

## Aerobic Versus Strengthening Exercises on Fibromyalgia in Postmenopausal Women

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### Abstract

**Background:** Fibromyalgia (FM) is a syndrome, with unknown aetiology, characterized by chronic widespread pain and several associated non-specific symptoms such as pain, fatigue, sleep disorders, depression and anxiety. It affects approximately 2-3% of the general population with more than 90% of patients being female.

**Aim of Study:** This study was aimed to determine which is more effective in alleviating pain and fibromyalgia symptoms; aerobic exercises or strengthening exercises in postmenopausal women.

**Material and Method:** Sixty postmenopausal women with FMS will be selected according to American College of Rheumatology (ACR) criteria from the Physical Therapy Department in Naser General Hospital to share in this study, their age ranged from 50-60 years and their Body Mass Index (BMI) will not exceed 30kg/m<sup>2</sup>, the participants were assigned into two groups of equal numbers. The group (A) received aerobic exercise program, in the form of treadmill 3 times/week for 8 weeks. Each session will take about 30 minutes, while the group (B) received strengthening exercises for the four limbs and trunk using their body weight or resistance band (Thera band) 3 times/week for 8 weeks. Each session will take about 30 minutes. All subjects in both groups were assessed through the Visual Analogue Scale (VAS) for pain and the Fibromyalgia Impact Questionnaire (FIQ) for the fibromyalgia related symptoms.

**Results:** The results of the present study revealed that there was a statistically significant improvement ( $p < 0.05$ ) in both pain and fibromyalgia related symptoms in group (A) than in group (B).

**Conclusion:** It can be concluded that aerobic exercises is more effective than strengthening exercises in relieving pain and fibromyalgia related symptoms in postmenopausal women.

**Key Words:** *Aerobic – Strengthening – Exercises – Fibromyalgia – Postmenopausal women.*

### Introduction

**FIBROMYALGIA** is a common chronic condition involving widespread pain, cognitive symptoms, non-restorative sleep, fatigue, and a number of somatic symptoms, along with a reduced quality of life [1]. Fibromyalgia (FM) syndrome fibro means fibre, myo means muscle, algia means pain and syndrome refers to a group of symptoms. Factors associated with the occurrence of widespread pain involved manual work, such as heavy lifting, repetitive motions, or squatting for extended periods of time. Examples of these factors include lifting heavy weights above shoulder level (shoulder and low back pain), lifting heavy weights with one or both hands (shoulder and low back pain), and lifting or carrying heavy weights with one hand (knee pain) [2].

Menopause is an inevitable life event for most women (and all women who live long enough) and is thought to represent the complete cessation of ovarian oocyte production [3].

Exercise was defined as planned, structured and repetitive movements done to improve or maintain one or more components of physical fitness [4]. Aerobic Exercise (AE) "walking" can be performed at varying intensities and therefore, walking may be an alternative exercise option for patients with FM who are unable to participate in aerobic exercise programs of higher intensities exercise programs [5]. Strengthening Exercises (SE) was associated with large improvements in global well-being and physical function [6].

### Material and Methods

The study was designed as a prospective, randomized, pre-post-test, controlled trial. This study

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was conducted in the outpatient clinic of Naser General Hospital. The study was conducted between June 2017 and March 2018. A convenient sample of sixty postmenopausal women with FMS were selected according to American College of Rheumatology (ACR) criteria from the Physical Therapy Department in Naser General Hospital to share in this study, their age ranged from 50 to 60 years old with at least 3-4 years post menopause, their body mass index did not exceed  $30\text{kg}/\text{m}^2$ . They were enrolled and assessed for their eligibility to participate in the study. After explaining the aim, nature, and benefits of the study to the participants, informing them of their right to can refuse or withdraw from the study at any time, and about the confidentiality of any obtained information. An informed consent was obtained from each participant. The sixty postmenopausal women with fibromyalgia were randomly assigned into two groups (group A and group B). Participants were randomly assigned into, group (A) (n=30), who received aerobic exercises program, in the form of walking on the treadmill device (JSB, HF39 by India) 2 times/week for 8 weeks. Each session took about 30 minutes as the following: 5 minutes warming up exercises by walking on the treadmill by low speed, 20 minutes walking at moderate intensity (70% of the maximal heart rate) and 5 minutes are cooling down by walking on the treadmill by low speed as in warming up, while group (B) (n=30), who received strengthening exercises for the four limbs and trunk using their body weight or resistance band (Thera-Band by USA) 2 times/week for 8 weeks. Each session took about 30 minutes as the following: 5 minutes warming up using general stretching exercises, 20 minutes strengthening exercise for the upper limbs, lower limbs, and trunk using the bodyweight and the Thera-Bands at different degrees of resistance as the patient's ability allows.

Both groups were assessed before and after the treatment using the visual analogue scale for pain. The patient is asked to mark a 100mm line to indicate pain intensity. The score is measured from zero anchors to the patient's mark. Using a millimeter scale to measure the patient's score will provide 101 levels of pain intensity [7]. And the fibromyalgia impact questionnaire, this questionnaire was designed to assess the current health status of patients (predominantly women) with fibromyalgia [18].

The Fibromyalgia Impact Questionnaire (FIQ) is a disease-specific self-reported questionnaire that comprises ten subscales of disabilities and symptoms ranging from 0 to 100. The total score

is the mean of ten subscales. A higher score indicates a lower health status [9].

*Statistical analysis:* Results are expressed as mean  $\pm$  standard deviation. Test of normality, Kolmogorov-Smirnov test, was used to measure the distribution of data measured pre-treatment. Accordingly, comparison between variables in the two groups was performed using either unpaired *t*-test or Mann Whitney test whenever it was appropriate. Comparison between variables measured pre-and post-treatment in the same group was performed using either paired *t*-test or Wilcoxon Signed Ranks test whenever it was appropriate. Difference was calculated as follows: Pre-treatment -post-treatment. Statistical Package for Social Sciences (SPSS) computer program (Version 19 windows) was used for data analysis. *p*-value  $\leq 0.05$  was considered significant.

## Results

A total of 60 postmenopausal women were randomized for study intervention. Group (A) consisted of 30 participants and received aerobic exercises program, in the form of walking on the treadmill for 30 minutes 2 times/week for 8 weeks. And group (B) consisted of 30 participants and received strengthening exercises for the four limbs and trunk using their body weight or thera-band for 30 minutes 2 times/week for 8 weeks. All randomized participants completed the trial. There were no statistical significant differences between both groups (A and B) in their ages, weight, height and body mass index (Table 1). In group A, there was a statistical significant decrease in the mean value of VAS measured at post-treatment when compared with its corresponding value measured at pre-treatment. In group B, there was a statistical significant decrease in the mean value of VAS measured at post-treatment when compared with its corresponding value measured at pre-treatment. The percentage of decrease in VAS in group A was higher (25.88%) than in group B (6.69%) (Table 2).

In group A, there was a statistical significant decrease in the value of FIQ measured at post-treatment when compared with its corresponding value measured at pre-treatment. In group B, there was a statistical significant decrease in the value of FIQ measured at post-treatment when compared with its corresponding value measured at pre-treatment. The percentage of decrease in FIQ in group A was higher (21.28%) than in group B (6.99%) (Table 3).

Table (1): General characteristics of the two studied groups.

	Group A (n=30)	Group B (n=30)	t- value	p- value
Age (yrs.)	52.57±2.31	53.43±2.70	-1.335	0.187 (NS)
Weight (kg.)	77.72±5.12	75.08±7.45	1.596	0.117 (NS)
Height (cm.)	166.07±3.49	164.20±6.18	1.440	0.157 (NS)
BMI (kg/m <sup>2</sup> )	28.37±1.06	27.89±1.30	1.576	0.120 (NS)

$p > 0.05$  = not significant.

Table (2): Comparison between mean values of VAS measured pre-and post-treatment in the two studied groups.

	Group A (n=30)	Group B (n=30)
Pre-treatment	8.00±0.98	8.07±0.91
Post-treatment	5.93±1.36	7.53±0.97
Mean difference	2.07	0.54
% change	25.88↓↓	6.69↓↓
t-value	10.475	3.565
p-value	0.001 (S)	0.001 (S)

$p < 0.05$  = significant.

Table (3): Comparison between values of Fibromyalgia Impact Questionnaire (FIQ) measured pre-and post-treatment in the two studied groups.

	Group A (n=30)	Group B (n=30)
Pre-treatment	61.38±6.31	64.70±1.95
Post-treatment	48.32±6.38	60.18±6.83
Mean difference	13.06	4.52
% change	21.28↓↓	6.99↓↓
Z value	-4.787	-4.783
p-value	0.001 (S)	0.001 (S)

$p < 0.05$  = significant.

## Discussion

Fibromyalgia is a syndrome, with unknown etiology, characterized by chronic widespread pain and several associated non-specific symptoms such as pain, fatigue, sleep disorders, depression and anxiety [10]. Because of the presence of extensive somatic complaints and disability, people with fibromyalgia have greater number of visits yearly and more specialists enlisted in their care [11]. Patients with fibromyalgia have findings compatible with tissue injury pain, the pain mechanisms involving both the primary afferent neuron and the nociceptive systems in the central nervous system [20]. Exercises have major beneficial effects on most chronic diseases. These benefits are not limited to preventing or limiting the progression of a disease, but include improving physical fitness, muscular strength and the quality of life [12].

It was reported that Aerobic Exercises (AE) and Strengthening Exercises (SE) can reverse deconditioning and improve pain and function in patients with FMS [13-15]. The result of the current

study revealed that there was a statistically significant improvement ( $p < 0.05$ ) in pain, and the related symptoms associated with fibromyalgia in the group (A) than in the group (B). Aerobic exercise interventions were shown to reduce pain, fatigue, and depression and to improve Health-Related Quality of Life (HRQOL) and physical fitness [16].

The result of current study in line with those of Özlem et al., [17] who compared the effects of aerobic training with a muscle-strengthening program in patients with fibromyalgia. This study was applied on twenty-six women, who completed the 8-week study. There were similar significant improvements in both groups regarding pain, sleep, fatigue, tender point count, and 6-min walk distance after treatment ( $p < 0.05$ ).

A systemic review by Angela [18] showed that aerobic-only training has beneficial effects on physical function and some FM symptoms also strength-only training may improve FM symptoms, but requires further study.

A published study by Valim [19] reported positive effects of walking. Seventy-six sedentary women were recruited to compare the effects of supervised walking and stretching three times per week for 45min over a 20-week period. Exercise intensity in the walking group was individually tailored to the patient's baseline physical function. Sixty-six percent of the patients in the walking group and 33% of those in the stretching group gained at least 15% improvement of their oxygen uptake. The between-group analysis showed that the walking group improved in terms of maximum oxygen uptake, vital capacity, the Fibromyalgia Impact Questionnaire (FIQ) total score, depression, and mental health compared with the control group who had practiced stretching [19].

In conclusion, aerobic exercise and strengthening exercise were shown effective at improving pain and the related symptoms in postmenopausal women with fibromyalgia syndrome. Recommendations for further research include using combination of aerobic and strengthening exercise versus aerobic alone and strengthening alone.

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## التمارين الهوائية مقابل تمارين التقوية على متلازمة الألم العضلي الليفي لدى النساء بعد إنقطاع الطمث

متلازمة الألم العضلي الليفي هي مرض روماتيزمي مجهول السبب الذي يتميز بالألم على نطاق واسع ويرتبط مع أعراض أخرى متعددة بما في ذلك التعب والقلق والإكتئاب. معدل الإنتشار العالمي لمتلازمة الألم العضلي الليفي في عامة السكان هو ٧.٢٪ مع نسبة من الإناث إلى الذكور من ٣:١ ويتم التشخيص في معظم الأحيان في منتصف العمر.

أجريت هذه الدراسة لمعرفة ما إذا كانت التمارين الهوائية أفضل من تمارين التقوية لتحسين الأعراض المصاحبة لمتلازمة الألم العضلي الليفي عند النساء بعد إنقطاع الطمث.

تم إختيار ٦٠ امرأة بعد إنقطاع الطمث وتم تشخيصهم بمتلازمة الألم العضلي الليفي عشوائيا وفقا لمعايير الكلية الأمريكية لأمراض الروماتيزم من قسم العلاج الطبيعي في مستشفى ناصر العام للمشاركة في هذه الدراسة، وتراوحت أعمارهم بين (٥٠-٦٠) سنة وما لا يقل عن ٣-٤ سنوات بعد إنقطاع الطمث. لم يتجاوز مؤشر كتلة الجسم ٣٠ كم/م<sup>٢</sup> يتم تشخيص جميع المشاركين من قبل أخصائي أمراض الروماتيزم على أنهم مصابون بمتلازمة الألم العضلي الليفي.

تم تقسيم المرضى عشوائيا إلى مجموعتين (أ، ب):

• المجموعة (أ): تلقى ثلاثون مريضا برنامج التمارين الهوائية، مرتين في الإسبوع لمدة ٨ أسابيع. إستغرقت كل جلسة حوالي ٣٠ دقيقة كما يلي: ٥ دقائق إحماء عن طريق المشي على جهاز الجرى بسرعة منخفضة، ٢٠ دقيقة سيرا على الأقدام بشدة معتدلة (٧٠٪) من معدل ضربات القلب القصوى (٢٢٠-العمر)، وه دقائق للتهدة عن طريق المشي على جهاز المشي بسرعة منخفضة كما هو الحال في الإحتماء.

• المجموعة (ب): تلقى ثلاثون مريضا تمارين تقوية للأطراف الأربعة والجذع بإستخدام وزن الجسم أو شريط المقاومة مرتين في الإسبوع لمدة ٨ أسابيع. تستغرق كل جلسة حوالي ٣٠ دقيقة على النحو التالي: ٥ دقائق من الإحماء، و ٢٠ دقيقة تقوية للأطراف العلوية والسفلية، والجذع بإستخدام وزن الجسم وشريط المقاومة عند درجات مختلفة من المقاومة كما تسمح قدرة المريض وه دقائق للتهدة.

تم تقييم جميع المرضى في كلا المجموعتين (أ، ب) قبل وبعد برنامج العلاج من خلال مقياس الألم المرئي وإستبيان تأثير أعراض متلازمة الألم العضلي الليفي.

أظهرت النتائج التي تم الحصول عليها من هذه الدراسة أن هناك إنخفاضا إحصائيا كبيرا في متوسط قيمة مقياس الألم المرئي في المجموعة (أ) عند مقارنته بالقيمة المقابلة في المجموعة (ب)، كما كان هناك إنخفاض كبير إحصائي في قيمة إستبيان تأثير أعراض متلازمة الألم العضلي الليفي في المجموعة (أ) عند مقارنتها بالقيمة المقابلة لها في المجموعة (ب).

وأخيرا من هذه الدراسة يمكن أن نستنتج أن التمارين الهوائية هي أكثر فعالية من تمارين التقوية في علاج الألم وأعراض متلازمة الألم العضلي الليفي في النساء بعد إنقطاع الطمث.