

The Effect of Cardiac Rehabilitation Program on Depression in Patients After Acute Coronary Events

Alsiofy SA, Elfiky E, Shabana AM* and Raymond R

Department of Cardiology, Faculty of Medicine, Ain Shams University, Egypt

*Corresponding author:

Sarah Ahmed Alsiofy,
Department of Cardiology, Faculty of Medicine,
Ain Shams University, Egypt

Received: 02 Jan 2024

Accepted: 27 Jan 2024

Published: 02 Feb 2024

J Short Name: ACMCR

Copyright:

©2024 Shabana AM. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially

Citation:

Shabana AM, The Effect of Cardiac Rehabilitation Program on Depression in Patients After Acute Coronary Events. *Ann Clin Med Case Rep.* 2024; V12(14): 1-4

Keywords:

Coronary heart disease; Depression;
Cardiac rehabilitation program; CR; Prevention

1. Abstract

1.1. Background: Cardiac Rehabilitation (CR) is a multidisciplinary approach for secondary prevention of coronary heart diseases as well as its comorbid psychological disorders such as depression. Its importance is not well established like other secondary prevention measures although it is one of the most cost-effective methods.

1.2. Objectives: The aim of this study is to examine the effect of the cardiac rehabilitation on depression symptoms in patients after acute coronary events and potential improvement in patient prognosis and reduction of overall morbidity and mortality.

1.3. Methods: This analysis is a double armed intervention study that was conducted in the period between March 2018 and August 2018 on 60 patients who were referred to the CR clinic after surviving acute coronary events. Patient selection was done so that a study group of 30 patients who completed the CR program and a control group of 30 patients who dropped out early from the CR program were included. It included mainly Egyptian patients who were referred the Ain Shams University Hospital CR clinic. The patients were studied as regard their full history and examination, and their psychological status was assessed using the Patient Health Questionnaire 9 (PHQ-9) before and after the rehabilitation program. Verbal consent was taken from each patient, confidentiality was ensured, patients were informed about findings in their results and they had the right to refuse inclusion.

1.4. Results: The study included a majority of male patients: 51 male patients (85%) and 9 female patients (16.5%). The mean age

was 52 years. 15% of the patients were diabetic and 40% hypertensive, 46.7% were smokers and 48.3% were dyslipidemic. There was no statistically significant correlation between age, gender and risk factors and whether or not the patients completed the cardiac rehabilitation program or dropped out. Most patients were presenting after anterior STEMI (63.3%) followed by inferior STEMI (21.7%) with a minority of NSTEMI-ACS patients (15%). There was a statistically significant effect of the CR on the CCS class but not on the NYHA class. The median PHQ-9 score before joining the program in the control group of 15.5, while that of the study group ranged from 8 to 20 with a median of 13, which was a significantly different score (P 0.03). Right after finishing the program the study groups PHQ-9 score median was 6.5. Three months after the beginning of the CR program the median PHQ-9 score was 23.5 and 0 for the control group. The change of the PHQ-9 over the course of 3 month from the beginning of the CR program was significantly improved for the study group with (P 0.00) and the median PHQ-9 score decreased from 13 to 0, while the control groups PHQ-9 score significantly deteriorated with a median score changing from 15.5 to 23.5.

1.5. Conclusion: CR is a highly effective method in reduction of the comorbid depression in coronary disease patient and should be recommended as a routine management after acute coronary events.

2. Introduction

Coronary artery disease continues to be a major focus of clinical and epidemiological research, where non-modifiable cardiovas-

cular risk factors, such as age, gender, family history, and race, as well as modifiable risk factors, such as hypertension, weight, smoking, sedentary lifestyle, abnormal lipid profiles, inflammatory markers, diabetes, metabolic syndrome, and subclinical CAD, are associated with increased cardiovascular risk [1].

Despite these findings, typically measured risk factor do not fully account for all the variation in outcomes. A number of psychological states and traits, such as depression, anxiety, anger, and stress, have also been implicated as potential risk factors for CAD [2]. One study found that even mild symptoms of depression can predict mortality, morbidity and poorer clinical outcomes in those with myocardial infarction [3]. Regular exercise training has been associated with significant reductions in cardiovascular disease events, cardiovascular disease mortality, and all-cause mortality [4]. There is also substantial evidence to suggest that cardiac rehabilitation exercise training programs result in notable reductions in depressive symptoms, anxiety, hostility, and overall psychological stress, [5,6,7] (Lavie et al, 2004) (Lavie et al, 1999) and improves the mortality risk associated with adverse psychological risk [8].

3. Methods

This study was a Double-armed interventional study that included 60 patients with recent acute coronary events who were referred to the cardiac rehabilitation clinic and found to have depression symptoms according to the PHQ-9 score. The patients were divided into two groups: Study group who completed the cardiac rehabilitation program and the control group who dropped out for different reasons. Full history and full examination were done and the PHQ-9 was done for the study group before initiation of the CR program, right after finishing the program and 1 month after finishing, and for the control group before initiation of the CR program and 2 months after dropping out.

3.1. Inclusion Criteria

- All patients with acute coronary syndrome: ST segment elevation myocardial infarction, non-ST segment elevation myocardial infarction and unstable angina who will be referred to CR clinic, usually within two weeks of the event

3.2. Exclusion Criteria

- Patients with any contraindication to initiation of CR program
- Ongoing chest pain
- Critical aortic stenosis
- Active pericarditis or myocarditis
- Resting systolic blood pressure > 200 mmHg or diastolic blood pressure > 110 mmHg
- Uncontrolled arrhythmias
- Decompensated heart failure

- 3° AV Block
- Resting ST-segment depression > 2 mm

3.3. Statistical Analysis

Sample size was calculated using PASS version 11 program, setting the type-1error (α) at 0.05 and power 80%. The area under the (ROC) curves was determined to assess the performance RSS. The performance of one measure could be considered better if its area under the curve was significantly greater. A P-value of < 0.05 was considered statistically significant.

4. Results

The study included a majority of male patients: 51 male patients (85%) and 9 female patients (16.5%). The mean age was 52 years. 15% of the patients were diabetic and 40% hypertensive, 46.7% were smokers and 48.3% were dyslipidemic. There was no statistically significant correlation between age, gender and risk factors and whether or not the patients completed the cardiac rehabilitation program or dropped out. Most patients were presenting after anterior STEMI (63.3%) followed by inferior STEMI (21.7%) with a minority of NSTEMI-ACS patients (15%). There was a statistically significant effect of the CR on the CCS class but not on the NYHA class. The median PHQ-9 score before joining the program in the control group of 15.5, while that of the study group ranged from 8 to 20 with a median of 13, which was a significantly different score (P 0.03). Right after finishing the program the study groups PHQ-9 score median was 6.5. Three months after the beginning of the CR program the median PHQ-9 score was 23.5 and 0 for the control group. The change of the PHQ-9 over the course of 3 month from the beginning of the CR program was significantly improved for the study group with (P 0.00) and the median PHQ-9 score decreased from 13 to 0, while the control groups PHQ-9 score significantly deteriorated with a median score changing from 15.5 to 23.5.

5. Discussion

The study group had an initial median score of 13 which denoted moderate depression. This score decreased to a median of 6.5 right by the end of the program which denoted mild depression and was finally decreased to a median of 0 which denoted no depression in the 1 month follow up after the completion of the program. On the other hand, the control group scored an initial median score of 15.5 denoting a moderately severe depression and eventually scored a median of 23.5 denoting severe depression. These findings support that there is a highly significant correlation (P<0.01) between early referral to the cardiac rehabilitation program and reduction of depression symptoms, in patient who were found to be initially depressed on PHQ-9 depression scale after surviving acute coronary syndromes. A similar study held earlier this year by Michael R. concluded that self-reported depression was consistent with the literature of 20% of patient's post-cardiac event [9], and the interventions for depression used by CR staff during the pro-

gram significantly reduced the level of self-reported depression. Similar to our study it also revealed that the event, gender and age were not a significant factor in self-reported depression scores between intake and completion of a CR program [10]. Another study was held early in 2018. This study explored the effect of cardiac rehabilitation in 139 Asian cardiac patients in Singapore, on physical quality of life, mental quality of life, anxiety, and depression. There was a statistically significant difference between the pre-and post-cardiac rehabilitation scores on the combined dependent variables. Carol et al, 2018 [11] pre-and post-cardiac rehabilitation depressive and anxiety scores were measured using the Hospital Anxiety and Depression Scale, HADS. A study was held in 2016 in Iran to examine the effects of a cardiac rehabilitation program on psychological status of patients after cardiac revascularization. Prior to start of rehabilitation protocol, 34 patients (28.3%) had significant depressive symptoms, upon completion of rehabilitation program, the number of patients with depressive symptoms decreased to 13 (10.8%) [12].

In 2015 another study proved that persistent patterns of physical activity level in patients, prior to being diagnosed with their first myocardial infarction, significantly decreased the odds of post-acute coronary syndrome depression, which further supports the promotion of physical activity throughout the healthcare system. Ernstsen et al, 2015 [13] However this study did not establish the effect of initiating the habit of physical activity after the development of acute coronary syndromes as a secondary prevention. Also, symptoms of anxiety and depression were assessed in this study using the Hospital Anxiety and Depression Scale (HADS) [14]. A meta-analysis of the effect of Cardiac Rehabilitation Interventions on Depression Outcomes in Adults 64 Years of Age and Older was done in 2012. This study proved that CR programs demonstrate a positive impact on depression outcomes in patients with heart failure and coronary artery disease. However, these studies were community-based and not purely hospital based and assessment was done only to elderly patients [15]. Another study held in 2012 was based in Iran by Farkhondeh Sharif et al, examining the effect of cardiac rehabilitation on anxiety and depression in patients undergoing coronary artery bypass grafting in hospitals affiliated to Shiraz University of Medical Sciences in southern Iran. There was a statistically significant difference in depression scores between groups at three time-points (Mean score from 19.6 to 10 in the intervention group and from 19.5 to 14 in the control group, $P = 0.0014$) [16]. Our results showed no statistically significant differences in PHQ-9 scores upon intake and completion of the CR program between males and females. This finding is inconsistent with previous studies (Grace, Yee, Reid and Stewart, 2014; Davidson, 2013; and Zimmerman et al., 2010) [17-19] that determined depression was more common in females than males. One possible explanation for our results is the PHQ-9 tool did not have

any gender-specific questions that may influence different responses depending on whether the participant was male or female. In addition, the majority of the participants that attended our program were male. Perhaps if more women had attended, or had a program dedicated to women only [20], the level of depression may have demonstrated a difference. Our organization may wish to explore this option of a gender-specific program and do further research on the effects of this type of program. Age was not a statistically significant finding in our results. Our results are consistent with Casey et al, 2008 who also reported there was no significant difference between depression and age. Our non-significant finding on depression by age might be accounted for by the sample size. A larger sample size is needed to determine if age is a factor on level of depression. Finally, we did not find a published paper indicating an insignificant effect of the cardiac rehabilitation program on depression symptoms in cardiac patients.

6. Limitations

Our study was conducted on a small size of population due to time limit. Also, it lacked psychiatric specialists who would have had a more objective opinion and would more accurately assess the patients psychologically.

7. Conclusion

CR is a highly effective method in reduction of the comorbid depression in coronary disease patient and should be recommended as a routine management after acute coronary events. The PHQ-9 is an easy at hand tool to assess and follow up the psychological well-being of patient and the psychological well-being of patients is a field that requires more investigation and raising the awareness of its importance.

References

1. Almdal T, Scharling H, Jensen J. The independent effect of type 2 diabetes mellitus on ischemic heart disease, stroke, and death: a population-based study of 13,000 men and women with 20 years of follow-up *Arch Intern Med.* 2004; 164:1422–1426.
2. Baumeister H, Haschke A, Munzinger M. Inpatient and outpatient costs in patients with coronary artery disease and mental disorders: a systematic review *Biopsychosoc Med* 2015; 9: 11.
3. Lespérance F, Frasare N, Koszycki D. Effects of citalopram and interpersonal psychotherapy on depression in patients with coronary artery disease: the Canadian Cardiac Randomized Evaluation of Antidepressant and Psychotherapy Efficacy (CREATE) trial *JAMA* 2007; 297:367–379.
4. Lavie CJ, Milani RV, Marks P, De Gruiter H. Exercise and the heart: Risks, benefits, and recommendations for providing exercise prescriptions. *Ochsner J.* 2001; 3(4): 207-213.
5. Milani RV, Lavie CJ, Cassidy MM. Effects of cardiac rehabilitation and exercise training programs on depression in patients following major coronary events. *Am Heart J.* 1996; 132: 726-732.

6. Lavie CJ, Milani RV, Artham SM. psychological factors and cardiac risk and impact of exercise training programs-a review of ochsner studies. *Ochsner J.* 2007;7(4):167-172.
7. Lavie CJ, Milani RV. Effects of cardiac rehabilitation and exercise training programs on coronary patients with high levels of hostility. *Mayo Clin Proc.* 1999; 74: 959-966.
8. Lavie CJ, Milani RV. High prevalence of anxiety in coronary patients with improvements following cardiac rehabilitation and exercise training. *Am J Cardiol.* 2004; 93: 336-339.
9. Sundquist K, Chang B, Parsons F, Dalrymple N, Edmonson D, Sumner J, et al. Treatment rates for PTSD and depression in recently hospitalized cardiac patients. *Journal of Psychosomatic Research.* 2016; 60-62.
10. Michael R. Effects of a Phase II Cardiac Rehabilitation Program on Patient Depression, *Health Sciences Research Commons.* 2018.
11. Carol C, Peter KH, Shuet-Ming L. Effect of Cardiac Rehabilitation on Quality of Life, Depression and Anxiety in Asian Patients, *International Journal of Environmental Research and Public Health,* 2018; 15: 1095
12. Leili Pourafkari, SamadGhaffari. The psychological effects of cardiac rehabilitation after coronary revascularization, *Turk Kardiyol-DernArs.* 2016; 44(3): 228-236.
13. Ernstsens L, Rangul V. Protective Effect of Regular Physical Activity on Depression after Myocardial Infarction: the HUNT Study, *The American Journal of Medicine.* 2015.
14. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale: An updated literature review. *J Psychosom Res.* 2002; 52(2): 69-77.
15. Zvi D. Meta-Analysis of the Effect of cardiac Rehabilitation Interventions on Depression Outcomes in Adults 64 Years of Age and Older, *The American Journal of Cardiology.* 2012; 110: 1219 –1224.
16. Farkhondeh S, Alireza S. The effect of cardiac rehabilitation on anxiety and depression in patients undergoing cardiac bypass graft surgery in Iran, *BMC Cardiovascular Disorders.* 2012; 12: 40.
17. Grace S, Yee J, Reid R, Stewart D. Measurement of depressive symptoms among cardiac patients: Should sex differences be considered? *Journal of Health Psychology.* 2014; 19(7): 943-952.
18. Davidson P. Tailoring and targeting interventions for women with heart disease: The need for gender-based approaches. *Evidence-Based Nursing.* 2013; 16(2): 45-46.
19. Zimmerman L, Barnason S, Hertzog M, Young L, Nieveen J, Schultz P, Tu C, et al. Care of the patient undergoing cardiovascular surgery. Gender differences in recovery outcomes after an early recovery symptom management intervention. *Heart and Lung.* 2011; 429-439.
20. Casey E, Highes J, Waechter D, Josephson R, Rosnick J. Depression predicts failure to complete phase-II cardiac rehabilitation. *J Behav Med.* 2008; 31: 421-431.