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ORIGINAL

VIBRATORY EXERCISE TRAINING EFFECTS ON WEIGHT IN SEDENTARY WOMEN WITH FIBROMYALGIA

EFECTO DE UN ENTRENAMIENTO VIBRATORIO SOBRE EL PESO EN MUJERES SEDENTARIAS CON FIBROMIALGIA

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ABSTRACT

The aim of this study was to study the effect of 12-week of Whole body vibration training (WBV) on the weight in people suffering by FM. Forty-one women diagnosed with FM with an average of 47 years (± 10.5) were randomized into a control group (n = 20) and WBV group (n = 21). WBV intervention consisted of 6 repetitions to 12.5 Hz over 3 sessions per week for 12 weeks. Weight was measured with a scale (Seca 710) and the degree of disability with the Fibromyalgia Impact Questionnaire. Following the completion of the program WBV have statistically significant differences in weight, with a treatment effect of 2.8%. In conclusion, this program could be useful for weight control in sedentary women with FM.

KEYWORDS: Fibromyalgia, weight, pain, vibration.

RESUMEN

El objetivo de este estudio fue estudiar el efecto de un entrenamiento de Vibración Mecánica de Cuerpo Completo (VMCC) de 12 semanas en el peso de personas con FM. Cuarenta y una mujeres diagnosticadas con FM de una media de 47 años (±10,5) fueron aleatorizadas en un grupo control (n= 20) y grupo VMCC (n=21). La intervención de VMCC consistió en 6 repeticiones a 12,5 Hz repartidas en 3 sesiones por semana durante 12 semanas. Se midió el peso con una balanza (Seca 710) y el grado de discapacidad con el Cuestionario de Impacto de Fibromialgia. Tras la realización del programa VMCC se han obtenido diferencias estadísticamente significativas en el peso, con un efecto del tratamiento del 2,8%. Como conclusión, el programa propuesto podría ser útil para el control de peso en mujeres sedentarias con FM.

PALABRAS CLAVES: Fibromialgia, peso, dolor, vibración.

INTRODUCTION

Obesity and excess weight are two of the main problems developed countries face [1]. To be more precise, in Spain, around 80% of females over 60 years old have obesity or excess weight problems (39.8 % excess weight; 40.8 % obesity) [2].

In the case of women suffering from Fibromyalgia (FM), a syndrome that involves chronic pain with a minimum duration of 3 months and hypersensitivity to pain in at least 11 of 18 trigger points [3], the prevalence of obesity is higher than in healthy people [4]. That is probably due to, amongst others, two factors: 1) the presence of continuous pain forces them to reduce their practice of sports and their overall mobility [5], 2) the pharmacological treatment usually prescribed

includes antidepressants [6] which may cause weight gain [7].

Traditional training such as running and aerobic exercise tends to cause pain to these patients [5], making it necessary to find training practices that are applicable, safe and effective in order to achieve an increment in the energy expenditure of these individuals and thus make it possible that they lose weight. In the last decade the study of the advantageous effects of Whole body vibration training (VMCC) has taken hold, following the publication of several papers in which, after applying a training based on VMCC, there have been improvements in the maximum consumption of oxygen [8], strength (9), balance [9] or bone mass [10].

As of today, in scientific literature only two papers have been published that evaluate the effects of a program based on VMCC in FM. Those programs have achieved improvements in the perceived pain and measured fatigue by way of a visual analogue scale [11] and dynamic balance [12].

At first glance, a VMCC training could be useful to increase the caloric expenditure of people suffering from FM for different reasons: 1) a previous study in another population found that with a VMCC therapy there can be weight loss (14); 2) in previous studies it was proven to be safe and applicable in FM (12, 13, 15); 3) it could increase the efficiency of the agonist-antagonist pair [13], which in previous studies has been affected in patients with FM, with the probable effect of delaying fatigue in exercises such as walking or reducing the "restless foot" sensation, and as a consequence those patients are able to resume exercises that they were forced to abandon due to fatigue (17, 18); 4) it increases the balance in this population due to a greater postural control brought about by a stimulation of the afferent mechanoreceptors of the sole of the foot [14], and as a consequence those patients are able to resume exercises that they were forced to abandon due to fear of falling and 4) during this type of training, the consumption of oxygen increases [8].

The goal of the study is to verify if a 12-week training is useful or not to control the weight of sedentary women with FM.

EQUIPMENT AND METHOD

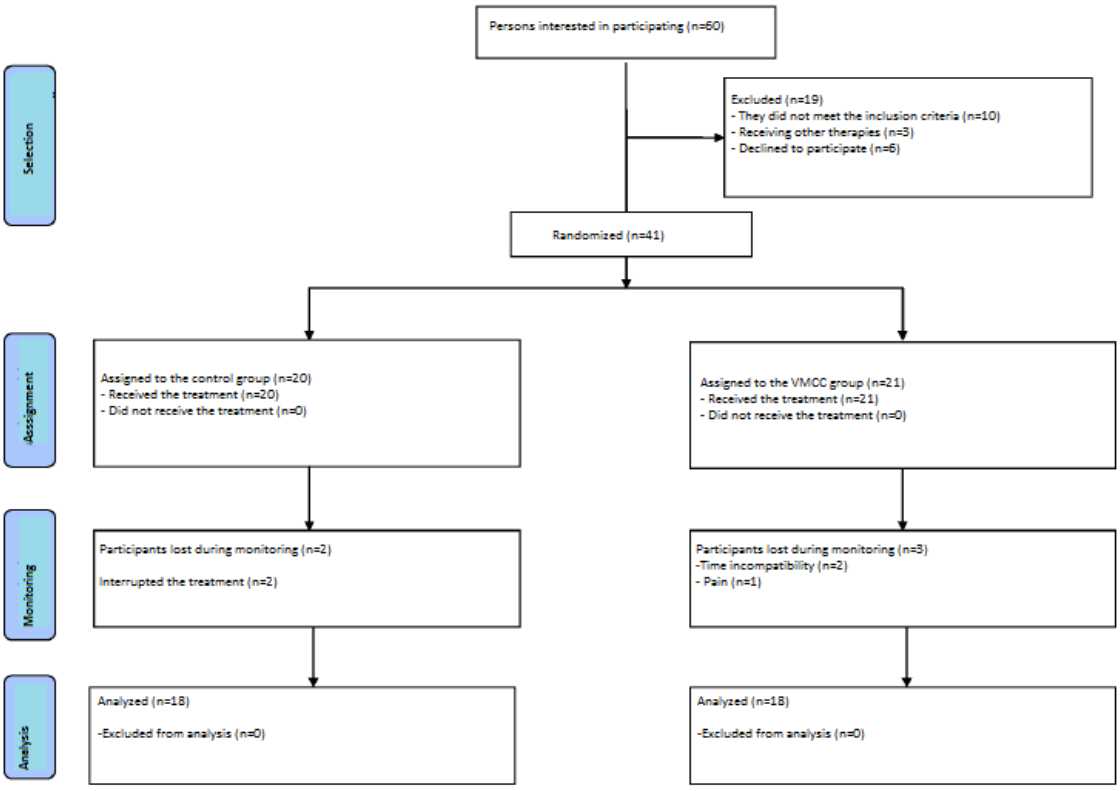
A randomized control trial registered with ISRCTN16950947 was performed. After verifying the inclusion and exclusion criteria, the 41 participants were assigned a number and by way of a randomized numbers table they were included in the vibration group (n = 21) or the control group (n = 20).

All women with FM from a local FM association were invited to participate in the study. In order to participate, they were required to have been diagnosed FM by a rheumatologist, according to the American College of Rheumatology diagnostic criteria (ACR) [3], at the time that the study was undertaken. The following exclusion criteria were also established: 1) having suffered a severe

trauma, 2) being pregnant, 3) inflammatory rheumatic diseases, 4) severe psychiatric illnesses, and any other illnesses for which physical burden is absolutely contraindicated, 5) the participation in another physical or psychological therapy program, or having done 30 minutes or more of regular physical exercise more than once a week in the last 5 years.

60 participants expressed interest for the study and demanded additional information (Diagram 1). Of those 60, 19 were excluded for the following reasons: 3 of them because they were taking part in other treatments (massages and psychological treatment) which could interact with the present treatment, 10 of them because they did not meet the inclusion criteria (other severe illnesses), and 6 of them because they lived too far away from the study center.

After having explained to them the protocol and the objectives of the study, the remaining 41 participants gave their informed consent in writing to take part in the study in accordance with the Helsinki Declaration and the Biomedical Ethics Committee of the University of Extremadura.



All participants received the standard treatment that included medical attention through the public health system (both hospital and outpatient, including primary care) and social support through the local FM association. The vibration group patients undertook as well a VMCC program with Galileo Fitness (Novotec Medical, Germany). This device is a VMCC tiltable platform that oscillates by its

middle axis.

Treatment included an initial session of 30 minutes in which participants were informed of the method to self-administer the vibration exercise.

Training consisted on 3 weekly sessions for a 12 week period. Each session included 10 warm-up minutes in which participants slowly walked and performed small movements, as well as 6 VMCC repetitions with a 12.5 Hz frequency, with a 60 seconds resting period between repetitions. The duration of each repetition was of 30 seconds the first month, 45 seconds the second month and 60 seconds the third month. Each time a repetition was performed, participants changed the forwarded leg, alternating between position A and B. The heels of the feet were in contact with the platform in both positions:

• Position A: feet placed perpendicularly to the axis of the platform's movement, with the right foot placed ahead of the left foot. The tip of the right foot and the heel of the left foot placed in the platform's 4mm mark. The knees bent in approximately a 45º angle. Back and head in a straight position.

• Position B: feet placed perpendicularly to the axis of the platform's movement, with the left foot placed ahead of the right foot. The tip of the left foot and the heel of the right foot placed in the platform's 4mm mark. The knees bent in approximately a 45º angle. Back and head in a straight position.

Each participant kept a register in which, after having completed each vibration exercise session, they wrote the date of the exercise and whether there had occurred any incidence. A person unrelated to the research team spoke via telephone with each participant once a week for 3 minutes in order to track the study, as well as to provide emotional support.

There was no monitoring of any of the participants' caloric intake. They were instructed to maintain their usual habits and to not follow a diet. They were also asked to let us know if any illnesses or setbacks arose that could affect their weight such as vomits, diarrhea, etc. During the 3 months the program lasted none of the participants informed of any problems. The study was performed during the months of October, November and December.

To evaluate weight a scale Seca 710® was used, previously calibrated (capacity: 200 kg; accuracy: 50 g) following the Council of Europe guidelines [15].

The FM degree of disability was measured with the Spanish version of the Fibromyalgia Impact Questionnaire, a reliable and valid questionnaire sensitive to changes used to quantify the health situation and physical functioning of FM patients [16].

Statistical analysis

After verifying that the variables assessed are normal, as well as the absence of significant differences between baseline groups, a Pearson's correlation was performed between weight and the Fibromyalgia Impact Questionnaire.

An intent analysis of treatment and effectiveness was made applying a repeated measures Anova in order to find significant differences between the control group and the VMCC group. Significance was established in $p < .05$.

RESULTS

Table 1 shows there were no statistically significant differences between the VMCC group and the control group in the baseline in the assessed parameters, and as a consequence both groups were comparable.

Table 1. Study participants' features (n=36)

Group	Control (n=18) (Average ± SD)	Exercise (n=18) (Average ± SD)	*P**
Age (years)	53.0 (12.0)	52.4 (10.8)	.860
Weight (kg)	70.83 (9.15)	72.08 (10.51)	.706
Height (cm)	156.0 (4.7)	156.4 (5)	.782
Number of trigger points (1-18)	15 (5)	15 (4)	.943
Duration of the symptons (years)	13.7 (6.2)	12.7 (6.7)	.672
Score in the Fibromyalgia Impact Questionnaire	56.7 (15.6)	58.8 (10.9)	.681

**P* of the T-Test statistical test
Significance was established at P < .05

The correlational analysis shows a positive association between weight and CIF in FM (table 2).

Table 2. Pearson's correlation between weight and the Fibromyalgia Impact Questionnaire (n= 41).

	Fibromyalgia Impact Questionnaire
Weight	.372 (*)

(*) The correlation is significant at a .05 level.

After the 12-week VMCC program finished significant differences have been obtained between weight, in the treatment intention analysis as well as in the efficiency analysis with an effect of the treatment of 2.25 % and 2.8 % respectively (table 3).

Table 3. Effects of the 12-week VMCC on the study participants' weight

Efficiency analysis	Baseline (Average ± SD)	Post-treatment (Average ± SD)	Effects of treatment (95% of the CI)	*P**
Control (n=18)	70.83 (9.15)	72.30 (9.91)		
Exercise (n=18)	72.08 (10.51)	71.56 (11.01)	1.99 (-0.14 at 3.25)	.027
Analysis per treatment intention				
Control (n=20)	70.94 (8.66)	72.39 (9.38)		
Exercise (n=21)	71.92 (9.70)	71.68 (10.16)	1.69 (-0.22 at 3.75)	.033

VMCC: Whole body vibration training; SD: Standard Deviation; CI: Confidence Interval.
**P* of the repeated measured analysis (ANOVA)

DISCUSSION

The present study's sample has an age, weight and height similar to those reported by other studies that analyzed the effects of a VMCC program (12, 15) in women with FM.

The main finding of this study lies in the fact that a VMCC training of 3 sessions for a period of 12 weeks may be effective to control or reduce weight in women with FM. Whereas participants in the control group increased in a significant manner their weight after the program, those who participated in the VMCC

group actually reduced their weight. The effects of the treatment on weight was 2.8 %, a number relatively high if we take into account the duration of the treatment as well as of the training sessions, and the fact that it wasn't accompanied by an hypocaloric diet. The weight increase in the control group may be accounted for by the higher caloric intake typical of Christmas holidays [17] during which the study finished.

This finding has several implications for this population at the physical and psychological levels, as a weight decrease in patients with FM is related to an improvement in the level of disability measured with the CIF [18] as well as to a decrease in the level of pain [19]. Also, the pain is positively correlated to depression, anxiety and worries about body image and negatively correlated with the quality of life related to health (25-27), factors which lead to think that reducing their weight would contribute to enhance those psychological parameters.

Moreover, we know that people with FM suffer more falls than healthy people, due amongst other things to a decrease in balance (13, 28, 29). In this regard, controlling or reducing the weight of that collective could help to maintain or enhance their balance, as excess weight is negatively correlated to this variable[20].

Another finding of the study is the relationship found between weight and the CIF, result in line with the data obtained in a previous research, in which a positive relationship was found between the body mass index (BMI) and the degree of disability in FM[21].

This pilot study suggests that VMCC might in the future be included in the recommendations of treatment by physical therapy for FM patients, alongside with other activities with demonstrated scientific evidence, such as aerobic exercise in hot water (32-34), yoga[22] or taichi (36).

Limitations

The main limitations were not to track the caloric intake of participants, or their informal physical activity outside the VMCC program. Furthermore, the progress of the participants' different body compartments wasn't tracked either, which in our opinion would have been extremely useful information. Weight loss is usually attributed mostly to the loss of fat mass, but this cannot be unequivocally stated. Another limitation is that due to the characteristics of the study it could not be made double-blind.

We need studies that add an hypocaloric diet to a therapy based on VMCC in order to analyze their effects and compare them to other more standardized physical activity therapies. It'd be interesting as well to analyze the evolution of the different body compartments after performing VMCC programs. We also need studies of longer duration to analyze the effects of VMCC programs in the long run.

CONCLUSION

To conclude, a low impact (12.5 Hz) Whole body vibration training program lasting 12 weeks could be useful for controlling weight in sedentary women with FM who participated in this study.

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