EFFECT OF EXERCISE TRAINING ON THE QUALITY OF LIFE AND ECHOCARDIOGRAPHY PARAMETER, FATIGUE, SOCIAL FUNCTIONING AND GENERAL HEALTH STATUS OF ELDERLY PATIENTS WITH CHRONIC HEART FAILURE: A RANDOMIZED TRAIL

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Abstract- Background:An essential public health goal is to reduce age-related disabilities (chronic heart failure) in the elderly., the aging populations are those who are in need of specific encouragement to engage in physical activity The purpose of this study was to Effect of exercise training on left ventricular ejection fraction, fatigue, social functioning and general health of elderly patients with chronic heart failure Methods/Design: The present study was conducted on elder with chronic heart failure. 70 patients were divided randomly into two experimental and control groups of 35 each. The patients in experimental group followed an exercise program within 24 weeks, three sessions per week, for 40 minutes in the morning including five to ten minutes of warm-up, 25-30 minutes of exercise, and five minutes of cool-down. Data gathering consisted of quality of life questionnaire SF-36, demographic questionnaire, Fatigue Severity Scale and echocardiography. The data were analyzed by SPSS 18 through pair and independent t-test.
Results: The results indicated that mean age was 69±2.2 years in the experimental group and 68±2.22 years in the control group. Findings indicated that, there was a statistically significant difference in mean score of fatigue, pain, blood pressure, pulse physical performance, activity limitation following physical problems, energy, social performance, left ventricular ejection fraction, and general health in two control and experimental groups between before and after the study
Conclusion: Recommended to incorporate healthcare teams including trained nurses with expertise on rehabilitation and exercise into rehabilitation programs of the elderly with heart diseases to offer higher quality services to patients.

Key words- Elderly Ejection Fraction, Fatigue, Social Functioning, General Health,

I. INTRODUCTIONS

One of the healthcare challenges worldwide is ageing (1).The elderly suffer from several problems so that heart disease is a prevalent chronic disease in the elderly and middle-aged population (2).Chronic heart disease is one of the main causes of hospitalization and leads to stupendous costs for patients and administration (3).Over the past two decades, the elderly population has more than doubled (1).Today, more than 15 million worldwide and approximately 5 million in the USA have acquired heart disease, out of whom 5700000 suffer from chronic congestive heart failure (3, 4).The prevalence and incidence of heart failure in the elderly are higher than the average population, so that 1% of individuals over 50 years and 10% of those over 80 years in the USA suffer from heart failure(5).In developing countries, over 30% are hospitalized due to heart failure. In Iran, over 100000 individuals are estimated to acquire heart failure(5).Heart failure results in decreased muscle mass and strength and intolerance to exercise. Congestive heart failure patients cannot perform their daily activities and are dependent on others. Moreover, heart failure negatively affects various aspects of quality of life, including physical, psychological, social, well-being perception, and public health (6).dyspnea and fatigue can limit their daily lives and leading to exercise intolerance (7).The general health status and quality of life in these patients could be disturbed by physical symptoms of psychological problems, therapies' side effects, and social limitations(8). Therefore, disease-associated difficulties result in withdrawal and social isolation in patients(9).In addition, the individuals experience mental, psychological stresses, physical problems, and ultimately repeated hospitalizations (10).Dyspnea and fatigue lead to stress, anxiety, decreased level of consciousness ,general health status and quality of life in the elderly (11).The elderly with heart failure may experience limitations in doing daily activities such as walking and shopping (12).Study findings have indicated that regular exercise leads to autonomy in daily activities and lack of physical and psychological dependence in the patients (1, 3, 7).In addition, regular exercise training may lead to an increase in autonomy for daily and routine activities, preventing functional incapacity and dependency conditions (13).
general health status and Quality of life has been approved as one of the important aspects of the patients' healthcare and investigating it has been used to detect differences between patients, predict outcomes, and evaluate the interventions (14-16).The results of other studies showed that exercise affected stress and anxiety positively and led to enhanced

quality of life(5). Chronic diseases seriously affect the general health status and therefore quality of life in the individuals (14, 17, 18).Exercise is not suitable for all experimental of heart failure and before the start of the exercise, the patient must be examined by a physician to let him/her do exercise (3). Any change in the lifestyle of patients with heart failure or change in physical activity should be performed under direct supervision of a nurse or a cardiologist; otherwise it leads to physical damage or deterioration of the patients' health (19).

Regarding the increased prevalence of heart failure in the elderly and its effect on public health as well as the significance of exercise and supportive healthcare such as management and treatment of stress and emotions, and in light of heart failure contribution to left ventricular ejection fraction and different aspects of general health status in the suffering individuals, and several physical, psychological, social, and economic problems experienced by these patients, the present study is conducted to study the effect of exercise training on left ventricular ejection fraction, fatigue, social functioning and general health status of elderly patients with chronic heart failure referring selected hospital affiliated with Shahrekord University of Medical Sciences in Iran.

II. MATERIALS AND METHODS

2.1. Design and Sample

This clinical trial study was conducted with the necessary approval obtained from Deputy of Research and Technology of Shahrekord University of Medical Sciences. In view of the previous studies and by the equation of sample size calculation, the required sample size for the present study was derived as including 70 individuals.

For data gathering, convenience, random method was adopted. At first, the units of study population were numbered and the numbers were recorded on small, similar cards. Then, we sent all cards in a box and after shaking the box each time took a card randomly out of the box and registered its number. This process continued until the desired number of sample units was derived. Then, the samples were randomly assigned to two groups of experimental and control.

To obtain the patients' consent to participate in the study, after explaining the research purposes for them, we asked the patients to fill out the form of consent for participation in the study. Also, the patients were ensured that the research data are dealt with as confidential and used only for research purposes. Ethical approval (code no. 85-9-1) was obtained from Ethics Committee of Shahrekord University of Medical Sciences and the study was registered as IRCT201306251376831 in Iranian Registry of Clinical Trials by Clinical Research Center of Iran's Ministry of Health and Medical Education.

2.2 Inclusion criteria

The individuals with chronic heart disease aged 60 years and over, who have signed the consent form to participate in the study, as well as the diagnosis of chronic heart failure by a cardiologist, clinical symptoms, and echocardiography, left ventricular ejection fraction less than or equal to 40%, the ability to perform the exercise of interest after pharmacotherapy and the physician's approval, lack of chronic diseases (rheumatoid arthritis, fractures, etc.), and lack of travel and heart transplantation till three months after the exercise program.

2.3. Exclusion criteria

Death, coronary artery bypass surgery during the study, and an unwillingness to participate in the study at any stage in this study were the exclusion criteria. Accordingly, in the experimental group 10 patients (tow patient because of death, five patients for coronary bypass surgery and, tree patient being unwilling to cooperate) and in the control group, ten patients (six patients being unwilling to cooperate with the research team and four patients for coronary bypass surgery) were excluded from the study.

Exercise was conducted within 24 weeks, three sessions per week, for 40 minutes in the morning including five to ten minutes of warm-up, 25-30 minutes of exercise (walking), and five minutes of cool-down for experimental group. Aerobics exercise was conducted by trained personnel the sport facility or gym in the hospital affiliated with Shahrekord University of Medical Sciences under supervision of nursing and medical team. Exercise started until heart rate reached equal to 60% of heart rate reserve. After 6 sessions, the duration of the exercise (walking) was increased to 30 to 35 minutes, and heart rate to 70% of heart rate reserve. Each patient exercised based on his/her ability and resistance. Exercise was stopped when patients were physically tired or faced severe dyspnea, fatigue, dizziness or other problems that could imperil patient health based on Rhoten Fatigue Scale (RFS). To assess the reproducibility of gas exchange parameters, the cardiopulmonary test was repeated 3 to 5 days before starting the protocol for all patients and considered as baseline. The examination was repeated at the end of the study.Also, the patient's blood pressure and heart rate were monitored before and after the study repeatedly. Patients in the control group received educational support but no exercise protocol However, patients in both groups received their medication as prescribed by cardiologist and there was no interruption in receiving drugs by the patients.

2.4. Instruments

The instrument of data gathering consisted of quality of life questionnaire SF-36, the demographic data, and echocardiography. To evaluate the patients' quality of life, Persian version of quality of life questionnaire SF-36 was used, which evaluated

physical functioning, role limitations due to physical problems, role limitations due to emotional problems, social status, physical pain, energy, vitality, mental health, and general health in the elderly with cardiac diseases. Validity and reliability of the Persian version of this questionnaire has been derived as satisfactory in previous studies (1).Questionnaires were completed by all patients and vital signs, and echocardiography register by nurse at baseline and again 24 weeks after the study completion. For assessment, the patient's fatique used a Visual analogue Scale. Visual analogue Scale is a 10-point where 1 _ energetic (no fatique,) 5, moderate fatique and 10, _ is severe fatique.

2.5. Data Analysis

The collected data were analyzed in statistical software SPSS18 in accordance with the study purposes by descriptive statistics (mean and standard deviation), independent t-test, paired t-test and ANOVA. Level of significance in all tests was considered less than 0.05.

III. RESULTS

Study results indicated that mean age was 69±2.2 years in the experimental group and 68±2.22 years in the control group. In experimental group, 58.6% and in control group, 61.3% were male. In the experimental group 72% and in the control group 74% had class III heart failure. In the experimental group 35% and in the control group 37.2% had primary school education. For the job, 22% in the experimental group and 25% in the control group were self-employed. In the experimental group 0.90% and in the control group 85% were covered by health insurance. Prior to the study no significant difference in blood pressure, pulse, fatigue, pain, physical functioning, role limitations due to physical problems, role limitations due to emotional problems, social status, energy, mental status, and general health of the two groups was observed in the two groups of treatment and control. But, the obtained findings indicated that, there is a statistically significant difference in mean score of fatigue in two control and experimental groups between before and after the study (Table 1).

Table 1. Paired t-test for comparison of fatigue intensity between before and after intervention independently in the two groups

Group	Time	No.	Mean score	Standard deviation	Difference in mean	t-test	df	p
Control	Before	25	3.5	1.25	-0.8	-2.96	24	<05
	After	25	5	1.3				
experimental	Before	25	3.7	1.2	1.7	2.16	24	< 05
	After	25	2.68	..755				

The obtained findings indicated that there is a significant difference in pain, physical functioning, role limitation due to physical problems, role limitation due to emotional problems, social status, vitality, mental status, and public health in experimental and treatment groups between before and after the study (Table 2).

Table 2:Different dimension of quality of life in experimental and control groups after intervention Different dimension of quality of life in experimental and control groups after intervention

group	Control Group		p	Experimental Group		p
	N = 25			N=25		
dimensions	Mean ±SD			Mean ± SD		
	pre	post		pre	post	
Physical performance	50.32 ±5 .7	44.56±6.98	<0.05	50.11±9.23	55.32±10.12	<0.05
Limited activity following emotional problems	51±5.88	57.32±8.87	< 0.05	53.24±10.12	48.36±11.46	< 0.05
Limited activity following physical problems	51±9.52	54.32±9.65	< 0.05	58.98±9.65	55.30±11.28	< 0.05
Energy	52.1±8.32	47.15±7.62	< .05	51.4211.71	50.65±10.62	> 0.05
Mental health	55.98±9.54	51.32±9.82	<0.05	54.36±11.24	55.14±11.73	> 0.05
Social performance	55±8.1	54.9±9.14	> .05	54.128.65	57.41±10.25	< 0.05
Body pain	55.6±11.22	54.63±8.64	>0.05	53.28±8.25	49.22±10.45	<0.05
general health	62.53±11.32	55.62±8.61	<0.05	60.32±12.59	64.6±9.12	< 0.05

Also, the results indicated a statistically significant difference in quality of life score before and after the study between the two control and experimental groups so that exercise led to increased and enhanced quality of life and health in experimental group, but in the control group quality of life not only did not increase but also decreased (Table 3).

Table 3: Mean ± standard deviation of different quality of life in experimental and control groups prior and post of the intervention

Group	Control Group	Experimental Group	p
	N = 25	25N =	Value **
	Mean ± SD *	Mean ± SD	
pre	79. ± 54.26	9.14±54.47	> 0.61
pos	10.22±51.85	9.33±57.94.	< 0.05

* Standard deviation, ** Independent t-test indicates a statistically significant difference between experimental and control groups.

On the other hand, the results indicated a significant difference in blood pressure and pulse rate before and after the study between the two control and experimental groups so that systolic and diastolic blood pressure and pulse rate decreased in the experimental group while there was no statistically significant difference in the control group. The findings indicated that left ventricular ejection fraction increased after exercise in experimental group but did not change in the control group.

IV. DISCUSSION

The present study's results indicated that in experimental group the fatigue level decreased after study compared to the control group. Other studies' findings indicated that exercise led to decreased fatigue, as well, and the patients doing exercise enjoyed a better mood(7, 20).In addition, findings showed that the patients' physical functioning enhanced after exercise and they were able to do their daily activities well. Results other study indicated that exercise led to 26% higher oxygen and hence higher freshness and mobility in experimental group while no change occurred in the control group (3, 5).On the other hand, the findings indicated that exercise led to decrease in physical and emotional limitation in the patients so that the patients expressed their feelings easily, conversed with others, experienced less loneliness and isolation, and generally have a good relationship with the others. Other studies' findings show that exercise resulted in increased self-care, decreased depression and anxiety, and improved sexual function(21).

In the present study, the patients who did exercise had better social functioning and energy compared to the control group, which causes enhanced self-esteem, freshness and vitality and improved mental status in the patients. As with the present study, other studies have indicated that exercise results increased satisfaction with life and improved social relationships(3, 13).

After study, the mean score of physical pain was significantly different between the intervention and control groups. Consistent with the present study, results other study indicated that pain intensity reduce after exercise in the intervention group, but no statistically significant difference was seen in the data on the control group (22). However, there was no statistically significant difference in depression and weakness between the two groups after the study (5, 23). In this Study findings indicated that exercise led to enhanced quality of life and general health. In other study, findings indicated that exercise led to enhanced quality of life (3, 24). Also, Dehkordi et al study indicated that exercise led to enhanced health and various dimensions of quality of life(7, 16). Georgiou et al study results showed that exercise had a remarkable impact on reducing length of stay in hospital, thereby reducing hospital costs and physician referral. On the other hand, exercise leads to promoted health and increased longevity (25).Another study findings indicated that exercise decreased mortality, the days of stay in hospital and readmission in the patients with fibrillation and cardiac arrhythmias in healthcare centers in treatment group (26).

The study findings indicated that left ventricular ejection fraction increased in treatment group, but no change in left ventricular ejection fraction was seen in the control group. Results other study show that after exercise the contractile strength of the heart muscle significantly increases and mortality decreases (3).Also, study findings indicate that exercise results increased cardiac output without additional charge to the pulmonary arteries (27).In a study to investigate the effect of 12-week rehabilitation on quality of life, daily activities and functioning in patients, exercise led to a significant increase in physical functioning, decrease in sense of inability, enhancement of left ventricular ejection fraction, increase in Exercise tolerance and promotion of quality of life and health in the individuals in treatment group, but no significant difference in the data was shown in the control group (12). Also, the study findings indicated that the exercise led to decreased systolic and diastolic pressure and pulse rate. Another study findings indicated that heart received more oxygen following exercise and therefore cardiac output enhanced in treatment group. But, in the control group, no significant change was seen in the findings (28).The study findings indicate that following exercise pulmonary vascular resistance decreases, but the strength of contraction of the left ventricle increases .

CONCLUSION

In view of the present study findings indicating that exercise leads to decreased fatigue, blood pressure and pulse, increased physical, mental and social functioning and general health, enhanced left ventricular ejection fraction and quality of life and relieved pain in the patients, it is recommended to incorporate healthcare teams including trained nurses with expertise on rehabilitation and exercise into rehabilitation programs of the elderly with heart diseases to offer higher quality services to patients.

5.1. Limitations

Small sample size enrolled in this study limits the generalization of the study findings.

5.2. Acknowledgement

Hereby, we thank the Research and Technology Deputy of Shahrekord University of Medical Sciences.

5.3. Funding/support

This study was supported by the Research and Technology Deputy of Shahrekord University of Medical Sciences.

5.4. Conflict of interest

The authors of the present work declare no conflict of interest.

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