



## SYSTEMATIC REVIEW

# Multidisciplinary rehabilitation treatments for patients with fibromyalgia: a systematic review

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## ABSTRACT

**INTRODUCTION:** Fibromyalgia (FM) is a pathology that causes physical, psychological, and social problems. For this reason, it requires treatment that involves all of these elements. The main of study is to examine multidisciplinary rehabilitation treatment (MRT) in fibromyalgia and to identify healthcare approaches developing effective MRT tools for the treatment of FM.

**EVIDENCE ACQUISITION:** In this systematic review, we searched the following databases: CINAHL, PubMed, Scopus, Cuidatge, Cuiden, ENFISPO, IBEC and IME.

**EVIDENCE SYNTHESIS:** Of 356 articles found we selected 13 to analyze and summarize. We created 4 different categories: 1) multidisciplinary rehabilitation treatment focusing on health education and cognitive behavioral therapy (CBT); 2) multidisciplinary rehabilitation treatment that includes dietetics; 3) multidisciplinary rehabilitation treatment adapted to the patients' characteristics; 4) multidisciplinary rehabilitation treatment based on physical exercise.

**CONCLUSIONS:** This review identifies the most effective treatments that may be usefully applied in many different rehabilitation contexts. These include all treatments that incorporated an education (ED) program to patients and an exercise program complete with aerobic exercise (AE), stretching (SE), relaxation (RE), strengthening (TE), endurance (EN), and which includes the entire body and biofeedback. Furthermore, many approaches also include cognitive behavioral therapy (CBT) for self-management such as occupational therapy, moderation, acceptance, commitment, motivation to change and forgiveness.

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**KEY WORDS:** Cognitive behavioral therapy; Combined modality therapy; Dietetics; Exercise therapy; Rehabilitation.

## Introduction

Fibromyalgia (FM) is a condition characterized by chronic widespread pain in the locomotor system<sup>1</sup> with exaggerated hypersensitivity to multiple tender points.<sup>2</sup> Besides pain, symptoms of FM usually include fatigue, joint stiffness, sleep disturbances,<sup>3</sup> cognitive and memory difficulties,<sup>4</sup> temporomandibular pain and irritable bowel syndrome.<sup>5</sup> The worldwide prevalence of this condition is 2-3% of the worldwide population with a higher prevalence for women.<sup>6,7</sup> For instance, Tunisia has a prevalence

of 9.3% while the United States (2.2-6.4%) and many European countries (*e.g.* Germany, 3.2% and Spain, 2.4%) show more modest rates. Several countries show prevalence rates less than 1% (*e.g.*, China, Malaysia, Thailand).<sup>8</sup> It has also been observed that FM mainly affects women (4.2%) from 40 to 50 years old, compared to men (0.2%).<sup>9</sup>

Although its etiology is still unknown, it is hypothesized that a biopsychosocial etiopathogenesis requires a multidisciplinary rehabilitation treatment (MRT) that includes pharmacology, psychological treatment and physical exercise.<sup>10-13</sup> Pharmacological and non-pharma-

cological treatments must be included and some patients may benefit from the additional use of other modalities of complementary and alternative medicine, with treatment strategies adapted to the individual.<sup>14</sup> Although the European League Against Rheumatism (EULAR) recommendation of 2017 advises that, if necessary, pharmacological treatment should be used, but not at the beginning of the symptomatology. Pharmacology is an essential item, but the medication recommendation must consider the balance between the desired effects, the adverse effects and the magnitude of their effects. It also emphasizes the importance of exploring new therapies of which evidence is not yet available.<sup>15</sup>

Education is an indispensable component of MRT and is considered an essential element to improve self-management and patient information.<sup>16</sup> Another fundamental component of MRT is psychotherapy. The most commonly used psychological therapies are cognitive behavioral therapy, problem solving therapy and learning coping strategies that decrease pain, anxiety and depression.<sup>17, 18</sup> A tendency to avoid pain has been detected in some of these patients;<sup>19, 20</sup> observing this element is related to worse functioning, depression and anxiety.<sup>21</sup> Another important element is physical exercise because it stimulates the brain regions involved in pain inhibition.<sup>22</sup> Physical exercise decreases muscle stiffness<sup>23</sup> and improves anxiety and depression.<sup>24</sup> In addition, stretching exercises reduce muscle stiffness,<sup>23</sup> anxiety and depression.<sup>24</sup>

### Multidisciplinary treatment and fibromyalgia

Due to FM's multifaceted nature, the best approach for treating this condition appears to be multidisciplinary treatment (MRT). MRT is an approach supported by the American Pain Society (2005), the Association of Scientific Medical Societies of Germany in 2008 and the EULAR.<sup>15</sup>

EULAR's recommendation in 2017 is that in the initial management of FM it should include patient education and should focus on non-pharmacological therapies. In case of non-response, additional therapies must be tailored to the specific needs of the individual and may include psychological therapies for mood disorders and inappropriate coping strategies, pharmacotherapy for severe pain and sleep disorders and a multimodal rehabilitation program for serious disabilities. Although the authors argue that these recommendations are supported by high quality reviews and meta-analysis, the size of effect for most treatments is relatively modest.<sup>15</sup> Several other recommendations include MRT.<sup>25-27</sup> These recommendations are based on research showing that MRT achieves better results than

other rehabilitation interventions. Our hope is to identify the healthcare approaches developing effective MRT tools for the rehabilitation treatment of FM that have not yet been fully incorporated into some national agendas for the treatment of FM.

### Purpose

The aim of the article is to examine the types of MRT in fibromyalgia, and identify the healthcare approaches developing effective MRT tools for the treatment of FM that have not yet been fully incorporated in some national agendas for the rehabilitation treatment of FM.

- Research Question 1: What are the current MRTs in fibromyalgia?
- Research Question 2: What tools are used in the most effective rehabilitation treatment approaches?
- Research Question 3: Which of these rehabilitation treatments have not yet been incorporated into some national agendas?

## Evidence acquisition

### Data sources and searches

The search was conducted in the following international databases on health sciences: CINAHL, PubMed and Scopus. The search was restricted to primary articles that had in their titles or abstracts the following words: FM, multidisciplinary rehabilitation care, multidisciplinary rehabilitation therapy, FM and multimodal rehabilitation care.

### Eligibility criteria

There were several inclusion criteria. First, the study had to be published between January 1<sup>st</sup>, 2009 and August 31<sup>st</sup>, 2019 on MRT and FM in adult populations. Second, the studies could be either randomized controlled trials or non-randomized trials. Third, these studies had to deal only with FM and evaluate the effectiveness of MRT (*i.e.*, pharmacology, education, physical exercise and cognitive-behavioral therapies) with the Fibromyalgia Impact Questionnaire (FIQ) used as an outcome measure. The FIQ is a specific tool self-administered to assess the impact of FM on physical capacity and quality of life. The total score of the FIQ is between 0-100, representing 0 the best functional capacity and the best quality of life, and 100 the worst state of health. Exclusion criteria included revisions/corrections of the same paper, duplicate titles, studies that only described a single treatment or studies that included pathologies other than FM and did not use the FIQ.<sup>28</sup>

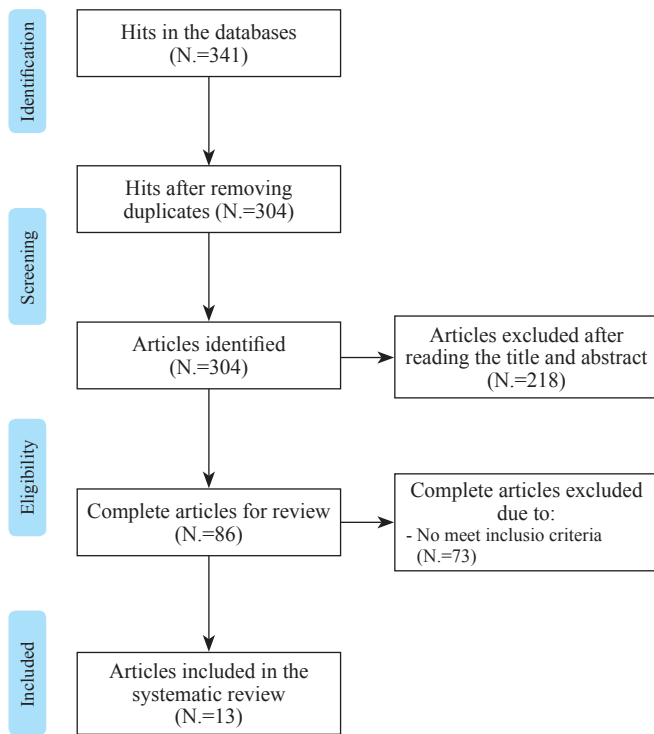


Figure 1.—PRISMA flow chart for study selection.

### Study selection

This review focusses on the national and international MRT interventions published between 2009 and 2017. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) process for selecting studies was used (Figure 1).<sup>29</sup> The selection process was carried out in three steps. First, one review author screened the titles of all articles retrieved from the database search. Then duplicates were removed. Next, two authors screened the titles and abstracts of articles deemed eligible after initial screening. Then, articles that did not meet the inclusion criteria were removed. Finally, six review authors participated in the full-text screening, with each article independently screened by two authors. Disagreements were resolved through discussion and, when necessary, involvement of the lead review author. A quality assessment was performed using the Joana Briggs Institute Critical Appraisal Checklist for Quasi-Experimental and Randomized Controlled Trials (Table I, II).<sup>30-43</sup>

### Evidence synthesis

Of the 341 studies identified in the search, only 13 met criteria for inclusion in this review. Seven studies were international and six were carried out in Spain, of which

TABLE I.—Results of the Joana Briggs Institute Critical Appraisal Checklist for randomised controlled trials.<sup>30-38</sup>

Questions (potential bias)	Wahner-Roedler <sup>31</sup>	Casanueva <sup>32</sup>	Castel <sup>33</sup>	Van Eijk-Hustings <sup>30</sup>	Hamnes <sup>38</sup>	Saral <sup>37</sup>	Castel <sup>36</sup>	Martinez <sup>37</sup>	Salvat <sup>35</sup>
1. Was true randomization used for assignment of participants to treatment groups?	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. Was allocation to treatment groups concealed?	Y	U	U	U	U	Y	Y	N	Y
3. Were treatment groups similar at the baseline?	Y	U	U	Y	Y	Y	Y	Y	Y
4. Were participants blind to treatment assignment?	Y	U	U	Y	N	Y	U	U	Y
5. Were those delivering treatment blind to treatment assignment?	Y	U	U	U	Y	U	Y	U	U
6. Were outcomes assessors blind to treatment assignment?	Y	U	Y	U	Y	U	Y	Y	N
7. Were treatments groups treated identically other than the intervention of interest?	Y	Y	Y	Y	Y	Y	Y	Y	Y
8. Was follow-up complete, and if not, were strategies to address incomplete follow-up utilized?	Y	Y	Y	Y	Y	Y	Y	Y	Y
9. Were participants analyzed in the groups to which they were randomized?	Y	Y	Y	Y	Y	Y	Y	Y	Y
10. Were outcomes in the same way for treatment groups?	Y	Y	Y	Y	Y	Y	Y	Y	Y
11. Were outcomes measured in a reliable way?	Y	Y	Y	Y	Y	Y	Y	Y	Y
12. Was appropriate statistical analysis used?	Y	Y	Y	Y	Y	Y	Y	Y	Y
13. Was trial design appropriate, and any deviations from the standard RCT design accounted for in the conduct and analysis of the trial	Y	Y	Y	Y	Y	Y	Y	Y	Y

Y: yes; N: no; U: unknown.

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TABLE II.—Results of the Joana Briggs Institute Critical Appraisal Checklist for quasi-experimental studies.<sup>39-42</sup>

Questions	Kas <sup>40</sup>	Vincent <sup>39</sup>	Gonzalez <sup>42</sup>	Michalsen <sup>41</sup>
1. Is it clear in the study what is the 'cause' and what is the 'effect'?	Y	Y	Y	Y
2. Were the participants included in any comparisons receiving similar treatment/care, other than the intervention of interest? (history threat/systematic difference/	N	N	N	N
3. Was there a control group?	N	N	N	N
4. Was there multiple measurements of the outcome both pre and post the intervention	Y	Y	Y	Y
5. Was follow-up complete, and if not, was follow-up adequately reported and strategies to deal with loss to follow-up employed?	Y	Y	Y	Y
6. Were the outcomes of participants included in any comparisons measured in the same way?	Y	Y	Y	Y
7. Were outcomes measured in a reliable way?	Y	Y	Y	Y
8. Was appropriate statistical analysis used?	Y	Y	Y	Y

Y: yes; N: no.

four were conducted in Catalonia. Three studies were conducted in USA, one in Turkey, one in Germany, one in Norway and one in the Netherland. The studies were carried out in two different clinical settings: four were carried out in hospitals and nine performed the treatment on an outpatient basis. All studies were written in English except one, which was written in Spanish. The length of the interventions was quite varied, from 5 days to 12 months.<sup>30, 39</sup> Although most were between 2 and 12 weeks. The duration in hours was from 9 to 59<sup>30, 39</sup> even though the majority were between 2 and 12 weeks. The duration in hours of the rehabilitation treatment could be short, but there was a greater follow-up of the evolution of its development.<sup>39</sup> Therefore, not only was number of hours of rehabilitation treatment considered, but also the total duration (in days, weeks, months) of the intervention. Such is the case of Vincent *et al.*, who introduced 3 prescheduled follow-up phone calls at 2 weeks, 1 month and 3 months after the program to reinforce the self-management concepts and answer questions (Supplementary Digital Material 1: Supplementary Table I).

The study designs can be classified into four large groups: Seven add one or more feature to an existing MRT.<sup>31, 32, 34-36, 40, 41</sup> Three of the studies compare the effectiveness of different modes of MRT.<sup>30, 33, 37</sup> Five create interventions for populations with specific FM characteristics.<sup>32, 33, 36, 39, 41</sup> The two remaining studies create an innovative MRT and assess its effectiveness.<sup>38, 42</sup> The approach most commonly used in nine studies to determine the effectiveness of interventions is a randomized controlled trial (Supplementary Table I). The most common tools were educational, physical exercise and CBT. Pharmacological treatment was aggregate in the experimental group of five studies.<sup>33, 35, 36, 38, 42</sup> They did not eliminate it if the patients were taking medications when the study started.

Cognitive behavioral therapy (CBT) was used in all

studies with the exception of Gonzalez *et al.*<sup>42</sup> Relaxation techniques were used in nine of the studies.<sup>30, 32-36, 38-40</sup> Pool therapy was used in five articles.<sup>33, 35, 36, 41, 42</sup> Occupational therapy in two of the studies.<sup>31, 42</sup> Nutrition or dietetic education was used in two of the studies.<sup>38, 41</sup> Supplementary Digital Material 2 (Supplementary Table II) shows the characteristics of the studies selected for analysis in detail.

We organized five different sections: 1) multidisciplinary rehabilitation treatment focusing on health education and CBT; 2) multidisciplinary rehabilitation treatment that includes dietetics; 3) multidisciplinary rehabilitation treatment adapted to the patients' characteristics; 4) multidisciplinary rehabilitation treatment based on physical exercise; 5) other more recent therapies.

#### Multidisciplinary rehabilitation treatment focusing on health education and CBT

When the effectiveness of CBT is compared with education for improving sleep in people suffering FM, after 6 months of treatment it can be seen that CBT is more effective than education.<sup>37</sup> The group that received CBT showed significantly lower levels of pain, fatigue, and insomnia than the group that only received education for improving sleep. In line with studies that indicate that CBT programs appear to be more beneficial than education, we found a study<sup>38</sup> that evaluates the effectiveness of a self-care education program that lasted for one week for patients recently diagnosed with FM. This study concluded that there were no significant differences between the control group and the intervention group at the end of the program. Unlike other studies that show that CBT is beneficial for this condition, this study demonstrates that the variable duration of the intervention, time since diagnosis, and intensity of therapy can render interventions that usually provide benefits to FM patients ineffective.

Another study emphasizes the importance of education for FM patients, and compares the effectiveness of MRT with a standard medical treatment that includes education.<sup>32</sup> One month later, the MRT group benefited more than the education group, because larger improvements were obtained in the general perception of health in the MRT group. These studies show that there are many intervention programs for managing FM based on CBT and education that are effective, and that this effectiveness is enhanced when the two approaches are combined.

### Multidisciplinary rehabilitation treatment that includes dietetics

Wahner-Roedler *et al.* examined a dietetic adjuvant to MRT. After 6 weeks of treatment with soja shakes in the experimental group and casein shakes in the control group as a placebo, the authors founded no statistically significant differences between the two interventions.<sup>31</sup> The participants were randomly assigned to either a soy supplement or a placebo taken once a day for 6 weeks. The participants added the soy shake supplement to participants that were enrolled in the Mayo FM Treatment Program. This program is a multidisciplinary outpatient program. There was also another study that evaluated the usual multidimensional rheumatologic treatment with a treatment that follows an integrative medicine approach. The integrative medicine approach used the same treatment elements and added fasting therapy and nutritional therapy. Specially, improvements were noted in the two first weeks, but after 12 weeks there were no longer differences between the integrative medicine approach and the control group. This study incorporated fasting therapy with a caloric restriction of less than 500 calories per day preceded by one or two prefasting days, using an 800 kcal/day monodiet of fruit, rice, or potatoes according to patients' choice.<sup>41</sup>

### Multidisciplinary rehabilitation treatment adapted to the patients' characteristics

Although dietary approaches are less common<sup>31, 41</sup> more are personalized treatments which were adapted to the characteristics of the patients, specifically to the educational level of the patients.<sup>33</sup> In Castel *et al.*'s study, Body Mass Index (BMI) of the participants undergoing treatment was considered.<sup>36</sup> Three groups were created according to BMI, and they underwent conventional MRT and MRT adapted to BMI status. Castel *et al.* concluded that

all patients who underwent MRT obtained benefits independently of their BMI. Therefore, a MRT for FM adapted to a low education level was created and compared with the usual MRT. In Castel *et al.*, patients who followed the adapted MRT obtained a significant improvement in the FIQ. In the Vincent *et al.* study, a nurse, an internist, a nurse practitioner (who operates similar to a physician with an independent license and prescribing abilities), and an exercise coach met with the patients the first day of treatment.<sup>39</sup> They evaluated the services that would be provided for each of them regarding exercise and health improvement. On the last treatment day, patients concluded the program with a closing visit with the internist who helped them to plan their individualized medication and self-management strategies.

In another study, fasting diet was adapted to the likes of the patients.<sup>41</sup> Furthermore, the treatment used by Castel *et al.* in 2013 was adapted to women with low educational level and it was shown that a multidisciplinary treatment tailored to fibromyalgia composed of medications, cognitive behavioral therapy and physiotherapy (pool therapy and kinesiotherapy) was effective for women with a low educational level. In this study, the vocabulary used was simplified to the maximum and the concepts were explained with examples and graphs, making a supervision so that the patients understood the information and the planned exercises.<sup>36</sup>

### Multidisciplinary treatment based on physical exercise

A study showed the importance of physical exercise for sufferers of FM by adding muscle toning sessions for the back and upper and lower extremities in a MRT that already obtained good results without the extra toning sessions.<sup>40</sup> A second study improving FIQ was Vincent *et al.*, which incorporated a self-management training in a rich variety of interventions: stretching (SE), and exercise and endurance (EN) coaching.

Overall, seven studies included aerobic exercises.<sup>33-36, 38, 40, 41</sup> Seven studies introduced stretching exercises<sup>30, 31, 33-36, 40</sup> and six studies used relaxation exercises.<sup>30, 33, 34, 36, 39, 42</sup> Pool therapy was used in five studies.<sup>33, 35, 36, 41, 44</sup> Strengthening was used in 8 studies.<sup>30, 31, 33-36, 38, 40</sup> Endurance only in three studies.<sup>31, 38, 39</sup> Pool therapy is a method of exercising involving hydro and kinesiotherapy in a heated pool about 30 °C. The pool therapy being part of MRT was more effective than conventional pharmacological treatment.<sup>33</sup> This method was used by Castel *et al.*,<sup>33</sup> Michaelsen *et al.*,<sup>41</sup> and Gonzalez *et al.*<sup>42</sup>

**Other more recent therapies**

Massage with ischemic pressure,<sup>32</sup> art therapy,<sup>30</sup> biofeedback,<sup>39, 40</sup> forgiveness therapy,<sup>39</sup> endurance,<sup>39</sup> family education,<sup>38, 39</sup> sociotherapy and art therapy,<sup>30</sup> thermal therapy<sup>32, 41</sup> and hydrotherapy were only used by Michalsen *et al.*<sup>41</sup> Nurses were involved in two studies.<sup>38, 39</sup> In these programs, nurses were incorporated to help patients in self-management education and all sessions were taught by registered nurses with experience in fibromyalgia content and lasted approximately 6 hours per day. Families also were involved.

**Discussion**

The best results combined education, physical activity, pharmacology, CBT, and exercise programs with stretches and aerobic exercise. The two best scores in FIQ applied biofeedback and occupational therapy with therapies focused on self-management and acceptance of the illness. The best score results were five studies (Table III).<sup>33, 34, 36, 39, 40</sup> All of these studies obtained an improvement in the FIQ of more than 8.1 points and an improvement of 14%, which is the necessary amount of change to establish a clinically important minimum effect.<sup>44</sup>

In the first study, Kas *et al.* obtained the best results in the post-intervention FIQ, but it was also the most complete MRT because it worked the physical exercise through aerobic exercise, relaxation, stretching, strength, relaxation, and toning.<sup>40</sup> In addition, this author introduced the “full body” to tone the large muscle groups instead of toning only the four limbs. The extremity strengthening ex-

ercises were increased regarding conventional treatment. Furthermore, it was focused on the addition of gradual resistance training to the major muscle groups of the upper and lower limb, including the biceps, triceps, shoulders, quadriceps, glutes, hamstrings, and gastrocnemius-soleus complex in order to gradually increase the patient’s tolerance to strength training. Additionally, it initiates disease acceptance therapy, important education and occupational therapy, CBT, and therapy for problem solving. In particular therapy for problem solving plays an important role in the treatment of FM; however, its benefits decrease when it is taught by itself because it leads to a decrease in depression and anxiety, but was not effective for pain treatment.<sup>18</sup> In addition Kas *et al.* performed biofeedback to measure the levels of stress and tension to facilitate relaxation techniques.<sup>40</sup> Comparing the effects of a combination of both aerobic and strengthening exercise, two other studies found that the combined effects included greater improvement in joint mobility, grip strength, and SF-36 scores compared to aerobic or strengthening alone.<sup>45, 46</sup>

In the second study, the education program conducted by Vincent *et al.* was the main element in MRT with a strong intervention in stretching exercises and endurance.<sup>39</sup> It consisted of a focus on understanding the central sensibilization in FM using CBT methods, chronic pain and self-control activities, occupational therapy and moderation, use of acceptance and commitment, moderation, and motivation to change. All sessions were delivered by registered nurses with expertise in FM. One internist supported their individualized medication and self-manage-

TABLE III.—Effects of the Rehabilitation Interventions on Fibromyalgia Impact Questionnaire (FIQ) outcomes.

Study	Pre-intervention			Post-intervention				
	Control group	Intervention group 1	Intervention group 2	Control group	Intervention group 1	Intervention group 2	Post-pre control	Post-pre intervention
Wahner-Roedler <sup>33</sup> α	65.0	62.0		52.8	53.8		-12.2	-8.2
Casanueva <sup>34</sup> †	64.01	68.52		-	55.79			-12.73
Castel <sup>36</sup> β	66±13.0	65.1±13.3		61.9±13.4	45.3±22.4*		-4.1	-19.8
Hamnes <sup>42</sup> †	59.7 (23.9-92.5)	59.0 (16.1-89.6)	55.4±2.3	61.0 (23.2-93.2)	55.9 (7.0-90.5)	56.2±2.9	+13	-3.1
Kas <sup>35</sup> †	62.9	63.03		38.31	27.57		-22.66	-27.56
Van Eijk-Hustings <i>et al.</i> (2013) β	66.3±1.8	64.5±1.4		51.2±2.3*	50.9±2.0*		-15.1	-13.6
Vincent <sup>31</sup> †		53.3			28.71*			-24.59
Gonzalez <sup>42</sup>		Moderate-severe			Moderate-light			
Castel <sup>40</sup> β	66.6±17.4	64.6±16.0		65.9±16.1	47.7±20.2*		-0.7	-16.9
Saral <sup>37</sup> β	65.5±13.2	71.6±14.2	67.7±12.0	65.5±11.5	53.9±9.3*	54.4±14.2*	-1.1	-17.7
Michalsen <sup>38</sup> β	68.0±8.9	54.3±15.0		63.9±20.7	47.7±19.3		-4.1	-6.6
Martinez <sup>41</sup> ϕ	64.09 (13.61)	60.71 (11.83)		64.46 (15.23)	50.47 (18.43)		+0.37	-10.24
Salvat <sup>39</sup> †	69.5 (55.0-80.3)	68.0 (53.0-76.0)		-	-			-14*

\*Statistically significant difference between the pre-intervention group and the post-intervention group.  
 α Percentage of the difference between averages of the pre-post intervention of each group; † average of the group’s total FIQ; ϕ average (standard deviation); β average + standard deviation; † average (min-max value).

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ment strategies. Exercise and endurance were supported by a coach. It also incorporated biofeedback and a session about the medical impact of forgiveness and how they could incorporate it in their daily life. According to some authors, forgiveness of others and oneself are the unique methods of coping that offer a remedy to eliminate the emotions that appears in FM that includes anger, stress, and fear.<sup>47</sup> Other negative emotions such as anger, shame or guilt that may appear due to the situations of abuse experienced frequently appear in patients with FM,<sup>48</sup> can be mitigated with forgiveness.

In the third study, Castel *et al.* created an MRT with very complete physical work but it was different from Kas' work where he introduced pool therapy and kinesiotherapy in a gymnasium. The sessions of pool therapy were conducted in a heated pool at 30 °C. Furthermore, Castel *et al.* incorporated gentle stretching exercises of thorax muscles and limbs and kinesiotherapy of pelvic, lumbar-pelvic and cervical muscles.<sup>36</sup> However, Kas *et al.* performed upper and lower extremity strengthening exercises focusing on the addiction of gradual resistance training.<sup>40</sup> In the same way, Nelson concluded resistance training can improve pain when it starts with low intensity and progressively increases.<sup>49</sup>

In the fourth study, Saral *et al.* combined CBT, exercise, and an education program.<sup>34</sup> They introduced aerobic exercise, stretching, strengthening, hydrotherapy and massage therapy. Ablin *et al.* also recommended pharmacotherapy, psychosocial and CBT and educational strategies.<sup>50</sup>

The five articles with best scores used pool therapy with the exception of Vincent *et al.*<sup>39</sup> However, Vincent *et al.* used forgiveness therapy and endurance exercise. This program is unique in its completeness, brevity and ease of administration.

Studies, which incorporated fasting therapy and soy shakes, did not improve as much.<sup>31, 41</sup> MRT adapted to the patients' characteristics achieved good scores (Table III).<sup>33, 36, 39</sup> This idea is in line with Stanos *et al.* who propose that FM treatment should adapt to each person's different personality traits.<sup>51</sup>

Scientific evidence indicates that an integrative, multidisciplinary treatment that includes guidelines for physical exercise, health education programs, CBT, and pharmacotherapy is necessary. These should be the foundations for MRT and they include a large variety of tools for the treatment of this condition.<sup>52</sup> These recommendations are incorporated by the studies that obtained the best score on the FIQ.<sup>33, 34, 36, 39, 40</sup> This is consistent with our results since the studies that obtained the best score were those that combined the educational programs with a com-

plete program of physical exercises carried out for 10-12 weeks.<sup>33, 36, 40</sup> Also, the program of Vincent *et al.* which lasted 5 days incorporated a strong educational program in self-management of FM in addition to stretching, resistance training and physical exercise.

The studies that showed better improvement of the FIQ used education programs.<sup>33, 34, 36, 39, 40</sup> In addition, all of them also used CBT. In CBT there are numerous techniques to improve the coping and adaptation of the disease. Kas *et al.* used adaptive therapy, commitment, and biofeedback.<sup>40</sup> Vincent *et al.* used biofeedback, moderation, and self-management, and added third generation management strategies focusing on the importance of using forgiveness to improve the conditions of the disease.<sup>39</sup>

CBT and especially those of the third generation, such as Acceptance-Commitment (ACT) and Behavioral Activation (BA), are the most recommended for their greater effectiveness.<sup>53</sup> These therapies have been implemented by Kas *et al.*<sup>40</sup>

As for physical exercise, there is no consensus to decide which is the best in each case, but they can be summarized in three large groups: aerobic exercises, strength and endurance, and stretching and flexibility.<sup>11</sup> In this review, those who have combined them have had better FIQ scores.<sup>33, 34, 36, 39, 40</sup> Resistance exercises and muscle improvements performed during 15 weeks obtained a significant reduction in pain, often by decreasing beliefs that cause the avoidance of physical activity.<sup>54</sup>

One study introduced soy in FM treatment due to the various benefits that soy has for the cardiovascular system, bones, and rheumatoid arthritis<sup>55</sup> and Wahner-Roedler *et al.* compared soy with casein shakes.<sup>31</sup> Similar to treatment for many chronic diseases, dietary aspects are often introduced in FM rehabilitation treatment. It has been shown that daily or almost daily consumption of fruit is positively associated with better mental health and a lower risk of severe depression. In addition, daily or almost daily intake of vegetables and moderate consumption of fish is positively associated with better mental health. In contrast, the almost daily intake of cured meat and sweetened or alcoholic beverages is associated with adverse psychosocial factors.<sup>56</sup>

Regarding biofeedback, seven studies<sup>53</sup> with a total of 321 participants showed improved pain, but no other aspects such as fatigue or insomnia improved. Therefore, Glombiewsky *et al.* recommend accompanying biofeedback with physical exercise and education.<sup>53</sup>

### Strengths and limitations of the study

It is important to highlight some aspects of the types of MRT reviewed above. The first is that there are no specific

guidelines for treating FM. The duration of the interventions is quite varied and, in general, they tend to be brief. The 5-week intervention performed at Mayo Clinic was very complete, structured, and although it was only 5 days, the total number of hours and the telephone follow-up was adequate.<sup>39</sup> Second, effective MRT can involve several components: 1) full body exercise including aerobic exercise, core strengthening, stretching; 2) occupational therapy; 3) psychotherapeutic work including CBT and ACT; 4) biofeedback.<sup>40</sup> Strength training is also as effective in controlling the pain associated with FM as the aerobic exercise.<sup>57</sup>

### Conclusions

This review identified the most effective MRT treatments. Key interventions appear to be those that will incorporate an education program to patients and a complete exercise program along with aerobic exercises, stretching, relaxation, strengthening, and endurance, and which includes the entire body and biofeedback. Furthermore, CBT for self-management that includes occupational therapy, moderation, acceptance, commitment, motivation to change and forgiveness are important components. Further research is recommended because the relatively small number of randomized controlled trials (RCTs), wide array of study designs, and small sample sizes continue to pose problems in building a strong case for practice implementation.

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