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## Review article

# Effects of muscle stretching exercises in the treatment of fibromyalgia: a systematic review<sup>☆</sup>



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### ABSTRACT

**Objective:** this study has the objective to systematize scientific evidences about the use of muscle stretching exercises in the treatment of FM.

**Methodology:** it was performed from retrospective research without chronological and linguistic limits, at databases of MEDLINE, LILACS, SciELO and PEDro, as well as at PubMed search tool. Data collection was performed by two independent reviewers in October 2012, with the search strategy formulated by crossing descriptors and relevant terms to the topic in English, Portuguese and Spanish languages. Randomized clinical trials, only with patients with a clinical diagnosis of fibromyalgia and muscle stretching exercises as a therapeutic measure at least in one of the intervention groups were included. Included studies were assessed for methodological quality using PEDro scale and their references analyzed to highlight additional sources. The search amounted to an average of 6,794 items. Only five articles were selected, one being excluded because of its low methodological quality. Pain was assessed unanimously. The method and timing of interventions varied widely, there was poor mention of the parameters used in the stretches and absence of specific physical examinations.

**Results:** there was significant improvement in all studies regarding pain, besides as related to quality of life and physical condition.

**Conclusion:** it is clear the importance of muscle stretching in the treatment of FM, however, there is a need for further studies to establish the real benefits of the technique, because the majority of published studies shows low methodological quality and there is a lack of standardization regarding the use of this resource.

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## Efeitos dos exercícios de alongamento muscular no tratamento da fibromialgia: uma revisão sistemática

### R E S U M O

*Palavras-chave:*  
Fibromialgia  
Alongamento  
Fisioterapia

*Objetivo:* o presente trabalho tem como objetivo sistematizar evidências científicas sobre a utilização dos exercícios de alongamento muscular no tratamento da fibromialgia (FM).

*Metodologia:* foi realizado a partir de consulta retrospectiva, sem limite cronológico e linguístico, às bases de dados MedLine, LILACS, SciELO e PEDro, além da ferramenta de busca PubMed. A coleta foi realizada por dois revisores independentes, em outubro de 2012, sendo a estratégia de busca formulada por meio do cruzamento de descritores e termos relevantes para o tema nos idiomas inglês, português e espanhol. Foram incluídos ensaios clínicos randomizados (ECRs) compostos apenas por pacientes com diagnóstico clínico de FM e com exercícios de alongamento muscular como medida terapêutica em pelo menos um dos grupos de intervenção. Os estudos incluídos foram avaliados quanto à qualidade metodológica por meio da escala PEDro, e suas referências bibliográficas, analisadas, para se destacar fontes adicionais. A busca totalizou 6.794 artigos. Cinco artigos foram selecionados, sendo um deles excluído por apresentar baixa qualidade metodológica. A dor foi avaliada por unanimidade. O método e o tempo das intervenções variaram amplamente, houve falta de menção de parâmetros na utilização dos alongamentos e ausência de exames físicos específicos.

*Resultados:* houve melhora significativa em todos os estudos quanto à dor, além de aspectos relacionados a qualidade de vida e condição física.

*Conclusão:* é evidente a importância do alongamento muscular no tratamento da FM, porém observa-se a necessidade de novos estudos para se estabelecer os reais benefícios da técnica, visto que a maioria dos trabalhos publicados apresenta baixa qualidade metodológica e ausência de padronização quanto ao uso desse recurso.

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## Introduction

Fibromyalgia (FM) is a rheumatic syndrome of unknown etiology that occurs predominantly in women aged 30-55 years.<sup>1</sup> It is characterized by a chronic, widespread musculoskeletal pain, with greater than three months duration, causing physical and emotional problems interfering directly in functional capacity and quality of life.<sup>2</sup> The diagnosis is based on the clinical condition of the patient,<sup>3</sup> and the treatment advocates pain control through global strategies of an interdisciplinary approach, with interventions in physical, pharmacological, cognitive-behavioral and educational spheres.<sup>1,4</sup>

Acting directly in the physical domain of FM patients, physiotherapy, a professional modality consisting of an arsenal of techniques responsible for breaking the vicious cycle of symptoms characteristic of chronic patients, deserves to be highlighted.<sup>4-6</sup> Scientific evidence shows that cinesiotherapeutic exercises minimize pain, fatigue and muscle tension, improving levels of stress, anxiety and depression in fibromyalgia patients, when performed on a regular basis and under monitorization.<sup>7,8</sup>

The stretching exercises, in turn, allow functional muscle length recovery, providing stress relief, postural realignment and improvement in amplitude, as well as freedom and awareness of movement.<sup>9,10</sup> However, although extensively used in physical therapy clinical routine by being easy to perform and tolerate, there does not seem to exist?? a consensus on the

more suitable stretching type, frequency and intensity for the treatment of patients with FM.<sup>4,7</sup>

Thus, the aim of this article is to systematize the scientific evidence on the use of muscle stretching exercises in the treatment of FM.

## Material and methods

A systematic literature review was performed from a retrospective consultation with no chronological and linguistic limits, to Literature Analysis and Retrieval Medical System Online (MEDLINE), Latin American and Caribbean Literature on Health Sciences (LILACS), Scientific Electronic Library Online (SciELO) and Physiotherapy Evidence Database (PEDro) databases, as well the search engine PubMed. The papers' collection was held in October 2012, with the search strategy formulated by crossing of descriptors (DeCS and MMeSHs) and terms relevant to the subject (free terms – FT), in English, Portuguese and Spanish idioms.

On Medline, LILACS, SciELO and PEDro, the following crossings: "Fibromyalgia" (DeCS) AND "Stretching" (FT) OR "Muscle stretching exercises" (DeCS) OR "Flexibility" (FT) OR "physiotherapy" (DeCS) OR "Physical Therapy Modalities" (DeCS) OR "Exercise"(TL) OR "Rehabilitation" (DeCS) were used. On PubMed, the articles were obtained from the crossing between "Fibromyalgia" (MeSH) AND "Stretching" (FT) OR "Muscle stretching exercises" (MeSH) OR "Flexibility" (FT) OR "Range of motion, articular" (MeSH) OR "Physical Therapy" (FT) OR

“Physical Therapy Specialty” (MeSH) OR “Physical Therapy Modalities” (MeSH) OR “Exercise [major]” (MeSH) OR “Rehabilitation” (MeSH).

RCTs composed only by patients with clinical diagnosis of FM and presenting muscle stretching exercises as a therapeutic measure in at least one of the intervention groups were included. The search and selection of articles, as well as the analysis of results, were judiciously performed by two independent reviewers. Initially, articles were excluded by title, followed by summary and, finally, by full reading of the study.

The studies which met the inclusion criteria were assessed for methodological quality using PEDro scale<sup>11,12</sup> consisting of 10 questions about the study, with a total score of 0-10 points. Surveys with < 3 points were excluded, for showing low methodological quality and with few possibilities of extrapolating their results to clinical practice. The references at the end of selected articles were analyzed in order to highlight additional sources.

Due to the small number of clinical trials on the subject and the large variability among the proposed interventions, a critical review analysis of the contents, with no possibility of a statistical analysis by meta-analysis, was performed. The relevant information was presented in the form of descriptive tables, considering the following variables: year, country, sample, evaluated outcomes/assessment tools, methodological design, intervention and effects found.

## Results

The search in databases totaled an average of 6,794 items, with the largest number of studies found through MEDLINE via BIREME (n = 3,068) and PubMed (n = 3,181). According to eligibility criteria, only five articles were selected, and that by Bressan et al. (2008)<sup>13</sup> was excluded because of its low methodological quality (PEDro scale = 2). As a final result, four articles, presented in chronological order in [Table 1](#) and methodologically evaluated according to [Table 2](#), were analyzed.

## Discussion

Analyzing the results obtained by the search strategy, we observed a higher concentration of studies in the 2000s;<sup>10,15,16</sup> there is only one publication in the year 1986.<sup>14</sup> It is worth noting that all investigations were conducted in North American<sup>14,15</sup> and South American countries,<sup>10,16</sup> and the pioneer<sup>14</sup> research was published in Canada, the host country of the 1st International Conference on Health Promotion, also held in the year 1986<sup>17</sup> from this meeting, discussions about improving quality of life worldwide were initiated, due to the broadening of the concept of health and the identification of an ever growing aging population.<sup>17,18</sup>

Given the changing epidemiological profile of the population, an increase in the prevalence of chronic diseases is observed, resulting in a need for research considering therapeutic approaches consistent with the new reality.<sup>18</sup> In 1990, the American College of Rheumatology published diagnostic criteria for FM<sup>19</sup> and strengthened researches on the syndrome in the Americas, with the consolidation of groups of researchers on the subject, as could be seen in this review, with

the selection of two items developed by the same authors in São Paulo, Brazil.<sup>10,16</sup>

Only the studies of Jones et al. (2002)<sup>15</sup> and of Berrsaneti & Marques (2010)<sup>16</sup> describe the calculation of minimum sample size, established with basis on the variables “isokinetic muscle strength” and “quality of life”, respectively. The rules of writing and publication of RCTs, constituents of CONSORT, highlight the importance of determining the sample size for extrapolation of results found.<sup>20</sup> Therefore, in our analysis there was no homogeneity with respect to the number of participants.

In contrast, although the authors have defined different age groups in the inclusion criteria of volunteers, the mean age of the samples from analyzed studies corresponded to the middle-aged population, which is consistent with the literature.<sup>21-23</sup> These same studies point to a high percentage of women with FM,<sup>21-23</sup> a fact also noted in this review, in which men were included only in the study conducted by McCain (1986),<sup>14</sup> probably due to the low methodological rigor required in interventional researches developed in the 1980s.

The variable “pain” was the only selected unanimously for the researchers’ hypothesis testing; however, in the study published in 1986<sup>14</sup> the dolorimetry test to assess pain threshold was performed in a different way, being applied in five specific points, because the diagnosis criteria for FM were established only later, in the 1990s.<sup>19</sup> There was consensus on the application of FIQ and SF-36 questionnaires for assessment of symptoms and quality of life in fibromyalgia patients; both are validated for the Brazilian population and exhibit good sensitivity and specificity, being reliable and reproducible tools.<sup>24,25</sup>

The manuscripts reveal a variety of physical tests applied, with the exception of Matsutani et al. (2007);<sup>16</sup> these authors, faithful to their purposes, considered adequate to analyze only variables of a subjective character. Among the flexibility tests chosen, Jones et al. (2002)<sup>15</sup> were limited to the evaluation of upper limbs through active functional tests of internal and external shoulder rotators; Berrsaneti & Marques (2010)<sup>16</sup> elected the third finger-floor test,<sup>26</sup> widely used in the evaluation of flexibility of the posterior muscles of the trunk and lower limbs, but that requires experience of the evaluator to avoid compensation during its execution, such as opening the tibiotarsal angle or decreasing hip flexion. Constraints on the choice of the test employed can be explained by lack of physical examinations specifically validated for patients with fibromyalgia.

Heterogeneity in intervention times and in the frequency of sessions, as well as in the intensity of exercise, were observed, corroborating previous findings<sup>4,7</sup> which reported lack of consensus regarding the application of the therapeutic stretching approach in patients with FM. However, we emphasize the educational contributions incorporated in the methodologies of the studies by Jones et al. (2002),<sup>15</sup> Matsutani et al. (2007)<sup>16</sup> and Berrsaneti & Marques (2010),<sup>10</sup> highlighting the need for an awareness of patients, with the aim to increase their adherence to the treatment, and also to obtain some guarantee, to the extent possible, of continuity of therapy.

As for the results found, a statistically significant improvement in almost all parameters evaluated by the analyzed studies in this systematic review was observed. When the stretching exercises were compared to strengthening

**Table 1 – Description of randomized clinical trials that use muscle stretching exercises as physical therapy intervention in the treatment of fibromyalgia.**

Study	Sample	Outcomes evaluated	Methodological study	Intervention	Effects found
(McCain, 1986) <sup>14</sup> Canada	Mean age: 42 years Groups: EG: Cardiovascular training (n = 12 ♀ and 6 ♂) PG: Stretching (n = 16 ♀)	Pain: - Dolorimetry ofChattillon to assess pain threshold on five specific points (TP +); - Visual Analogue Scale (VAS); - Diagram of pain. Fitness test: - PWC-170 Cycle Test.	Randomized clinical trial; reviews pre/post-intervention of 20 weeks.	EG and PG: 60 sessions with three-weekly frequency (duration not described). EG: Exercise in a cycle ergometer maintaining a minimal of 150 bpm. PG: General flexibility exercises.	Improvement in all the aspects evaluated in both groups, with higher gains obtained in the cardiovascular training group.
(Jones et al., 2002) <sup>15</sup> USA	Mean age: 48 years Groups: EG: Strengthening (n = 28 ♀) CG: Stretching (n = 28 ♀)	Pain: - Dolorimetry of Fisher to assess the number of positive tender points (TP +) and pain threshold (PT); - Total score of PT; - Visual Analogue Scale (VAS). Quality of life: - Fibromyalgia Impact Questionnaire (FIQ); - Quality of life scale (QOLS). Depression: - Beck Depression Questionnaire. Anxiety: - Beck Anxiety Questionnaire. Self-efficacy: - Arthritis Self-efficacy Scale. Muscle force: - Maximal voluntary contraction (MVC) of knee flexors and extensors and internal and external shoulder rotators with an isokinetic dynamometer. Flexibility: - Functional testing of internal and external shoulder rotators. Body composition: - Fat (caliper); - Weight (kg).	Randomized clinical trial; Reviews 2 weeks before and 2 weeks after 12-week intervention.	EG and CG: Educational meeting, followed by 24 sessions of general exercises, lasting 60 minutes and biweekly frequency, in which: GE: initial 5 minutes for heating (walking + stretching), followed by 45 minutes of strengthening exercises with evolution of load and number of repetitions (4-5 up to 12) and 10 minutes of deceleration + stretching. GC: initial 10 minutes of walking, followed by 40 minutes of stretching (medium intensity of discomfort) and 10 minutes of relaxation.	GE: The strengthening group showed improvement in 12 evaluated measures (total score of PT, VAS, MVC of knee flexion/extension and shoulder rotations, functional flexibility tests, FIQ, Beck Scale, QOLS and self-efficacy scale). GC: The stretching group showed improvement in six of the nine measurements (MVC of knee extension and shoulder rotations, functional tests of flexibility and self-efficacy scale). Comparison between groups: There was no significant difference between the post-test results.

- Table 1 (Continued)

Study	Sample	Outcomes evaluated	Methodological study	Intervention	Effects found
(Matsutani et al., 2007) <sup>16</sup> Brazil	Mean age: 45 years Groups: EG: Stretching/Laser (n = 10 ♀) CG: Stretching (n = 10 ♀)	Pain: - Dolorimetry of Fisher to assess the number of positive tender points positive (TP +); - Visual Analogue Scale (VAS). Quality of life: - Fibromyalgia Impact Questionnaire (FIQ); - SF-36.	Randomized clinical trial; reviews pre/post-5-week intervention.	EG and CG: initial educational guidelines and in 10 treatment sessions lasting 1 hour and with biweekly frequency. EG: Application of laser in tender points (3 J/cm <sup>2</sup> , 830 nm, 30 mW) and general stretching exercises. CG: general stretching exercises.	Improvement in all aspects evaluated, with no difference between the intervention groups.
(Berssaneti & Marques, 2010) <sup>10</sup> Brazil	Mean age: 46 years Groups: EG1: Stretching (n = 14 ♀) EG2: Strengthening (n = 16 ♀) CG: No treatment (n = 14 ♀)	Pain: - Dolorimetry of Fisher to assess pain threshold on tender points (PT) and number of positive tender points (TP +); - Visual Analogue Scale (VAS). Symptoms: - Fibromyalgia Impact Questionnaire (FIQ). Quality of life: - SF-36. Flexibility: - 3rd finger-floor Test (3FF). Muscle force: - Maximum voluntary isometric contraction (MVC) of the knee flexors and extensors with load cell (EMG System of Brazil).	Randomized clinical trial; reviews pre/post-12-week intervention.	GE: educational guidelines in 24 general exercise sessions, lasting 40 minutes and biweekly frequency, in which: EG1: initially 3 sets of 30 seconds, increasing monthly until 5 series; medium intensity of discomfort. EG2: 1 set of 8 reps initially unloaded, with addition of 0.5 kg weekly, since the patient presents Borg Scale = 13. CG: Patient revised after 12 weeks, without intervention.	SG1: Improvement in variables: PT, 3FF, fatigue, sleep, stiffness, FIQ total score, functional capacity, vitality, mental health, pain and physical and emotional totals of SF-36. EG2: Improvement in variables: PT, TP+, 3FF, MVC of knee flexion, fatigue, sleep, stiffness, anxiety, depression, FIQ total score, functional capacity, vitality, mental health and emotional total of SF-36. CG: No improvement. Comparison between groups: stretching and strengthening exercises significantly improve pain, FM symptoms and quality of life and can be considered complementary, because they act on different aspects.

♀, female gender; ♂, male gender; EG, experimental group; PG, placebo group; CG, control group; bpm, beats per minute.



**Table 2 – Methodological classification of studies selected by the PEDro Scale.**

	McCain (1986) <sup>14</sup>	Jones et al. (2002) <sup>15</sup>	Matsutani et al. (2007) <sup>16</sup>	Berssaneti & Marques (2010) <sup>10</sup>
1 Inclusion criteria specified	Yes	Yes	Yes	Yes
2 Random allocation	Yes	Yes	Yes	Yes
3 Secrecy in allocation	No	No	No	No
4 Basis comparison	Yes	Yes	Yes	Yes
Subjects “blinded”	Yes	No	No	No
Therapists “blinded”	No	No	No	No
7 Raters “blinded”	Yes	Yes	No	Yes
8. Adequate follow-up	No	Yes	No	No
9 Analysis by intention to treat	No	No	No	No
10 Statistical comparison between groups	Yes	Yes	Yes	Yes
11 Point estimates and variability	Yes	Yes	Yes	Yes
PEDro TOTAL SCORE	6	6	4	5

OBS.: Specification of the inclusion criteria (item 1) does not receive PEDro scores.

exercises in the studies by Jones et al. (2002)<sup>15</sup> and Berssaneti & Marques (2010),<sup>10</sup> or with the use of laser in a phototherapeutic study by Matsutani et al. (2007),<sup>16</sup> there was no superiority of benefits among the techniques, confirming that patients with FM need not only an interdisciplinary treatment, but also an approach that encompasses different resources during their therapy.<sup>6,7,27</sup>

## Conclusion

Given the above, it is evident the importance of conducting therapeutic exercises for physical and mental improvement in patients with FM. However, we must emphasize the need for clinical trials with greater methodological rigor in order that, in fact, the real benefits of physiotherapy resources used, especially those with muscle stretching exercises, become known.

## Conflicts of interest

The authors declare no conflicts of interest.

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