






## SYSTEMATIC REVIEWS

# Effects of rehabilitative exercise on quality of life in patients with fibromyalgia. Clinical trials review

## Efectos del ejercicio de rehabilitación sobre la calidad de vida en pacientes con fibromialgia. Revisión de ensayos clínicos

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### ABSTRACT

**Introduction:** Fibromyalgia is a chronic disease characterized by widespread pain, fatigue and sleep disorders. Although there is no cure, multidisciplinary treatment, including lifestyle changes, cognitive-behavioral therapy and medications, can help control symptoms and improve quality of life.

**Methods:** a systematic review of clinical studies investigating the effectiveness of exercise in patients with fibromyalgia was conducted during the period from 2017 to 2021. A total of 29 relevant scientific articles that met the established inclusion criteria and filters were identified and evaluated.

**Results:** studies have shown that various physical activity interventions can have a positive impact on symptoms and quality of life in fibromyalgia patients, although efficacy may vary by modality. Obesity may moderate the benefits of treatment, and it is suggested that staying active may be an effective strategy in the management of fibromyalgia.

**Conclusions:** the most effective interventions were low-intensity physical exercise programs, such as resistance and coordination training; muscle stretching exercises and resistance training; core strengthening exercises and stretching exercises; and Tai Chi.

**Keywords:** Fibromyalgia; Exercise Therapy; Muscle Stretching Exercises.

### RESUMEN

**Introducción:** la fibromialgia es una enfermedad crónica caracterizada por dolor generalizado, fatiga y trastornos del sueño. Aunque no existe cura, el tratamiento multidisciplinar, que incluye cambios en el estilo de vida, terapia cognitivo-conductual y medicamentos, puede ayudar a controlar los síntomas y mejorar la calidad de vida.

**Métodos:** se realizó una revisión sistemática de los estudios clínicos que investigaron la eficacia del ejercicio en pacientes con fibromialgia durante el período comprendido entre 2017 y 2021. Se identificaron y evaluaron un total de 29 artículos científicos relevantes que cumplieron con los criterios de inclusión y filtros establecidos.

**Resultados:** los estudios han demostrado que diversas intervenciones de actividad física pueden tener un impacto positivo en los síntomas y la calidad de vida de los pacientes con fibromialgia, aunque la eficacia puede variar según la modalidad. La obesidad puede moderar los beneficios del tratamiento, y se sugiere que mantenerse activo puede ser una estrategia eficaz en el tratamiento de la fibromialgia.

**Conclusiones:** las intervenciones más eficaces fueron los programas de ejercicio físico de baja intensidad, como entrenamiento de resistencia y coordinación; ejercicios de estiramiento muscular y entrenamiento de resistencia; ejercicios de fortalecimiento del core y ejercicios de estiramiento; y Tai Chi.

**Palabras clave:** Fibromialgia; Terapia De Ejercicio; Ejercicios De Estiramiento Muscular.

## **INTRODUCTION**

Fibromyalgia is a chronic disease characterized by widespread pain throughout the body, soft tissue tenderness, persistent fatigue and sleep disturbances. Although the exact cause of fibromyalgia is unknown, it is believed that it may be the result of a combination of factors, such as genetic predisposition, chemical imbalances in the brain, and environmental factors or emotional triggers.<sup>(1,2)</sup>

One of the hallmarks of fibromyalgia is the presence of tender points in certain areas of the body, known as trigger points, which can cause intense pain when pressure is applied to them. In addition to widespread pain, symptoms of fibromyalgia can include muscle stiffness, difficulty concentrating, memory problems, depression, anxiety and mood disorders.<sup>(3,4)</sup>

Fibromyalgia primarily affects middle-aged women, although it can also affect men and people of all ages, including adolescents and children. Symptoms can vary from person to person and can fluctuate in intensity over time. The disease can be debilitating and have a significant impact on patients' quality of life, limiting their ability to perform daily activities and participate in social activities.<sup>(5)</sup>

Diagnosing fibromyalgia can be complicated, as there are no specific laboratory tests or medical imaging to confirm its presence. Instead, physicians rely on symptoms and perform a physical examination to evaluate the presence of tender points in the body. Additional tests may also be performed to rule out other medical conditions that may be causing the symptoms.

Management of fibromyalgia is based on a multidisciplinary approach that combines different treatment strategies. This may include lifestyle changes, such as adopting a healthy diet, incorporating regular physical activity, and practicing relaxation and stress management techniques. In addition, medications, such as painkillers, antidepressants and muscle relaxants, may be prescribed to help control symptoms.<sup>(1,6)</sup>

Patient education and cognitive behavioral therapy are also important components of fibromyalgia management. These interventions can help patients understand their disease, learn pain self-regulation techniques, and develop skills to manage stress and improve quality of life.<sup>(6,7)</sup>

While there is no cure for fibromyalgia, many people with the disease can find relief and improve their quality of life through the right combination of treatments and management strategies. Continued research on fibromyalgia is critical to improve understanding of the disease and to develop better treatment options in the future.<sup>(8,9,10)</sup>

In this context, several randomized controlled clinical trials have been conducted to evaluate the effectiveness of different therapeutic approaches in patients with fibromyalgia. These studies have investigated everything from low-intensity physical exercise programs, muscle stretching and resistance exercises, to cognitive-behavioral interventions and water-based physical therapy, among others.

The results of these studies have yielded promising findings. For example, it has been observed that physical exercise programs, whether in the form of resistance training, core strengthening exercises or physical activity in daily life, can improve physical fitness, reduce pain intensity and improve patients' quality of life. In addition, it has been shown that certain combined interventions, such as cognitive-behavioral therapy integrated with neuromuscular training, can be beneficial for adolescents with fibromyalgia.

However, factors that may influence treatment outcomes have also been identified. For example, obesity has been associated with less improvement in fibromyalgia symptoms in response to motivational interviewing-based therapy. In addition, it has been observed that different therapeutic approaches may have varying effects on different aspects of the disease, such as physical function, depression and pain perception.

In that sense the question arises: what is the effect of different physical exercise interventions in patients with fibromyalgia?

Fibromyalgia is a chronic and complex disease that affects many people worldwide. Despite numerous studies, there is still a need for continued research to better understand how physical exercise can impact the symptoms and quality of life of fibromyalgia patients.

The present study would provide valuable information on the effectiveness of different physical exercise interventions. By comparing and analyzing the results of these studies, the most effective interventions for reducing pain, improving physical function and quality of life in patients with fibromyalgia could be identified.

## **METHODS**

A systematic review was conducted following the PRISMA workflow.<sup>(11)</sup> Scientific articles of clinical studies on the effectiveness of exercise in patients diagnosed with fibromyalgia were included. The study period ranged from 2017 to 2021.

The search was performed in the PubMed database. The search expression was constructed using the

following MeSH terms: ((Fibromyalgia) AND (Exercise Therapy OR Muscle Stretching Exercises)). The following filters were applied: years 2017-2021, full-text available, clinical trial, English and Spanish language. Duplicate articles and those that did not fit the research topic were removed.

A total of 1027 articles were identified with the search expression, and the filters were applied. Twenty-nine articles were evaluated (figure 1).

## RESULTS AND DISCUSSION

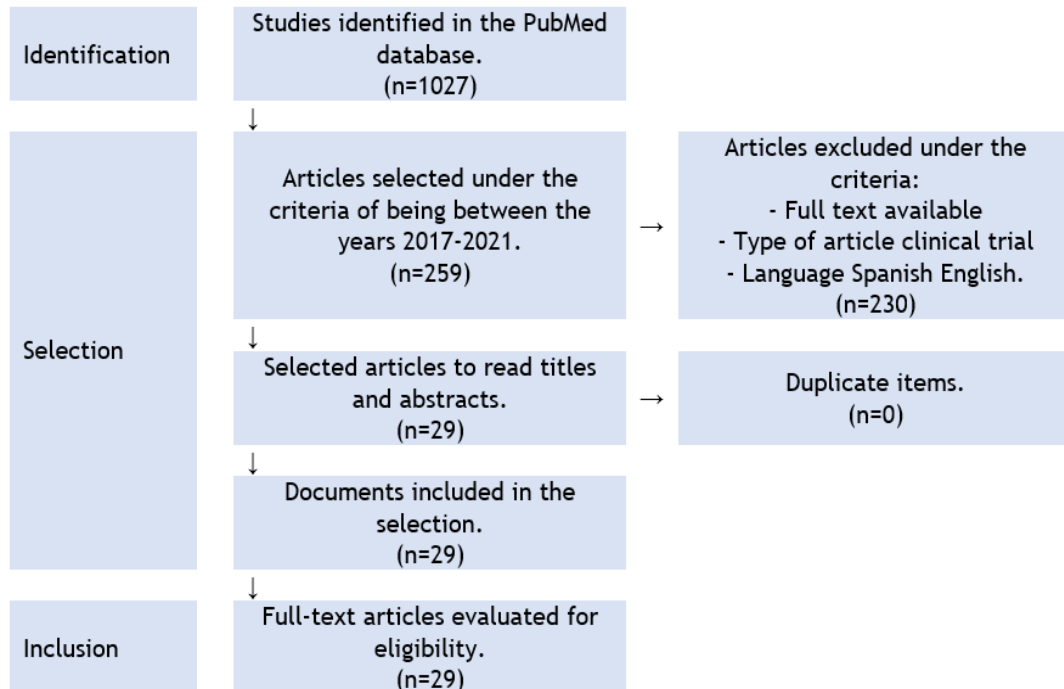


Figure 1. Flowchart for the review of the state of the art according to PRISMA methodology

Several studies demonstrated significant improvements in the conditions of fibromyalgia patients through various physical treatment methods. These treatments included low-intensity exercise, stretching and resistance, core strengthening, Tai Chi, aquatic training, heavy weight exercise, Swiss ball exercise, telerehabilitation with aerobic exercise, physical activity programs, integrated physical training and cognitive-behavioral therapy, aquatic physical training, aerobic exercise, and vibration platform training.<sup>(12,13,14,15,16,17,18,19,20,24,30,31,32,34,36,37,39)</sup>

In contrast, Sauch-Valmaña et al.<sup>(21)</sup>, Merriwether et al.<sup>(22)</sup> and Haugmark et al.<sup>(23)</sup> found no significant differences in outcomes after physical activity programs and a multidisciplinary rehabilitation program. The Ernberg et al.<sup>(25)</sup> study found no significant anti-inflammatory effects on fibromyalgia symptoms or clinical and functional variables after progressive resistance exercise or relaxation therapy.

The Jablochkova et al.<sup>(27)</sup> study also showed unchanged results in nerve growth factor levels and high plasma brain-derived neurotrophic factor levels after progressive resistance exercise.

Studies by Kashikar-Zuck et al.<sup>(28)</sup>, Black et al.<sup>(29)</sup>, Tran et al.<sup>(33)</sup>, Fussner et al.<sup>(35)</sup>, demonstrated significant improvements in pain, physical function, and pain interference in adolescents with fibromyalgia who participated in the FIT Teens program, a program that integrates cognitive-behavioral therapy and neuromuscular training.

Park et al.<sup>(26)</sup>, meanwhile, showed that advertising in local newspapers was the most effective, but also the most expensive recruitment method for an exercise clinical trial.

Kaleth et al.<sup>(38)</sup> found that obesity moderated the beneficial effects of motivational interviewing-based treatment in fibromyalgia patients, with obese patients showing less improvement in symptoms compared to non-obese patients.

Jones et al.<sup>(40)</sup> found that advice to stay active resulted in functional improvement at 26 weeks in patients with distal arm pain compared with advice to rest.

The results show the diversity of physical activity interventions that can have a positive impact on symptoms and quality of life in patients with fibromyalgia. These findings align with existing literature supporting the role of physical activity and exercise in the management of fibromyalgia.<sup>(40)</sup>

Several studies demonstrated the efficacy of interventions such as resistance and coordination exercises,<sup>(12)</sup> stretching and endurance,<sup>(13)</sup> core strengthening,<sup>(26)</sup> Tai Chi,<sup>(15)</sup> and aquatic training.<sup>(16)</sup>

Although physical activity and exercise have a positive effect on fibromyalgia symptoms in general, the type of activity and modality may vary in terms of efficacy. For example, Wang et al.<sup>(15)</sup> found that Tai Chi provided similar or better results than aerobic exercise in improving fibromyalgia symptoms and quality of life.

Table 1. Main characteristics of the included studies

No	Author (Year)	Country	Type of study	Treatment/ Intervention	Sample	Main outcomes
1	Izquierdo-Alventosa et al. <sup>(12)</sup> , 2020	Spain	Randomized controlled trial	Low-intensity physical exercise program (resistance and coordination training)	Women with fibromyalgia	Significant improvement in psychological variables, pain perception, quality of life and physical condition in women with fibromyalgia
2	Assumpção et al. <sup>(13)</sup> , 2018	Brazil	Randomized controlled trial	Muscle stretching and resistance training exercises	Women with fibromyalgia	Improvement in quality of life and fibromyalgia symptoms with both types of exercise. Muscle stretching exercise was more effective in improving physical function and resistance exercise in reducing depression
3	Park et al. <sup>(14)</sup> , 2021	Republic of Korea	Randomized controlled trial	Core muscle strengthening exercise and stretching exercises	Middle-aged women with fibromyalgia	Both types of exercise improved fibromyalgia symptoms, but there was no significant difference between them. The core muscle strengthening exercise showed improvements in balance function
4	Wang et al. <sup>(15)</sup> , 2018	United States of America	Randomized controlled trial	Tai Chi vs. aerobic exercise	Adults with fibromyalgia	Tai Chi showed similar or better results than aerobic exercise in improving fibromyalgia symptoms and quality of life. Duration and intensity of Tai Chi influenced the results
5	Andrade et al. <sup>(16)</sup> , 2019	Chile Brazil	Randomized controlled trial	Aquatic training and detraining	Women with fibromyalgia	Aquatic training improved aerobic functional capacity and clinical symptoms in women with fibromyalgia. However, these improvements were not maintained after the detraining period
6	Andersson et al. <sup>(17)</sup> , 2021	Sweden	Randomized crossover pilot study	Resistance exercise with heavy loads and low number of repetitions	Women with fibromyalgia	Exercise with heavy loads was more positive and produced lower lactate levels compared to exercise with light/moderate loads in women with fibromyalgia
7	Bjersing et al. <sup>(18)</sup> , 2017	Sweden	Randomized controlled trial	Strengthening exercises with Swiss ball vs. stretching exercises	Women with fibromyalgia	The Swiss ball exercise group showed a statistically significant improvement in pain, health status, quality of life and muscle strength compared to the stretching group
8	Hernando-Garijo et al. <sup>(19)</sup> , 2021	Spain	Randomized controlled trial	Telerehabilitation program based on aerobic exercise	Women with fibromyalgia	The aerobic exercise-based telerehabilitation program produced immediate improvements in pain intensity, mechanical pain sensitivity, and psychological distress in women with fibromyalgia during confinement due to pandemic COVID-19
9	Arakaki et al. <sup>(20)</sup> , 2021	Brazil	Randomized controlled trial	Strengthening exercises with Swiss ball vs. stretching exercises	Adults with fibromyalgia	Significant improvement in pain, health status, quality of life and muscle strength in the Swiss ball exercise group compared to the stretching group
10	Sauch-Valmaña et al. <sup>(21)</sup> , 2020	Spain	Randomized controlled trial	Physical activity program	Adults with fibromyalgia	No significant differences were found in the results after a 3-month physical activity program compared to the control group
11	Merriwether et al. <sup>(22)</sup> , 2018	United States of America	Randomized controlled trial	Physical activity in daily life	Women with fibromyalgia	Physical activity was positively related to physical function and fatigue, but no relationship was found with pain in women with fibromyalgia

12	Haugmark et al. <sup>(23)</sup> , 2021	Norway	Randomized controlled trial	Multidisciplinary rehabilitation program (mindfulness and acceptance-based group program followed by physical activity counseling)	Adults with fibromyalgia	No significant differences were found between the multidisciplinary rehabilitation program and treatment as usual in terms of improvement of the patient's overall impression of change and other related outcomes
13	Martínez-Rodríguez et al. <sup>(24)</sup> , 2018	Spain	Randomized controlled trial	Physiotherapy treatment combined with a vegetarian-dairy dietary intervention	Women with fibromyalgia	The central stabilization exercise and lacto-vegetarian diet group showed pain reduction and improved body composition compared to the placebo and control groups
14	Ernberg et al. <sup>(25)</sup> , 2018	Sweden	Randomized controlled trial	Progressive resistance exercise or relaxation therapy	Women with fibromyalgia	Changes in cytokine levels were found after both types of intervention, but no significant anti-inflammatory effects on fibromyalgia symptoms or on clinical and functional variables were observed
15	Park et al. <sup>(26)</sup> , 2021	United States of America	Randomized controlled trial	Various methods of recruitment for an exercise clinical trial	Adults with fibromyalgia	Advertising in local newspapers was the most effective recruitment method, but also the costliest. Community-based strategies recruited a more racially diverse sample
16	Jablochkova et al. <sup>(27)</sup> , 2019	Sweden	Randomized controlled trial	Progressive resistance exercise for 15 weeks	Women with fibromyalgia	Unchanged levels of nerve growth factor and high levels of brain-derived neurotrophic factor in plasma after progressive endurance exercise
17	Kashikar-Zuck et al. <sup>(28)</sup> , 2018	United States of America	Randomized controlled trial	Integrated cognitive-behavioral therapy and neuromuscular training	Adolescents with fibromyalgia	Participants in the FIT Teens group showed a significant decrease in pain intensity compared to the cognitive-behavioral therapy-only group
18	Black et al. <sup>(29)</sup> , 2021	United States of America	Randomized controlled trial	Fibromyalgia Integrated Training Program for Teens (FIT Teens)	Adolescents with fibromyalgia	The FIT Teens group showed improvements in hip strength and movement biomechanics compared to the cognitive-behavioral therapy-only group
19	Kim et al. <sup>(30)</sup> , 2017	United States of America	Randomized controlled trial	Exercise-based motivational interviewing therapy	Adults with fibromyalgia	Exercise-based motivational interviewing therapy had sustained benefits on physical function, pain severity, and fibromyalgia symptom severity in nonopioid-using patients
20	Andrade et al. <sup>(31)</sup> , 2017	Brazil	Randomized controlled trial	Aquatic physical training	Women with fibromyalgia	Aquatic physical training did not produce significant changes in body composition, but increased maximal oxygen consumption during exercise in women with fibromyalgia
21	Mannerkorpi et al. <sup>(32)</sup> , 2017	Sweden	Randomized controlled trial	Aerobic physical exercise	Women with fibromyalgia	Aerobic physical exercise for 15 minutes increased insulin-like growth factor levels in women with fibromyalgia, irrespective of exercise intensity
22	Tran et al. <sup>(33)</sup> , 2017	United States of America	Randomized controlled trial	Cognitive-behavioral therapy and integrated neuromuscular training	Adolescents with fibromyalgia	Adolescents with fibromyalgia who participated in the FIT Teens program showed significant improvements in physical function and reduced fear of movement

23	de Carvalho et al. <sup>(34)</sup> , 2021	Brazil	Randomized controlled trial	Wii group (virtual rehab) vs. control group (stretching exercises)	Women with fibromyalgia	The Wii group showed significant improvements in peak torque for dorsiflexion and plantarflexion movement in women with fibromyalgia. Both groups showed a significant decrease in tender point count. There was no significant improvement in static baropodometry.
24	Fussner et al. <sup>(35)</sup> , 2019	United States of America	Randomized controlled trial	Cognitive-behavioral therapy (CBT) vs. CBT combined with neuromuscular exercise (FIT Teens)	Adolescents with fibromyalgia	The FIT Teens intervention (CBT combined with neuromuscular exercise) resulted in significant improvements on the Pediatric Pain Interference Scale (PPI) and Functional Disability Inventory (FDI) in adolescents with fibromyalgia
25	Serrat et al. <sup>(36)</sup> , 2021	Spain	Randomized controlled trial	FIBROWALK + Standard Treatment Group vs. Standard Treatment alone	Adults with fibromyalgia	The FIBROWALK + Standard Treatment group showed significant improvements in functional disability and several secondary indicators in patients with fibromyalgia
26	Villafaina et al. <sup>(37)</sup> , 2020	Spain	Randomized controlled trial	Exergames exercise group vs. control group	Womens with fibromyalgia	The exergames exercise group showed improvements in heart rate variability in women with fibromyalgia, indicating an improvement in autonomic control
27	Kaleth et al. <sup>(38)</sup> , 2018	United States of America	Analysis of secondary data from a clinical trial	Exercise-based Motivational Interviewing (MI) vs. Attention Control (AC) therapy	Adults with fibromyalgia	Obesity moderated the beneficial effects of treatment based on motivational interviewing (MI) therapy in patients with fibromyalgia. Obese patients showed less improvement in symptoms compared to non-obese patients
28	Mingorance et al. <sup>(39)</sup> , 2021	Spain	Randomized controlled trial	Vertical vibration platform group vs. rotational vibration platform group vs. control group	Adults with fibromyalgia	Both types of vibration platforms showed benefits in fibromyalgia patients, but the rotational vibration platform was more effective in vibration thresholds and motor function and balance tasks
29	Jones et al. <sup>(40)</sup> , 2019	United Kingdom	Randomized controlled trial	Remain active advisory group vs. rest advisory group vs. immediate treatment	Adults with fibromyalgia	Advice to remain active resulted in functional improvement at 26 weeks in patients with distal arm pain compared with advice to rest. Immediate physical therapy showed no additional benefit compared with physical therapy after a waiting time



Obesity may moderate the beneficial effects of treatment in fibromyalgia patients, suggesting the need to address obesity as a concurrent condition in the management of fibromyalgia.<sup>(38)</sup>

Finally, the Jones *et al.*<sup>(40)</sup> suggests that advice to stay active may be an effective strategy in the management of fibromyalgia. This emphasizes the importance of promoting regular physical activity in this population, although the type and intensity of activity may need to be individualized depending on patient characteristics and preferences.

## CONCLUSIONS

- Various types of exercise can improve symptoms and quality of life in people with fibromyalgia.
- Tai Chi and aquatic exercise are effective in relieving fibromyalgia symptoms.
- Multidisciplinary rehabilitation programs have similar results to standard treatment in patients with fibromyalgia.
- Interventions combining cognitive-behavioral therapy with neuromuscular training are beneficial for adolescents with fibromyalgia.
- The most effective interventions were low-intensity physical exercise programs, such as resistance and coordination training; muscle stretching exercises and resistance training; core strengthening exercises and stretching exercises; and Tai Chi.

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The authors declare that there are no conflicts of interest.

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