



Research Article

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The Effects of Using the Progressive Muscle Relaxation Technique on the 6-minute Walk and Fatigue Levels among Patients with Heart Failure in Jordan

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Abstract

Background: Heart failure (HF) is a chronic, progressive disease that presents a massive global clinical burden and contributes heavily to severe fatigue and reduced physical capacity. **Objective:** To examine the effects of using a progressive muscle relaxation technique on the 6-minute walk and fatigue levels among patients with heart failure in Jordan. **Methods:** A single-setting, one-group pretest-posttest quasi-experimental design was employed at a university-affiliated hospital in Amman. A convenience sample of 79 outpatient participants with New York Heart Association class II or III heart failure underwent baseline testing and received individual training in progressive muscle relaxation technique. Participants practiced the technique at home three times weekly (two sessions per day) for two weeks, guided by an audio link. Fatigue level was assessed using the Arabic version of the Brief Fatigue Inventory; physical capacity (exertion level) was assessed using the adult OMNI-Walk Scale; and functional distance was measured using the 6-minute walk test. **Results:** The mean score of the total sample baseline fatigue level was 6.85 ± 1.56 ; the mean score for perceived exertion was 4.41 ± 2.01 . Following a two-week progressive muscle relaxation intervention, fatigue levels decreased significantly to 5.58 ± 12.6 ($p < 0.001$), and perceived exertion decreased to 1.53 ± 1.39 ($p < 0.001$). Moreover, the results showed that participants' walking distance increased by 27.8 meters ($p < 0.001$). **Conclusions:** The progressive muscle relaxation technique is a highly feasible, safe, and effective non-pharmacological intervention to reduce fatigue, lower physical exertion, and enhance functional walking capacity in patients with heart failure.

Keywords: Fatigue; Heart failure; Jordan; 6-minute walk; Progressive muscle relaxation technique.

تأثير استخدام تقنية الاسترخاء العضلي التدريجي على المشي لمدة 6 دقائق ومستويات التعب لدى المرضى المصابين بقصور عضلة القلب في الأردن

الخلاصة

الخلفية: قصور عضلة القلب (HF) هو مرض مزمن يشكل عبئا سريريا عالميا هائلا ويساهم بشكل كبير في التعب الشديد وانخفاض القدرة البدنية. **الهدف:** دراسة تأثير استخدام تقنية استرخاء العضلات التدريجي على مستويات المشي لمدة 6 دقائق والتعب بين مرضى HF في الأردن. **الطرائق:** تم استخدام تصميم شبه تجريبي من مجموعة واحدة قبل الاختبار وما بعد الاختبار في مستشفى جامعي في عمان. خضع عينة من 79 مشاركا مصابين بـ HF من الدرجة الثانية أو الثالثة في العيادات الخارجية حسب تصنيف جمعية القلب في نيويورك لاختبارات أساسية وتلقوا تدريباً فردياً على تقنية استرخاء العضلات التدريجي. مارس المشاركون التقنية في المنزل ثلاث مرات أسبوعياً (جلسات يومية) لمدة أسبوعين، بتوجيه رابط صوتي. تم تقييم مستوى الإرهاق باستخدام النسخة العربية من تقييم الإرهاق الموجه؛ تم تقييم القدرة البدنية (مستوى الجهد) باستخدام مقياس المشي الشامل للبالغين؛ وتم قياس المسافة الوظيفية باستخدام اختبار المشي لمدة 6 دقائق. **النتائج:** كان متوسط درجة الإرهاق الأساسي للعينة 6.85 ± 1.56 ؛ وكان متوسط الدرجة للجهد المدرك 4.41 ± 2.01 . بعد تدخل استرخاء عضلي تدريجي استمر أسبوعين، انخفضت مستويات التعب بشكل ملحوظ إلى 5.58 ± 12.6 ($p < 0.001$)، وانخفض الجهد المدرك إلى 1.53 ± 1.39 ($p < 0.001$). علاوة على ذلك، أظهرت النتائج أن مسافة المشي بين المشاركين زادت بمقدار 27.8 متر ($p < 0.001$). **الاستنتاجات:** تقنية الاسترخاء العضلي التدريجي للعضلات هي تدخل غير دوائي عملي وأمن وفعال للغاية لتقليل التعب، وتقليل الجهد البدني، وتعزيز القدرة الوظيفية على المشي لدى مرضى HF.

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INTRODUCTION

Heart failure (HF) is a chronic, progressive, and debilitating cardiovascular disease in which the heart muscle cannot pump sufficient blood to meet the body's needs for blood and oxygen. Mainly, the heart cannot keep up with body demands [1]. It has been recognized as an emerging worldwide burden for over 25 years. The current prevalence of HF is 64.34 million cases (8.52 per 1,000 inhabitants), and this number is increasing over time [2]. Moreover, the rate of HF in the Jordanian population is high, and the risk increases with age and an unhealthy lifestyle. The number of HF patients is expected to increase

dramatically [3]. Heart failure is a serious health condition that negatively affects a person's quality of life (QoL) [4]. Common symptoms of HF include chest pain, shortness of breath (S.O.B.), sleep disturbances, and fatigue; it stays one of the most pervasive and disruptive. The New York Heart Association (NYHA) classifies heart failure into four categories based on a patient's limitations in physical activity and the presence of angina pain [5]. Fatigue is a persistent feeling of tiredness that makes it difficult to perform daily activities, such as shopping, climbing stairs, carrying groceries, or walking [1]. Hajj and his colleagues found that there is an effect of HF on QoL and symptoms of HF (fatigue and sleep quality);

together, they predict about 40% of the difference in the physical and mental components of QoL [6]. A retrospective data analysis indicates that the clinicians and the health care providers (HCP) were less likely to discuss the relationship between symptoms such as fatigue, sleep disturbance, depression, and HF, as well as how these symptoms can deteriorate patients' health status [7]. However, more attention and awareness are needed when an HCP takes the history for HF patients, and identifying all symptoms may contribute to improving the patients' health. Management of fatigue among HF patients requires non-pharmacological interventions as well as pharmacological ones. Fatigue primarily affects skeletal muscles, and to mitigate its negative impact in HF patients, the progressive muscle relaxation technique (PMRT) is one non-pharmacological intervention that can be used to reduce fatigue [8]. PMRT is an active relaxation technique in which individuals gradually induce a sense of quietness and coolness by actively contracting and then releasing specific muscle groups [9]. PMRT has been widely studied for fatigue and other QoL symptoms, but not in HF patients in Jordan. The six-minute walk test (6-MWT) is considered the most widely used and cost-effective test for assessing functional capacity and exercise tolerance in patients with HF enrolled in cardiac rehabilitation programs [10]. The 6-MWT is significant for measuring outcomes before and after the intervention and may help predict morbidity and mortality in patients with heart or lung disease [11]. Functional capacity is a common predictive factor used to assess patients with HF [12]. Despite its considerable influence on patient health, fatigue is often an underappreciated symptom, frequently neglected by HCP and inadequately reported by patients. Fatigue contributes to an increase in physical disability among patients with HF and decreases their QoL [13]. The use of non-pharmacological interventions can enhance patients' physical abilities, ADLs, and QoL [14]. Several studies have examined the effects of PMRT as an important non-pharmacological intervention for patients with several chronic diseases, with little focus on heart failure patients. The results of this study will address the effects of PMRT on 6-MWT and fatigue levels among patients with HF in Jordan. Many studies represent a positive therapeutic effect of PMRT on reducing fatigue [8,15]. The PMRT technique has not been used as a rehabilitation therapy among HF patients who suffer from the severe negative effects of fatigue on their QoL [14]. Despite the recognized benefits of PMRT for chronic conditions, it remains underutilized in HF management due to a lack of context-specific evidence. This study aims to address this gap by evaluating the efficacy of PMRT in reducing fatigue in HF patients. This study represents a pioneering investigation in Jordan that evaluates the impact of PMRT on functional capacity, measured by the 6-MWT, and fatigue levels, thereby providing a substantial contribution to clinical practice in the region. This study aims to examine the effects of progressive muscle relaxation on the 6-minute walk

distance and fatigue levels among patients with heart failure in Jordan.

METHODS

Study design and setting

A quasi-experimental, one-group pretest-posttest design was utilized to evaluate the effects of PMRT over time. This design allows each participant to serve as their own clinical control, with maximum statistical efficiency, and to isolate the temporal effects of the intervention on measures of functional capacity and fatigue. The study was conducted at the outpatient cardiology clinic of a university-affiliated hospital in Amman, which has a high visiting rate for HF patients.

Sampling and sample size

A non-probability convenience sampling strategy was employed to recruit adult outpatients diagnosed with HF in class II or III who experienced fatigue and met the inclusion criteria between October 2021 and April 2022. The sample size was determined using G*Power software (version 3.1.9) [16]. Based on a paired t-test with a significance level of 0.05, power of 0.8, effect size of 0.36, and a minimum of 63 participants was required. Recruitment targets were increased by 25% to account for anticipated attrition and dropout rates. Ultimately, 79 participants completed all intervention stages.

Inclusion criteria

The inclusion criteria included adults aged 18 years or older, outpatients who were diagnosed with heart failure with class II or class III, had clinical symptoms of HF such as fatigue and physical disability, and had voluntary participation. In addition, the ability to perform the exercise program after medication therapy, as well as the 6-MWT.

Exclusion criteria

Patients were excluded from participation in the study if they had myocardial infarction or unstable angina a month before inclusion, had a recent pulmonary embolism (<3 months ago) causing severe hemodynamic strain, had a physical disability related to other causes (e.g., having neurological or muscular disease, having any cognitive impairments, or having difficulty with movement (such as rheumatoid arthritis or fractures)), and were those with unclear medical diagnoses.

Study instrument

Demographic and clinical data were obtained using self-administered interviews, including age, gender, marital status, and level of education, while the clinical data were obtained using the patient's medical record, including weight (Wt.), height (Ht.), BMI, years of suffering from HF, LVEF, O₂ saturation (O₂

sat.), heart rate (HR), distance that patient walked, and presence of comorbid diseases of diabetes mellitus (DM), hypertension (HTN), chronic kidney disease (CKD), and atherosclerosis. The Brief Fatigue Inventory (BFI) was developed for evaluating fatigue severity and is designed for easy translation into multiple languages. It consists of nine items scored on a 0–10 numeric scale. The first three items assess fatigue severity at its worst, usual, and current levels, while the remaining six evaluate interference with daily life over the past 24 hours. Scores of 0–6 indicate “non-severe” fatigue, while scores above 7 indicate “severe” fatigue [17]. The BFI has been translated into various languages, including Arabic. In a study involving 79 Jordanian cancer patients, the Arabic version (BFI-A) demonstrated high reliability (0.93) and significant correlations with the Insomnia Severity Index and Zung Depression Scale. The BFI also showed reasonable validity regarding clarity and comprehensiveness [18]. The functional capacity and exercise tolerance in heart failure (HF) patients are crucial and were evaluated using the Borg scale (1962), which first explored the link between physical effort and perceived exertion, introducing two tools: the Ratings of Perceived Exertion (RPE) and the OMNI scale, developed by Borg and Robertson, which is valid and reliable when compared to the RPE scale [19]. The OMNI is defined as pictures and verbal expressions used to facilitate exercisers in rating their exertion visually. The OMNI Picture scale asked the participants to rate their level of exertion in a format that comprises both graphic and verbal descriptions located on a narrow numerical response ranging from 0 to 10, where 0 means “extremely easy” and 10 means “extremely hard” [20]. In the current study, the OMNI scale was used to assess perceived exertion in HF patients during the 6-MWT before and after receiving PMRT.

Ethical considerations

All necessary steps were taken to ensure the participants' ethical rights. Before data collection, approval for conducting the study was obtained from the Institutional Review Board (IRB) of the university-affiliated hospital. Generally, PMRT is considered a safe procedure that imposes no harm to patients, and the inclusion and exclusion criteria were followed. Participation in this study was voluntary, and participants' confidentiality was maintained throughout the study. All eligible participants signed a consent form before data collection. Protections were established to ensure patient safety. The participants completed the study phases at the cardiac clinic, where a cardiologist was available in case of an emergency. The researchers and nurses were certified in Basic Life Support (BLS), and an emergency trolley was available. The participants were trained by the principal investigator to perform PMRT and were informed that if they experienced any physical changes, the procedure would be terminated.

Statistical analysis

Data were entered and analyzed using IBM SPSS Statistics version 25 [21]. Data entry was followed by standard data cleaning procedures to assess data accuracy and address patterns of missing data [22]. Descriptive statistics, including frequencies, percentages, means, ranges, and standard deviations, were computed for demographic and clinical variables. A paired-sample t-test was used to examine the effect of PMRT on the primary dependent metrics (fatigue levels, OMNI exertion level, and 6-MWT walking distance) after verifying normality via histograms and boxplots. Statistical significance was established at $p < 0.05$.

RESULTS

As shown in Table 1, the total sample of 79 participants had a mean age of 61.8 years (SD = 9.49), ranging from 38 to 80 years. The majority of participants were male (53.2%, $n = 42$), while the female participants accounted for about 46.8% ($n = 37$).

Table 1: Categorical demographic and clinical characteristics of the sample ($n=79$)

Characteristics	n(%)
<i>Gender</i>	
Male	42(53.2)
Female	37(46.8)
<i>Marital Status</i>	
Single	1(1.3)
Married	69(87.3)
Divorced	1(1.3)
Widowed	8(10.1)
<i>Educational level</i>	
Primary	28(35.4)
Secondary	21(26.6)
Diploma	19(24.1)
Bachelor	11(13.9)
<i>BMI</i>	
18.5-24.5	13(16.5)
25-29.9	28(35.4)
30 and above	38(48.1)
<i>Medication</i>	
ARBs	68(86.1)
ACEI	40(50.6)
CCB	14(17.7)
Diuretics	73(92.4)
Dyslipidemia	74(93.7)
Antiplatelet	35(44.3)
NSAIDs	47(59.5)
<i>Comorbidity diseases</i>	
HTN	77(97.5)
DM	56(70.9)
CKD	8(10.1)
COPD	1(1.3)
Atherosclerosis	50(63.3)
Others	9(11.4)

BMI: Body mass index; ARBs: Angiotensin receptor blockers; ACEI: Angiotensin-converting enzyme inhibitors; CCB: Calcium channel blockers; NSAIDs: Non-steroidal anti-inflammatory drugs; HTN: Hypertension; DM: Diabetes mellitus; CKD: Chronic kidney disease; COPD: Chronic obstructive pulmonary disease ; MI: Myocardial infarction.

Participants' marital status was divided into four categories: single, married, divorced, and widowed. About 87.3% of the participants were married ($n = 69$). Moreover, education level was divided into five categories: primary, secondary, diploma, bachelor's, and higher education; 35% of participants had primary education. None of the study participants were in the

higher education category; therefore, this category was excluded from the analysis. Participants' BMI was categorized into four classes: below 18.5, 18.5–24.5, 25–29.9, and 30 or above. Most participants were overweight, with 48.1% ($n = 38$) having a BMI of 30 or higher and none had a BMI below 18.5, which was excluded from the analysis. The majority received Angiotensin Receptor Blockers (ARBs) (86.1%, $n = 68$), Dyslipidemia medication (93.7%, $n = 73$), Diuretics (92.4%, $n = 74$), and Non-steroidal anti-inflammatory drugs (NSAIDs) (59.5%, $n = 47$). A significant percentage did not receive calcium channel blockers (CCB) (82.3%, $n = 65$) or antiplatelets (55.7%, $n = 44$). Participants were nearly evenly split regarding receiving Angiotensin-Converting Enzyme Inhibitors (ACEIs) (50.6%, $n = 40$). Most had hypertension (97.5%, $n = 77$) and diabetes mellitus (70%, $n = 56$), while fifty had atherosclerosis, eight had chronic kidney disease (CKD), and one had chronic obstructive pulmonary disease (COPD). Nine participants had other comorbidities, including myocardial infarction (3), hypothyroidism (2), and pancreatic cancer (2), with osteoporosis, cerebral vascular accident (CVA), and benign prostatic hypertrophy (BPH) each occurring once (Table 1). The mean for years of HF suffering was 6.29 ± 4.01 , ranging from 1 to 20 years, although the mean for the LVEF was 29.8 ± 8.02 , ranging from 15 to 40 (Table 2).

Table 2: Continuous demographic and clinical characteristics of the sample ($n=79$)

Characteristics of the Sample	M $\pm$ SD (Range)
<i>Demographical Characteristics</i>	
Age (year)	61.8 $\pm$ 9.49 (38-80)
<i>Clinical Characteristics</i>	
Years of suffering	6.29 $\pm$ 4.01 (1-20)
LVEF	29.8 $\pm$ 8.02(15-40)

At baseline, before receiving the PMRT, the mean fatigue score was 6.85 ± 11.58 , ranging from 4.2 to 8.8. After two weeks of receiving the PMRT, all participants reassessed their fatigue level using the BFI tool; their mean fatigue level post-intervention was 5.58 ± 12.67 , ranging from 1.7 to 7.7. The functional capacity was measured for all participants before the intervention, with a mean score of 4.4 ± 2.01 , ranging from 2 to 10. After two weeks of intervention administration, functional capacity was remeasured, with a mean score of 1.53 ± 5.26 , ranging from 0 to 5 (Table 3).

Table 3: Means and Ranges of the primary study outcomes at different points of time ($n= 79$)

Outcome	Time Point	
	Pre-test	Post-test
Functional capacity	4.4 $\pm$ 2.01 [2-10]	1.53 $\pm$ 5.26 [0-5]
Fatigue level	6.85 $\pm$ 11.58 [4.2-8.8]	5.58 $\pm$ 12.67 [1.7-7.7]

Functional capacity by OMNI (0-10).

To assess whether there was a difference in fatigue level scores pre- and post-PMRT intervention, a paired t-test was performed to compare the mean scores pre- and post-test. Fatigue levels were assessed twice (pre- and post-intervention) for all participants.

The assumptions of the paired t-test were examined before conducting the test [23]. There were two paired measurements of the characteristics of interest (fatigue level). Histograms and boxplots indicated that fatigue level scores are approximately normally distributed without outliers. After meeting the assumptions of using a paired t-test, the results revealed a statistically significant difference in the fatigue scores pre- and post-intervention ($p < 0.001$) (Table 4). To determine whether PMRT affected functional capacity pre- and post-intervention, a paired t-test was performed to establish the effect of PMRT on improving functional capacity. The OMNI scale was measured for all participants at two time points (pre- and post-intervention). The assumptions of the paired t-test were examined before the test was run [23]. After meeting the assumptions for using the test, the result revealed a statistical difference in the OMNI scores pre- and post-PMRT ($p < 0.001$). The mean distance participants walked before receiving PMRT was 221.8 ± 61.6 m, ranging from 120 to 330 m, while the mean distance covered after receiving PMRT was 249.6 ± 63.8 m, ranging from 120 m to 385 m. After meeting the assumptions of using a paired t-test, the results revealed a statistical difference in the distances walked pre- and post-intervention ($p < 0.001$) (Table 4).

Table 4: The effects of PMRT on the study outcomes pre- and post-test ($n= 79$)

Primary outcomes	Time point	M $\pm$ SD (Range)	p-value
Fatigue score	Pre-test	6.85 $\pm$ 11.56 [4.2, 8.8]	<0.001
	Post-test	5.58 $\pm$ 12.67 [1.7, 7.7]	
Functional capacity	Pre-test	4.41 $\pm$ 2.01 [2-10]	<0.001
	Post-test	1.53 $\pm$ 1.39 [0-5]	
Distance (m)	Pre-test	221.81 $\pm$ 61.63 [120-330]	<0.001
	Post-test	249.65 $\pm$ 63.8 [120-385]	

DISCUSSION

Approximately 65% of patients with HF experience moderate to severe fatigue; thus, a decrease in their physical capacity may increase the risk for mortality, morbidity, and rehospitalization [24]. Fatigue and physical capacity were the main factors in examining the effectiveness of PMRT. In this study, 79 participants reported a fatigue level of 6.8 before receiving PMRT, which is considered moderate to severe [18]. This result is consistent with previous studies showing that patients with HF have moderate to high fatigue [24-26], confirming that patients with high fatigue levels had lower stroke and cardiac indices than those with moderate-low fatigue levels. Therefore, patients with HF had poor sleep quality, low QoL, and certain fatigue severity [6]. Nganou *et al.* mentioned in their study that patients with HF have poor physical capacity, which negatively affects their QoL [27]. Moreover, 57.4-77.6% of patients experienced mild to severe fatigue [28-29]; similarly, pain, fatigue, and depression have contributed to functional performance changes in patients with HF. However, fatigue is a significant symptom that affects patients' physical performance [30]. Additionally, patients with HF reported the same level of fatigue as patients with cancer, and both of these population

groups experienced more fatigue than healthy adults [31]. Furthermore, both general and exertional fatigue were associated with clinical and psychological characteristics such as depressive symptoms and dyspnea [32]. In the present study, the distance that the participants covered over the six minutes was measured before receiving PMRT, with a mean distance of approximately 221.8 m, which was consistent with the results of Shah *et al.*, who revealed that the average distance walked by the HF participants at baseline was 218 m [33]. Similarly, patients with HF walked a median distance of 300 m [34]. A possible explanation for these results may be differences across studies in the classification of HF, patients, age groups, and the number of years that patients have suffered from HF. Likewise, the 6-MWT may provide consistent information about the patient's ADL and short-term prediction of HF consequences, especially in patients with HF and reduced ejection fraction [35]. Fatigue levels were significantly decreased after receiving PMRT, with a mean score of 5.58, compared to a pre-PMRT fatigue level of 6.8; this finding is consistent with the results showing that fatigue levels significantly decreased in the interventional group (who received training exercise) among patients with class II and III HF [36], while the fatigue severity increased in the control group. Likewise, Dehkordi and Jalali stated that PMRT enhanced an individual's ability to perform daily activities independently and had positive effects on aspects of QoL [9]. In addition, fatigue severity significantly decreased in the intervention group. Patients with post-valvular heart surgery who received PMRT had a statistically significant reduction in fatigue levels [37]. The severity of fatigue remained similar in the control group. Moreover, sleep quality was enhanced in the experimental group compared to the control group. The Baduanjin exercise is considered a cardiac rehabilitation (CR) program, as CR consists of regular exercise training and relaxation exercises. [29]. The study revealed that the group that received the exercise showed significant improvement in fatigue levels and QoL [29,38]. Van Geffen *et al.* conducted a study to determine fatigue levels during and after receiving the CR program [38]. The OMNI scale was used to measure physical capacity (level of exertion) among patients with HF. The mean score before receiving PMRT was 4.41, and after receiving the 6-MWT, it was decreased to 1.53. Thus, PMRT had a positive effect on physical capacity, consistent with previous studies that reported that early exercise in cardiac rehabilitation improved the 6-MWT distance and enhanced the physical capacity of patients with HF [39,40]. Moreover, one study reported that 6-MWT improved in patients with HF after an aerobic exercise training program [41]. A study was conducted to explore the role of exercise training (ET) on the functional walking capacity and activity level of Nigerians with biventricular heart failure (BVF) [42]. The authors reported that the exercise group had significant enhancements in functional walking capacity and activity levels. Thus, more studies are needed to assess the effects of PMRT on the 6-MWT exertion level using the OMNI scale.

Regarding the effects of PMRT, the average distance walked after 2 weeks of treatment increased by 27.8 m. A similar result was observed, with a mean improvement in distance during the 6-MWT of approximately 34.8 m [42]. Studies reported that the distance covered during the 6-MWT was higher after ET, averaging 50–54 m [41,43]. The differences in the average distance covered may be related to the sample size and patient characteristics, such as age and NYHA class of HF. One possible explanation for these results may be the small sample size, differences in the time frame for conducting the 6-MWT, and the HF classification (class II and III) of the participants.

Strengths and Limitations

The present study is the first of its kind to test the effects of PMRT on the 6-MWT and fatigue levels among patients with heart failure as a non-pharmacological approach in Jordan, which can greatly influence the client's response to the intervention, since this intervention requires cognitive and belief changes. On the other hand, this study has several limitations. First, the data were collected using convenience sampling from a single hospital, which may limit the study's generalizability to patients diagnosed with HF. Second, the lack of a control group may limit control over other confounding variables that could affect the results.

Implications and Recommendations

Fatigue in patients with heart failure needs greater recognition by healthcare professionals. Nurses considered the impact of fatigue and physical ability on QoL among HF patients. Increased fatigue should be considered during routine nursing assessments during treatment, for inpatients and outpatients alike. Nurses may also screen patients for fatigue using valid and reliable tools to improve early recognition and treatment of HF. Based on these findings, patients with heart failure, especially outpatients who wait long for appointments, should have an individualized plan for fatigue management earlier in the diagnostic process, and this plan should be continued throughout their treatment. Given evidence that patients with advanced HF are more prone to fatigue, a more focused assessment and priority should be given to these patients to alleviate their fatigue and identify contributing factors that might lead to or exacerbate it. Thus, nurses have an instrumental responsibility to effectively manage patients with fatigue, and they are expected to choose the best tools to help patients with heart failure manage their condition and improve their QoL. The PMRT is a non-invasive, low-cost, and easy-to-administer technique that, in the present study, showed an evident effect on the 6-minute walk and fatigue levels among patients with heart failure. PMRT may help nurses care for patients with heart failure. Considering that PMRT is a non-pharmaceutical approach, it plays an important role in fatigue management. Nurses have a holistic model for caring for HF patients, and awareness of this approach to therapy is also necessary.

Future Prospects

The current study contributes to the development of knowledge and literature and may serve as a platform for further research on managing fatigue in patients with HF. In addition, this study's results support the use of PMRT to reduce fatigue severity and improve 6-MWT performance. They may encourage researchers to evaluate the effectiveness of PMRT on other symptoms and health problems, such as sleep disturbances, dyspnea, depression, and anxiety, among patients with HF.

Conclusions

The outcome indicates that patients with HF often experience significant fatigue, which negatively impacts their ADL and QoL activities. Proper fatigue management, such as PMRT, is essential, as unrelieved fatigue can lead to decreased activity, depression, and relationship challenges. This study suggests that PMRT is a promising intervention for managing fatigue, although more research is needed. These findings may inspire further exploration of training programs and alternative interventions to improve the 6-MWT outcomes for HF patients. Importantly, this is the first study to demonstrate the feasibility and acceptability of PMRT in the Jordanian population, underscoring the need to further examine other interventions for HF-related symptoms.

Conflict of interests

The authors declared no conflict of interest.

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Data sharing statement

The data that supports the findings of this study are available from the corresponding author upon a reasonable request.

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