

Frequency, intensity and duration of routine rehabilitation exercises practiced by patients with coronary artery disease

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Abstract

Objective: To determine the frequency, intensity and duration of routine rehabilitation exercises practiced by patients with coronary artery disease.

Method: The cross-sectional descriptive study was conducted from February to June 2019 in different hospitals of Lahore, Pakistan, and comprised coronary artery disease patients of either gender aged 35-65 years. Data was collected using an interview-based questionnaire. Data was analysed using SPSS 25.

Results: Of the 186 subjects, 105(56.5%) were males and 81(43.5%) were females. Overall, 72(38.7%) subjects were aged 52-62 years. Of the total, 117(62.9%) subjects practiced brisk walking as their routine rehabilitation exercise; 57(48.7%) doing it 3 times per week. All of these 117(100%) subjects practiced it for 10-20 minutes.

Conclusion: Brisk walking was mostly practiced by coronary artery disease patients for 10-20 minutes 3 times per week.

Keywords: Coronary artery disease, Exercise-based cardiac rehabilitation, Aerobic exercise. (JPMA 71: 1399; 2021)

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Introduction

Cardiovascular diseases (CVDs) remain the leading cause of physical disability and deaths worldwide. Approximately 40% of these deaths are ascribed to coronary artery disease (CAD).¹ It is one of the major causes of morbidity and mortality rates in the elderly population. Even the World Health Organisation (WHO) estimated that around 17.5 million, or around 31%, deaths per year are credited to CVDs out of which 85% occur due to heart attacks and stroke.^{2,3} There are many risk factors both adjustable and non-adjustable that are attributed to CAD and are also well-documented in many areas.^{4,5} One of the chief causes of CAD-related morbidity is atherosclerosis, which is a long-term process that begins with fatty lesions progressing to stenosis of coronary arteries that later exhibit as angina, or chest pain, or myocardial infarction (MI), or heart attack, and if this blockage reaches the brain, it can lead to stroke.^{6,7}

Other risk factors include physical inactivity, tobacco use, alcohol abuse and inadequate diet. Physical activity plays a crucial role in health improvement and enhancement. Other than physical inactivity, another primary cause that can lead to CAD is inappropriate diet which will ultimately result in conditions like obesity or overweight.⁸ The prevalence of obesity is drastically increasing, with 5.2% females and 1.6% males being obese at the minor age of 15 years.⁹

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Regardless, of being preventable and treatable, CAD is still one of the major causes of mortality rates and this burden is likely to increase two-fold which is an alarming situation.¹⁰ CAD prevalence among Pakistani population is higher and 30% of the population age >40 are most likely to be affected by the disease.¹¹ Exercise-based cardiac rehabilitation (CR) has been known to be favourable in CAD patients and it improves their quality of life (QOL), exercise tolerance, measured through aerobic capacity (peakVO₂) and cardiac-related morbidity and mortality rates in which men, with a peakVO₂ (mL·kg⁻¹·min⁻¹) below ~15 were more prone to higher risk, whereas a peakVO₂ above ~19 were associated with a low rate. Similarly, among women, a peakVO₂ below ~12 were more prone to higher risk, whereas those with peakVO₂ above ~16.5 were associated with the lowest rate.¹²

Frequency, intensity and duration of exercise are important factors for CR, but intensity is an important predictor of determining the effectiveness of an exercise programme.¹³ Studies have shown that higher intensity interval training (HIIT) is more effective than continuous training at moderate level.¹⁴⁻¹⁶

Physical fitness is also important for CAD patients and is also one of the basics of CR. It helps in decreasing morbidity and mortality rates in cardiac patients. Physical fitness can be determined by different scales, such as Patient Specific Functional Scale (PSFS) and Disability Rating Index (DRI).¹⁷

Patients with CAD are often stressed out, and CR is

introduced in such cases. The main goal of CR is to improve QOL by reducing stresses that will ultimately improve cardiac function.¹⁸

The American Heart Association (AHA) and the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) and other well-established organisations also recommend providing comprehensive CR. The aim included patient's assessment, weight control, blood pressure (BP) management, lipid profile, management of diabetes, smoking cessation, psychosocial management and an adequate exercise training programme. The goal is optimising CVD risks reduction, reducing chances of disabilities and motivating patients to live active and healthy lifestyle.¹⁹

Liou K. et al. compared HIIT with moderate-intensity continuous training (MICT) to see which had better effect on CAD patients. There was incremental increase in VO₂ in those who performed HIIT rather than MICT.¹⁶

Armstrong M.J., et al. reported that patients with diabetes could not complete the programme. Those who completed CR despite having diabetes had reduced mortality rates.²⁰

Szylinska A. et al. concluded that InPhysio patients showed better improvements with very less decrease in forced vital capacity (FVC) between initial and final tests.²¹

The current study was planned to determine routine rehabilitation exercises of CAD patients.

Patients and Methods

Cross-sectional descriptive study was conducted in University of Lahore, while patients were recruited from different settings of Lahore such as Jinnah Hospital and Punjab institute of cardiology. The sample size was calculated using the formula $n = Z^2 * P * (1-P) / d^2$, with anticipated population proportion (P) 86%, absolute precision required (d) 5% and significance (α) 5%.

Those included were patients of either gender aged 35-65 years having myocardial infarction (MI), post-coronary artery bypass grafting (CABG) surgery and stable angina. Patients having unstable angina, exertional angina and multiple organ failure were excluded. Data was collected using an interview-based questionnaire. This questionnaire was specifically designed to determine frequency, intensity and

duration of exercise practiced by CAD patients according to their condition. Age, occupation, physical activities, BP, blood cholesterol, family history of chronic disease, patient history were noted. Also, search engines, such as Google Scholar, PubMed and PEDro, were used to retrieve information regarding the current research on the topic.

Data was analysed using SPSS 25. Descriptive statistics, including frequencies and percentages, were calculated for each variable.

Results

Of the 186 subjects, 105(56.5%) were males and

Table: Type, frequency and duration of exercises performed by coronary artery disease (CAD) patients.

Determinants of exercises	Components	Frequency	Percent
Type of exercise	Brisk walking	117	62.9
	Cycling	3	1.6
	Treadmill	5	2.7
	Combination of above exercises	25	13.4
	Other exercises	3	1.6
	No exercise	33	17.7
Frequency of exercise (Times/week)	Once	1	0.5
	2 times	43	23.1
	3 times	57	30.6
	4 times	21	11.3
	More than that	28	15.1
	None	36	19.4
Duration of exercise	3-5 min	10	5.4
	10-20 min	117	62.9
	20-30 min	22	11.8
	>30 min	1	0.5
	<3min	36	19.4

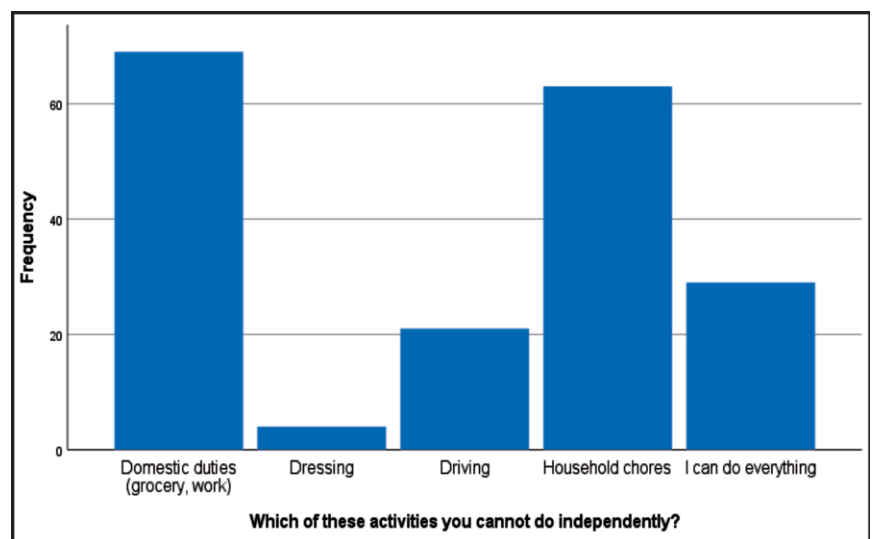


Figure: Activities that were not performed independently after cardiac incidents.

81(43.5%) were females. Overall, 72(38.7%) subjects were aged 52-62 years. Of the total, 117(62.9%) subjects practiced brisk walking as their routine rehabilitation exercise; 57(48.7%) doing it 3 times per week. All of these 117(100%) subjects practised it for 10-20 minutes(Table).

Besides, 69(37.1%) subjects faced difficulties in performing certain activities of daily life, such as domestic duties involving grocery, work etc., while 63(33.9%) faced problems while performing household chores (Figure).

Discussion

Findings showed 62.9% of the CAD patients preferred brisk walking as their routine rehabilitation exercise.

Conraads VM et. al. concluded that aerobic interval training was considered the best for such patients.¹⁵ It was also noted in the current study that many CAD patients were not very fond of CR. Cesar LAM et. al.said higher intellectual level or family income was directly related with better knowledge on the efficacy of CR.²² Anderson et al. supported the idea of exercise-based CR for reducing mortality rate and improving QOL.²³ Diabetes and hypertension are consistent risk factors for this malady accompanied with physical inactivity and unhealthy diet. Diabetes is considered the root cause of CAD, accounting for 80% of CVD deaths.²⁴ On the other hand, hypertension is also considered a menace. It can lead to major diseases, such as cerebrovascular disease and chronic kidney disease (CKD). Its prevalence rate is more than its control rate. It is known that hypertension causes 45% of CAD and is also the leading cause of stroke.^{25,26} The current study showed many subjects (24.7%) were diabetic, many were bound to bed-rest due to society norms of cardiac patients, while 30.1% subjects were hypertensive.

Physical inactivity and smoking also play significant roles in this regard. Pakistan has been ranked 9th in terms of obesity, and there are greater chances of its rise in the near future. Obesity engulfs every category, including child, adult and older people, regardless of gender.²⁷

A study stated that from the past decades, cardiologists have provided acute management and now it involves multidisciplinary approach, including acute management, life-saving management and pharmacological treatment.²⁸ It also suggested the need for CR as it covers every boundary to enhance health-related QOL in cardiac patients. It proposed establishment of CR centres across the country in every hospital unit as cardiac diseases are now increasing at an alarming pace.²⁸

Conclusion

Brisk walking was the CVR of choice for most CAD patients among whom many were facing difficulties in performing simple domestic activities. Exercise-based CR is a must for cardiac patients and the study population was not found to be particularly inclined towards CR.

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Conflict of Interest: None.

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References

1. Bruning RS, Sturek M. Benefits of exercise training on coronary blood flow in coronary artery disease patients. *Prog Cardiovasc Dis* 2015;57:443-53. doi: 10.1016/j.pcad.2014.10.006.
2. Goyal A, Kahlon P, Jain D, Soni RK, Gulati R, Chhabra ST, et al. Trend in prevalence of coronary artery disease and risk factors over two decades in rural Punjab. *Heart Asia* 2017;9:e010938. doi: 10.1136/heartasia-2017-010938.
3. Yusuf S, Rangarajan S, Teo K, Islam S, Li W, Liu L, et al. Cardiovascular risk and events in 17 low-, middle-, and high-income countries. *N Engl J Med* 2014;371:818-27. doi: 10.1056/NEJMoa1311890.
4. Chen CH, Chen YJ, Tu HP, Huang MH, Jhong JH, Lin KL. Benefits of exercise training and the correlation between aerobic capacity and functional outcomes and quality of life in elderly patients with coronary artery disease. *Kaohsiung J Med Sci* 2014;30:521-30. doi: 10.1016/j.kjms.2014.08.004.
5. Deaton C, Froelicher ES, Wu LH, Ho C, Shishani K, Jaarsma T. The global burden of cardiovascular disease. *Eur J Cardiovasc Nurs* 2011;10(Suppl 2):s5-13. doi: 10.1016/S1474-5151(11)00111-3.
6. McGill HC Jr, McMahan CA, Zieske AW, Tracy RE, Malcom GT, Herderick EE, et al. Association of Coronary Heart Disease Risk Factors with microscopic qualities of coronary atherosclerosis in youth. *Circulation* 2000;102:374-9. doi: 10.1161/01.cir.102.4.374.
7. World Health Organization, World Heart Federation, World Stroke Organization. Global atlas on cardiovascular disease prevention and control. In: Mendis S, Puska P, Norrving B, eds. Geneva, Switzerland: WHO Press; 2011.
8. Shahid SU, Shabana, Rehman A, Hasnain S. Role of a common variant of Fat Mass and Obesity associated (FTO) gene in obesity and coronary artery disease in subjects from Punjab, Pakistan: a case control study. *Lipids Health Dis* 2016;15:29. doi: 10.1186/s12944-016-0200-0.
9. Shabana NA, Hasnain S. Association of the leptin receptor Gln223 Arg polymorphism with lipid profile in obese Pakistani subjects. *Nutrition* 2015;31:1136-40. doi: 10.1016/j.nut.2015.05.001.
10. Abraham G, Bhalala OG, de Bakker PI, Ripatti S, Inouye M. Towards a molecular systems model of coronary artery disease. *Curr Cardiol Rep* 2014;16:488. doi: 10.1007/s11886-014-0488-1.
11. Nuri MMH, Nawaz A, Usman H. A proposed study of risk factors of heart disease in rural population of Punjab (Pakistan) — time to act!. *Pak Heart J* 2006;39:42-7.
12. Keteyian SJ, Brawner CA, Savage PD, Ehrman JK, Schairer J, Divine G, et al. Peak aerobic capacity predicts prognosis in patients with coronary heart disease. *Am Heart J* 2008;156:292-300. doi: 10.1016/j.ahj.2008.03.017.
13. Rankin AJ, Rankin AC, MacIntyre P, Hillis WS. Walk or run? Is high-intensity exercise more effective than moderate-intensity exercise at reducing cardiovascular risk? *Scott Med J* 2012;57:99-102. doi: 10.1258/smj.2011.011284.

14. Mezzani A, Hamm LF, Jones AM, McBride PE, Moholdt T, Stone JA, et al. Aerobic exercise intensity assessment and prescription in cardiac rehabilitation: a joint position statement of the European Association for Cardiovascular Prevention and Rehabilitation, the American Association of Cardiovascular and Pulmonary Rehabilitation and the Canadian Association of Cardiac Rehabilitation. *Eur J Prev Cardiol* 2013;20:442-67. doi: 10.1177/2047487312460484.
15. Conraads VM, Pattyn N, De Maeyer C, Beckers PJ, Coeckelberghs E, Cornelissen VA, et al. Aerobic interval training and continuous training equally improve aerobic exercise capacity in patients with coronary artery disease: the SAINTEX-CAD study. *Int J Cardiol* 2015;179:203-10. doi: 10.1016/j.ijcard.2014.10.155.
16. Liou K, Ho S, Fildes J, Ooi SY. High Intensity Interval versus Moderate Intensity Continuous Training in Patients with Coronary Artery Disease: A Meta-analysis of Physiological and Clinical Parameters. *Heart Lung Circ* 2016;25:166-74. doi: 10.1016/j.hlc.2015.06.828.
17. Wittboldt S, Cider Å, Bäck M. Reliability of two questionnaires on physical function in patients with stable coronary artery disease. *Eur J Cardiovasc Nurs* 2016;15:142-9. doi: 10.1177/1474515115593840.
18. Tarride JE, Lim M, DesMeules M, Luo W, Burke N, O'Reilly D, et al. A review of the cost of cardiovascular disease. *Can J Cardiol* 2009;25:e195-202. doi: 10.1016/s0828-282x(09)70098-4.
19. Tessler J, Bordoni B. *Cardiac Rehabilitation*. Treasure Island, FL: StatPearls Publishing; 2021.
20. Armstrong MJ, Sigal RJ, Arena R, Hauer TL, Austford LD, Aggarwal S, et al. Cardiac rehabilitation completion is associated with reduced mortality in patients with diabetes and coronary artery disease. *Diabetologia* 2015;58:691-8. doi: 10.1007/s00125-015-3491-1.
21. Szylińska A, Listewnik M, Rotter I, Rył A, Kotfis K, Mokrzycki K, et al. The Efficacy of Inpatient vs. Home-Based Physiotherapy Following Coronary Artery Bypass Grafting. *Int J Environ Res Public Health* 2018;15:e2572. doi: 10.3390/ijerph15112572.
22. César LAM. Cardiovascular Rehabilitation in Coronary Artery Disease and Better Knowledge of Its Own Disease. *Arq Bras Cardiol* 2019;112:85-6. doi: 10.5935/abc.20180258.
23. Anderson L, Oldridge N, Thompson DR, Zwisler AD, Rees K, Martin N, et al. Exercise-Based Cardiac Rehabilitation for Coronary Heart Disease: Cochrane Systematic Review and Meta-Analysis. *J Am Coll Cardiol* 2016;67:1-12. doi: 10.1016/j.jacc.2015.10.044.
24. Zaman MU, Fatima N. Diabetes and Coronary Artery Disease: Role of Functional Imaging. *J Coll Physicians Surg Pak* 2017;27:529-31.
25. Shafi ST, Shafi T. A survey of hypertension prevalence, awareness, treatment, and control in health screening camps of rural central Punjab, Pakistan. *J Epidemiol Glob Health* 2017;7:135-40. doi: 10.1016/j.jegh.2017.01.001.
26. Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A, et al. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA* 2013;310:959-68. doi: 10.1001/jama.2013.184182.
27. Ahmad S, Zhao W, Renström F, Rasheed A, Samuel M, Zaidi M, et al. Physical activity, smoking, and genetic predisposition to obesity in people from Pakistan: the PROMIS study. *BMC Med Genet* 2015;16:114. doi: 10.1186/s12881-015-0259-x.
28. Arabia DHA, Rathore FA, Mansoor SN. Cardiac Rehabilitation as a Continuum of Care and Current Situation in Pakistan. *J Coll Physicians Surg Pak* 2018;28:412-13. doi: 10.29271/jcpsp.2018.05.412