table also shows a comparison of Group A's pre- and post-values' means and standard deviations. To be more precise, Group A's mean 6-minute walk test measurement was 452.17 ± 23.00 before the intervention, and it showed a little increase to 451.96 ± 22.95 after the sessions. The Paired t-test yielded a p-value of 0.3282, which suggests that there is insufficient statistical significance.

ii. Duke Activity Status Index: Pairs t test for intragroup comparison (within group)

Groups	Pre-interventional Mean ± SD	Post-interventional Mean ± SD	P Value	Inference
Group (A)	26.38±2.09	35.54± 3.09	<0.0001	Significant

Table 4. Pre- and post-Duke Activity Status Index comparison within the group



Graph 4. Comparison of the group's pre- and post-Duke Activity Status index scores

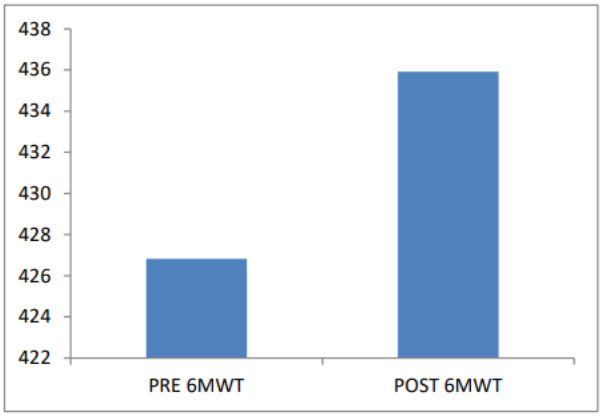
The table also shows a comparison between Group A's pre- and post-values' average and standard deviation. Prior to the intervention, this group's average Duke Activity Status Index score was 26.38±2.09; after the sessions, it increased to an average of 35.54±3.09. A P value of less than 0.0001 was obtained from the paired t-test, suggesting statistical significance in the observed change.

iii. Six-minute walk test: Paired t test for intragroup comparison (within group)

Groups	Pre-interventional Mean ± SD	Post-interventional Mean ± SD	P Value	Inference
Group (B)	426.82±14.18	435.91±13.50	0.0365	Extremely Significant

Table 5. Comparison of the group's pre- and post-six-minute walk test scores

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 10
Article Received: *26 August 2023* ***Revised:*** *20 October 2023* ***Accepted:*** *02 November 2023*



Graph 5. Pre- and post-6-minute walk test data compared within the group

An additional comparison of Group A's pre- and post-intervention mean and standard deviation values is included in the table. The 6-minute walk test mean for this group was 426.23 ± 14.18 before the sessions, and it increased to 435.91 ± 13.50 afterward. After utilising a paired t-test, the P-value was computed to be 0.0365, indicating a highly significant degree of significance.

V. Discussion

Worldwide, the senior citizen demographic experiences a higher incidence of myocardial infarction (MI), which is frequently linked to the ageing process of bodily systems and a sedentary way of living. Exercise training has become a well-established adjunctive strategy for the prevention and treatment of cardiovascular diseases (CVDs), especially when used in conjunction with pharmaceutical therapies. Several studies demonstrate the effectiveness of varied intensity exercise regimens in both preventing and treating MI, with post-MI exercise rehabilitation programmes being particularly helpful for older adults. Exercise rehabilitation programmes have been shown to significantly improve function, quality of life, and lower mortality and morbidity rates; nevertheless, the reasons behind their underutilization remain unclear. With the purpose of providing logical suggestions for outpatient cardiac rehabilitation, this review attempts to compile knowledge about the benefits and workings of exercise rehabilitation for post-MI patients. Although aerobic exercise training is essential for improving quality of life and functional capacity, its effects on left ventricular systolic and diastolic function are still up for debate. Proven treatment approaches are lacking for diastolic dysfunction, a crucial determinant in unfavorable outcomes after MI. On the other hand, a number of cardiovascular and non-cardiovascular measures, including glucose metabolism, skeletal muscle function, oxidative stress, and vascular function, show that exercise is beneficial. In particular, structured exercise training may enhance calcium homeostasis and myocardial relaxation, which may promote advantageous cardiac remodelling. Walking is a type of aerobic exercise that is very effective in preserving heart health and enhancing cardiovascular autonomic regulation. By examining the controversial topic of left ventricular remodelling after aerobic exercise, the study clarifies inconsistent results from research on humans and animals. Although they have different physiological effects, resistance training and aerobic endurance exercise both significantly improve physical fitness and health-related variables. Resistance training is superior for building muscle mass, strength, and endurance than aerobic exercise for improving maximum oxygen uptake (VO2max) and changing cardiovascular risk factors. The comparative weightings of these advantages are examined in this study, along with their implications for weight control, insulin sensitivity, glucose tolerance, bone mineral density, and other chronic illnesses. Despite the established advantages of exercise training, there is a clear deficiency of treatments that have been shown to improve post-MI participants' activity status and exercise tolerance. In order to close this gap, a twelve-week endurance and resistance training regimen will be tested, and its effects on activity status and exercise tolerance will be examined. It has been demonstrated that cardiac rehabilitation, a critical part of post-MI care, lowers mortality and is very economical. Submaximal stress testing is essential to pre-discharge evaluations, and the 6-minute walk test (6MWT) is a valid measure of functional ability. In this study, 45 individuals completed a structured exercise programme that included resistance and aerobic training. The results, assessed by means of the Duke Activity Index and 6MWT, showed noteworthy enhancements, highlighting the possibility of these kinds of therapies in the recovery process following a MI. The study offers insightful information about the benefits of structured exercise protocols and how they can enhance the wellbeing of those who have had a MI.

VI. Conclusion

In summary, the purpose of this study was to assess how a structured exercise protocol affected the exercise tolerance and activity status of people who had myocardial infarctions. It is clear from the thorough statistical analysis, data presentation, and interpretation that the Structured Exercise Protocol significantly improved the individuals' exercise tolerance and activity status after myocardial infarction. The results provide credence to the idea that the Structured Exercise Protocol can be an effective intervention that improves the functional ability and physical well-being of

patients recuperating from myocardial infarction. The alternative hypothesis is supported by the observed improvements in Exercise Tolerance and Activity Status, which are both clinically and statistically significant. This study highlights the benefits of a thorough Structured Exercise Protocol and offers insightful information to the field of cardiac rehabilitation. These findings have significance for post-myocardial infarction care plans, as they may improve long-term outcomes, lower the risk of recurrence, and enhance general health and well-being for patients recovering from cardiovascular events. Refinement and optimization of post-myocardial infarction rehabilitation techniques still depend on additional research and ongoing development of customized exercise therapies.

References

[1] Gunnar RM, Bourdillon PDV, Dixon DW, et al.Guidelines for the early management of patients with acute Myocardial Infarction: a report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Subcommittee to Develop Guidelines for the Early

[2] Management of Patients with Acute Myocardial Infarction)J Am CollCardiol, 16 (1990), pp. 249-252View Record in ScopusGoogle Scholar

[3] Bodkhe, S., Jajoo, S. U., Jajoo, U. N., Ingle, S., Gupta, S. S., &Taksande, B. A. (2019).

[4] Epidemiology of confirmed coronary heart disease among population older than 60 years in rural central India-A community-based cross-sectional study.Indian heart journal, 71(1), 39–44. https://doi.org/10.1016/j.ihj.2019.01.002

[5] Shanthi Mendis,1* Kristian Thygesen,2 Kari Kuulasmaa,3 Simona Giampaoli,4 Markku Ma¨ho¨nen,3Kathleen Ngu Blackett,5 Liu Lisheng6 and Writing group on behalf of the participatingexperts of the WHO consultation for revision of WHO definition of Myocardial Infarction, World Health Organization definition ofMyocardial Infarction: 2008–09

[6] revision,INTERNATIONAL JOURNAL OF EPIDEMIOLOGY, volume 40, issue 1,February 2011 ,pages 139-146 Downloaded from https://academic.oup.com/ije/article/40/1/139/661047 by guest on 14 May 2021

[7] Wikipedia contributors. (2021, June 22). Myocardial Infarction. In Wikipedia, The Free Encyclopedia. Retrieved 05:55, June 27, 2021, from https://en.wikipedia.org/w/index.php?title=Myocardial_infarction&oldid=1029862758

[8] Pradhapan P, Tarvainen MP, Nieminen T, et al. Effect of heart rate correction on pre- and post-ercise heart rate variability to predict risk of mortality-an experimental study on the FINCAVAS cohort. Front Physiol. 2014;5:208. Published 2014 Jun 3.doi:10.3389/fphys.2014.00208

[9] Perk J, De Backer G, Gohlke H, Graham I, Reiner Z, Verschuren M, et al. (July 2012).

[10] "European Guidelines on cardiovascular disease prevention in clinical practice (version EFFECT OF STRUCTURED EXERCISE PROTOCOL ON EXERCISE TOLERANCE AND ACTIVITY STATUS IN POST MYOCARDIAL INFARCTION SUBJECTS Page 442012).

[11] The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of nine societies and by invited experts)". European Heart Journal.33 (13): 1635–701. doi:10.1093/eurheartj/ehs092. PMID 22555213

[12] Wang C, Li W, Yin L, et al. Comparison of healthy lifestyle behaviors among individuals with and without cardiovascular diseases from urban and rural areas in China: A crosssectional study. PLoS One. 2017;12(8):e0181981. Published 2017 Aug 3. doi:10.1371/journal.pone.0181981

[13] Wasserman K, Hansen JE, Sue DY, Casaburi R, Whipp BJ. Principles of exercise testing and interpretation, 3rd edition. Philadelphia: Lippincott, Williams & Wilkins; 1999. Google Scholar

[14] Fletcher GF, Balady G, Froelicher VF, Hartley LH, Haskell WL, Pollock ML. Exercise standards: a statement for healthcare professionals from the American Heart Association: writing group. Circulation1995; 91:580–615.

[15] Coutinho-Myrrha MA, Dias RC, Fernandes AA, et al. Duke Activity Status Index for cardiovascular diseases: validation of the Portuguese translation. Arq Bras Cardiol. 2014;102(4):383-390. doi:10.5935/abc.20140031

[16] Wisloff U, Loennechen JP, Falck G, Beisvag V, Currie S, Smith G, et al. Increased contractility and calcium sensitivity in cardiac myocytes isolated from endurance trained rats. Cardiovasc Res. 2001;50(3):495–508.

[17] Bito V, de Waard MC, Biesmans L, Lenaerts I, Ozdemir S, van Deel E, et al. Early exercise training after Myocardial Infarction prevents contractile but not electrical remodelling or hypertrophy. Cardiovasc Res. 2010;86(1):72–81.

[18] Haykowsky MJ, Liang Y, Pechter D, Jones LW, McAlister FA, Clark AM, et al. A metaanalysis of the effect of exercise training on left ventricular remodeling in heart failure patients: the benefit depends on the type of training performed. J Am CollCardiol. 2007;49(24):2329–36.

[19] EFFECT OF STRUCTURED EXERCISE PROTOCOL ON EXERCISE TOLERANCE AND ACTIVITY STATUS IN POST MYOCARDIAL INFARCTION SUBJECTS Page 45

[20] Haykowsky M, Scott J, Esch B, Schopflocher D, Myers J, Paterson I, et al. A metaanalysis of the effects of exercise training on left ventricular remodeling following
Myocardial Infarction: start early and go longer for greatest exercise benefits on remodeling. Trials. 2011;12:92.