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Effectiveness of a strength training program for patients with fibromyalgia syndrome: feasibility study

Eficácia do treinamento de força para pacientes com síndrome da fibromialgia: estudo de viabilidade

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Abstract

Introduction: Fibromyalgia is a disease characterized by chronic pain; it is a syndrome with an unknown cause and has no cure**. Objective:** Examine the feasibility of a strength training program in patients with FM. **Methods:** Forty-seven patients from general community were allocated into two groups: strength training group and control group. The patients underwent strength training performed three times per week for eight weeks. We used the Fibromyalgia Impact Questionnaire and Perceived Stress Scale to obtain data. **Results:** After eight weeks of strength training, there was a significant reduction in pain (p = 0.00) and stress (p = 0.02). No changes were found in the variables analyzed in the control group pre- and post-test. **Conclusions:** The practice of strength training is a safe and effective alternative for the treatment of fibromyalgia patients.

Keywords: Fibromyalgia; Physical exercise; Pain; Feasibility studies.

Resumo

Introdução: A fibromialgia é uma doença sem cura e de etiologia desconhecida, caracterizada por dor crônica. **Objetivo:** verificar a viabilidade de um programa de treinamento de força (TF) em pacientes com FM. **Métodos:** Quarenta e sete pacientes foram divididos em dois grupos: grupo TF e grupo de controle. Os pacientes submetidos ao TF realizaram o treinamento três vezes por semana, durante oito semanas. Para análise dos dados foram utilizados o Questionário de Impacto da Fibromialgia e a Escala de Estresse Percebido. **Resultados:** Após oito semanas de treinamento de força, houve uma redução significativa na dor (p = 0,00) e no estresse (p = 0,02). Não foram encontradas alterações nas variáveis analisadas no grupo controle pré e pós-teste. **Conclusões:** A prática do treinamento de força é uma alternativa segura e eficaz para o tratamento dos pacientes fibromialgia.

Descritores: Fibromialgia; Exercício físico; Dor; Estudo de viabilidade.

Introduction

Fibromyalgia (FM) is a debilitating disorder characterized by pain in the skeletal muscle, fatigue, decreased functionality, and other symptoms.[1,2] In 1990, the American College of Rheumatology (ACR) defined diagnostic criteria for FM presence as widespread pain on the left and right side, tenderness on pressure in at least 11 of 18 specified sites, and chronic pain for more than three months.[3] Because of difficulties with diagnosis, in 2010, the ACR set new criteria for the syndrome's diagnosis, which takes into consideration diffusing pain in addition to the more common symptoms, such as sleep disturbances, fatigue, morning stiffness, and depression.[1] Despite updating the guidelines for diagnosis, a gap still exists because it cannot distinguish FM with maximum accuracy from other diseases that are also characterized by chronic pain.[4] FM does not have a definite cause, and it is more frequent in women compared to men, affecting mainly those aged 55 to 84 years; it has a prevalence of 2.9% in Europe.[5,6]

Due to the widespread pain, people with FM have difficulties adhering to physical exercise programs,[7] even when they are recommended.[8,9] Studies involving walking indicated positive effects, such as improvement in pain, quality of life, sleep, self-efficacy, and mood.[10] Water-based physical exercises are also suggested to people with FM, as they promote muscle relaxation, reduction of muscle spasms, and pain reduction.[11] More recently, strength training (ST) is suggested as an FM treatment. ST was slow to become an alternative treatment[12] as it was believed it would increase symptoms, since the pain is manifested in the skeletal muscle.

The first studies reporting the effects of ST analyzed aerobic and strength, or flexibility and strength. Thus, few studies have investigated the isolated effect of ST on FM symptoms. However, these studies demonstrated benefits to practitioners, such as increased strength,[7,13] reduced pain sensation[13,14,15] and reduction of tender points.[16] The psychological variables apparently do not tend to change with ST;[7] nonetheless, it needs more studies[14]. For example, stress is a common symptom in patients with chronic pain;[17] however, it is not known whether it causes the pain or is a symptom of it. To investigate this, Ferreira et al.[18] studied 63 women (32 healthy FM and 31 controls) and realized that women with FM had higher stress levels compared to women without the disease.

The study of ST in people with FM in Brazil is a recent topic; it is considered as an innovative area, causing insecurity among professionals who assist these patients. Before starting, a randomized controlled trial is necessary to elaborate upon the protocol of ST, methods, tolerance and adherence to treatment.

Taking this into consideration, the study objective was to verify the feasibility of a ST program for patients with FM, analyzing the effects of ST practice on pain, stress, and the impact of FM on quality of life of patients.

Materials and methods

Forty-seven patients with clinical diagnoses of FM were recruited from March to April 2015. They were allocated into two groups according to availability of time and interest: Strength Training Group (STG) or Control Group (CG).

All patients participated in the extension program, "Psychology of sport and exercise applied to health," which is linked to the Psychology of Sport and Exercise Laboratory (LAPE) of the Health Sciences Centre and Sports (CEFID), Santa Catarina State University (UDESC). The criteria for inclusion in the study were have had a medical diagnosis by medical specialists in rheumatology, orthopedics or general practitioners, age over 18 years, be sedentary and participated in 50% of the training sessions. At the end of the screening of participants' process, 33 patients were excluded due to not having attended the initial interview or the initial evaluation, had practice the exercise

in other local areas, and declined to participate (personal problems and time limitations). At the end of the draw, there were seven patients in the STG and seven in the CG (Figure 1).

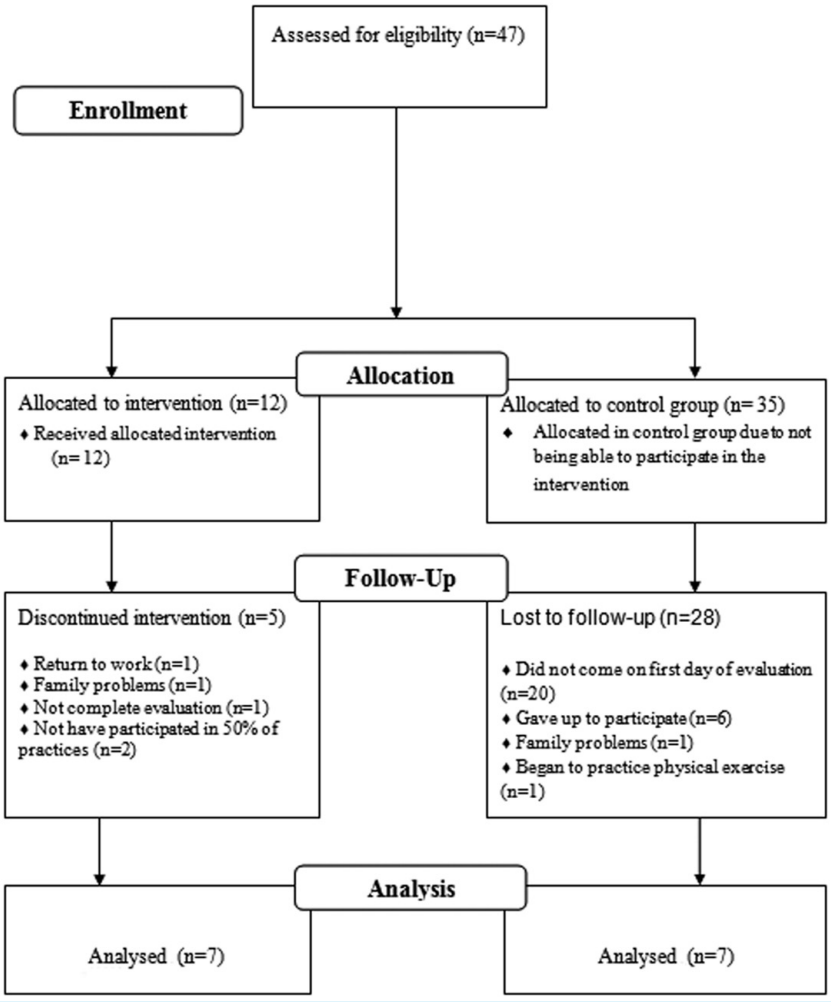

Figure 1: Diagram of patient flow

This feasibility study was a quasi-experimental controlled parallel group study, that followed the recommendations of the Transparent Reporting of Evaluations with Nonrandomized Designs[19], with assessment of outcomes at baseline and at post-intervention. This study was approved by the Ethics Committee for Research Involving Human Subjects, State University of Santa Catarina (UDESC; Reference No: 103/2010). An initial interview with interested patients was undertaken in which they were informed about the research, objectives, relevance, and procedures of the evaluations; anonymity in participation was also ensured. Those who agreed to participate as volunteers and who met the inclusion criteria signed the study's consent form. The patients were allocated to intervention or control group according to their interest and availability schedules.

Intervention

The ST program was performed three times per week, on non-consecutive days, for eight weeks with session duration of approximately one hour. The session took place at UDESC gym and was supervised by an experienced exercise physiologist or a physiotherapist. Each training session was preceded and followed by a 10-minute warm up and cool down involving stretching exercises. The training session consisted of the following exercises: knee extension, knee flexion, bench press, peck deck, adductor, low rowing, pull downs, high-pulley triceps extension, lateral raise, arm curl with dumbbells, standing calf raises, and abdominal crunches. The ST was initiated at 40% of one repetition maximum (RM) and progressed up to 85% during the 8 weeks. During the first and second weeks, patients performed two sets of 12 repetitions (40-60% of one RM). After the second week, patients were instructed to perform three sets of 8-12 RM (70-85% of 1 RM), as utilized in recent studies.[14,15] Patients had a 1-minute rest between sets. The weight and load increment was calculated based on the ratings of the perceived exertion analysis of each participant. The load was in-

creased when the patient performed three sets of 12 repetitions in the same exercise during the same week.

Patients who participated in the CG had not practiced exercises during the study period.

Outcome measures

Participants were assessed individually on the university's premises for approximately one hour by a trained researcher. The instruments used were the Fibromyalgia Impact Questionnaire (FIQ)[20] and Perceived Stress Scale[21] (PSS-14). The FIQ[20] was used to measure the quality of life and patient status. It has been designed to measure the components of health that are believed to be most affected by FM. FIQ comprises 20 items about work difficulty, pain, fatigue, morning tiredness, anxiety, depression and stiffness. High scores in FIQ indicate a greater impact of the syndrome on the patient. The PSS-14[21] is the most widely used psychological instrument for measuring the perception of stress. PSS-14 assessed the perception of stressful experiences over the previous month using a Likert scale. High scores suggested higher levels of perceived stress.

Statistical analysis

Data were analyzed via descriptive and inferential analyses. The Shapiro-Wilk test was performed to verify that the variables presented normal distribution. We used the Wilcoxon test to analyze the non-parametric distribution of data and Student's t-test to compare the normal distribution data. The significance level used was an alpha of 0.05 (95%; ps < 0.05).

Results

The average age of the STG was higher than the CG, 55.86 years (± 6.01) and 48.71 years (± 9.44), respectively. Of the 12 patients allocated to the intervention group, 5 discontinued the treatment; nonetheless, in no case the worsening of symptoms was cited as a reason (Figure 1). In the intervention period, there were no adverse events arising from the ST practice. Of the 14 study participants, 12 were female and 2 were male.

Table 1: Results of the intervention and control groups on pain, stress and impact of fibromyalgia on quality of life after 8 weeks [x (±)]

	Pretest	Post-test		Pretest	Post-test	
	Strength Training Group (n=7)			Control Group (n=7)		
Variable	x ±	x ±	p	x ±	x ±	p
Pain	8.84 (1.29)	6.27 (2,23)	0.00*	7.41 (2.04)	7.91 (1.80)	0.21
Stress	25.57 (5.76)	18.42 (5,41)	0.02*	29.14 (6.91)	31.85 (8.11)	0.24
FIQ Total	52.55 (2.68)	38.77 (11,60)	0.10	55.01 (21.94)	60.48 (16.85)	0.26
Functional capacity	2.61 (1.53)	1.21 (0,97)	0.05	3.00 (1.94)	3.60 (2.28)	0.41
Wellbeing	5.72 (2.92)	3.26 (2,29)	0.07	5.51 (3.54)	7.76 (1.39)	0.08
Work absences	3.06 (2.91)	1.83 (1,79)	0.25	2.24 (2.16)	1.83 (1.59)	0.65
Work capacity	6.85 (3.34)	5.31 (1,86)	0.12	7.68 (2.32)	6.51 (2.48)	0.07
Fadigue	6.75 (3.41)	5.24 (1,40)	0.28	7.38 (2.69)	7.37 (2.58)	0.97
tiredness morning	4.24 (3.50)	4.64 (2,87)	0.62	6.15 (3.93)	6.52 (3.93)	0.69
Stiffness	5.97 (3.63)	5.12 (2,83)	0.47	4.91 (4.14)	6.12 (2.87)	0.28
Anxiety	4.47 (3.78)	3.30 (2,69)	0.32	5.64 (2.46)	7.02 (2.73)	0.36
Depression	4.01 (4.41)	2.61 (2,27)	0.27	5.04 (2.97)	5.78 (2.71)	0.51

* Significant difference between pre- and post-test at p<0.05

After the intervention period, the patients in the STG experienced a significant decrease in their pain and stress levels. The CG showed no significant differences. Table 1 shows the results of the 8-week STG and CG on stress and pain, and the impact of FM on quality of life.

Discussion

FM is characterized by generalized and chronic musculoskeletal pain,[1] which is more

frequent in women than in men,[5] and this explains the reason for the high prevalence of women in FM studies.[9,13,22,23,] Regarding age, FM occurs primarily from 35 years, depending on the population studied,[5,6] while in Europe, the prevalence is between 55 to 84 years. In the present study, the mean age of participants was 56 years in the STG and 49 years in the CG. Similar age means were found in other studies.[14, 22,23]

Concerning the ST program for patients with FM, it has been proved that this program is feasible and tolerable, with no adverse effects. Regarding the effects of ST on pain and stress and the impact of FM on quality of life in patients, it is important to note that treatment through physical exercise is beneficial to improve FM symptoms.[10] It is common for people with the syndrome to be sedentary because of their chronic pain condition, which worsens symptoms. Thus, several studies that investigated the effects of stretching programs, water exercise, and aerobic exercises found positive effects on symptoms.[10,11] The study conducted by Steffens et al.[24] investigated the effects of walking exercises and yoga on the impact of FM on quality of life and stress. After 32 practice sessions, participants experienced significant improvements in the impact of FM on quality of life; however, for stress, there were no significant improvements. These findings differ from the present study in which improvements occurred for stress, but not regarding the the impact of FM quality of life. This can be explained by the greater number of sessions (32 sessions) in relation to this study (24 sessions), as well as by the difference of interventions, which caused different effects in the studied variables.

Strength training is also cited in the literature as a form of treatment;[12] however, this was slow to be accepted, because it was believed that the FM was caused by an injury in the muscles skeletal and ST would exacerbate the symptoms. This hypothesis has lost its strength, as several studies have shown that there is no morphological abnormality in muscle skeletal structure of patients with FM when compared to healthy people.[2] Another important fact is that patients with FM have lower levels of force,[25] which highlights the importance of the ST in this population. In this study, ST does not exacerbate pain, rather the participants who performed ST experienced a significant decrease in pain and stress. Other studies have also found positive effects on pain, FM impact on quality of life, strength, fatigue, depression, functional ability, anxiety, and so forth, after ST treatment.[13,22,26-27]

The main symptom of FM is pain; for this reason, many authors have investigated the effects that ST has on this symptom,[13,22,23,26,27] and positive results have been observed, with a significant decrease in pain. In the ST group, pain decreased significantly after eight weeks, from 8.84 (± 1.29) in the pre-test to 6.27 (± 2.23) in the post-test, while no significant differences were found for the CG. In a similar study conducted by Bircan et al.[22] patients participated in the 8-week intervention through ST undertaken three times per week, with each session lasting 40 minutes. The results were very positive. Among the variables studied, the pain improved significantly. In the study by Valkeinen et al.[13] the pain decreased significantly after 21 weeks of ST and, in the Hooten et al.[23] study, the pain subsided after only 3 weeks. We realized that the ST caused positive changes in pain with differences treatment times.

Stress in the STG decreased from 25.57 (± 5.76) to 18.42 (± 5.41) after eight weeks. These data show that it is possible to improve this symptom through ST; however, the literature is still scarce for studies that have also evaluated the influence of ST on stress in people with FM. More studies are needed to determine whether there is a relationship between pain reduction and stress reduction.

There were no significant differences on the impact of FM on quality of life after the intervention, despite a reduction of the impact on most of the evaluated components (functional capacity, wellness, work absences, ability to work, fatigue, stiffness, anxiety, and depression). In the CG, there were also no significant

differences. In the study by Kingsley et al.[12] after analyzing 15 women with FM who underwent 12 weeks of ST, no significant improvements in the impact of FM on the quality of life of patients were found. This was different from the results found by Jones et al.[26] and Kingsley et al.[16] In the first study, after 12 weeks of ST in 28 women with FM, there were significant improvements in the impact of FM on participants' quality of life. They trained twice per week for 60 minutes, which were fewer training sessions than that were used in this study in which participants performed three weekly training sessions. In the second study[16], nine women with FM were assessed. Over 12 weeks, they were subjected to two sessions of 30 min of daily practice. The reason STG had no significant improvement can be attributed to the small number of participants; conversely, in the study by Jones et al.[26] there were 28 women and, in the study conducted by Kingsley et al.[16] there were nine patients who underwent a 12-week intervention period.

The study had several limitations. One limitation is the low number of participants and that the allocation was not done randomly in groups. Another aspect is that this study was limited in investigating the effect of ST on variables of pain, stress and the impact of FM on quality of life for eight weeks. Nonetheless, these limitations do not prejudice our findings on the feasibility of ST program for patients with FM. Despite the positive response of training on pain and stress, more studies are necessary to assess participants for a longer period, and a larger number of participants are also needed. Further studies are needed to investigate stress in patients with FM, as this variable has a notable impact on the syndrome and limited studies have examined this so far. There is also a need to investigate the effect of ST on other common variables in FM, especially in psychological aspects, such as anxiety, depression and mood states. Regarding the impact of FM on quality of life, further studies are needed to reach a consensus.

Since ST for the treatment of symptoms of patients with FM is a recent alternative, studies that detail the training protocols are needed. Thus, this study presents a valid treatment option and can be used by physical therapists to alleviate the patient's symptoms. In clinical practice, the use of ST is feasible needing little recourse. If started with lighter load and then progressed depending on the tolerance level of the patient's, the ST can help relieve symptoms and provide health benefits in general. Another relevant factor is the autonomy that exercise training gives patients during treatment.

Conclusion

To conclude, ST is a feasible and tolerated treatment for patients with FM. A training protocol of ST is safe and effective in treating some symptoms in patients with FM. Moreover, a significant decrease in pain and stress after eight weeks of intervention was observed. The impact of FM on quality of life showed no statistically significant reduction in any of the groups. In the CG, there were no significant differences in the variables after eight weeks.

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Declaration of conflicting interests

None declared

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