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Effects of pompage associated with aerobic exercises on pain, fatigue, and sleep quality in female patients with fibromyalgia: a pilot study

Efeitos da pompage associada ao exercício aeróbico sobre dor, fadiga e qualidade do sono em mulheres com fibromialgia: um estudo piloto

Los efectos de la pompage con ejercicios aeróbicos en el dolor, fatiga y en la calidad de sueño de mujeres con fibromialgia: un estudio piloto

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ABSTRACT | Aiming at evaluating the effects of pompage as a complementary therapy to aerobic exercises and stretching on pain, fatigue, and sleep quality in women with fibromyalgia, 23 women with this diagnosis were allocated randomly in the groups: Experimental (EG, n = 13) and Control (CG, n = 10). Subsequently, they were assessed using McGill Pain Questionnaire, Chalder Fatigue Questionnaire, and Sleep Inventory. For 12 weeks, twice a week, the EG made pompage, aerobic exercises, and stretching, while the CG only aerobic exercises and stretching. Evaluation was repeated after 6 and 12 weeks. We had sample losses totaling 15 individuals (EG, n=7/CG, n=8). We used ANOVA for repeated measurements in the statistical analysis, followed by the T test for independent samples with significant differences (p≤0.05). There was a significant reduction of McGill Pain Questionnaire joint score after 12 weeks in the EG compared with CG. There were not significant changes in other aspects evaluated for pain, fatigue and sleep quality. Therefore, we suggest that pompage as a complementary therapy to aerobic exercises and stretching did not have beneficial effects on women with fibromyalgia, since there was improvement in only one aspect of the pain evaluated. Studies with larger samples are necessary for a more consistent analysis of the results investigated.

Keywords | Fibromyalgia; Musculoskeletal Manipulations; Exercise Therapy; Surveys and Questionnaires.

RESUMO | O objetivo da pesquisa foi avaliar os efeitos da *pompage* como terapia complementar a exercícios aeróbicos e de alongamento sobre dor, fadiga e qualidade do sono em mulheres com fibromialgia. Para isso, 23 mulheres com esse diagnóstico foram alocadas aleatoriamente nos grupos: Experimental (GE, n = 13) e Controle (GC, n=10), e em seguida foram avaliadas através do Questionário McGill de Dor, Questionário de Fadiga de Chalder e Inventário do Sono. Durante 12 semanas, duas vezes por semana, o GE realizou *pompage,* exercícios aeróbicos e alongamentos, enquanto o GC fez apenas exercícios aeróbicos e alongamentos. A avaliação foi repetida após 6 e 12 semanas. Ocorreram perdas amostrais, resultando em 15 indivíduos (GE, n=7/GC, n=8). Na análise estatística, utilizou-se ANOVA para medidas repetidas, seguido do teste *t* para amostras independentes em que houve diferença significativa (p≤0,05). Houve redução significativa do escore da dimensão mista do Questionário McGill de Dor após 12 semanas no GE comparado ao GC. Nos outros aspectos avaliados de dor, fadiga e qualidade do sono, não foram observadas alterações significativas. Assim, sugere-se que a *pompage* como terapia complementar a exercícios aeróbicos e de alongamento

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não apresentou efeitos benéficos importantes para mulheres com fibromialgia, uma vez que houve melhora em apenas uma das dimensões de dor avaliadas. Estudos com amostras maiores são necessários para uma análise mais consistente dos desfechos investigados.

Descritores | Fibromialgia; Manipulações Musculoesqueléticas; Terapia por Exercício; Inquéritos e Questionários.

RESUMEN | Para evaluar los efectos de la *pompage* como terapia complementaria a los ejercicios aeróbicos y de estiramiento en el dolor, fatiga y en la calidad de sueño de mujeres con fibromialgia (MF), se dividieron veintitrés mujeres con este diagnóstico en grupos al alzar: Grupo Experimental (GE, n = 13) y Grupo Control (GC, n = 10). Después les aplicaron el Cuestionario de dolor McGill, el Cuestionario de fatiga de Chalder y el Inventario del sueño. Durante 12 semanas, dos veces a la semana, el GE hizo *pompage,* ejercicios aeróbicos y estiramientos, mientras que el GC solo hizo ejercicios aeróbicos y estiramientos. Se repitió la evaluación después de 6 y 12 semanas. La cantidad de participantes redujo para 15 (GE, n = 7, GC, n = 8). En el análisis estadístico se empeló la ANOVA para medidas iguales, la prueba t para las muestras independientes, en las cuales presentaron diferencias significantes ($p \leq 0,05$). En la puntuación de dimensión mixta del Cuestionario de dolor McGill tras 12 semanas presentó reducción significativa en el GE comparado al GC. En los demás ítems evaluados, dolor, fatiga y calidad de sueño, no se observaron diferencias significantes. Así que la *pompage* como terapia complementaria a ejercicios aeróbicos y de estiramiento no presentó efectos relevantes en mujeres con FM, debido a que solamente uno de los ítems de dolor evaluados ha presentado mejora. Son necesarios estudios con muestras más grandes para un análisis más detenido de los ítems evaluados.

Palabras clave | Fibromialgia; Manipulaciones Musculoesqueléticas; Terapia por Ejercicio; Encuestas y Cuestionarios.

INTRODUCTION

Fibromyalgia (FM) is a syndrome characterized by chronic widespread pain that affects 0.6-4.4% of the world's population[1] and 2.5% of the Brazilian population[2], mostly women between 20 and 55 years old[3]. Besides pain, its main symptoms are fatigue and sleep disorders[4,5].

The main hypotheses on etiopathogenesis of FM associates it with central sensitization, dysfunction of the neuroendocrine system, and generalized fascial inflammation[6,7].

FM is a complex disorder and its treatment requires a multidisciplinary approach, combining pharmacological and non-pharmacological measures[8,9], among which is aerobic exercise (AE). It acts on pain perception, triggering the release of endorphins, and increases resistance to fatigue, developing the skeletal muscle metabolism. Thus, it is a useful tool for the FM treatment[7-10]. Stretching exercises also have shown beneficial effects, e.g., improvements in sleep quality and morning stiffness[8]. FM patients, however, have many difficulties to adapt to these exercises[7-10].

Based on the evidence for fascial dysfunction in FM associated with central sensitization[6], pompage emerges as a technique of manual therapy that can reduce the FM effects. It consists of a fascial mobilization that improves local blood circulation and tissue nourishment, helping thus to reduce pain[11,12]. There are, however, few studies on this approach, making it necessary research that provide evidence of its effects and mechanisms of action, especially in individuals with FM[11,12].

Studies show a relationship between pain, fatigue, and sleep quality: the greater the pain and fatigue, the worse the sleep quality and vice versa[13,14]. Therefore, pompage with stretching exercises and AE may have an indirect effect on fatigue and sleep quality.

In this context, it seems appropriate to sustain the hypothesis that the association between pompage, AE, and stretching exercises may lead to beneficial effects on the muscle fascia and on the central mechanisms of pain control, contributing to the FM treatment. Therefore, this article aims at evaluating pompage effects as a complementary treatment to AE and stretching exercises on pain, fatigue, and sleep quality in women with FM.

METHODOLOGY

Sample

Women were recruited from the physical therapy clinic of a public hospital and from a clinic-school of a private university in Recife, Pernambuco, Brazil. The volunteers – aged between 18 and 60 years – should be

diagnosed with FM and approved by a cardiologist to practice physical activities.

The exclusion criteria were: pregnancy, undergoing another physiotherapeutic treatment, regular practice of physical activities (assessed using the International Physical Activity Questionnaire-IPAQ)[15], and cognitive disability or other musculoskeletal disorders that would hinder the realization of proposed activities.

Triage was made through patient lists and phone calls. Patients who met the eligibility criteria were allocated randomly in the experimental group (EG) and in the control group (CG). Randomization was made using a computer software, by a research assistant not involved in the study.

STUDY DESIGN

Controlled, randomized pilot study with allocation concealment and examiner masking. The survey took place between July 2011 and June 2013, was approved by the Research Ethics Committee of UFPE, protocol 050/2011, CAAE: 0032.0.172.000-11. After signing an informed consent term, the volunteers participated in an initial assessment (IA).

Data gathering

During IA anthropometric and clinical data were collected, followed by the tools described below.

The pain was assessed through the McGill Pain Questionnaire, adapted to Portuguese by Pimenta and Teixeira in 1996[16], composed of 78 words used to describe the sensory, affective, evaluative, and mixed aspects of pain. Patients were instructed to choose the words that better described their pain. The sum of these resulted in the Pain Rating Index (PRI), in which the higher the score, the greater the pain.

The Chalder Fatigue Questionnaire (validated for Brazil by Cho et al. in 2007)[17] was used to assess fatigue. It is composed of 14 items that generates a final score ranging from 14 to 56 points. Higher scores are related to the existence of fatigue[10,17].

To assess sleep quality we applied the Sleep Inventory (translated and adapted to Portuguese)[10], which is composed of 30 items, resulting in a global score. Higher scores corresponded to better sleep quality[10].

The same tools were applied after 6 weeks (RV1) and 12 weeks (RV2).

Protocol

For 12 weeks were attended two times a week at the physical therapy clinic (Hospital das Clínicas/UFPE), where the EG has undergone pompage, stretching, and AE, while CG undergone stretching and AE.

Global, lymphatic, upper trapezius, torso, lumbar, and quadriceps pompage were applied (5 repetitions maintaining tension for 15 seconds (s) and 10 second intervals[11]).

Patients underwent passive stretching of the hamstring and quadriceps femoris muscles, and active stretching of the anterior and posterior trunk muscles and the triceps surae muscles (two repetitions during 30 seconds and a 10 second interval).

AE was conducted on exercise bicycle (Ergo-FIT ®, Ergo 167 Cycle), at 50-60% of maximum heart rate[18], monitored with a frequency meter (Speedo Model 38). During the first week, 2 periods of 10 minutes (min) were performed with 5 min interval and initial load of 15 watts (W). In the three following weeks, 2 periods of 15 min, with the same interval, increasing initial load every week: 15W, 20W, and 25W. From the fifth week on, workload remained 25W in a single period of 30 min[19].

We did not require patients to stop using or change the medicines they were taking.

Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) v. 18.0. To analyze categorical data, we used Pearson's Chi-square test and Fisher's exact test. We verified normal distribution of continuous variables using Shapiro-Wilk test and then analysis of variance for repeated measures (ANOVA 2x3), comparing the main effects: time-interaction (AV, RV1, and RV2), time-group and group (EG and CG), and as post-hoc we used the T test for independent samples. A significance level of $p \leq 0.05$ was adopted.

RESULTS

In Figure 1 we have the sample flowchart. 47 women were contacted during the triage, but only 23 of them met the eligibility criteria, being randomly put in EG (n = 13) and CG (n = 10). There were sample losses during the study (15 patients).

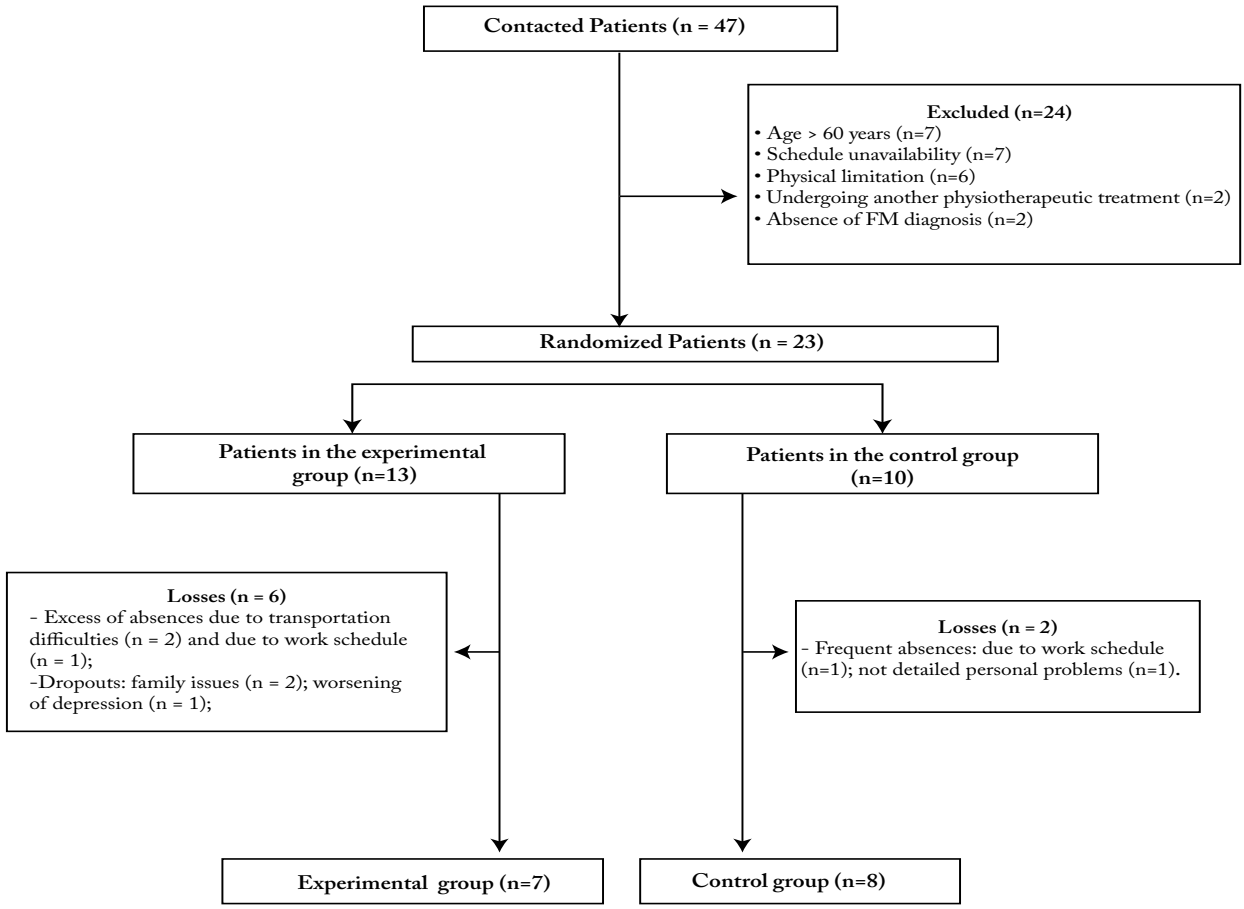

Figure 1. Sample flow chart

The sample characterization – anthropometric and clinical data obtained on initial assessment – is shown in Table 1. There was no statistical difference.

Table 2 presents average scores obtained in pain, fatigue, and sleep assessments (AV, RV1, and RV2). Table 3 has ANOVA results for these data. In the analysis of pain, when comparing PRI averages and the sensory, affective, and evaluative aspects in the three moments of assessment, no significant change was verified. There were significant differences, however, for mixed aspects in time × group analysis (ANOVA, p = 0.006) and in the post-hoc (independent samples t-test, p = 0.028), indicating that the EG presented significantly lower scores than the CG after 12 weeks (RV2).

The results regarding fatigue and sleep quality did not have significant differences.

Table 1. Sample characterization at first assessment

Variables	EG	CG	*p* value
Age (average in years±SD)	44.86±6.56	44.75±13.44	0.985[a]
Body mass index (BMI) (kg/m^2±SD)	27.87±1.24	27.42±7.09	0.866[a]
Time since diagnosis (n in percentage)			
≤ 1 year	1 (14.3)	0	0.431[b]
> 1 year and ≤ 3 years	0	1 (12.5)	
> 3 years and ≤ 5 years	4 (57.1)	3 (37.5)	
> 5 years	2 (28.6)	4 (50)	
Use of medicines (n in percentage)			
Analgesic	3 (42.9)	2 (25)	0.427[c]
Myorelaxant	5 (71.4)	2 (25)	0.1[c]
Anxiolytic	2 (28.6)	3 (37.5)	0.573[c]
Antidepressant	4 (57.1)	5 (62.5)	0.622[c]

[a] Independent samples t-test; [b] Pearson's Chi-square test; [c] Fisher's exact test; EG: experimental group; CG: control group

Table 2. Scores from McGill Pain Questionnaire, Chalder Fatigue Scale, and Sleep Inventory (mean±standard deviation) of Experimental Group (EG) and Control Group (CG) prior to intervention (PI), after 6 weeks (RV1) and after 12 weeks (RV2)

Variables	EG (n = 7)			CG (n = 8)		
	PI	RV1	RV2	PI	RV1	RV2
Pain						
PRI	34.42±8.3	35.42±10.32	32.57±11.25	37.75±3.49	37.25±10.71	40.37±13.21
Aspects						
Sensory	17.85±4.52	20.14±4.52	18.28±6.21	20.25±3.65	19.75±7.08	21.62±7.2
Affective	6.85±1.57	6.57±2.69	6.14±3.23	7.87±1.8	6.62±2.44	7.25±2.18
Evaluative	3±1.63	2.85±1.57	3±1.15	3.37±1.4	3.12±1.12	2.5±1.19
Mixed	6.71±2.69	5.85±3.23	5.14±2.6*	6.12±1.55	7.75±3.69	9±3.33*
Fatigue						
Global score	41.71±7.27	39±8.75	39.85±7.75	41.62±7.9	41.5±4.37	42.62±4.92
Sleep						
Global scorel	4.53±0.99	4.47±1.26	4.71±1.35	4.21±0.79	4.26±0.93	3.97±1.02

PRI – Pain rating index. *Significant difference ($p < 0.05$)

Table 3. Result of repeated measures ANOVA for pain, fatigue, and sleep

Pain	d.f	F	p	pη2
PRI				
Time	2	0,012	0,988	0,001
Time × group	2	0,791	0,494	0,057
Group	1	0,991	0,338	0,071
Sensory pain				
Time	2	0,194	0,825	0,015
Time × group	2	0,679	0,516	0,050
Group	1	0,671	0,446	0,045
Affective pain				
Time	2	0,951	0,399	0,068
Time × group	2	0,465	0,633	0,035
Group	1	0,517	0,485	0,038
Evaluative pain				
Time	2	0,717	0,497	0,052
Time × group	2	0,851	0,439	0,061
Group	1	0,007	0,934	0,038
Mixed pain				
Time	2	0,543	0,587	0,040
Time × group	2	6,279	0,006*	0,326
Group	1	1,652	0,221	0,113
Fatigue (global score)				
Time	2	0,360	0,701	0,027
Time × group	2	0,422	0,660	0,031
Group	1	0,332	0,574	0,025
Sleep (global score)				
Time	2	0,012	0,988	0,001
Time × group	2	1,015	0,376	0,072
Group	1	0,701	0,418	0,051

PRI – Pain Rating Index

DISCUSSION

Pain, fatigue, and sleep disorders are the main FM symptoms. In this syndrome pain loses its alarm function and becomes the main problem, affecting the individual's performance of professional and everyday activities, in addition of interpersonal relationships, with high socioeconomic costs[8,14].

Pain is a multidimensional and subjective experience; therefore, the McGill Questionnaire is an important evaluation tool, for it evaluates pain quantitative and qualitatively. Initially the questionnaire words were organized in three groups (sensory, affective, and evaluative), however another group of words had to be added to describe mixed aspects of pain, representing the sum of the other aspects[16].

In our study, adding pompage to therapy with stretching exercises and AE for 12 weeks improved only one of the pain aspects evaluated by the McGill Questionnaire (mixed aspects of pain) and for PRI no significant difference was found. The easy understanding of the words of mixed aspects may have collaborated to this, while the lack of familiarity with the words of the other aspects of the questionnaire may have made difficult choosing the most appropriate word, compromising evaluation[20].

AE beneficial effects on pain and FM are already well described in the literature[21]. However, lack of research on pompage do not allow so far to determine whether this method contribute to control this symptom. We only found in the literature Rocha et al.[12] publication, a case report of pompage use in the FM treatment, and which reports pain reduction. The authors, however, have combined pompage with hydrotherapy and stretching, not being thus possible to identify the effects of each method.

Although pompage is not widely studied, other manual therapy techniques that manipulate the fascia have been used in the FM treatment, e.g., Brattberg[22] and Castro-Sanchéz et al.[23] who used connective tissue massage and myofascial release and observed reduction of pain, evaluated by the visual analogue scale.

Our study's protocol had no significant results on fatigue. According to Bandak et al.[24], patients with FM have a higher sense of fatigue than objective signs, concluding that this symptom has more likely a central than peripheral source. Based on this observation, one may infer that in our study the pompage effects on muscle fascia were not sufficient to act on central mechanisms of fatigue and to promote recovery. Moreover, it is worth mentioning the scarcity of studies on the effects of manual therapy techniques on fatigue in patients with FM, making the comparison of our findings more difficult.

Sleep quality has been reported as one of the factors that most affect pain and fatigue[13,14]. There is evidence that in these patients, besides serotonin and growth hormone deficiency the fourth stage of sleep is affected, which participates in the recovery of muscle micro-trauma[5,14].

After the proposed treatment, we found no significant change on sleep quality. This result was similar to Brattberg[22] findings using connective tissue massage. Results, however, were different from Castro-Sanchéz et al.[23], who improved sleep quality through myofascial release. This fact may be justified by the longer duration of the protocol compared to the our study and by differences in manual therapy technique employed, e.g., regions of manipulation and depth of manipulated tissue.

It is necessary to point out some limitations in our study: small sample size, which may have been insufficient to detect significant differences among the groups; high sample loss, although for reasons not related to the protocol, e.g., transport difficulties, schedule incompatibility, and family issues; volubility of FM symptoms and comorbidities, whose intensity may vary by day and location[14], possibly compromising assessment; interference of psychosocial and hormonal factors and use of medicines, which were not monitored.

CONCLUSION

Pompage associated with stretching exercises and AE for 12 weeks in treatment for FM showed no significant benefits, since only one of the dimensions of pain evaluated improved and had no effect on fatigue and sleep. Further research is needed, however, for a more consistent analysis of our study results.

Therefore, we suggest that clinical trial using the proposed protocol with a larger sample, controlling causes of sampling bias, may find more significant results, and generate thus more evidence for the use of pompage associated with physical exercises in the treatment for FM.

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