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Effect of home-based walking on performance and quality of life in patients with heart failure

Sedigheh Fayazi MScN, BScN, RN, (Senior Lecturer)[1], **Kourosh Zarea** MScN, BScN, PhD, (Assistant Professor)[1], **Ali Abbasi** Ms, Bs, RN, (Lecturer)[2] and **Farzaneh Ahmadi** MD, (Associated Professor)[3]

[1]School of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran, [2]School of Nursing and Midwifery, Golestan University of Medical Sciences, Gorgan, Iran and [3]School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

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Introduction: Chronic heart failure defined as the inability of the heart to meet the demands of the tissues, which results in symptoms of fatigue or dyspnoea on energy progressing to dyspnoea at rest. The inability to perform the exercise without discomfort and poor quality of life may be one of the first symptoms experienced by patients with heart failure and is often the principal reason for seeking medical care.

Objectives: The aim of the study was to find the effect of a home walking programme on the performance and quality of life in the patients with heart failure.

Methods and results: Sixty patients with New York Heart Association class II and III heart failure were divided into two matched and equal groups. The quality of life scores and 6-minute walking scores were measured for each patient at entry and after 8 weeks. Both groups were followed for 8 weeks. The results showed between mean walking distance on the 6 minutes at entry and after 8 weeks in the training group ($p < 0.001$), but no significance was seen between the control groups ($p = 0.351$). Furthermore, results showed a significant difference between mean of quality of life scores at entry and after 8 weeks in the training group, but such significance was not reported between before and after control group scores.

Conclusion: The home-based walking showed improvement in the performance, exercise tolerance time and quality of life in heart failure patients. Therefore, Nurses should employ alternatives such as home exercises in the caring of heart failure patients.

Keywords: heart failure, quality of life, exercises training, Iran.

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Introduction

Heart failure (HF) is a clinical complex syndrome that can result from any structural of functional cardiac disorder that damages the ability of the ventricle of fill with or ejects blood (1, 2). HF may be defined as the inability of the heart to meet the demands of the tissues, which results in symptoms of fatigue or dyspnoea on energy progressing to dyspnoea at rest. It occurs at a median age of around 75 and affects 1–3% of the general population and approximately 10% of elderly people (3, 4). There are an estimated 5.3 million Americans living with HF in the US, 80% of whom are elderly, with the incidence approaching 10 per 1000 population after age 65 years (5). As the US population ages, the number of Medicare beneficiaries living with HF will continue to increase. Even if the prevalence remains stable, more than 6 million Medicare beneficiaries will have a diagnosis of HF by 2020 (6). Overall, it appears that HF affects 1–3% of the general population and 6–10% of those over 65 years of age (7). Cardiovascular diseases are the primary cause of death in Iran, and currently, HF has a prevalence of 3500 in 100 000 people. Despite advances in medical treatment for HF, nonadherence to prescribed therapeutic regimen remains as a problem among HF patients in Iran (8). It is a serious health care problem not only for patients and their family but also for society, as it contributes significantly to the enormous costs associated with the care of patients (9, 10). Literature review shows that HF is an increasingly common public health problem that leads to poor prognosis, is associated with increased morbidity, decreased quality of life, depression and increasing dependency and may result in prolonged and frequent hospital admissions (11–16). Hospital admissions and costs for HF have increased over the past two decades to the point where HF

Correspondence to:
Sedigheh Fayazi, School of Nursing & Midwifery, Ahvaz Jundishapur University of Medical Sciences, Golestan Blov, Ahvaz, Iran.
E-mail: sadighe_fa@yahoo.com

now accounts for 2% of the total health care expenditure. The main clinical symptoms in chronic heart failure (CHF) patients who limit activities of daily living and lead to exercise intolerance are dyspnoea, tiredness and fatigue. The fundamental issue to patients is how these symptoms disturb their life. These factors may lead to individuals withdrawing from activities and previous social contacts and losing their social relations and social support (16).

Although evidence-based pharmacological and device therapies may decrease mortality, hospitalisations and heart failure symptoms and improve quality of life, many patients managed with these regimens often remain burdened by dyspnoea and fatigue, decreased exercise tolerance, reduced quality of life, recurrent hospitalisations and early mortality (5, 17). Not too long ago, bed rest was the standard treatment for these patients (18), but over the past two decades, it has been recognised that physical reconditioning may play a key role in the progression of symptoms and poor outcomes (17, 19, 20). Exercise and physical activity are another treatment area being completely readdressed and revised in this setting (21). Previous studies have assessed the ability of exercise training to improve functional capacity in patients with heart failure. Most of them showed positive effects of exercise training on exercise capacity, quality of life and the patterns of strength muscles, and therefore, should be considered as an integral part of therapeutic standards in such patients (22–25). Harris et al. and Nuhr et al.(26, 27) published the results of first randomised trials comparing the home-based low-frequency electrical stimulation (ES) training and classical exercise training; the results showed that both methods could significantly influence the muscle strength, improve functional parameters and improve also the quality of life in patients with CHF. The exercise training has been shown to improve the functional capacity and quality of life, and in addition, the patterns of strength muscles, and therefore, should be considered as an integral part of therapeutic standards in such patients (28), but effects on cardiac function have not been detected uniformly and may require longer training periods (29). Despite this, it is not widely utilised, perhaps because data on its effect on survival are limited. However, even rehabilitation based on physical exercise can improve both exercise capacity and symptoms, some patients may be too ill to exercise (28). Although the complication rate for all patients participating in cardiac rehabilitation has been reported to be extremely low, the complication rate for patients with heart failure in clinical trials of exercise training has been substantially higher (14, 24). Despite recent advances in the medical treatment of CHF, this clinical syndrome remains progressive (1), and not all study shown positive findings (30, 31). For example, Witham et al. (2005) (32) demonstrated that six-minute walking did not change quality of life. As indicated earlier, studies had different findings and require many researches with unlike background. On this way, we aimed to obtain reliable and precise estimates of waking exercise on the quality of life and performance of heart failure patients.

Material and methods

Design and method description

The study was a quasi-experimental trial comparing 8 weeks of a home walking exercise programme in the training group vs. control group (Fig. 1). Assessment of performance and quality of life measures were performed in both the training and control group at entry (T1) and after 8 weeks (T2). This study was performed in a hospital linked to Iran University of Medical Sciences and finally in the patient's houses. The study design was approved by the local hospital and University medical ethics committee. Informed consent was obtained from all patients.

Participants

In this study, 60 patients with New York Heart Association (NYHA) class II and III heart failure were used as study participants. Inclusion criteria were age 40–75 years, HF duration >6 months, left ventricular ejection fraction (LVEF) ≤40%, a documented ejection fraction conducted within the last year by echocardiogram, participant was stabilised on cardiac medications for at least 6 months in the period before study enrolment, and stable mild-to-moderate heart failure NYHA class II and III. The cause of congestive heart failure was coronary artery disease in 34,

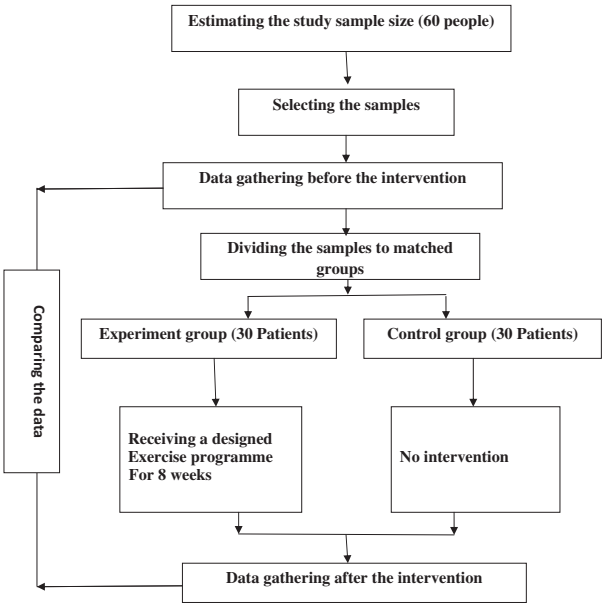

Figure 1 The study's schematic design.

dilated cardiomyopathy in 13, hypertensive heart disease in 5, aortic regurgitation in 5 and mitral regurgitation in 3. There were 37 patients with New York Heart Association class II heart failure and 23 patients with' New York Heart Association class III heart failure. All patients were taking diuretic treatment. Other treatment included captopril (n = 10), nitrates (n = 9) and digoxin (n = 41; all had atrial fibrillation). Subjects were excluded if they had chronic obstructive pulmonary disease (COPD), documented exercise-induced ischaemia or ventricular tachycardia, uncontrolled hypertension and diabetes, orthopaedic or neurological disease, renal insufficiency (serum creatinine >2.5), psychotropic use and psychiatric disorder. Subjects in two groups (training and control) matched according to age, sex, body mass index (BMI), the heart failure, intensity of disease, duration of disease, smoking, ejection fraction, then divided to two groups included training (n = 30) and control group (n = 30).

Instruments and data collection

Quality of life was assessed using the Minnesota Living with Heart Failure Questionnaire (MLHFQ). It assesses the patient's perception of the effects of HF on the physical, socioeconomic and psychological aspects of their life (33). Patients responded to 21 items using a six-point Likert scale (0–5). The score ranges from 0 (best) to 5 (worst). To measure functional performance, patients were asked to walk in a corridor of patients home from end to end at their own pace while attempting to cover as much ground as possible in the allotted period of 6 minutes (34, 35). At the completion of the 6-minute period, the participants were instructed to stop walking, and the distance was recorded. Physical symptoms were observed by the investigator or reported by the participants, and time stopped during the walk test was recorded.

Training programme

Participants allocated to exercise group were instructed to home walking exercise (activity logs) for 30 minutes daily and 3 days a week for 8 weeks and consisted of three components: (i) a warm-up period (5 minutes), (ii) walking period (20 minutes, in two 10-minute series separated by 5 minutes of rest), and (iii) cool-down period (5 minutes)(36).

Subjects were asked to complete activity logs daily to report heart rate, ratings of perceived exertion, exercise performed, duration of exercise and any symptoms experienced. Activity logs were returned to project staff on a biweekly basis. Exercisers also received daily phone calls that were used to monitor adherence, progress, answer questions and provide individualised feedback. In addition, how to exercise in a safe and proper way, including self-monitoring of symptoms, level of exertion and exercise-related problem, was explained and summarised in a 1-page brochure. In addition, to eliminate bias resulted from the relationship of researcher with participants, two groups were followed up by phone calls daily.

Data were analysed by SPSS software version 11. In the analysis, we used descriptive statistics, differences were analysed by paired *t*-test, Wilcoxon and repeated measure test, and a p-value of <0.05 was regarded as statistically significant.

Results

A total 60 participants were recruited, 30 of whom were allocated to the experimental group and 30 to the control group. The follow of participants through the study is presented in Fig. 1. The baseline characteristics of participants are presented in Table 1.

Table 1 Demographic and clinical baseline of patients

Variables	*Training group*	*Control group*	*p-value*
Sex (male/female)	27.3 (90.10)	27.3 (90.10)	1
Age (years)	60.86 ± 9.004	61.76 ± 9.00	0.7
BMI (kg/m^2)	24.26 ± 1.91	25.13 ± 1.71	0.69
Exercise history (yes/No)	8/22	4/26	0.197
Type of exercise			
Walking	3 (37.5%)	1 (15%)	0.48
Ball – game	1 (12.5%)	0 (0%)	
Nonaerobic Training	4(50%)	3(75%)	
Heart failure duration (month)	32.4 ± 7.6	33.23 ± 9.4	0.86
Type of Cardiomyopathy			
Ischaemic	24 (80)	24 (80)	1
No ischaemic	6 (20)	6 (20)	
NYHA functional class			
Class II	21 (70)	21 (70)	1
Class III	9 (30)	9 (30)	
LVEF (%)	31.13 ± 7.15	31.06 ± 7.42	0.972
Disease history			
Angina			0.696
Myocardial infarction			
Uncontrolled hypertension			
Uncontrolled diabetes			
Congenital heart disease			
Medications			
Diuretics			0.949
ACEI 23			
Angiotensin receptor blockers			
Nitrates			
Beta – blocker			
Digoxin			
Smoking (yes/No)	3/27	4/26	0.945

Quality of life

Total scores on the MLHFQ before training showed no significant differences between the training and the control group ($p > 0.95$). Furthermore, statistical paired *t*-test and Wilcoxon test showed that significant differences existed between mean QOL total scores at entry and after 8 weeks in the training group (52.32 to 43.80, $p < 0.001$), and no significance was seen between control groups (52.43 to 52.50, $p = 0.821$). Furthermore, scores of the physical, socioeconomic and psychological aspects in the training group decreased from T1 to T2 but in the control group on subscale of MLHFQ (psychological) decreased (Table 2).

Six-minute walk test

Descriptive results from the 6MWT show that before training, no significant differences were found between the training and the control group (373.86 ± 71.67m in the training group, 376.70m ± 71.58 in the control group, $p = 0.764$). Furthermore, statistical paired *t*-test showed that significant differences existed between mean walking distance on the 6 MWT at T1 and T2 in the training group (373.86 ± 71.67 to 412. 30m, $p < 0.001$), while no significance difference was seen between pre- and post-test in the control group (376.70 ± 58 to 377.63m ± 72.55, $p = 0.351$) (Table 3).

Exercise time

Mean exercise time in the training group from W1 to W8 increased. Repeated measure test showed differences significantly (19.96 minute to 23.10 minute, $p < 0.001$) (Table 4).

Discussion

The effects of the home-based walking exercise programme in patients with heart failure were evaluated in this quasi-experimental study. Significant differences in performance, QOL scores and exercise time were clearly presented between the training and control groups. Patients in the training group with NYHA class III had the greatest increase in distance walked on the 6MWT and the most improvement in QOL scores and exercise time. The training group experienced no adverse events during the 8-week walking programme. This study confirms that exercise training can be performed safely by patients with HF. Giannuzzi et al. (2001) (21) suggested that low-to-moderate intensity exercise can be performed safely by patients with HF. Our finding is in line with the study of Radzewitz et al. (37) who found that significant changes occurred in the scales for physical functioning, role physical, bodily pain, general health, vitality, and role-emotional and mental health. Also, Gary et al. (38) in a study determined the effects of home-based exercise on performance and QOL in women with diastolic heart failure. They found that QOL by MLHFQ measurement in the intervention group were improved compared with participants in the control group. In contrast to the our results, Witham et al. (32) in a randomised controlled trial on eighty-two patients aged ≥70 years with heart failure found that six-minute walk distance and quality of life did not change between exercise and control groups. This adverseness with our results may because of the older age of participants in their training group.

Significant difference between physical, psychological and socioeconomic aspects between T1 and T2 in the training group ($p < 0.05$) was revealed. These finding showed that exercise training had caused betterment in

Table 2 Quality of life scores

	Training group		*p-value*		*Control group*		*p-value*	
Subscales of MLHFQ	T_1	T_2	*Paired t–test*	*Wilcoxon*	T_1	T_2	*Paired t-test*	*Wilcoxon*
Physical	31.23 ± 4.14	26.60 ± 3.68	$p < 0.001$	$p < 0.001$	31.53 ± 3.31	31.86 ± 3.91	0.125	0.132
Psychological	10.10 ± 2.69	8.30 ± 2.13	$p < 0.001$	$p < 0.001$	10.10 ± 2.13	9.73 ± 2.42	0.019	0.022
socioeconomic	10.73 ± 2.06	9.26 ± 1.99	$p < 0.001$	$p < 0.001$	10.49 ± 2.17	10.53 ± 2.17	0.536	0.527
MLHFQ total Scores	52.33 ± 8.23	43.80 ± 6.77	$p < 0.001$	$p < 0.001$	52.43 ± 6.68	52.50 ± 7.32	0.821	0.717

Table 3 Outcome measures (6-minute walk distance)

Training group			*Control group*		
T_1	T_2	*p-value**	T_1	T_2	*p-value**
373.86 ± 71.67	412.30 ± 70.51	$p < 0.001$	376.70 ± 71.58	377.63 ± 72.55	$p = 0.351$

*Paired *t*-test

Table 4 Mean of exercise time

Exercise training weeks	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	*p-value**
Mean exercise time	19.96	20.20	20.33	20.73	21.16	21.96	22.90	23.10	$p < 0.001$

*Repeated measure test

different QOL aspects including physical aspect (symptoms of disease, physical actives of daily living ability, working in home and walking ability), psychological aspect (anxiety, depression aesthesis and sense freeloader in family) and socioeconomic aspect (association with friends and family). Although, in the control group, physical and socioeconomic aspects of the QOL scores did not improve, there were significant differences between the psychological aspects at T1 and T2. This is likely due to the researcher contact with the control group in their homes or calling them (as case groups). Resnick et al. (39) reported that QOL in HF patients may be impaired by physical symptoms, psychological problems, adverse treatment effects and social limitation. More studies of QOL showed that exercise training in patients with HF has effects on different QOL aspects. Functional performance improved in the training group significantly compared with the control group as measured by the 6-minute walk test; that development in the 6-minute walks test showed that exercise training is an important modality to increase functional performance in HF. Corvera-Tindel et al. (40) demonstrated that the effect of a 12-week home walking exercise programme on the functional status and symptoms in patients with HF in the training group had significantly longer walking distances measured by the 6-minute walk test. Eicher et al. compared the functional electrical stimulation (FES) with the conventional bicycle training in a group of CHF patients with stable condition in a one-week home-based study. They found that in the group with the two type training, the functional performance improved measured by the six-minute walk test (28). But Witham et al. (32) showed that the training group had not increased in walking distances measured by the 6-minute walk test. Mean exercise time in the exercise programme week in the training group showed that these participants had significant development at W1 to W8. In line with our study, Corvera-Tindel et al. (40) described the effect of a 12-week home walking exercise programme in the training group had significant development in exercise time measured by the exercise test.

It should be noted that in CHD, the apparent severity of patients' symptoms may fluctuate widely according to mood and morale, although the patients' cardiac function may be unchanged. This variability maybe effect on quality of life then limited this study. It is difficult to generalise this study because of the small sample size; therefore, the results must be interpreted with caution.

Conclusion

The home-based exercise programme can increase exercise capacity, performance and quality of life in CHF patients. Therefore, nurses should consider interventions such as home-based exercises in their home-care plans of patients with heart failure. This programme could be offered in the future as an alternative to conventional training as part of a community-based exercise training programme, depending upon the results of further studies.

Author contributions

Sadegheh Fayazi: Study design, administrative/technical/material support, drafting of manuscript. Kourosh zarea: Data collection, drafting of manuscript, data analysis. Abasi, Ali: Study conception, data collection, statistical expertise, Farzaneh Ahmadi: Critical revisions for important intellectual content, supervision

Ethical approval

Ethical approval has been granted by the Ethical Review Board, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, 2006/3513.

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