Med. J. Cairo Univ., Vol. 91, No. 4, December: 1575-1584, 2023
www.medicaljournalofcairouniversity.com

Effect of Cardiac Rehabilitation Program on the Quality of Life in Egyptian Patients after Primary Percutaneous Coronary Angioplasty: Comparison between Elderly and Young Adults

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Abstract

Background: Exercise-based cardiac rehabilitation is underutilized in patients with recentmyocardial infarction, particularly in the elderly. The ageing biology ofthis senior population is definitely unique, and they are more likely to experience different consequences for which cardiac rehabilitation can be especially useful.

Aim of Study: This study aimed to investigate the effect of a 12-week cardiac rehabilitation program on the quality of life of two age groups with recent myocardial infarction who underwent primary coronary angioplasty.

Patients and Methods: The present study was conducted on 50 patients divided into two groups; Group 1 included those aged z65 years and Group 2 included patients aged <65 years. Both groups underwent cardiac rehabilitation between May 2018 and August 2020. Quality of life assessment was performed using the RAND-36 questionnaire, while depression screening was performed using the PHQ-9 questionnaire.

Results: Both groups showed improvement in quality of life after the completion of the cardiac rehabilitation program. The younger group showed better improvement in the domains related to physical functioning, general health, role limitation due to physical health, and energy/fatigue, and also showed better improvement in depressive symptoms, dyslipidemia, and left ventricular ejection fraction, whereas the senior group showed better improvement in role limitation due to emotional problems.

Conclusion: Exercise training in a comprehensive CR program improves the quality of life of young and elderly patients. The young population improved mainly in the domains related to physical health, while the elderly group improved in the emotional domain in the quality of life questionnaires.

Key Words: *Cardiac rehabilitation — Ischemic heart disease — Exercise — Quality of life — RAND — PHQ9 — Elderly.*

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Introduction

COMPREHENSIVE cardiac rehabilitation (CR) programs are not only physical training, but they have also evolved over the past decades from simple physical training to a multidisciplinary approach that focuses on clinical evaluation of the participants, individually tailored exercise programs, pharmacotherapy evaluation, psychological rehabilitation, risk factor evaluation and reduction, lifestyle modification, and patient education. CR is anessentialcomponent in the continuum of care for patients with coronary artery diseases, with the goal of stabilizing and decelerating disease progression, increasing physical performance, improving quality of life, and improving prognosis, thereby returning cardiac patients to normal functioning in a safe and effective manner [1,2,3]. Despite these benefits, CR remains an underutilized tool for secondary prevention worldwide [4].

Elderly patients with acute myocardial infarction (MI) may present with atypical symptoms [5]. Additionally, in the elderly population, acute MI is associatedwith significantly higher short- and long-term mortality than in the young [6-10], yet elderly patients have been treated less aggressively than younger patients.

List of Abbreviations:

AMI : Acute myocardial infarction.
CAD : Coronary artery disease.
CR : Cardiac Rehabilitation.
EF : Ejection fraction.
HRR : Heart rate reserve.
J-CARP : Juntendo Cardiac Rehabilitation Program.
LV : Left ventricle
MCS : Mental health score.
PCS : Physical health score.
PHQ-9 : Patient health questionnaire-9.
QOL : Quality of life.

Despite these benefits, there is still a significant underutilization of CR in the elderly population. Several studies found that the overall use of CR in the elderly was low, approximately 33% after acute MI **[4,11,12,13].** Reasons for poor participation in this population may be related to medical and psychological factors, such as multiple comorbidities, denial of disease severity, depression, and frailty, or totally unrelated to medical issues, such as logistic and socioeconomic difficulties **[14].**

Aim of the work:

This work aimed to investigate the impact of a 12-week completed cardiac rehabilitation program on the quality of life in two different age groups with recent myocardial infarction who underwent primary coronary angioplasty.

Patients and Methods

After approval from the local Ethics Committee, 70 participants were recruited for this prospective clinical trial from May 2018 to 2020. They were divided into two groups: Group 1: Those aged -65 years and Group 2: Those aged 18-64 years. Both groups underwent cardiac rehabilitation at Ain Shams University Hospitals.

All patients had a recent myocardial infarction, treated with full revascularization. The exclusion criteria were as follows: Patients aged <18 years; patients within two weeks of acute coronary syndrome; patients with decompensated heart failure; patients with acute medical conditions (e.g., recent pulmonary embolism, recent stroke, or transient ischemic attack); and patients with contraindications to exercise (e.g., severe aortic stenosis), patients with marked cognitive impairment, and patient refusal.

In addition to history taking, clinical examination, risk factor assessment, routine labs, ECG, and transthoracic echocardiography, all patients were asked to answer to quality-of-life assessment via RAND-36 quality of life questionnaire (an Arabic version was used and scoring was done in a two-step process as previously mentioned in literature **[15]** in addition to depression screening questionnaire using "patient health questionnaire" (PHQ-9) **[16].**

The Cardiac Rehabilitation Protocol consistsed of supervised exercise training, risk factor modification, and education. The program duration was 12 weeks of exercise sessions, on a treadmill machine, twice a week, 45-60 minutes for each session, consisting of (a warm-up period of 5-10 minutes, aerobic training of 30-40 minutes, and a cool-down phase of 5-10 minutes). Exercise prescription during the Cardiac Rehabilitation Program was individualized to each participant depending on their clinical status (after performing an initial symptom-limited exercise test) to reach 40-60% of heart rate reserve (HRR) calculated using the Karvonen formula **[17]** and to be modulated according to the Borg scale **[18,19].** The exercise sessions were supervised by cardiologist from the cardiac rehabilitation team. In addition, lifestyle advices were implemented to all patients as well as control of risk factors and psychiatric assessment.

Follow-up: After three months of CR, several parameters were reassessed, including the clinical status of the patients, quality of life reassessed via the RAND-36 quality of life questionnaire, depression reassessed via the Patient Health Questionnaire (PHQ-9), transthoracic echocardiography, and labs.

The data were coded and entered using SPSS version 20. Quantitative data are expressed as mean standard deviation (SD). A paired t-test was used for comparison of quantitative variables between the two groups, while qualitative variables are compared using the chi-square test Multiple comparisons were assessed using repeated-measures ANOVA. Statistical significance was set atp-value <0.05.

Results

Seventy post-MI patients were evaluated for possible enrollment. Twelve patients were excluded because of systemic diseases that limited their exercise. Five patients were lost to follow-up within a few weeks. Three patients from group two were admitted to the hospital because of acute medical conditions and did not continue the study. The patients who completed the study (n=50) were subdivided into two groups according to their age, group one included patients aged -65 years and group two <65 years.

No significant differences were observed between the two groups regarding baseline demographic data and comorbidities. Furthermore, there were no significant differences between both groups regarding ejection fraction, PHQ-9 score, and quality of life questionnaire results (Table 1).

Comparison between pre- and post-cardiac rehabilitation program parameters in Group 1 (Table 2):

Table (2) shows significant differences in systolic blood pressure at baseline (140.20±20.69 mmHg) vs (130.36±17.92 mmHg) post-rehabilitation program (p=0.013). From Table (2) we also observed that there were highly significant differences regarding each of PHQ-9 and RAND-36 parameters: PHQ-9 at baseline was (9.88±3.03) vs (8.12±3.80) post-rehabilitation program, p-value (0.003), while Quality of life assessed by RAND-36 showed marked improvement regarding physical functioning (median baseline of 50 vs 60 post-rehabilitation program [p-value (0.002)] energy/fatigue [with p-value (0.007)], emotional well-being [with p-value (0.000)]. There was also statistically signif-

icant improvement regarding role limitation due to emotional problems from a baseline of (0) reaching 33 post rehabilitation programs [p-value (0.033)], general health change [with p-value (0.016)], while there were no significant differences seen regarding other RAND-36 parameters.

Comparison between different parameters pre- and post-cardiac rehabilitation program in Group 2:

There were significant statistical differences in smoking, dyslipidemia, weight, and blood pressure control (mainly for systolic blood pressure), with p-values were (0.001), (0.001), (0.032) and (0.007) respectively. In addition, we found a highly significant improvement in PHQ-9 scores from baseline of (8.72±1.93) to (6.48±1.39) post-rehabilitation program and EF from baseline (48.12±5.87) to post-cardiac rehabilitation (50.44±6.39) [with p-values (0.000)]. Regarding RAND-36 parameters, we observed a highly significant improvement in all parameters, except for role limitation due to emotional problems, which showed no significant improvement. Other parameters assessed showed no significant differences. (Table 3).

Table (1): Baseline characteristics in both groups.

		Group 1	Group 2	Test value	*P*-value	Sig.
		No. = 25	No. = 25			
Gender	Female	3 (12.0%)	4 (16.0%)	0.166*	0.684	NS
	Male	22 (88.0%)	21 (84.0%)			
Weight (kg)	Normal	12 (48.0%)	9 (36.0%)	1.377*	0.502	NS
	Overweight	11 (44.0%)	15 (60.0%)			
	Obese	2 (8.0%)	1 (4.0%)			
Smoking	No	14 (56.0%)	10 (40.0%)	1.282*	0.258	NS
	Yes	11 (44.0%)	15 (60.0%)			
Diabetes mellitus	No	13 (52.0%)	18 (72.0%)	4.056*	0.132	NS
	Uncontrolled	9 (36.0%)	7 (28.0%)			
	Controlled	3 (12.0%)	0 (0.0%)			
Hypertension	No	3 (12.0%)	4 (16.0%)	0.353*	0.838	NS
	Uncontrolled	16 (64.0%)	14 (56.0%)			
	Controlled	6 (24.0%)	7 (28.0%)			
Dyslipidemia	No	12 (48.0%)	10 (40.0%)	1.576*	0.455	NS
	Uncontrolled	9 (36.0%)	13 (52.0%)			
	Controlled	4 (16.0%)	2 (8.0%)			
Systolic BP (mmHg)	Mean ± SD	140.20-±20.69	138.40±22.49	0.295•	0.770	NS
Diastolic BP(mmHg)	Mean ± SD	79.40±9.50	84.96±10.25	-1.989.	0.052	NS
PHQ-9	Mean ± SD	9.88±3.03	8.72±1.93	1.615•	0.113	NS
EF %	Mean ± SD	45.28±5.86	48.12±5.87	-1.712.	0.093	NS
RAND-36						
Physical functioning	Median (IQR)	55 (45-60)	60 (55-60)	-1.713#	0.087	NS
Role limitations due to physical health	Median (IQR)	0 (0-25)	0 (0-0)	-0.798	0.425	NS
Role limitations due to emotional problems	Median (IQR)	0 (0-33)	0 (0-33)	-0.105#	0.916	NS
Energy / Fatigue	Median (IQR)	35 (25-40)	30 (30-35)	-0.839#	0.402	NS
Emotional well-being	Median (IQR)	48 (32-55)	36 (34-44)	-1.606#	0.108	NS
Social functioning	Median (IQR)	53 (50-70)	50 (43-63)	-1.184	0.237	NS
Pain	Median (IQR)	45 (45-78)	45 (45-55)	-0.961#	0.336	NS
General health	Median (IQR)	30 (20-30)	30 (15-30)	-0.586#	0.558	NS
Health change	Median (IQR)	50 (25-50)	25 (25-50)	-1.103#	0.270	NS

p-value >0.05: Non significant.
p-value <0.05: Significant.
p-value <0.01: Highly significant.
EF = Ejection fraction.
*: Chi-square test.
•: Independent t-test.

Table (2): Effect of CR program on Group I parameters.

		Group I		Difference	Test value	13- value	Sig.
		Pre	Post				
Weight (kg)	Normal	12 (48.0%)	16 (64.0%)	–	1.378*	0.502	NS
	Overweight	11 (44.0%)	8 (32.0%)				
	Obese	2 (8.0%)	1 (4.0%)				
Smoking	No	14 (56.0%)	19 (76.0%)	–	2.228*	0.136	NS
	Yes	11 (44.0%)	6 (24.0%)				
Diabetes mellitus	No	13 (52.0%)	13 (52.0%)	–	4.196*	0.123	NS
	Uncontrolled	9 (36.0%)	4 (16.0%)				
	Controlled	3 (12.0%)	8 (32.0%)				
Hypertension	No	3 (12.0%)	3 (12.0%)	–	2.397*	0.302	NS
	Uncontrolled	16 (64.0%)	11 (44.0%)				
	Controlled	6 (24.0%)	11 (44.0%)				
Dyslipidemia	No	12 (48.0%)	12 (48.0%)	–	0.000*	1.000	NS
	Uncontrolled	9 (36.0%)	9 (36.0%)				
	Controlled	4 (16.0%)	4 (16.0%)				
Systolic BP (mmHg)	Mean ± SD	140.20±20.69	130.36±17.92	-9.84±18.32	2.686•	0.013	S
Diastolic BP (mmHg)	Mean ± SD	79.40±9.50	80.76±7.57	1.36±11.35	-0.599•	0.555	NS
PHQ-9	Mean ± SD	9.88±3.03	8.12±3.80	-1.76±2.71	3.244•	0.003	HS
EF %	Mean ± SD	45.28±5.86	45.48±5.64	0.20±2.06	-0.485.	0.632	NS
RAND-36							
Physical functioning	Median (IQR)	55 (45-60)	60 (50-65)	3.20±4.30	-3.092#	0.002	HS
Role limitations due to physical health	Median (IQR)	0 (0-25)	0 (0-25)	2.68±15.15	-0.943#	0.346	NS
Role limitations due to emotional problems	Median (IQR)	0 (0-33)	33 (0-33)	10.52±22.92	-2.138#	0.033	S
Energy / Fatigue	Median (IQR)	35 (25-40)	35 (30-45)	2.80±4.58	-2.693#	0.007	HS
Emotional well-being	Median (IQR)	48 (32-55)	56 (48-64)	10.00±5.91	-4.384#	0.000	HS
Social functioning	Median (IQR)	53 (50-70)	50 (50-75)	2.36±11.17	-1.543#	0.123	NS
Pain	Median (IQR)	45 (45-78)	55 (45-78)	5.24±27.41	-0.705#	0.481	NS
General health	Median (IQR)	30 (20-30)	30 (20-35)	1.72±5.81	-1.718#	0.086	NS
Health change	Median (IQR)	50 (25-50)	7 5 (50-75)	17.08±31.32	-2.419#	0.016	S

p-value >0.05: Non significant.
p-value <0.05: Significant.
p-value <0.01: Highly significant.

*: Chi-square test.
•: Paired t-test.

S = Significant.
NS = Nonsignificant.
HS = Highly significant.
EF = Ejection fraction.

Comparison between the two groups regarding the post-rehabilitation program (Table 4):

The younger group (Group 2) showed more control of dyslipidemia at the end of CR program compared with group one [(p-value .028)]. Group II also revealed better improvement in LV EF at the end of the program [(p-value of 0.0005)]. In addition, there was a mild statistically significant difference between the two groups regarding the PHQ-9 [p-value=0.048], and the younger group showed better improvement.

Assessment of the degree of improvement in Quality of life assessed by the RAND-36 items displayed highly statistically significant differences regarding physical functioning [p-value=0.001] and general health [p-value=0.003], with better improvement seen in the younger group, whereas a highly significant difference was observed in the emotional well-being parameter [p-value=0.002] with better improvement seen in the senior group (Group 1). There was a mild but significant improvement in role limitation due to physical health [p-value=0.022] and energy/fatigue [p-value=0.030] in favour of the younger group.

The other parameters showed no statistically significant differences between the two groups.

Table (3): Effect of CR program on group II parameters.

		Group II		Difference	Test value	*P*-value	Sig.
		Pre	Post				
Weight (kg)	Normal	9 (36.0%)	18 (72.0%)	–	6.909*	0.032	S
	Overweight	15 (60.0%)	7 (28.0%)				
	Obese	1 (4.0%)	0 (0.0%)				
Smoking	No	10 (40.0%)	21 (84.0%)	–	10.272*	0.001	HS
	Yes	15 (60.0%)	4 (16.0%)				
Diabetes mellitus	No	18 (72.0%)	18 (72.0%)	–	3.818*	0.148	NS
	Uncontrolled	7 (28.0%)	4 (16.0%)				
	Controlled	0 (0.0%)	3 (12.0%)				
Hypertension	No	4 (16.0%)	4 (16.0%)	–	0.104*	0.949	NS
	Uncontrolled	14 (56.0%)	13 (52.0%)				
	Controlled	7 (28.0%)	8 (32.0%)				
Dyslipidemia	No	10 (40.0%)	10 (40.0%)	–	13.393*	0.001	HS
	Uncontrolled	13 (52.0%)	3 (12.0%)				
	Controlled	2 (8.0%)	12 (48.0%)				
Systolic BP (mmHg)	Mean ± SD	138.40±22.49	126.40 ± 16.74	-12.00±20.21	2.969•	0.007	HS
Diastolic BP (mmHg)	Mean ± SD	84.96±10.25	81.12 ± 6.92	-3.84±8.71	2 205.	0.037	S
PHQ-9	Mean ± SD	8.72±1.93	6.48 ± 139	-2 24±1 .67	6.725•	0.000	HS
EF %	Mean ± SD	48 .12±5 .87	50.44 ± 639	2 32±1 .80	-6.458.	0.000	HS
RAND-36							
Physical functioning	Median (IQR)	60 (55-60)	70 (60 - 75)	8.52±7.40	-3.857#	0.000	HS
Role limitations due to physical health	Median (IQR)	0 (0-0)	25 (25 - 25)	12.68±15.03	-3.327#	0.001	HS
Role limitations due to emotional problems	Median (IQR)	0 (0-33)	0 (0 - 33)	5.72±3136	-0.885#	0.376	NS
Energy / Fatigue	Median (IQR)	30 (30-35)	40 (40 - 45)	9.40±7.68	-3.956#	0.000	HS
Emotional well-being	Median (IQR)	36 (34 44)	40 (36 - 52)	4.12±4.19	-3.567#	0.000	HS
Social functioning	Median (IQR)	50 (43-63)	63 (50 - 63)	9.84±13.89	-2.813#	0.005	HS
Pain	Median (IQR)	45 (45-55)	68 (68 - 78)	18 32±18 .09	-3.577#	0.000	HS
General health	Median (IQR)	30 (15-30)	35 (31- 40)	12 20±8 .80	-4.181#	0.000	HS
Health change	Median (IQR)	25 (25-50)	50 (50 - 75)	17 .00±21 31	-3.145#	0.002	HS

p-value >0.05: Non significant.
p-value <0.05: Significant.
p-value <0.01: Highly significant.
*: Chi-square test.
•: Paired t-test.
*: Wilcoxon Ranks test.
NS = Nonsignificant.
HS = Highly significant.
S = Significant.
EF = Ejection fraction.

Table (4): Comparison between both groups at end of CR program.

		Group 1	Group 2	Test value	*P*- value	Sig.
		No. = 25	No. = 25			
Weight (kg)	Normal	16 (64.0%)	18 (72.0%)	1.184*	0.553	NS
	Overweight	8 (32.0%)	7 (28.0%)			
	Obese	1 (4.0%)	0 (0.0%)			
Smoking	No	19 (76.0%)	21 (84.0%)	0.500*	0.480	NS
	Yes	6 (24.0%)	4 (16.0%)			
Diabetes mellitus	No	13 (52.0%)	18 (72.0%)	3.079*	0.214	NS
	Uncontrolled	4 (16.0%)	4 (16.0%)			
	Controlled	8 (32.0%)	3 (12.0%)			
Hypertension	No	3 (12.0%)	4 (16.0%)	0.783*	0.676	NS
	Uncontrolled	11 (44.0%)	13 (52.0%)			
	Controlled	11 (44.0%)	8 (32.0%)			
Dyslipidemia	No	12 (48.0%)	10 (40.0%)	7.182*	0.028	S
	Uncontrolled	9 (36.0%)	3 (12.0%)			
	Controlled	4 (16.0%)	12 (48.0%)			
Systolic BP (mmHg)	Mean ± SD	130.36-±17.92	126.40±16.74	0.807•	0.423	NS
Diastolic BP(mmHg)	Mean ± SD	80.76±7.57	81.12±6.92	-0.175.	0.861	NS
PHQ-9	Mean ± SD	8 .12±3 .80	6.48±1 .39	2.027•	0.048	
EF %	Mean ± SD	45.48±5.64	50.44±6.39	-2.911.	0.005	HS
RAND-36						
Physical functioning	Median (IQR)	60 (50-65)	70 (60-75)	-3.369#	0.001	HS
Role limitations due to physical health	Median (IQR)	0 (0-25)	25 (25-25)	-2.286	0.022	
Role limitations due to emotional problems	Median (IQR)	33 (0-33)	0 (0-33)	-1.352#	0.177	NS
Energy / Fatigue	Median (IQR)	35 (30-45)	40 (40-45)	-2.164#	0.030	
Emotional well-being	Median (IQR)	56 (48-64)	40 (36-52)	-3.124#	0.002	HS
Social functioning	Median (IQR)	50 (50-75)	63 (50-63)	-0.641	0.522	NS
Pain	Median (IQR)	55 (45-78)	68 (68-78)	-1.358#	0.174	NS
General health	Median (IQR)	30 (20-35)	35 (31-40)	-2.931#	0.003	HS
Health change	Median (IQR)	75 (50-75)	50 (50-75)	-1.457#	0.145	NS

p-value >0.05: Non significant. * : Chi-square test. NS = Nonsignificant.
p-value <0.05: Significant. • : Independent t-test. HS = Highly significant.
p-value <0.01: Highly significant. S: Significant. EF = Ejection fraction.

Discussion

The present study aimed to explore the impact of outpatient exercise-based cardiac rehabilitation program on the quality of life in two different age groups with recent myocardial infarction. Each group consisted of 25 patients with no statistically significant differences in baseline demographic data, risk factors, EF, depression, or quality of life data. Females represented only 14% of the total number. This small percentage is concordant with most studies on CR **[20,21].** This is mostly because women face several difficulties to participate in CR programs such as transportation difficulties and other socioeconomic obstacles.

In our study, the younger age group showed a significant improvement in lipid profile. Similar results have been reported previously **[22,23,24].** This may be partially due to implementation of secondary prevention program during CR leading to the optimization of lipid-lowering diet knowledge and improvement of diet and drug adherence. In contrast, the older age group in our study did not show a statistically significant difference in lipid profile after cardiac rehabilitation. In the J-CARP study **[25],** which was conducted in Japan, a total number of thirty-four males older than 65 years, with known coronary artery disease, were randomly assigned to exercise-based CR group and a control group. After 6 months; the intervention group did not show any significant improvement in their lipid profile, which is consistent with the present study. This may be attributed to poor drug adherence or less strict dietary controls. Thus, further studies are needed to determine the long-term effects of cardiac rehabilitation on the lipid profiles of elderly CAD patients.

Randomized controlled trials have found a significant increase in smoking cessation among CR

participants **[26],** which is consistent with our study where participants (in group II) showed statistically significant differences in smoking cessation compared to their baseline data [p-value=0.001]. There is evidence that the characteristics associated with quitting smoking include age and marital status, where younger married persons are more likely to quit **[27],** also as education and better communication with the patient and his family with an explanation of the magnitude of smoking problems and offering appropriate help play a major role in smoking cessation. In the older age group, although there was a decrease in the number of smokers after CR, it was not statistically significant, which might be attributed to the relatively small number of smokers at baseline and lack of motivation to stop smoking.

In our study, both groups showed improvement in depressive symptoms, with better improvement achieved in the younger age group [p-value (*p*= 0.048)]. The improvement in patients' psychological status may be attributed to the positive effect of exercise, group discussion, meeting people with the same problem, improvement in physical fitness, and psychosocial support provided by the rehabilitation team **[28].** Other researchers have reported improvements in depression scores after cardiac rehabilitation **[29],** which provesthe impact of exercise training on depression in patients with myocardial ischemia [30].

The current study revealed that the degree of LV EF improvement between the two groups at the end of CR was more in the younger age group [p-value =0.005]. Our results are consistent with those of a study conducted by Acar et al., which included 54 patients who suffered from acute MI and average baseline EF49%. After the follow-up period, there was a significant improvement in LVEF in the rehabilitation group compared with the other groups **[31].** Similar results were obtained from Sadeghi et al., who included 70 patients who underwent a cardiac rehabilitation program after AMI. They showed significant improvement in left ventricular EF, which increased from 45.14±5.77% to 50.44±8.70% [32].It was suggested that exercise can result in improvement in oxidative metabolism and other neurohumoral factors in the otherwise non-infarcted myocardium. This includes a central effect, that may salvage the myocardium from the ischemic effect [33]. In contrast, the older age group in the present study did not show an improvement in EF, which might be attributed to the relatively lower baseline EF. In aging hearts, there are decreased numbers of viable ventricular myocytes (due to apoptosis and necrosis), with an increase in fibroblast activity resulting in decline in the compliance of the ventricle and eventually causes dysfunction **[34].**

Regarding the impact of cardiac rehabilitation on QOL, we noticed a dramatic improvement in both groups after rehabilitation. While the senior group showed better improvement in emotional well-being [p-value (0.002)] , the younger group showed better improvement regarding physical functioning [p-value (0.001)], general health [p-value (0.003)], role limitation due to physical health [p-value (0.022)] and energy/fatigue [p-value (0.003)]. This might be attributed to the fact that exercise training is not as strongly prescribed in older patients as in younger ones [35,36] because most elderly patients have several comorbidities that may limit their exercise capacity such as peripheral neuropathies, skeletal muscle weakness, arthritis and frailty **[37,38].** Moreover, there is no definite recommendations concerning the strength and frequency of exercise training for elderly patients and a lack of specially designed rehabilitation programs for this frail group. These data underscore that elderly patients should not be rejected from joining CR programs after an acute event, but they need special attention during the training sessions.

The QoL outcome in a study by Ulbrich et al. **[39]** was measured using the Minnesota Living with Heart Failure Questionnaire and RAND-36. Their results showed that all quality of life domains improved significantly at the end of the exercise program Another evidence by WislOff et al. **[40].** Randomly assigned 27 patients to either high-intensity interval training (n=9) [95% of peak heart rate], moderate-intensity training (n=9) [70% of peak heart rate] or a control group (n=9) [received standard advice regarding physical activity]. They assessed QOL using the MacNew global score. They showed significant improvement in both exercise groups compared to the control group, but the results were similar in all age groups. This difference from our results may be attributed to differences in sample size and exercise type.

In the study by Duncan and Pozehl, **[41]** 16 HF patients with coronary artery disease were randomly assigned to an exercise-only group (no=8) or to an exercise-with-adherence group (no=8). The mean age of participants was 66.4 years, and most subjects were men. QOL was assessed by the Minnesota Living With Heart Failure Questionnaire They concluded that there is marked improvement in QOL, which is concordant with our study, and the relative differences in quality-of-life improvement between the two studies, seen in the lower improvement achieved by the older group, may be explained by the differences in sample size and types of questionnaires used in the assessment of QOL.

Conclusions:

Exercise training as a part of comprehensive CR programs is a safe, inexpensive strategy that improves the quality of life and depression and must be conducted equally for all society members, includingolder adults.

Study limitations:

The main study limitation is that the data were derived from a single medical center, the sample size was relatively small, predominantly male, and only short-term effects were assessed after CR.

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تأثير برنامج تأهيل القلب على جودة حياة الشباب مقابل كبار السن المصريين المصابين باحتشاء عضلة القلب مؤخرًا

الخلفية: إعادة تأهيل القلب القائم على التمرينات غير مستغل بشكل كافٍ في المرضى الذين يعانون من احتشاء عضلة القلب مؤخرًا، وخاصة عند كبار السن. إن بيولوجيا الشيخوخة لدى هؤلاء كبار السن فريدة من نوعها، ومن المرجح أن يواجهوا عواقب مختلفة يمكن أن يكون إعادة تأهيل القلب فيها مفيدًا.

الهدف: نحن نهدف إلى دراسة تأثير برنامج إعادة تأهيل القلب لمدة ١٢ أسبوعًا على نوعية حياة فئتين عمريتين مصابتين باحتشاء عضلة القلب مؤخرًا.

الدراسة: أجريت الدراسة الحالية على ٥٠ مريضاً مقسمين إلى مجموعتين؛ شملت المجموعة الأولى الأشخاص الذين تزيد أعمارهم عن ٦٥ عاماً وتضمنت المجموعة الثانية المرضى الذين تقل أعمارهم عن ٦٥ عاماً. خضعت كلا المجموعتين لإعادة تأهيل القلب بين مايو ٢٠١٨ وأغسطس ٢٠٢٠. وتم إجراء تقييم جودة الحياة باستخدام استبيان RAND-36، بينما تم إجراء فحص الاكتئاب باستخدام استبيان PHQ-9. بالاضافة الى متابعه تحاليل الدم وفحص صدى القلب ومقدار الجهد

النتائج: أظهرت كلا المجموعتين تحسنا في نوعية الحياة بعد الانتهاء من برنامج إعادة تأهيل القلب. أظهرت المجموعة الأصغر سنا تحسنا أفضل في المجالات المتعلقة بالأداء البدني، والصحة العامة، ومحدودية الأدوار بسبب الصحة البدنية، والطاقة / التعب، وأظهرت أيضا تحسنا أفضل في أعراض الاكتئاب، واضطراب شحوم الدم، وكفاءة البطين الأيسر، في حين أن المجموعة الأخرى أظهرت تحسنا أفضل في تأثير المشاكل النفسية.

الخلاصة: التدريب على التمارين الرياضية في برنامج تأهيل القلب الشامل يحسن نوعية حياة المرضى الصغار والكبار. تحسنت فئة الشباب بشكل رئيسي في المجالات المتعلقة بالصحة البدنية، بينما تحسنت فئة كبار السن في المجال العاطفي (النفسي) في استبيانات جودة الحياة.