

Evidence Based Physical Therapy Interventions for Fibromyalgia Management: Systematic Review

Mohamed Mahdi A Bani Humayyim; Nesreen Ghareeb Elnahas; Salma Ibrahim Alghitany

Department of Physical Therapy for Cardiovascular/Respiratory Disorders and Geriatrics,

Faculty of Physical Therapy, Cairo University

Corresponding author: Mohamed Mahdi A Bani Humayyim, email: Ptrservices2022@gmail.com, Mobile: 01050366830

ABSTRACT

Background: Fibromyalgia (FMS) is a chronic pain condition characterized by generalized musculoskeletal pain, hyperalgesia and allodynia, commonly associated with other symptoms such as fatigue, poor sleep quality, anxiety and depression. Although pain in FMS is widespread, the most affected regions are related to respiratory mechanics.

Methods: Four electronic data base (PubMed, Pedro, Cochrane and Google scholar) were searched from 2014 till 2024. Study selection: Two independent reviewers screened studies for eligibility first by title then by abstract then finally by full text. 13 studies met the inclusion criteria of this review, all of them were about evidence based physical therapy interventions for fibromyalgia management, quality was assessed using Pedro and the Cochrane risk of bias assessment tool. **Data synthesis:** 12 studies were included in the quality assessment. For Pedro scale, five studies introduced the least bias, 8 yes in their scores with good quality, as there was blinding for the assessor and follow up for more than 85 % for at least one key outcome in both studies which decrease the risk of bias in both studies and increase its quality. While, the high risk of bias represented in one study with 4 yes and 2 study with 5 yes. The rest of studies were between six and seven yes indicating good quality.

Result: The study showed that there was significant effect of Evidence Based Physical Therapy Interventions for Fibromyalgia: in the following outcome measures (HR, Fatigue, Quality of Life, depression, Anxiety, ROM, Muscle strength and Physical function). **Conclusion:** The systematic review showed that there were effects of Evidence Based Physical Therapy Interventions for Fibromyalgia Management

Keywords: Evidence Based, Fibromyalgia, Interventions.

INTRODUCTION

Fibromyalgia is a chronic pain illness characterized by generalized musculoskeletal pain, hyperalgesia, and allodynia, often accompanied by additional symptoms such as fatigue, poor sleep, anxiety, and despair. This rheumatic disease's clinical manifestations have a major impact on social activities, quality of life, and health status, with serious psychosocial and economic consequences ⁽¹⁾.

This disease, which causes impairment with substantial direct, e.g., pharmaceutical treatment and medical care, as well as indirect costs (such missed productivity), is prevalent in the general population (0.2–6.6%) and primarily affects women aged 20–50 ⁽²⁾.

Among the muscles most affected by respiratory mechanics are the anterior cervical region, the suboccipital muscles, the upper trapezius muscle, and the second rib, despite the fact that discomfort in FMS is widespread ⁽³⁾. The development of respiratory diseases can be aided by fibromyalgia syndrome, which can cause discomfort and stiffness in the muscles of the thorax and spine. This reduces the functional ability of the breathing muscles ⁽⁴⁾.

Therefore, the respiratory examination in fibromyalgia syndrome has gained interest due to the presence of symptoms including fatigue and dyspnea as well as discomfort in areas linked to respiratory mechanics ⁽⁵⁾.

According to *Antunes et al.* ⁽⁶⁾, women with FMS had an obstructive respiratory pattern since their FEV1 and FEV1/FVC values were lower.

In this population, low levels of physical activity lead to respiratory muscle dysfunction, which results in reduced respiratory muscle strength and thoracic mobility ⁽⁷⁾.

PURPOSE OF THE STUDY

To systematically review and summarize all research that has examined the effect of physical therapy interventions on management of fibromyalgia.

MATERIALS AND METHODS

Only randomized controlled trials (RCTs) were included in the current study. a) The clinical study's design compared several groups and was prospective. b) The trials lacked quantitative measures. c) Physical therapy interventions based on evidence for managing fibromyalgia.

Eligibility criteria:

Only observational case-control, cohort, and randomized control studies were included in this analysis. Studies were accepted if they met the following requirements:

- 1) Participants in the studies ranged in age from 18 to 60.
- 2) English had to be used when writing the studies.
- 3) The search took place within the previous ten years.
- 4) Research examined the evidence-based physical therapy treatments for fibromyalgia using either observational or RCT designs (e.g., case control or cohort studies).

Exclusion criteria:

- 1- Studies published in a language other than English.
- 2- Conference proceedings, editorials, letters, and poster presentations.

Information sources and search strategy

To find observational and randomized controlled trials published in English and indexed within the previous decade, The PubMed, Web of Science, Embase, SAGE, and Scopus databases were searched electronically. A combination of free text terms and medical subject headings (MeSH) pertaining to ("Fibromyalgia Syndrome," "OR," "Fatigue Fibromyalgia," "OR," "Thoracic mobility," "OR," "Respiratory Muscle Strength," "OR," "Treatment in Fibromyalgia," "OR," "Intervention in Fibromyalgia," "OR," "Sleep disorder in Fibromyalgia," "OR," "Pain in Fibromyalgia " "OR" Fibromyalgia disease," "OR," "Chest pain in Fibromyalgia," "OR," "Dyspnea in Fibromyalgia," "OR," "Lung Function Fibromyalgia," and " Fibromyalgia Syndrome in Chronic Obstructive Pulmonary Disease."

In order to find more related research that electronic searches were unable to find, the references of all pertinent papers were also examined.

Study selection and data extraction:

Two separate researchers evaluated the retrieved articles for relevancy based on their titles and abstracts after duplicates were eliminated using the Endnote program version 20. Following the acquisition of full-text versions of pertinent publications, the same two investigators evaluated them for eligibility.

The relevant data were being extracted independently by two reviewers. In order to confirm whether all relevant data had been correctly collected, they had compared their findings. Authors, year of publication, title, study design, subject characteristics, pain, exhaustion, anxiety, physical function, autonomic function, depression, quality of life, functional capacity, dyspnea, lung function, thoracoabdominal mobility, results, and conclusions were all extracted.

Risk of bias assessment:

1-For observational studies:

The two investigators independently evaluated the included papers using the Newcastle Ottawa Quality Assessment Scale (NOS) in accordance with case-control studies. The majority of the included papers were cross-sectional studies, which led to the selection of this quality assessment approach ⁽⁸⁾. A third investigator was asked if there was a need to come to an agreement because the two investigators disagreed on the selection's outcomes ⁽⁹⁾. A study was evaluated using three criteria by the NOS's (star rating system): the choice of study groups, the groups' comparability, and the identification of the exposure or outcome of interest. With the exception of comparability, which can receive

up to two stars ⁽¹⁰⁾, There were several things in each facet that were given a single star rating. Good quality was indicated by a score of ≥ 7 , middling quality by a score of ≥ 5 , and bad quality by a score of < 5 . Cohen's kappa was used to assess the level of agreement between the two reviewers ⁽¹¹⁾.

2-For randomized control studies:

A systematic review of an intervention's effects was thought to need an assessment of the possibility of bias. The Cochrane risk-of-bias tool was the most widely used instrument for randomized trials. It was revised to address user input regarding the previous tool's shortcomings and to reflect advances in our knowledge of how bias emerged in randomized trials ⁽¹²⁾.

Data Extraction

Primary sources of information regarding trials and participants, as well as about interventions, methodology, outcome measures, significant findings, and conclusions, were tabulated on data extraction sheets.

Ethical considerations:

The study's ethical committee approved the research conducted at Cairo University's Faculty of Physical Therapy. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

These meta-analyses compiled information on physical therapy therapies for the management of fibromyalgia at the study level. At the conclusion of the intervention period, fibromyalgia patients' heart rates, beck sadness and anxiety scales, fatigue severity scale (FSS), fibromyalgia impact questionnaire (FIQ), pain, and quality life indicators were evaluated. The visual analogue scale (VAS) was used to measure pain. Fibromyalgia was measured with the Fibromyalgia Impact Questionnaire (FIQ). Depression was measured using the Beck Depression Scale. Anxiety was measured using the Beck Anxiety Scale. The SF36 scale questionnaire assessed quality of life by assessing changes in physical functioning, physical role, physiological discomfort, general health, vitality, social functioning, emotional role, and mental health.

RESULTS

The purpose of this study was to compile the observational and randomized controlled studies that looked into evidence-based physical therapy interventions for the treatment of fibromyalgia. The main goal of this study was to conduct a comprehensive evaluation of the literature on evidence based physical therapy interventions for fibromyalgia management. Both observational studies and randomized controlled trials were used in the study.

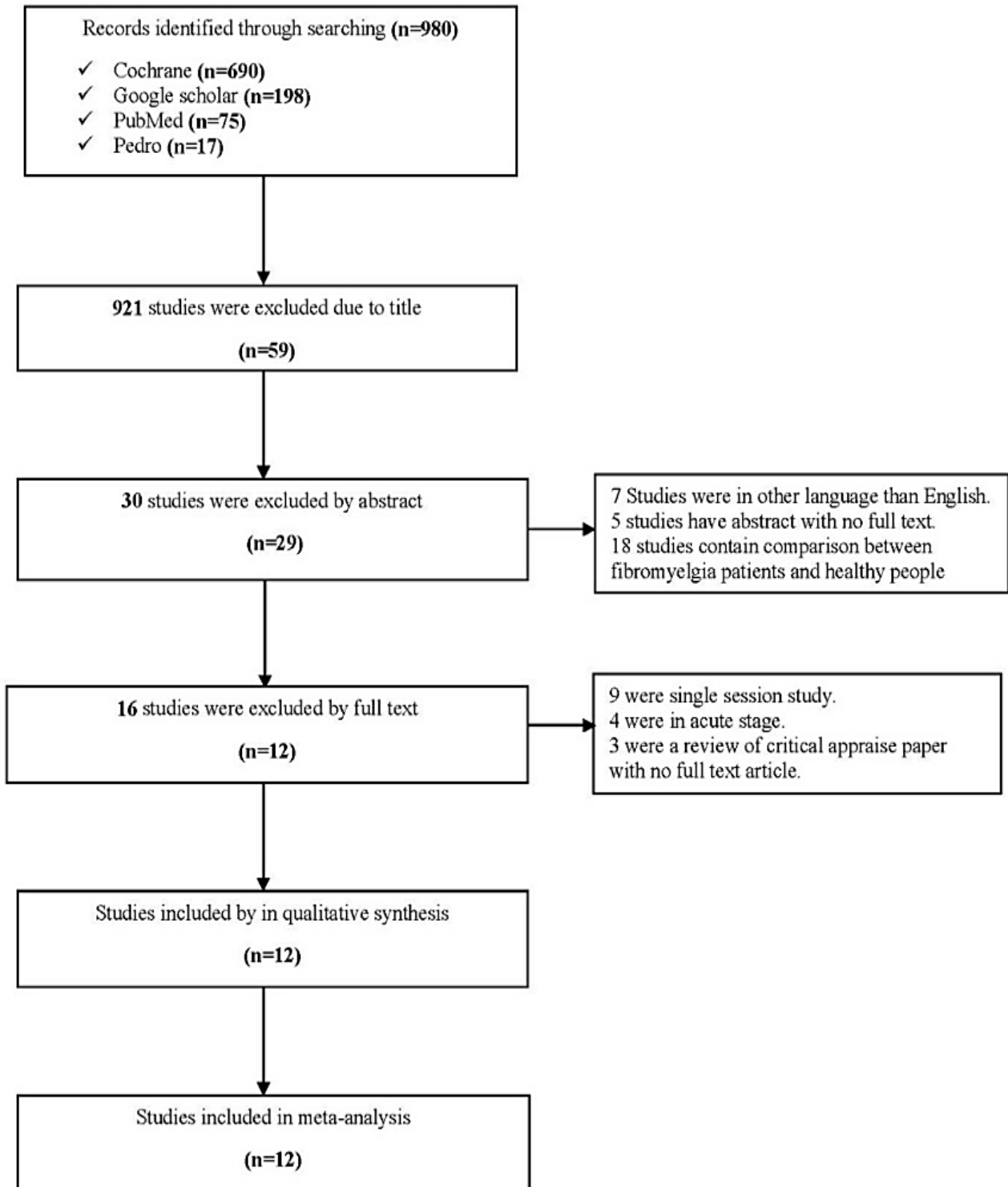


Fig. (1): Flow diagram of search results

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Abdelaziz et al. 2024	+	+	-	-	+	+	
Ardila et al. 2021	+	+	-	+	-	+	
Carus et al. 2022	+	+	+	-	+	-	
Fort et al. 2016	+	-	+	+	+	+	
Koppold et al. 2024	+	+	+	-	+	+	
Kutlu et al. 2020	+	+	-	-	+	-	
Nicolás et al. 2020	+	-	-	+	+	+	
Reis et al. 2014	+	-	-	+	-	-	
Schmidt et al. 2017	+	-	-	-	+	-	
Stival et al. 2014	+	-	-	+	-	-	
Tomas-Carus et al. 2022	+	-	-	-	-	+	
Valmaña et al. 2020	+	+	+	+	+	+	
Vrouva et al. 2022	+	+	-	-	+	+	
Zarapuz et al. 2024	+	-	+	-	-	+	

Figure (2): Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

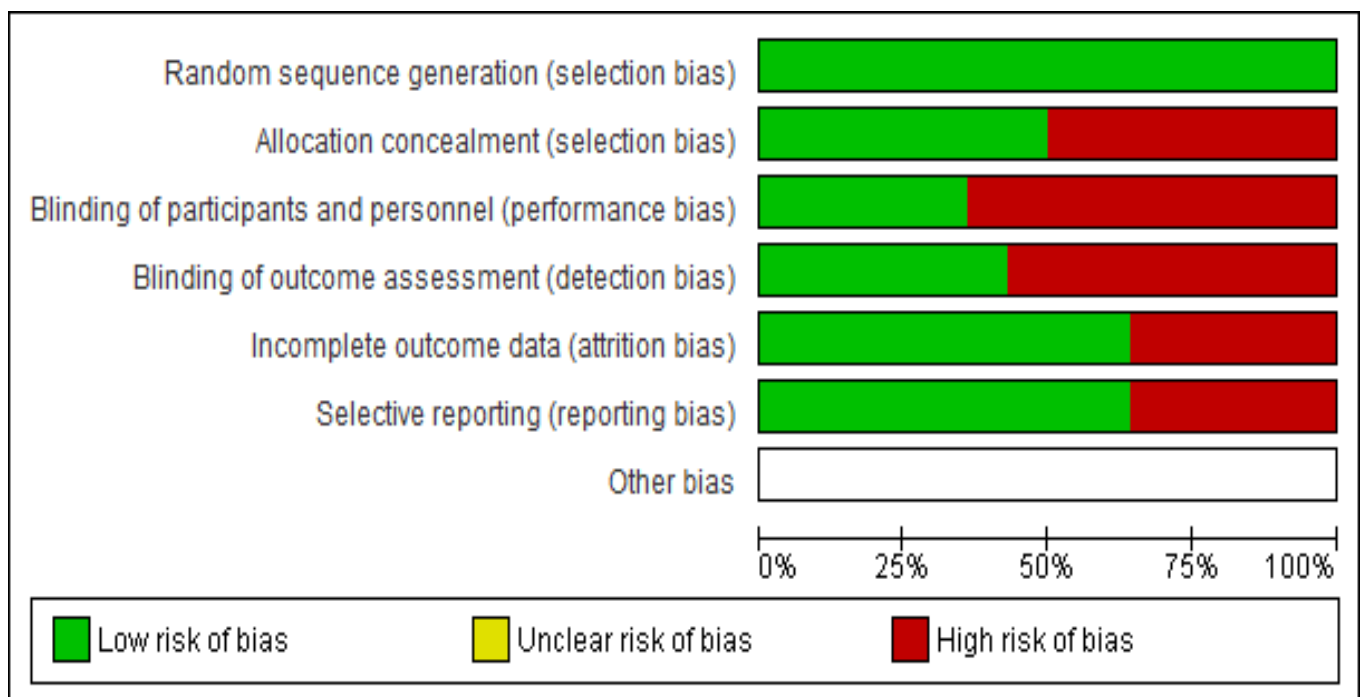


Figure (3): Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

DISCUSSION

Physical therapy treatments supported by evidence for the treatment of fibromyalgia were the subject of this systematic review and meta-analysis. The studies included both randomized controlled trials and observational studies.

We included studies so we could compare the treatments' long-term impact on physical function and tiredness levels. This review set out to examine physical therapy interventions for fibromyalgia that are supported by evidence. The meta-analysis examined the efficacy of different rehabilitation approaches in the treatment of fibromyalgia and comprised thirteen studies. Our attention was drawn to the period after rehabilitation, the frequency of treatments, and the results assessed using clinical decision-making criteria.

Consistent with previous reviews showing significant differences between physiotherapy and rehabilitation treatments for fibromyalgia patients, the systematic review indicated that different types of exercise affected physical function, anxiety, depression, and fatigue in this condition.

Ten trials compared the intervention group to a control group in terms of visual analog scale (VAS) pain ratings in fibromyalgia patients. In a total of 10 trials, with 396 individuals in the intervention group and 444 people in the control group, there was a significant amount of variability ($P < 0.00001$; $I^2 = 96\%$) in pain (VAS). The pain (VAS) scores of the intervention and control groups were significantly different ($P = 0.02$; $P < 0.05$) with a standard deviation of -0.96 and a 95% confidence interval ranging from -1.80 to -0.13. The results of the sensitivity analysis demonstrated significant heterogeneity in the pain (VAS) scores of fibromyalgia patients, and the fact that these scores remained constant throughout the study suggested that the results should be trusted.

That there were two trials that compared the intervention group to the control group in terms of FSS in fibromyalgia patients. Over the course of four trials, which included fifty-two individuals in the control group and fifty-four in the intervention group, there was a significant amount of variation in FSS ($P < 0.00001$; $I^2 = 97\%$). Between the two groups, there was no discernible change in FSS (SMD = -2.90; 95% CI, -6.69 to 0.89) ($P = 0.13$; $P > 0.05$).

That there were two trials that compared the intervention group to the control group in terms of FSS in fibromyalgia patients. Over the course of four trials, which included fifty-two individuals in the control group and fifty-four in the intervention group, there was a significant amount of variation in FSS ($P < 0.00001$; $I^2 = 97\%$). Between the two groups, there was no discernible change in FSS (SMD = -2.90; 95% CI, -6.69 to 0.89) ($P = 0.13$; $P > 0.05$).

The results of three trials that compared the intervention group to the control group in terms of quality of life physical functioning in individuals with fibromyalgia. Over the course of three trials, which

included 65 people in the intervention group and 65 people in the control group, there was no significant difference in quality of life physical functioning ($P = 0.29$; $I^2 = 18\%$). The physical functioning subscale of quality of life (SMD = -0.05; 95% CI, -0.43 to 0.34) did not vary significantly ($P = 0.81$; $P > 0.05$) between the control and intervention groups.

There was a substantial disagreement between the Pedro scale and the Cochrane risk of bias scale when it comes to deciding whether trials met quality requirements. The Cochrane Rob tool defines high quality as blinding study assessors, creating random sequences, and verification of allocation; nevertheless, despite some of our trials scoring well on the Pedro Scale, they did not meet well accepted quality standards. Treatment effect estimates may be drastically affected by these differences in trial parameters, as stated by **Moher et al.** ⁽¹³⁾. Avoiding the use of skewed estimates from individual trials is crucial when undertaking emetic reviews or meta-analyses, since this might lead to misleading conclusions.

Element pertaining to reporting bias takes precedence in summary scores (like the Pedro scale) above that which is essential for evaluating the possibility of bias in the internal validity of articles. Despite the need for open reporting in order to measure the quality of trial conduct, a focus on ting quality in quality scores runs the risk of masking differences in trial conduct and leading to an under- or overestimation of the methodological quality ⁽¹⁴⁾.

I was surprised to see that the Pedro scale doesn't have any questions specific to the field of physical therapy. Physical therapists face unique challenges in conducting complex clinical trials when compared to pharmacological studies, including issues related to treatment protocol standardization, intervention reliability, and therapist competence, education, and experience ^(15, 16) states that the most reliable way to determine which physical therapy studies may be included is to use the Cochrane risk of bias analysis.

However, we must highlight that this evaluation was not without its flaws. To begin with, it was concerning that the discovered studies did not consistently use the same number of weeks of follow-up, which prevented a thorough study of the data acquired across longer time periods. The total quality of evidence is diminished by the second item's restriction on identifying I trials, which impacts the shown homogeneity among outcome measures. Confirmation of "non-significant benefits" is more probable from a small sample than confirmation of ineffective treatment techniques. Finally, the trials' high risk evaluated quality reduces the overall quality of the evidence and results.

CONCLUSION

This systematic review could not determine patient satisfaction due to a lack of studies that measured it. However, it did find that fibromyalgia management

improved functional ability, mental ability, exercise tolerance, and heart rate in fibromyalgia patients, VO2 max.

- **Financial support and sponsorship:** Nil.
- **Conflict of interest:** Nil.

REFERENCES

1. **Garrido-Ardila E, González-López-Arza M, Jiménez-Palomares M et al. (2021):** Effects of physiotherapy vs. acupuncture in quality of life, pain, stiffness, difficulty to work and depression of women with fibromyalgia: A randomized controlled trial. *J. Clin. Med.*, 10 (17): 3765. 10.3390/jcm10173765
2. **Mascarenhas A, Souza M, Oliveira M et al. (2021):** Association of therapies with reduced pain and improved quality of life in patients with fibromyalgia: A systematic review and meta-analysis. *JAMA Intern. Med.*, 181 (1): 104–112.
3. **Alciati A, Nucera V, Masala I et al. (2021):** One year in review 2021: Fibromyalgia. *Clin. Exp. Rheumatol.*, 39 (3): S3–S12. 10.55563/clinexp Rheumatol/gz4i3i.
4. **Antunes M, Schmitt A, Marques P (2021) :** AB0912-HPR AMIGOS de fibro (fibro friends): Educational program to promote the health of people with fibromyalgia in Brazil. *Ann. Rheum. Dis.*, 80: 1478. 10.1136/annrheumdis-2021-eular.2598.
5. **Antunes D, Schmitt B, Marques P (2022a) :** Amigos de fibro (fibro friends): development of an educational program for the health promotion of fibromyalgia patients. *Primary Health Care Research & Development*, 23 (e44): 1–7. 10.1017/S1463423621000773.
6. **Antunes D, Schmitt B, Marques P (2022b):** Amigos de Fibro (fibro friends): Validation of an educational program to promote health in fibromyalgia. *Int. J. Environ. Res. Public Health.*, 19 (9): 5297. 10.3390/ijerph19095297.
7. **Areso-Bóveda B, Mambrillas-Varela J, García-Gómez B et al. (2022):** Effectiveness of a group intervention using pain neuroscience education and exercise in women with fibromyalgia: A pragmatic controlled study in primary care. *BMC Musculoskelet. Disord.*, 23 (1): 323–332. 10.1186/s12891-022-05284-y.
8. **Lo K, Dominik M, Mark L (2014):** Newcastle-Ottawa Scale: comparing reviewers' to authors' assessments. *BMC medical research methodology*, 14(1):1-5.
9. **McPheeters L, Kripalani S, Peterson B et al. (2012):** Closing the quality gap: revisiting the state of the science (vol. 3: quality improvement interventions to address health disparities). Evidence report/technology assessment, (208.3): 1-475.
10. **Stang A (2010):** Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *European journal of epidemiology*, 25(9):603-605
11. **McHugh L (2012):** Interrater reliability: the kappa statistic. *Biochemia medica*, 22(3):276-282.
12. **Sun P, Fang L, Zhang J et al. (2022):** Repetitive transcranial magnetic stimulation for patients with fibromyalgia: A systematic review with meta-analysis. *Pain Med.*, 23 (3): 499–514. 10.1093/pm/pnab276.
13. **Moher D, Pham B, Jones A et al. (1998):** Does quality of reports of randomised trials affect estimates of intervention efficacy reported in meta-analyses? *National library of Medicine*, 22;352 (9128):609-13.
14. **Soares M, Miranda A, Siebesma P et al. (2004):** An eddy-diffusivity/mass-flux parametrization for dry and shallow cumulus convection. *Quarterly Journal of the Royal Meteorological Society: A journal of the atmospheric sciences. applied meteorology and physical oceanography*, 130(604): 3365-3383.
15. **Kunz S, Robert W, Norine C, Mark R (2006):** The PEDro scale provides a more comprehensive measure of methodological quality than the Jadad scale in stroke rehabilitation literature. *J. Clin. Epidemiol.*, 58(7):668-73.
16. **Armijo-Olivo S, Bruno R, Greta C et al. (2015):** PEDro or Cochrane to Assess the Quality of Clinical Trials? A Meta-Epidemiological Study. *PLoS One*, 10 (7):e0132634. doi: 10.1371/journal.pone.0132634.