

# Effect OF Underwater Exercises ON Treating Postmenopausal Fibromyalgia Symptoms

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*Abstract: Our investigation was aim to study effect of underwater exercises on relieving the symptoms of fibromyalgia during postmenopausal life. Sixty women complaining from the symptoms of postmenopausal fibromyalgia were randomly selected according to American College of Rheumatology criteria from the physical therapy clinic in Horus University in Egypt to share in this study, their age ranged between 50-60 years old with at least 3-4 years post menopause. Their body mass index did not exceed 30 km/m<sup>2</sup>. A rheumatologist diagnoses all women as having fibromyalgia symptoms. Women were divided to 2 equal groups, (A) treated by Hydrotherapy in form of underwater exercises for four limbs and trunk while group (B) received land exercises for the four limbs and 2 times/ week for 8 weeks. Each session took about 30 minutes as the following: 5 minutes warming up, 20 minutes aerobics, strengthening and flexibility exercises for the upper and lower limbs, and trunk using the bodyweight and the resistance bands at different degrees of resistance as the patient's ability permitted and 5 minutes of cooling down. Women in the usual care group received general physical activity guidelines. Exercise interventions had aerobics, muscular strengthens and flexibility. Weight and height scale was used to assess BMI, VAS was used to assess pain, and FIQ using for assessment the fibromyalgia-depend on symptom for both groups A and B before and after treatment. Results of the study found that, BMI, VAS and FIQ showed no significant differences between both groups A and B before treatment. After treatment, VAS in (A) showed decreasing in mean when comparing to its corresponding values(B), Also the value of FIQ in group A showed a statistically significant decrease when comparing to its corresponding values(B).*

*It can be concluded that underwater exercises are very effective in treating fibromyalgia postmenopausal symptoms.*

*Key words: Hydrotherapy-Fibromyalgia- postmenopausal.*

## INTRODUCTION

One of the inevitable life events for most women is the menopause, which refers to the ovarian oocyte production complete cessation. This period of the life of women is not only the menopausal time but also accompanied with multiple chronic diseases as breast cancer, and osteoporotic changes(1) and (2).

After 12 months of amenorrhea, menopause is diagnosed. During this year hormonal changes and clinical symptoms happened reaching to menopause; the climacteric or premenopausal is the term of this period but is increasingly referred to as the menopausal transition (3).

Fibromyalgia (FM) syndrome fibro refers to fibre, myo refers to muscle, algia refers to pain and syndrome means symptoms group. Another name to fibromyalgia, is Fibrositis, which means, the abnormal way that the body coping with a specific stressor trauma **(4)**. The syndrome of Fibromyalgia (FM), which aetiology is unknown, distinguished by characters include pain which is chronic and widely spread, fatigue, sleep disorders, depression and anxiety **(5)**.

Extensive somatic complaints and disability are present with fibromyalgia patients, so they are seeking for larger number of visits rough the year and needing larger number of specialists in their care plan **(6)**.

Nearly 2–3% of the general population are affected by fibromyalgia. More than 90% of those patients are women. The period of 45-64 years old is the peak age **(7) and (8)**. Planned, structured and repetitively movements for improving/ maintaining physically fitness components, is the exercise definition **(9)**.

The rehabilitation of women with FM should include exercise training to decrease symptoms and overall physical fitness improvement **(10)**.

Walking as aerobic exercise can be done at varying intensities so walking may be used by women with FM who cannot participate in aerobic exercise programs of higher intensities, as an alternative exercise option **(11)**.

One of non-pharmacological deals with FM is the aquatic physical training, or hydrotherapy, which consists of resisted physical training exercises program that is conducted in a heated pool. Pain reduced by using this alternative treatment method and the quality of life of fibromyalgia women improved **(12)**.

Large improvements in global well-being and physical Function are associated with Strength exercises (SE) **(13)**.

## **MATERIALS AND METHODS**

### **Subjects**

This study was performed on sixty women who having symptoms of the postmenopausal fibromyalgia were randomly selected according to American College of Rheumatology criteria from the physical therapy clinic in Horus University in Egypt to participate in this study, their ages ranged between 50-60 years old with at least 3-4 years post menopause. A physician diagnoses these women. The study was performed from Jan 2018 to Jul 2019. Their body mass index did not exceed 30 km/m<sup>2</sup>. A rheumatologist diagnoses all women as having fibromyalgia. Any woman with a history of epileptic fits, cardiac affection and using pace maker, smokers, renal, liver or endocrinal disorder, pulmonary disease, any drugs that may affect cardio-respiratory system, any analgesic or corticosteroid medications and history of bone disease such as osteoporosis was excluded from the study. Women were divided into 2 groups, (A) treated by Hydrotherapy in underwater exercises form for four limbs and trunk while group (B) received land exercises for the four limbs and 2 times/ week for 8 weeks. Each session took about 30 minutes as the following: 5 minutes warming up, 20 minutes aerobic, strengthening and flexibility exercises for the upper and lower limbs, and trunk using the bodyweight and the resistance bands at different degrees of resistance as the patient's ability permitted and 5 minutes of cooling down. Women in the usual care group

received general physical activity guidelines. All exercises included aerobics, muscular strengthens and flexibilities exercise. Weight and height scale was used to assess BMI, VAS was used to assess pain, and FIQ using for assessment fibromyalgia-related symptoms for both groups A and B before and after treatment. Results of the study found that, BMI, VAS and FIQ showed no significant differences between both groups A and B before treatment. After treatment, VAS in A showed decreasing in average when comparing to its corresponding values in B, Also FIQ value in group A showed a statistically significant decrease when comparing to its corresponding value in B.

For land exercising group, Cardiovascular exercises incorporated walk with many speeds and continuously and rhythmical activity which had affected largely on muscles and aerobics dance. Resistance strength training which consist of 1-3 set of 8-12 repetition. Strengthening exercises as biceps curls, arm extensions, arm side lifts, shoulder elevation, lateral leg elevation, stands up from seated position, lunge, sideways lunge and step-up/step-down. Loads were increase gradually. Body weight throughout starting our program and barbells was (0.5-2 kg /exercise). Flexibilities were developed by static stretching after warm-up and cool-down times.

For water-based exercise group, cardiovascular exercises as bicycling simulation, walk around pool, continuous and rhythmic activity and aerobics dance. Strength exercise was performed at slow pace by water and aquatic substances.

It can be concluded that underwater exercises are very effective in treating fibromyalgia postmenopausal symptoms.

#### Procedures

A full explanation of the protocol of the study was given to all women and consent form was signed by every woman preparticipating in our investigation.

##### *A) Evaluation procedures:*

1-Weight-Height scale: For measuring weight and height for A &B groupspre and post treatment program.

2- VAS (Visual analogue scale): It was used to assess intensity of anterior knee pain for both groups (A&B) pre and post treatment program.

3- FIQ: For assessment fibromyalgia- depending on manysymptom for both groups (A&B) pre and post treatment program.

##### *B) Treatment Materials:*

1-Hubbard tank with warm (~30°C) water: used for the training of Group (B)

I-Buoyancy assistive tools as collars, belts, swim bars and vests: are made from natural foamy material having the advantage of being latex free, with variable measures to fit all women.

II- Resistance bands (Thera-Band), which were made in USA from the natural foam rubber having the advantage of being latex free (14), with variable degrees of resistance as a method of strengthening exercises for group B

#### Statistical analysis

Results express as  $M \pm SD$ . Kolmogorov-Smirnov test or normality test for measuring reresults destruction Pretreatment. Unpaired t test or Mann Whitney test for comparing Among variables in the two groups whenever it was appropriate. Paired t test or Wilcoxon Signed Ranks test for comparing among variables measured pre and post treatment in the

same group whenever it was it was appropriate. Difference was calculated as follows before treatment and after treatment. Data analyzed by using SPSS /version 19 windows).  $P \leq 0.05$  is significantly.

**RESULTS**

I- Physical (general) of patient's characteristics:

1-Age, height, weight and BMI:

No statistically significant differences between mean values of age and height of group A and group B were found, Table (1).

Table (1): Age, height, weight and BMI 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)
Height (cm.)	166.07±3.49	164.20±6.18	1.440	0.157 (NS)
Weight (kg.)	77.72±5.12	75.08±7.45	1.596	0.117 (NS)
BMI (kg/m <sup>2</sup> )	28.37±1.06	27.89±1.30	1.576	0.120 (NS)

NS: Not significant.

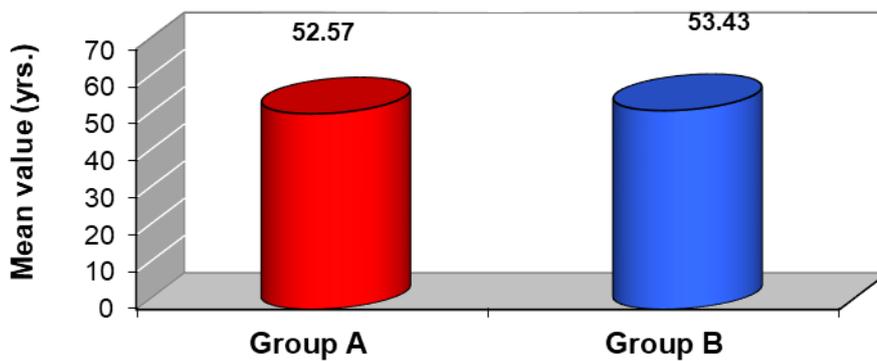


Fig. (1): Mean values of age in both groups.

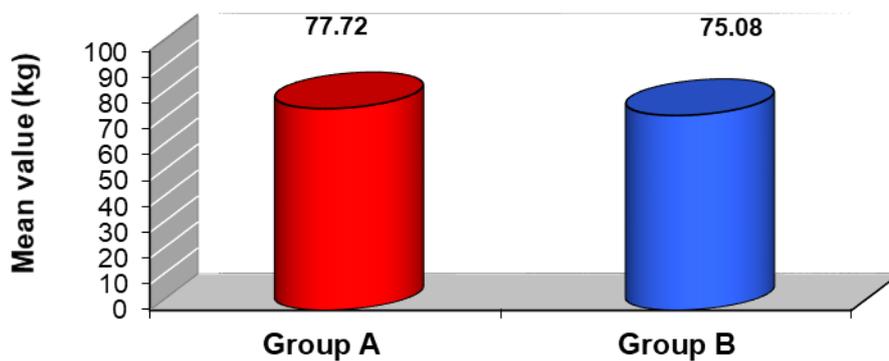


Fig. (2): Mean values of weight in both groups

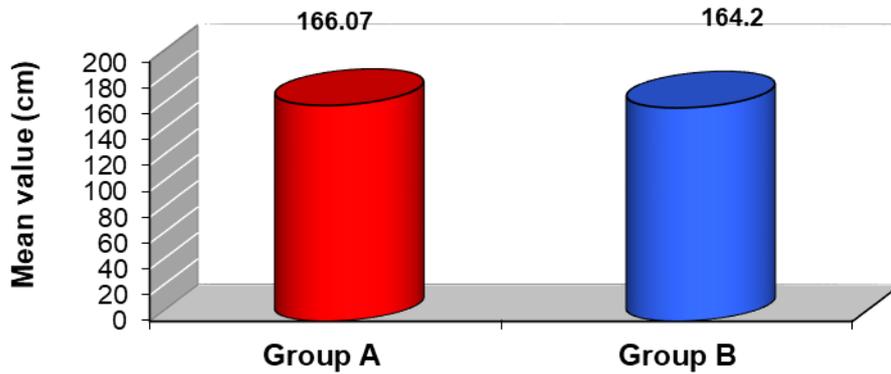


Fig. (3): Mean values of height in both groups.

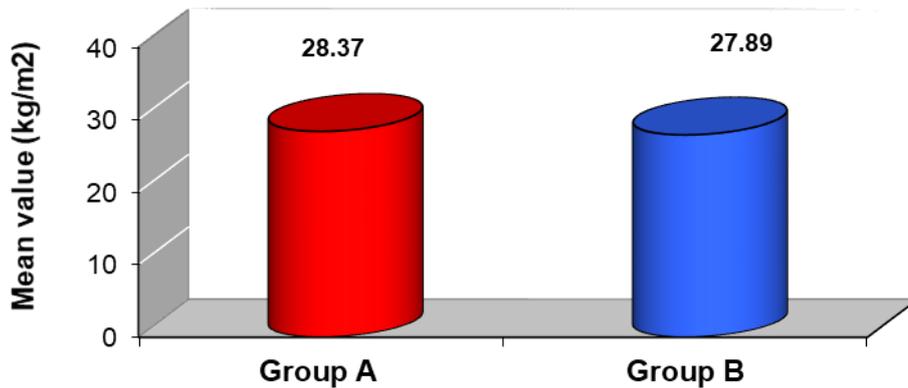


Fig. (4): Mean values of BMI in both groups.

## II- VAS

### A- Within groups

Group A: A statistically significant decrease in the mean value of VAS measured ( $5.93 \pm 1.36$ ) after treatment when compared with its corresponding value ( $8.00 \pm 0.98$ ) before treatment with t value= 10.475.

Group B: after treatment, decreasing in VAS means values ( $7.53 \pm 0.97$ ) when comparing to its corresponding values pretreatment ( $8.07 \pm 0.91$ ) with t value= 3.565.

Decreasing % in VAS in group B was lower (6.69%) than in group A (25.88%) (Table2).

Table (2): Comparison between mean values of vas measured before and after treatment in the two studied groups.

	A (n=30)	B (n=30)
<b>Before treatment</b>	8.00±0.98	8.07±0.91
<b>After treatment</b>	5.93±1.36	7.53±0.97
<b>Mean difference</b>	2.07	0.54
<b>% change</b>	25.88↓↓	6.69 ↓↓
<b>T value</b>	10.475	3.565
<b>P value</b>	0.001 (S)	0.001 (S)

S:significant.

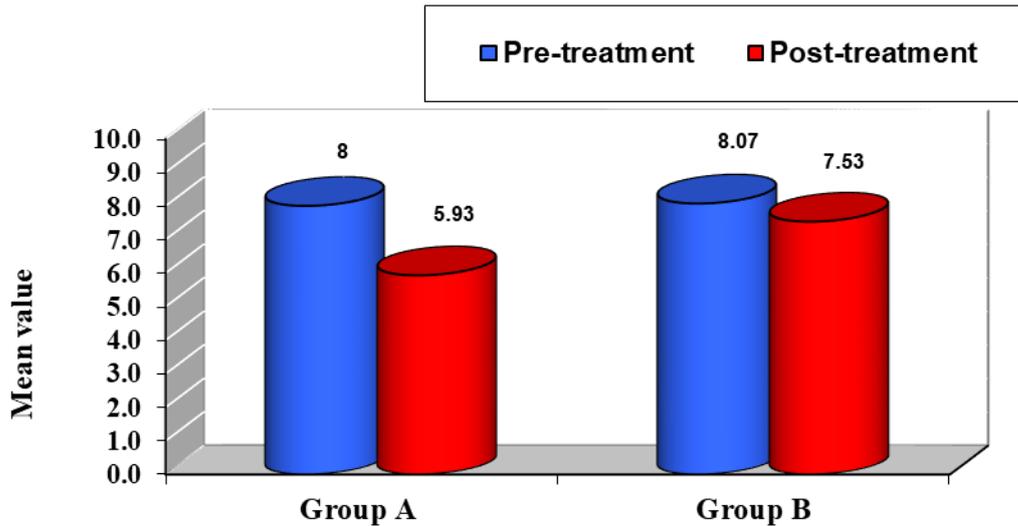


Fig. (5): Comparison between mean values of VAS measured pre- and post-treatment in the two studied groups.

**B-Between groups**

No significant difference between both groups (A) ( $8.00 \pm 0.98$ ) and its corresponding value in group (B) ( $8.07 \pm 0.91$ ) pre treatment in VAS found.

Decreasing in VAS mean for (A) ( $5.93 \pm 1.36$ ) comparing to its corresponding value in (B) ( $7.53 \pm 0.97$ ) Table (3).

Table (3): Comparing between VAS mean values measured either pre or post treatment.

	A (n=30)	B (n=30)	T	P
<b>Before treatment</b>	$8.00 \pm 0.98$	$8.07 \pm 0.91$	-0.273	0.786 (NS)
<b>After treatment</b>	$5.93 \pm 1.36$	$7.53 \pm 0.97$	-5.233	0.001 (S)

NS: not significant. S: significant.

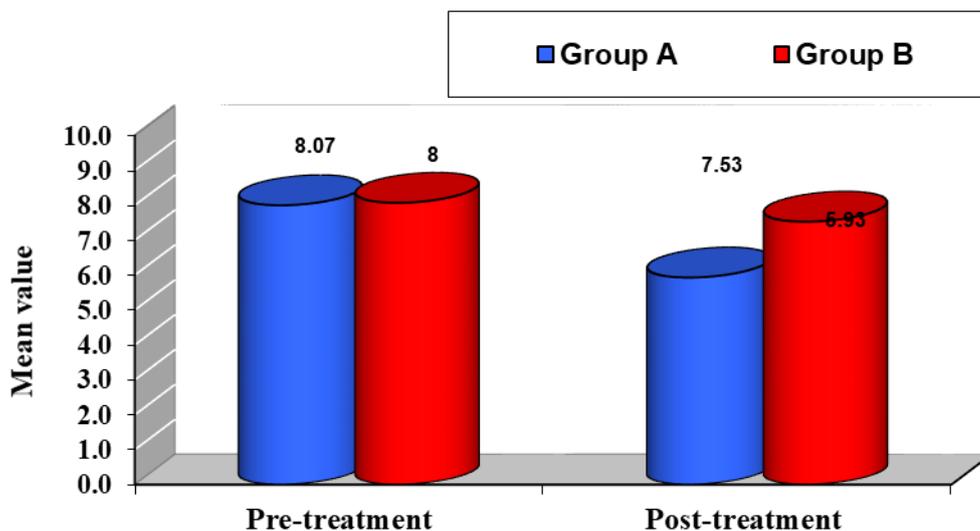


Fig. (6): Comparing among VAS mean values measured before and after treatment

III- FIQ:

Group A: decreasing in FIQ mean value measure posttreatment (48.32±6.38) comparing to its corresponding value measure pretreatment (61.38±6.31).

Group B: Decreasing in FIQ mean value of measure posttreatment (60.18±6.83) comparing to its corresponding value pretreatment (64.70±1.95).

decreasing in FIQ% in group was lower (6.99 %) forA than for B (21.28%) (Table 4).

Table (4): Comparing among FIQ mean values of measure before and after treatment.

	Group A (n=30)	Group B (n=30)
<b>Before treatment</b>	61.38 ± 6.31	64.70 ± 1.95
<b>After treatment</b>	48.32 ± 6.38	60.18 ± 6.83
<b>Mean difference</b>	13.06	4.52
<b>% change</b>	6.99↓↓	21.28↓↓
<b>T value</b>	-4.787	-4.783
<b>P value</b>	0.001 (S)	0.001 (S)

Data are expressed as mean± SD. Z value= Wilcoxon Signed Ranks test.  
S=p<0.05=significant.

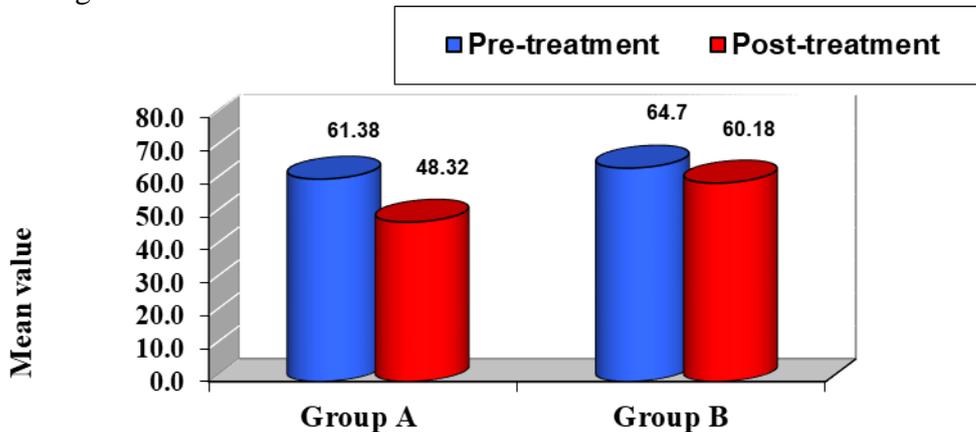


Fig. (7): Comparing amongFIQ values measured before and after treatment.

B-Between groups:

No significant difference between both groups (A) (61.38± 6.31)and its corresponding value in group (B) (64.70 ± 1.95) with Z value = -1.287 and p value= 0.198 pre-treatment in FIQ.

A statistical significant decrease in the mean value of FIQ in (A) (48.32± 6.38) comparingto its corresponding value in (B) (60.18± 6.83), Table (5).

Table (5): Comparing among FIQ measured before and after treatment.

	Group A (n=30)	Group B (n=30)	T	P
<b>Before treatment</b>	61.38 ± 6.31	64.70 ±1.95	-1.287	0.198 (NS)
<b>After treatment</b>	48.32 ± 6.38	60.18 ± 6.83	-6.218	0.001 (S)

Z value:Mann Whitney test. NS: not significant. S: significant.

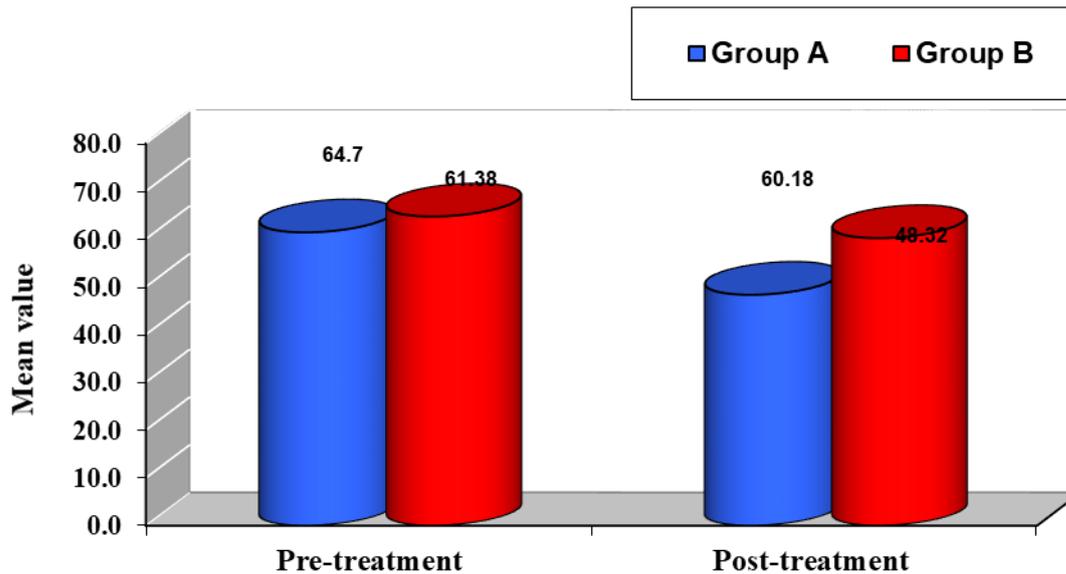


Fig. (8): Comparison between values of FIQ measured before and after treatment

## DISCUSSION

Fibromyalgia syndrome (FMS) is a widely spread chronic musculoskeletal pain syndrome with undistinguished aetiology till now. Chronic pain on large areas of the body, abnormality processing of and heightened sensitivities to pains, chronic fatigue, sleeping disorder, and emotional distressing or depressing are the characters of this syndrome. Quality of life and productivity are reduced in patients with fibromyalgia also functional disability is associated, lost work time, as well as the use of health care services increases. Fibromyalgia affects middle-aged females; males are less exposure to have fibromyalgia even if they meet diagnostic criteria of the ACR (3.4% women vs. 0.5% men). FMS is associated with increased utilizations and costs for health servicing. For medical and economic reasons, effected treatments option is required(15).

No definite aetiology of fibromyalgia is clear till now but researches tell that there may be accompanied with both the peripheral and central nervous systems complex functional changes. Recently there are theories included peripheral tissues sensitizations occurred post injury, pains amplifications syndrome which might arised from central nervous system sensitizations and/or peripheral tissues abnormality, changing in descend noxious inhibitory control, and psychology risks factors which included somatisations or increase concentration on body symptoms, negative life event, psychological distressing, and passive pains coping mechanism(16).

Poor muscle strength, limited flexibility and aerobically unfitare the obvious characters of fibromyalgia patients (17).

Fibromyalgia treatment options include exercising, hydrotherapy, education, cognitive behavioural therapy, and pharmacotherapy. Nodefinitely consensus on treatments option; but, Hydrotherapy exercising as a beneficial method for patients with fibromyalgia is widely accepted (18).

Exercises have obvious beneficial effects on lots of chronic diseases. These benefits are not restricted to preventing or stopping the disease progression, but also physical fitness, muscular strength and the quality of life improvements(19).

Low to moderating qualities evidences relatively to controlling the suggests which aquatic training is beneficially to wellness improving, symptom, and fitness in with fibromyalgia. Deceasing qualities evidences suggesting there were aquatic benefits and land-based exercises, excepting the muscle strength (low qualities evidences favouring land). (20).

Typically, exercise researches have focused on the effect of exercise on physical outcomes such as pain, function, strength, or cardiovascular fitness. A lot of researches refer to exercise as an option that enhance patients' mood (21).

As known aerobic exercising (AE) and strengthening exercisng (SE) can reverse deconditioning and so on pain and function in patients with FMS could be improved(22).

This study was done on sixty women during their postmenopausal life. A rheumatologist diagnoses them using the American college of rheumatology as they have fibromyalgia syndrome, their age (50 : 60 years) and body mass index  $< 30 \text{ kg/m}^2$ . They were assigned in random manner into A & B equal in numbers. (A) was receive hydrotherapy inform of underwater strengthening exercises and group (B) received land strengthening exercises.

Our investigation conducted forknown,hydrotherapy is better than land exercises at improving fibromyalgia-related symptoms in women during their postmenopausal life either preorpost treatmentsby useVAS for pain and the Fibromyalgia Impact Questionnaire (FIQ) for the fibromyalgia-related symptoms.

Our results showed there were decreasing in mean VAS values in group (A) ( $5.93 \pm 1.36$ ) comparing with its corresponding values for (B) ( $7.53 \pm 0.97$ ) with t value = -5.233, Significantly decreasing in FIQ values in A ( $48.32 \pm 6.38$ ) comparing to its corresponding values in B ( $60.18 \pm 6.83$ ) with Z value = -6.218 and p value = 0.001.

Exercises under water could be suggested as a method for treating pain in patients with fibromyalgia, in this case a term "exercise-induced hypoalgesia" should be used. Exercise causes blood pressure rising during exertion. This has may be linkedto changes the perception of the pain. So, it is possible that these two systems, pain modulation and cardiovascular responses, take part in exercise-induced hypoalgesia An analgesic response after exercises, caused by the involvement of the endogenous opioid system has most often been suggested as an explanation of the exercise-induced hypoalgesia. It has also been suggested that an interaction might occur between pain modulatory and cardiovascular systems(23) and (24).

The result of this study agreed with (25) who found that progressive and regular under water strengthening exercises led to marked improvement in the muscle strength of the lower limbs, marked improvement in the functional capacity and slight attenuation of perceived pain and fatigue in postmenopausal women with fibromyalgia. Therefore, individually tailored strength training exercises is a recommendable mode of exercises in postmenopausal women with fibromyalgia.

This study agreed with (26) who made a systemic review of the effects of exercise and physical activity in women with fibromyalgia he found that aquatic based aerobic or underwater strengthening exercises are more effective than the land based aerobic or strengthening exercises in this review, aquatic strengthening exercises interventions for

reducing pains, fatigue, and depression and for improving health-related quality of life and physical fitness.

This study agreed with (27) and (28) water help stretch and strengthens muscle and joints core without cause pains. Their sessions consist of a warm up to loosen tight joints, aerobic exercise and water exercises increase strength and a cool down to stretch muscles and strengthen core, so as patients of fibromyalgia is able to do many more activities in the water than to tolerate on land.

This study agreed with (29) who compared to hydrotherapy effects exercise training with muscle-strengthening programs by fibromyalgia. 14 women were diagnosed with fibromyalgia assigned into Aquatic Therapy (n = 20) or Land-based Therapy (n = 20). All interventions for 60-min therapy session, divided for 4 sections: warm-up, proprioceptive exercises, stretching and relaxation and would carry out three times per week for three months. Primary outcomes were balance and pain. Secondary outcomes as functional balance, quality of life, sleeping, fatigue, self-confidences in balance and physical abilities. Measuring outcome would evaluating at baseline, after three months, and six weeks after treatment. The results showed that underwater exercises are better than land exercises as more improvement in sleep, balance and flexibility problems that are associated with fibromyalgia patients.

This study was supported by (30) who found that specially tailored muscle strengthening programs and experiences were improved in overall disease activities, without exercises induce flare in pains. Flexibilities training alone results in overall improvements, but of a lesser degree, when performed on 68 women had FM for 12 week. Results were included muscle strength, flexibilities, weight, body fat, tender point count, and disease and symptom severity scales.

On the opposite side of view (31) found that fibromyalgia patients reported more sleep problems, imbalance, high general fatigue, underwater exercises induced extremity pain and perceived exertion compared with untrained healthy controls. The exercises induced extremity pain in fibromyalgia patients had not returned to the pre-exercise values 24 hours after the exercises. High exercises induced extremity pain in fibromyalgia patients was reported after static and dynamic upper limb exercises also after bicycling at submaximal to maximal intensity in fibromyalgia patients.

## CONCLUSION

It can be concluded that hydrotherapy is very effective in relieving postmenopausal fibromyalgia symptoms.

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