Systematic review

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The effect of physiotherapy on fatigue and physical functioning in chronic fatigue syndrome patients: A systematic review

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Abstract

Objective. The objectives of this work were to fill the gap in the scientific literature and to evaluate the results of physical therapy treatments in individuals affected by chronic fatigue syndrome, considering only studies that employed a randomized controlled trial.

Methods. A systematic review was carried out according to PRISMA guidelines. Three bibliographic databases were searched: MEDLINE, Cochrane Library, and PEDro. The minimum prerequisites for papers to be included in the systematic review were that they had to (a) employ a randomized controlled trial; (b) be published in English; and (c) be published during the last ten years (2007–2017). The studies were evaluated according to Jadad score.

Results. Four studies were included. This systematic review suggests that a treatment that is more effective than all the others cannot be defined. This conclusion is related to the low number of investigated studies; therefore, the collected results cannot be generalized.

Conclusion. Chronic fatigue syndrome is not yet a well-understood pathology, and the physical mechanisms that influence the outcomes still need more study. Rehabilitation programs that promote physiotherapy techniques such as exercise, mobilization, and body awareness (e.g., MRT and GET) are the most effective in reducing medium and long-term fatigue severity in CFS patients. ***Clin Ter 2018; 169(4):e184-188. doi: 10.7417/CT.2018.2076***

Key words*: chronic fatigue syndrome, rehabilitation, physical therapy, rehabilitation program*

Introduction

Chronic fatigue syndrome (CFS), often called Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS), is a complex multisystem condition that is associated with a substantial impairment of pre-illness levels of activity and quality of life. Individuals with CFS have increased symptoms during and after various physiological challenges, such as physical exercise, orthostatic stress, and cognitive tasks (1).

Chronic fatigue syndrome is an illness characterized by persistent medically unexplained fatigue of more than six months' duration. Sufferers experience significant disability and distress that may be further exacerbated by a lack of understanding from others, including health professionals (2). Fatigue is accompanied by other complaints such as joint pain, poor concentration, and post exertion malaise, resulting in restrictions on participation in daily activities. According to the biopsychosocial model, these restrictions influence and can be influenced by personal and external factors and vary between patients, resulting in differences in clinical presentations of the syndrome.

Although increasing evidence suggests that central sensitization might be the explanation for many CFS symptoms, the exact etiology of the condition is unknown. This uncertainty combined with the heterogeneity of the clinical presentation has resulted in a lack of consensus concerning the definition of CFS. This lack of consensus is likely to be responsible for the variation in the estimates of the syndrome's prevalence, which range from 0.2% to 2.6% worldwide (3).

Fatigue is a common symptom in adults worldwide, being reported by around 20% of patients seeking medical care. Recent literature emphasizes that fatigue should be considered a multidimensional concept, incorporating both physical and mental fatigue. Due to its subjective nature, fatigue is difficult to objectively define and measure. If idiopathic chronic fatigue is accompanied by four or more of the following symptoms-unrefreshing sleep, lengthy malaise after exertion (lasting for over 24 hours), impaired memory or concentration, sore throat, tender cervical or axillary lymph nodes, muscle pain, multijoint pain without swelling or redness and headaches of a new type or severity—it is diagnosed as CFS according to the Centers for Disease Control (CDC) criteria. Muscle pain is the most common of these symptoms, affecting as many as 93% of CFS patients; however, chronic idiopathic pain, such as that occurring in CFS, is poorly understood (4).

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The prevalence of CFS has been reported to be between 0.2% and 2% in general population samples. Prevalence rates vary according to several factors such as the criteria used to diagnose

CFS. In terms of prognosis, a systematic review conducted by Cairns and Hotpof (5) found that full recovery from untreated CFS is rare. It is more common for patients to experience an improvement in symptom severity. CFS etiology remains unknown and is considered to be associated with a combination of several predisposing (e.g., genes), precipitating (e.g., life events), and perpetuating (e.g., physical inactivity) factors (5).

The aim of our systematic review is to investigate all the rehabilitation treatments available in the literature for managing Chronic Fatigue Syndrome with the highest efficacy in both physical and mental behavior through randomized controlled trials.

Materials and methods

Criteria for considering studies for this review Type of studies

For this review were considered only qualitatively significant studies. Therefore, only Randomized Control Trials (RCTs) were included, meaning only those studies that involve the random assignment of participants to two types of treatment, one experimental and one control. We included studies with any type of control group (other rehabilitation or intervention, specialist medical care, ..).

Type of participants

The study focused on patients suffering from Chronic Fatigue Syndrome. Those patients with comorbid conditions that could justify chronic fatigue as a result of other pathological conditions were not taken into consideration.

Types of interventions

The research has been oriented towards all possible physiotherapy treatments, carried out either individually or in a multidisciplinary team, aimed at mitigating the problem of fatigue and managing its multiple effects.

Search methods

A PRISMA checklist (6) was used to carry out the review. This work was developed through systematic review using a double-blind approach. Three electronic database were searched: MEDLINE, Cochrane Library, and PEDro. The bibliographical search was performed with a due date set to February 20, 2017.

The following keywords were used:

MEDLINE/Cochrane Library: "Fatigue Syndrome, Chronic"(Mesh); (treatment) OR (exercise) OR (pain) OR (rehabilitation) OR (physiotherapy) OR (treatment rehabilitation) OR (rehabilitation treatment) OR (physiotherapy treatment) OR (treatment physiotherapy); PEDro: "CFS" (MeSH).

Selection of studies

The minimal prerequisites for papers to be included in the systematic review were that they had to (a) employ a randomized controlled trial (RCT); (b) be published in English; and (c) be published during the last ten years (2007–2017).

Data extraction and risk of bias

The methodological quality of the studies was evaluated using the Jadad scale (7), by giving each article a score between 0 and 5 points. Two authors independently assessed the risk of bias of the included studies, and disagreements were resolved with the introduction of a third reviewer.

Data Items in the Included Studies

For each of the included studies, we analyzed the following items: sample size, mean age of participants, intervention, type and dosage of therapy for both the study and the control group, follow-up, outcomes, and Jadad score (Oxford Quality Scoring System).

Results

The total number of articles retrieved from MEDLINE, Cochrane, and PEDro was 5220.

Excluded and included studies

We excluded 4628 articles after reading the titles and abstracts, as they were not RCTs. Of the remaining 217 articles, only 18 were selected after reading the titles and abstracts. The reading of the full text of these papers further reduced the number of selected articles from 18 to only 4 (Fig. 1) after removing duplicates, and these four studies were all RCTs published in English language (Table 1).

Brett et al. (8) investigated 22 adolescents with CFS and randomly assigned them to a graded aerobic exercise program or a progressive resistance-training program for 5 days/week for 4 weeks. The authors found that in all the outcomes, including health-related quality of life (SF-36), exercise tolerance (minutes), heart rate (METs), fatigue severity (FSS), and depression (BDI), the progressive resistance training was as effective as the graded exercise therapy.

Vos-vromans et al. (3) selected 122 patients (mean age 40, range 18–59 years) and divided them into CBT (60) and MRT (62) treatment groups. They found that MRT was more effective in sustaining the decrease in fatigue severity and that patients were more satisfied with the results at 52 weeks compared to CBT patients, suggesting that the implementation of MRT in rehabilitation centers should be recommended. Self-efficacy, satisfaction with the results, and achievement of personal goals had increased more in the MRT group after follow-up at 26 and 52 weeks. However, there was no significant difference in the quality of life, fatigue severity, change in attention and awareness, functional impairment, physical and nonphysical attributions,

Table 1. Data Extraction

Author	Participant details	Interventions (SG)	Rates of treatment	Control group (CG)	Outcome measurement tools	Follow-up	Conclusions	Jadad score
Gordon, 2010 (8)	*N* = 22; SG = 11, CG = 11 Mean age: SG 15.6±1.6, CG 16.2±0.8	Resistance Training	NV	Aerobic training (GET)	Time of Fatigue, METs, Push-ups, Sit to Stand, SF-36, FSS, BDI	4 weeks	Resistance training is equally as effective as aerobic training (GET) for improving QoL, exercise tolerance, and fatigue severity.	3
Vos-Vromans 2016 (1)	*N* =113; SG = 57, CG = 56 M 21, F 92 Mean age: SG 39.9±10.1, CG 39.9±12.1 Duration of fatigue: SG < 60 months (35), >60 months (22) CG <60 months (34), >60 months (22)	Multidisciplinary rehabilitation treatment (MRT)	33 hours	Cognitive behavioral therapy (CBT)	CIS, PCS, and MCS (SF-36), SES, SCL-90,	4/14/26/52 weeks	MRT was more influenced by patients' expectancy than CBT in terms of severity of fatigue and HRQoL,	4
Vos-Vromans 2015 (3)	N = 122; SG = 62, CG = 60 M 25, F 97 Mean age: SG 40±10.2, CG 40.6±12.0 Duration of fatigue: SG < 60 months (38), >60 months (24) CG <60 months (35), >60 months (25)	Multidisciplinary rehabilitation treatment	33 hours	Cognitive behavioral therapy	CIS, PCS, and MCS (SF-36), SES, SCL-90, MAAS, SIP8, CAL, LSQ, PSCG	4/14/26/52 weeks	MRT is more effective in reducing long-term fatigue severity than CBT in CFS.	4
Nùñez 2011 (9)	*N* = 120; SG = 60, CG = 60 M 19, F 101 Mean age: SG 42.65±9.60, CG 44.27±10.76 Duration of fatigue: SG 32±2 months CG 33±2 months	Multidisciplinary rehabilitation treatment	13.5 hours	CFS therapy: exercise counseling and conventional PT	SF-36, HAQ, VAS, HADS, FIS	52 weeks	The combination of CBT and GET is ineffective, not evidence-based, and may be harmful in some patients.	3

GET: Graded exercise therapy ; BDI: Beck's Depression Inventory; CAL: Causal Attribution List; MCSSF-36: Measuring Impact Short form; M: male / F: female; SG: Study group / CG: Control group; PT: Physical Therapy; CSI: Checklist Individual Strength; LSQ: Life Satisfaction Questionnaire; CBT: Cognitive Behavioral Therapy ; PCS: Patient-Specific Complaints; PSCG: Patient-Specific Complaints and Goals questionnaire; MRT: Multidisciplinary rehabilitation treatment; SES: Self-Efficacy Scale; HAQ: Health Assessment Questionnaire; SF: Short form; SCL-90: Symptom Check List-90; VAS: Visual Analogue Scale; METs: metabolic equivalent ; MAAS: Mindfulness Attention Awareness Scale; HADS: Hospital Anxiety and Depression Scale; FSS: FatigueSeverityScale; SIP-8: Sickness Impact Profile-8; FIS: Fatigue Impact Scale

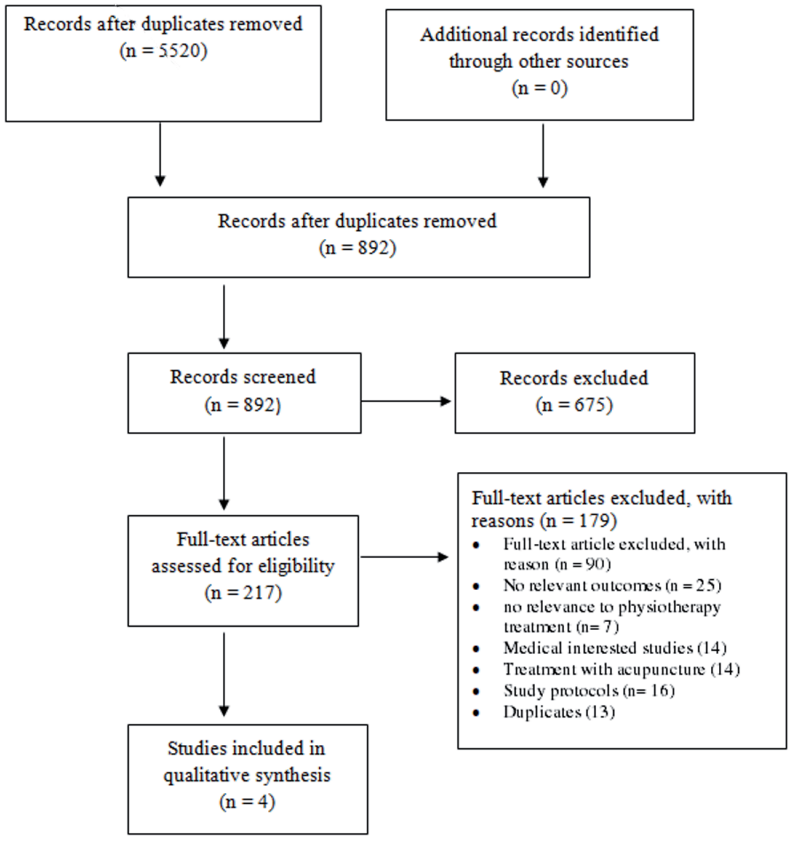

Fig. 1. Flow-chart

psychological symptoms, physical activity or satisfaction with life.

Vos-vromans et al. 2016 (1) split 113 patients into an MRT group (57) and a CBT group (56). CBT treatment was compared with multidisciplinary treatment (MT). After that MRT treatment included CBT and, depending on the individual analysis, elements of body awareness therapy, gradual reactivation, pacing, mindfulness, gradual normalization of sleep/wake rhythm, and social reintegration.

The researchers found it important to check the patients' expectancy and the credibility of the treatments in order to achieve the best results. In fact, the effect of expectancy on fatigue was significant for MRT, meaning that fatigue decreased by 1.52 points as expectancy increased by one point. The effect of expectancy on fatigue was not significant for CBT. On the other hand, credibility was not significantly different for the two groups.

Nùñez et al. 2011 (9) analyzed 120 patients and compared the Health-Related Quality of Life (HRQL) at 12 months of follow-up in CFS patients receiving group CBT, GET, and conventional pharmacological treatment (60) with those receiving only the usual treatment (60); the authors found no evidence that the intervention improved HRQL scores at 12 months.

Evaluation of the quality of the studies

The articles were analyzed using Jadad scores. Two articles had a Jadad score of three points (8,9), and two had a Jadad score of four points (1,3).

Discussion

CFS is not yet a well-understood pathology, and the physical mechanisms that can influence the outcomes still need more study. Given the huge number of articles with which this study started and the difficulty in retrieving the corresponding evidence, the search for scientific evidence in this review was not trivial. One problem was that several of the articles did not clearly specify the nature of the health-care professional who performed the treatment (e.g., a physical therapist). Various clinical interventions involving rehabilitation have been described in the literature. Bourke et al. (10) recently reported a parallel group randomized controlled trial of patients with CFS that tested the effects on pain symptoms of Adaptive Pacing Therapy (APT), Cognitive Behavioral Therapy (CBT), and Graded Exercise Therapy (GET), either alone or added to Specialist Medical Care (SMC). A pilot study by Keech et al. (11) found that aerobic exercise induced a sustained exacerbation of fatigue in patients with CFS but was not accompanied by corresponding changes in leukocyte gene expression.

Sandrler et al. (4) compared interval and continuous exercise programs and demonstrated that the exacerbation of CFS symptoms after interval exercise was not significantly greater than after a continuous bout. The authors concluded that the close similarity of the pattern and degree of exacerbation of fatigue after the two exercise types suggests that interval exercise should be explored as an alternative to continuous aerobic approaches, which are part of GET. Marques et al. (5) developed a protocol for a brief self-regulation-based physical activity program for patients suffering from unexplained chronic fatigue, the "4 steps to control your fatigue" (4. STEPS) program. In this intervention program, graded exercise and pacing are combined. Unfortunately, we could not include this article in our study because we have not been able to find the final paper in the literature.

Taking into consideration the most common symptoms that Chronic Fatigue Syndrome causes, we strongly believe that an accurate and conscious intervention performed by the physiotherapist can be significantly helpful as demonstrated by various studies among which we remember a recent epidemiological review concluded that physical activity can reduce fatigue and improve energy.

However, we must not forget that we are facing a widely unexplored field, besides the great symptomatological variability as well as the few certainties about endopathogenesis lead us to proceed carefully. Recently we have witnessed a debate supported by academics and patients regarding the effectiveness of the treatments submitted so far and the reliability of the studies conducted. (12) There are several patients who complain of a worsening of symptoms rather than an improvement with regards to the specific rehabilitative interventions, but we must not forget the strong subjective impact that affects the response to treatment.

We realize how delicate this moment is for Chronic Fatigue Syndrome research. The few studies available in literature, the low quality of the latter but at the same time the difficulty and sometimes the skepticism in correctly setting the diagnosis represent notable limits. For this reason, we hope that the research will go on first and foremost to clarify the biological mechanisms that underlie the CFS, and then will find the best possible strategies in the rehabilitation field and will allow all patients to claim back their role and their identity, which is deeply endangered because of this persistent fatigue making them disappear from their family life, social surroundings and work.

Limitations of the study

The number of samples was too limited for the generalization of the results and the number of studies found was not enough to give a proper picture of the treatments.

Conclusion

Rehabilitation treatment for CFS aims to improve and sustain the improvement of any limitations of normal daily life activities. It seems clear from the present review that, to reach this goal, physiotherapy is not enough. The CBT treatment is one of the most studied in the literature, and has shown good results in improving patients' autonomy in daily life activities and their control of symptoms. However, the need to identify the best outcome encouraged the researcher to include physical activity. Rehabilitation programs that promote physiotherapy techniques such as exercise, mobilization, and body awareness (e.g., MRT and GET) are the most effective in reducing medium and long-term fatigue severity in CFS patients. However, when we look

at all the outcomes, the best achievements come from the combinations of psychological treatment (CBT) and physiotherapy rehabilitation treatments (13,14). There are also other types of physical therapy that can improve functions (15,16,17). No evidence suggests that exercise therapy may worsen outcomes.

This systematic review suggests that a treatment that is more efficient than all the others cannot be defined. This conclusion is related to the low number of investigated studies; therefore, the collected results cannot be generalized. The differences among the outcomes measured in the four included studies do not allow a meta-analysis. However, a recommendation can be made that physical therapists should definitely perform and propose more clinical studies of a higher quality and evidence level, with the aim of building up a trustworthy arsenal of evidence-based interventions for people affected by chronic fatigue syndrome.

Competing interests

The authors declare that there are no competing interests regarding the publication of this paper.

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