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Effects of the Fibroactívate program on physical fitness and disease impact in women with fibromyalgia: case report

Efectos del programa Fibroactívate sobre la aptitud física y el impacto de la enfermedad en mujeres con fibromialgia: reporte de casos

Efeitos do programa Fibroactívate sobre a aptidão física e o impacto da doença em mulheres com fibromialgia: relato de caso

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Abstract

Introduction: *Fibroactívate* is a physical exercise program designed for women with fibromyalgia, offering three levels of training (basic, intermediate, and advanced) while considering the patient's physical fitness and the impact of the disease.

Purpose: To evaluate the effects of a 12-week multicomponent intervention, based on the *Fibroactívate* program, on physical fitness and disease impact in women with fibromyalgia, delivered in two formats: in-person and hybrid.

Methodology: Five women participated in the in-person modality (mean age 49.4 ± 5.4 years) and three in the hybrid (mean age 53.6 ± 2.1 years). The in-person group attended two supervised sessions per week and followed home-based recommendations, while the hybrid group received weekly advisory sessions and home training plans. Physical fitness was assessed using the 30-second chair stand test, arm curl test, 8-foot up-and-go test, and 6-minute walk test. Disease impact was measured using the Fibromyalgia Impact Questionnaire (FIQ). Within-group changes were analyzed using paired t-tests or Wilcoxon signed-rank tests, and between-group differences were described.

Results: Both modalities showed improvements in lower and upper limb strength, cardiorespiratory capacity, and dynamic balance. A reduction in FIQ scores was observed in all participants, with a statistically significant decrease in the in-person group.

Conclusions: These findings suggest that *Fibroactívate* program, whether delivered in-person or in a hybrid format, may be beneficial for improving physical fitness and reducing disease impact in women with fibromyalgia.

Keywords: physical activity; rheumatic diseases; women's health

Resumen

Introducción: *Fibroactívate* es un programa de ejercicio físico para mujeres con fibromialgia, que ofrece tres niveles de entrenamiento (básico, intermedio y avanzado) considerando la aptitud física y el impacto de la enfermedad.

Objetivo: Evaluar los efectos de una intervención multicomponente de 12 semanas, basada en el programa *Fibroactívate*, sobre la aptitud física y el impacto de la enfermedad en mujeres con fibromialgia, aplicada en dos modalidades: presencial e híbrida.

Metodología: Participaron cinco mujeres en la modalidad presencial (49.4 ± 5.4 años) y tres en la modalidad híbrida (53.6 ± 2.1 años). En la modalidad presencial, las pacientes realizaron dos sesiones supervisadas por semana y siguieron pautas para ejercicios en casa. En la modalidad híbrida, asistieron a una sesión semanal de asesoría y recibieron un plan de entrenamiento para ejercicios en casa. La aptitud física se evaluó mediante el test de levantar y sentarse en 30 segundos, el test de curl de brazos, el test de 8-foot up-and-go y el test de marcha de 6 minutos. El impacto de la enfermedad se midió con el Cuestionario de Impacto de la Fibromialgia (FIQ). Se realizaron análisis dentro del grupo, mediante pruebas t pareadas o prueba de rangos con signo de Wilcoxon, y se describieron las diferencias entre grupos.

Resultados: Ambas modalidades mostraron mejoras en fuerza de las extremidades superiores e inferiores, la capacidad cardiorrespiratoria y el equilibrio dinámico. Se observó una reducción en los puntajes del FIQ en todas las participantes, siendo significativa en el grupo presencial.

Conclusiones: Estos hallazgos sugieren que el programa *Fibroactívate*, ya sea en formato presencial o híbrido, puede ser beneficioso para mejorar la aptitud física y reducir el impacto de la enfermedad en mujeres con fibromialgia.

Palabras clave: actividad física; enfermedades reumáticas; salud de la mujer

Resumo

Introdução: Fibroactívate é um programa de exercício físico para mulheres com fibromialgia, que oferece três níveis de treinamento (básico, intermediário e avançado) considerando a aptidão física e o impacto da doença.

Objetivo: Avaliar os efeitos de uma intervenção multicomponente de 12 semanas, baseada no programa Fibroactívate, sobre a aptidão física e o impacto da doença em mulheres com fibromialgia, aplicada em duas modalidades: presencial e híbrida.

Metodologia: Cinco mulheres participaram da modalidade presencial (49,4 ± 5,4 anos) e três da modalidade híbrida (53,6 ± 2,1 anos). Na modalidade presencial, as participantes realizaram duas sessões supervisionadas por semana e seguiram orientações para exercícios em casa. Na modalidade híbrida, participaram de uma sessão semanal de orientação e receberam um plano de exercícios domiciliares. A aptidão física foi avaliada pelo teste de levantar e sentar em 30 segundos, teste de flexão de braços, teste de 8-foot up-and-go e teste de caminhada de 6 minutos. O impacto da doença foi medido com o Questionário de Impacto da Fibromialgia (FIQ). Foram realizados análises intra-grupo por testes t pareados ou teste de postos com sinal de Wilcoxon, e as diferenças entre grupos foram descritas.

Resultados: Ambas as modalidades mostraram melhorias na força dos membros superiores e inferiores, capacidade cardiorrespiratória e equilíbrio dinâmico. Observou-se redução nos escores do FIQ em todas as participantes, sendo significativa no grupo presencial.

Conclusões: Estes achados sugerem que o programa Fibroactívate, seja em formato presencial ou híbrido, pode ser benéfico para melhorar a aptidão física e reduzir o impacto da doença em mulheres com fibromialgia.

Palavras-chave: atividade física; doenças reumáticas; saúde da mulher

Introduction

Fibromyalgia (FM) is a rheumatologic syndrome (Assumpção *et al*., 2018) whose etiopathogenesis remains unknown (Antunes *et al*., 2022). This condition affects approximately 2.1% of the world population and is more common in women between 35 and 60 years of age (Silva *et al*., 2019). According to Cabo-Meseguer *et al*. (2017), it is estimated that approximately 1% of women in Mexico suffer from this condition.

FM is characterized by persistent and widespread pain, along with fatigue (Berwick *et al*., 2022), anxiety, depression (Álvarez-Gallardo *et al*., 2019), joint stiffness (Tuta-Quintero *et al*., 2022), a high degree of impairment in physical fitness (Sochodolak *et al*., 2022), and quality of life (Galvez-Sánchez *et al*., 2020). To date, there is no definitive cure for FM. However, there are treatments available to alleviate the impact of symptoms (Latorre-Santiago & Torres-Lacomba, 2017). Pharmacological treatment represents the principal modality employed in the management of this condition (González & Merellano-Navarro, 2022). Nevertheless, Maffei (2020) has indicated that only a minority of these medications (approximately 25% to 40%) are capable of reducing pain. Consequently, the literature suggests that pharmacological treatment can be supplemented with non-pharmacological approaches (Bair & Krebs, 2020), such as sleep hygiene, cognitive-behavioral therapy (Kundakci *et al*., 2022), pain management, diet (Acosta-Carreño *et al*., 2022), and physical exercise (Vrouva *et al*., 2022).

Physical exercise is considered an indispensable component in the effective management of FM (Bair & Krebs, 2020). In a study by Couto *et al*. (2022), it was reported that aerobic exercise, strength training, and stretching have a positive effect on pain, depression, and quality of life in adults with FM. On the other hand, Chen *et al*. (2022) proposes that a combination of aerobic and strength exercise represents the optimal method to improve physical functionality in this population. Despite the existence of specialized services in Mexico to address this disease (nutrition, psychotherapy, rehabilitation, etc.), there is limited evidence regarding specific physical exercise programs for this population.

Hybrid training is defined as a training modality in which participants have the option to perform exercises both with and without supervision. For instance, it may include weekly supervision (Yang & Oh, 2013). This training modality offers several advantages, including a reduction in the use of material resources (Harden *et al*., 2012), more affordable services (Da Costa *et al*., 2005), and a decrease in the need for travel, particularly for patients with mobility limitations or limited access to

transportation (Serrat *et al*., 2022). Furthermore, as indicated by Tomas-Carus *et al*. (2019), hybrid training can yield outcomes comparable to those of in-person training in terms of disease impact. Hybrid training could constitute an effective strategy to improve exercise adherence in this population. This approach offers flexibility to make individualized adjustments based on symptomatic fluctuations and mobility limitations characteristic of this population, which could mitigate barriers related to transportation and symptom exacerbation.

Fibroactívate (Bañuelos-Terés & Enríquez-Reyna, 2023) is a multicomponent physical training program designed for individuals with FM. The program provides detailed guidelines for exercise prescription, including aerobic, strength, and flexibility exercises, tailored to the disease's impact and each patient's physical condition. Following an initial assessment of physical fitness and the impact of FM, patients are integrated into one of the three training subprograms offered by *Fibroactívate:* basic, intermediate, or advanced. Each of these subprograms present training guidelines based on the FITT principle (frequency, intensity, time, and type), as recommended by the American College of Sports Medicine (ACSM; Liguori *et al*., 2021). The aim of the study was to evaluate the effects of participation in the *Fibroactívate* multicomponent physical exercise program on eight Mexican women with FM, focusing on changes in physical fitness and disease impact.

Materials and methods

Participants. The present study proposed a case study design with descriptive-comparative explanatory scope. This design was considered appropriate due to the explanatory nature of the study, the small sample size, and the aim of understanding the effects and underlying mechanisms of a multicomponent intervention. Additionally, the limited existing evidence on hybrid exercise interventions for fibromyalgia in Mexico supported the use of a case study approach to provide contextualized insights and inform future research and practice.

The study population included Mexican women diagnosed with FM who resided in the metropolitan area of Monterrey City and who responded to an open call disseminated on social networks of the Faculty of Sports Organization at the Autonomous University of Nuevo León, in hospitals, on television, radio, as well as on other pages and/or groups associated with FM. Furthermore, invitations were sent to rheumatologists in person or via email. A snowball sampling technique based on participant preferences was employed to recruit a sample of women with FM. Following an 18-month data collection period (from February 2023 to July 2024), 30 participants initially began the

study, but only eight completed it (a dropout rate of 73.3%): five participants (mean age 49.4 ± 5.4 years) in the in-person modality and three participants (mean age 53.6 ± 2.1 years) in the hybrid modality (Table 1).

Table 1
Personal data of the participants

Case	Age	Weight (kg)	Height (m)	BMI (kg/m^2)	Time since diagnosis (years)	Occupation
1P	48	60.6	1.63	22.8	3	Working
2P	56	69.5	1.60	27.1	15	Housemaker
3P	43	64.9	1.55	27	5	Working
4P	46	68.3	1.60	26.6	18	Housemaker
5P	54	54.6	1.53	23.3	15	Housemaker
1H	56	56.1	1.51	24.6	6	Housemaker
2H	53	71.9	1.54	30.3	2	Working
3H	52	62.8	1.56	25.8	4	Working

Note. P= In-person modality; H= Hybrid modality; BMI=Body Mass Index.

Instruments. An *ad hoc* digital questionnaire was sent to participants through the Google Forms platform (Google, Mountain View, California, United States). The questionnaire required the participants to provide personal information, emergency contact details, medication information, and to indicate the time elapsed since their diagnosis. Furthermore, participants completed the Fibromyalgia Impact Questionnaire (FIQ) in order to assess the impact of the disease. The FIQ was utilized in its Spanish version, in accordance with the format proposed by Esteve-Vives *et al*. (2007), consisting of 10 items referring to the week prior to administration. In the study by Ceballos-Gurrola *et al*. (2024), the instrument demonstrated satisfactory reliability, with an alpha coefficient of .90. The first item comprises 10 sub-items assessing physical functionality using a four-point Likert scale, where 0 represents “always” and 3 represents “never”. The second and third items are 8-point numerical scales (0-7), reflecting the number of days the individual felt well and experienced difficulties in their activities, respectively. The fourth to tenth items request information regarding various symptoms associated with FM, which are assessed using visual analogue scales ranging from 0 to 10.

Once the data has been collected, it is necessary to recode it as follows: for the first item, the total sum of the 10 sub-items is calculated, then this sum is divided by the number of items responded to and multiplied by 3.33. For the second item, the value

is recoded to be consistent with the other items (where 7 becomes 0, 6 becomes 1, and so on) and multiplied by 1.43. The value reported in the third item is also multiplied by 1.43. Finally, from the fourth to tenth item, the values obtained on the visual scales are summed. Subsequently, the total of all the obtained values is calculated to yield the so-called FIQ index. The index ranges from 0 to 100, with 0 representing the optimal state and 100 representing the least optimal state (Monterde *et al*., 2004).

In addition, physical fitness was evaluated using four specific tests obtained from the Senior Fitness Test battery (Rikli & Jones, 1999), which have been used for this population. The initial test was the 30-second chair stand test, which measures lower body strength by counting the number of repetitions the patient can perform of standing up from a seated position within a 30-second period. Subsequently, the arm curl test was employed to evaluate upper body strength, quantified as the number of repetitions the individual could achieve in lifting a 5lb (2.26kg) dumbbell for 30 seconds. The 8-foot up & go test was then conducted to evaluate dynamic balance. This test involved recording the time taken by the patient to rise from a chair, traverse 8 feet (2.44 meters), go around a cone, and return to the initial position. considering the best time obtained in two attempts. Finally, the 6-minute walking test was carried out, with a view to assessing cardiorespiratory capacity, by recording the maximum distance covered in a period of six minutes (Álvarez-Gallardo *et al*., 2017).

As control variables, body weight was assessed using an OMRON® HBF-514C (Omron Healthcare, Kyoto, Japan) scale and height with a SECA® 2013(SECA, Hamburg, Germany) stadiometer. Furthermore, blood pressure was measured using a Welch Allyn aneroid sphygmomanometer (Welch Allyn, Skaneateles Falls, New York, United States) and a 3M™ Littmann® stethoscope (3M Company, St. Paul, Minnesota, United States), while resting heart rate was recorded using a Medimetrics® FS10A pulse oximeter (Medimetrics, Naucalpan, State of Mexico, Mexico). These measurements were taken by a trained professional administering the program at three time points: baseline (week 0), intermediate (week 8), and at the end of the intervention (week 13).

Procedures. The intervention consisted of a 12-week individualized multicomponent training program based on the *Fibroactívate* program (Bañuelos-Terés & Enríquez-Reyna, 2023). *Fibroactívate* proposes three levels or sub-programs of training: basic, intermediate, or advanced, which are determined based on the results obtained in the initial assessments (week 0) of each participant regarding the impact of FM and physical fitness tests. Each of these subprograms consists of specific guidelines for aerobic exercise, strength training, and stretching. These guidelines were developed based on

the FITT principle guidelines (Liguori *et al*., 2021) and a literature review (Bañuelos-Terés *et al*., 2022). Once the patients were assessed and assigned to one of the subprograms, they had the option to choose between two training modalities: in-person or hybrid.

In the in-person modality (P), participants attended the facilities of the Faculty of Sports Organization twice a week, focusing on strength exercises and stretching under the supervision of a trained professional in 60-minute training sessions. Furthermore, participants were given instructions regarding their weekly home training program, which included aerobic exercise and stretching. In contrast, in the hybrid modality (H), patients attended the facilities once a week for a counselling and follow-up session. During the counselling session, participants were provided with a weekly training plan covering aerobic exercise, strength training, and stretching, which they were instructed to perform at home. In both modalities, the training plan was supplied in printed format, accompanied by illustrative images of the recommended exercises. Moreover, access was facilitated to audiovisual material on the "*Fibroactívate Oficial*" YouTube channel (2022).

Table 2
Individualized physical exercise program per participant (1st-12th week)

Case	Subprogram	Aerobic exercise	Strength training
1P	Intermediate Advanced	F: 3 days/week. I: 3-5 RPE. T_m: 20-30min. T_p: walking in the park.	F: 2 days/week. I: 0-6 OMNI-RES. T_m: 8-9 exercises, 3-4 sets, 8-10 y 10-12 reps. T_p: bodyweight, dumbbells, suspension training.
2P	Basic	F: 2-3 days/week. I: 2-3 RPE. T_m: 10-30min. T_p: treadmill.	F: 2 days/week. I: 0-6 OMNI-RES. T_m: 8-9 exercises, 1-3 sets, 8-10 y 10-12 reps. T_p: bodyweight, dumbbells, fitball.
3P	Basic	F: 2-3 days/week. I: 2-4 RPE. T_m: 15-30min. T_p: walking in the park.	F: 2 days/week. I: 0-4 OMNI-RES. T_m: 8-9 exercises, 1-4 sets, 8-10 y 10-12 reps. T_p: bodyweight, dumbbells.
4P	Basic Intermediate	F: 2-3 days/week. I: 3-5 RPE. T_m: 15-35min. T_p: walking in the park.	F: 2 days/week. I: 2-4 OMNI-RES. T_m: 8-9 exercises, 1-4 sets, 8-10 y 10-12 reps. T_p: bodyweight, dumbbells.

Case	Subprogram	Aerobic exercise	Strength training
5P	Intermediate Advanced	F: 2-3 days/week. I: 3-5 RPE. T_m: 15-35min. T_p: walking in the park.	F: 2 days/week. I: 2-4 OMNI-RES. T_m: 8-9 exercises, 2-4 sets, 10-12 y 12-15 reps. T_p: bodyweight, dumbbells, suspension training.
1H	Basic	F: 2-3 days/week. I: 2-4 RPE. T_m: 10-30min. T_p: walking in the park.	F: 2 days/week. I: 0-4 OMNI-RES. T_m: 8-9 exercises, 1-4 sets, 8-10 reps. T_p: bodyweight, dumbbell.
2H	Basic	F: 2-3 days/week. I: 2-4 RPE. Tm: 15-30min. Tp: walking in the park.	F: 2 days/week. I: 0-4 OMNI-RES. T_m: 8-9 exercises, 1-4 sets, 8-10 reps. T_p: bodyweight, dumbbells.
3H	Basic Intermediate	F: 2-3 days/week. I: 3-5 RPE. Tm: 20-35min. Tp: bicycle.	F: 2 days/week. I: 0-4 OMNI-RES. T_m: 8-9 exercises, 1-4 sets, 8-10 reps. T_p: bodyweight, dumbbells.

Note. P= In-person modality; H= Hybrid modality; F= Frequency; I= Intensity; T_m= Time; T_p= Type; RPE= Rating of Perceived Exertion; OMNI-RES= OMNI-Resistance Exercise Scale; reps= repetitions; min= minutes.

Each session began with a warm-up consisting of 10 joint mobility exercises, with a total duration of 10 minutes. Following this, the primary focus of the session alternated between aerobic exercise and strength training, in accordance with the distribution of sessions established in the weekly plan. The dosage of this training was tailored to the type of subprogram and the specific symptoms of each patient (Table 2). It is noteworthy that the intensity of the aerobic training was monitored using the Borg CR-10 scale (Andrade *et al*., 2017), while the OMNI-RES scale was employed for strength training (Marín Mejía *et al*., 2019). Finally, the session was concluded with 10 stretching exercises, with 1-2 sets of 15-20 seconds each, as part of the cool-down.

Ethical considerations. The project was conducted in accordance with the principles established in the Declaration of Helsinki (World Medical Association, 2013) and was based on the Regulation of the General Health Law on Health Research in Mexico (Secretaría de Salud, 2014). The research protocol was registered with the Research Coordination of the Faculty of Sports Organization under registration number REPRIN-FOD-105 and was approved by the Research Ethics Committee of the same institution, with registration number CONBIOETICA-19-CEI-002-20220418. Prior to their participation, each individual was provided with a comprehensive informed consent

document that outlined the specific variables under investigation, the voluntary nature of their involvement, the potential risks and benefits associated with the training program, and the confidentiality of the data collected.

Statistical analysis. Descriptive statistics were computed using Microsoft Excel and IBM® SPSS 27.0. Data from two assessment time points (baseline [week 0] and post-intervention [week 13]) were analyzed. Continuous variables were expressed as mean ± standard deviation (SD) or median and interquartile range (IQR), depending on the distribution.

Normality of the differences between pre- and post-intervention scores was assessed using the Shapiro–Wilk test. For within-group comparisons, paired *t*-tests were used when the normality assumption was met, while the non-parametric Wilcoxon signed-rank test was applied otherwise. Statistical significance was set at $p < .05$ (two-tailed). Effect sizes were calculated for each within-group comparison: Cohen's d was used for the t-tests, and effect size r was computed for Wilcoxon tests ($r = Z / \sqrt{N}$). Negative values indicate the direction of change (e.g., improvement when lower scores represent better outcomes, as in FIQ or 8-foot up and go). Between-group differences in the magnitude of change from pre- to post-intervention were also reported for descriptive purposes.

Results

Impact of the disease

A reduction in the perceived impact of the disease was observed in all cases, with particularly notable improvements in case 5 from the in-person modality (Δ% = -80.9%) and case 2 from the hybrid modality (Δ% = -73.9%) (Table 3a). In contrast, case 3 from the hybrid modality exhibited a slight reduction (Δ% = -2%). At the group level, the in-person modality demonstrated a greater reduction in FIQ scores (Δ = –26.9 points) compared to the hybrid modality (Δ = –18.5 points), resulting a between-group difference of –8 points in favor of the in-person group. This reduction was statistically significant in the in-person group ($t(4) = 4.67$, $p = .010$) (Table 4).

Physical fitness

In the results of the 30-second chair stand test, a positive percentage increase in lower body strength was observed in all participants. Particularly marked gains were observed in case 3 (Δ% = 77.7%) and case 5 (Δ% = 69.2%) from the in-person group, and in case 2 (Δ% = 60%) from the hybrid group (Table 3). In the within-group analysis, the

in-person modality showed a greater increase in repetitions (Δ = 6.6) compared to the hybrid modality (Δ = +5), resulting in a between-group difference of +1.6 repetitions in favor of the in-person group (Table 4). This increase was statistically significant in the in-person group ($t(4) = -9.73$, $p < .001$).

Table 3
Results obtained in the assessments

Case	FIQ (pts)			CST (reps)			ACT (reps)		
	PRE	POST	Δ%	PRE	POST	Δ%	PRE	POST	Δ%
1P	56	44.6	-20.3	13	18	38.4	16	21	31.2
2P	41.1	11	-73.2	9	15	66.6	10	16	60
3P	61.3	39.1	-36.1	9	16	77.7	9	17	88.8
4P	48.7	24.3	-50	12	18	50	14	18	28.5
5P	57.5	11	-80.9	13	22	69.2	11	21	90.9
1H	75.1	48.5	-35.3	9	13	44.4	0	15	-
2H	37.9	9.8	-73.9	10	16	60	10	17	70
3H	45.9	44.9	-2	11	16	45.4	9	19	111.1

Note. P= In-person modality; H= Hybrid modality; Δ%= Percentage change; pts= points; reps: repetitions; secs= seconds; m= meters; FIQ= Fibromyalgia Impact Questionnaire; CST= 30-second chair stand test; ACT=Arm curl test.

Table 3
Results obtained in the assessments

Case	8FUGT (secs)			6MWT (m)		
	PRE	POST	Δ%	PRE	POST	Δ%
1P	5.2	4.7	-9.6	513.3	591.3	15.2
2P	7.1	5.4	-23.8	356.1	529.5	48.6
3P	7.2	4.8	-32.2	417	530.4	27.1
4P	5.3	4.4	-16.6	540	585	8.3
5P	4.8	3.8	-20.8	448.8	593.4	32.2
1H	7.7	5.7	-25.1	300.9	420.9	39.8
2H	5.9	4.4	-24.4	483.6	564	16.6
3H	6.2	5.1	-16.4	465.3	713.4	53.3

Note. P= In-person modality; H= Hybrid modality; Δ%= percentage change from PRE to POST; pts= points; reps= repetitions; secs= seconds; m= meters; 8FUGT= 8-foot up & go test; 6MWT= 6-min walk test.

Regarding upper body strength, as evaluated through the arm curl test, participants in case 3 (Δ% = 88.8%) and 5 (Δ% = 90.9%) from the in-person modality, and case 3 (Δ% = 111.1%) from the hybrid modality exhibited the highest percentages. It is pertinent to highlight that in case 1 of the hybrid modality, a percentage value was not provided, as the participant was unable to complete the test in week 0 due to the perception of pain while holding the 5-pound dumbbell. Nevertheless, it is important to note that she also demonstrated a positive change in this variable at the end of the study (Table 3).

Table 4
Within and between-group changes by intervention group

Variable	Group	PRE (Mean ± SD / Mdn [IQR])	POST (Mean ± SD / Mdn [IQR])	Δ%	*t* / *Z*	*p*-value (within)	Effect size	Between-group Δ (Post–Pre)
FIQ (pts)	In-person[1]	53 ± 8	15.6 ± 7	-70.6	4.67	.010	2.08	-8.42
	Hybrid[1]	53 ± 19.6	34.5 ± 21.4	-63	2.10	.170	1.21	
CST (reps)	In-person[1]	11 ± 2	17.8 ± 2.7	+61.8	-9.73	<.001	-4.35	+1.60
	Hybrid[2]	10 [9-NA]	16 [13-NA]	+60	-1.60	.109	0.92	
ACT (reps)	In-person[1]	12 ± 2.9	18.6 ± 2.3	+55	-6.12	.004	-2.74	-4.00
	Hybrid[1]	6 ± 5.5	17 ± 2	+183.3	-4.57	.045	-2.63	
8FUGT (secs)	In-person[1]	6 ± 1.1	4.7 ± 0.6	-21.7	3.87	.018	1.73	0.20
	Hybrid[1]	6.6 ± 1	5.1 ± 0.7	-22.7	5.53	.031	3.19	
6MWT (m)	In-person[2]	449 [386-527]	585 [530-592]	+30.2	-2.02	.109	-2.16	-38.62
	Hybrid[1]	416.6 ± 100.6	566.1 ± 146.3	+35.9	-2.95	.098	1.31	

Note.

[1] Paired t-test used after confirming normality of the difference scores.

[2] Wilcoxon signed-rank test used due to small sample size and/or non-normal distribution.

Each variable is presented according to its distribution: mean ± SD for normally distributed variables and median [IQR] for non-normally distributed ones.

Δ% = percentage change from PRE to POST; Δ (Post–Pre) = between-group difference in change from PRE to POST; Z = Wilcoxon statistic; *t* = Student's paired t-test statistic. NA = Not available due to very small sample size (*n* = 3).

Effect sizes are reported as *r* = Z / √N (for Wilcoxon tests) or Cohen's d (for paired t-tests).

In the within-group analysis, the hybrid modality showed a greater increase in repetitions (Δ = 10.6) than the in-person modality (Δ = 6.6), resulting in a between-group difference of 4 repetitions in favor of the hybrid group (Table 4). This increase was statistically significant in both the in-person ($t(4) = –6.12$, $p = .004$) and hybrid modalities ($t(2) = –4.57$, $p = .045$).

In relation to dynamic balance, the outcomes of the 8-foot up & go test indicate that a reduction was observed in all eight cases, suggesting an improvement in dynamic balance. It is notable that case 3 (Δ% = -32.2%) from the in-person modality exhibited the most pronounced change in this test (Table 3). In the within-group analysis, the hybrid modality showed a slightly greater reduction in time (Δ = –1.47) compared to the in-person modality (Δ = –1.27), with a between-group difference of –0.20 seconds favoring the hybrid group (Table 4). This reduction was statistically significant in both the in-person ($t(4) = 3.87$, $p = .018$) and hybrid groups ($t(2) = 5.53$, $p = .031$).

Finally, the results of the 6-minute walk test indicated positive percentage changes in all cases, suggesting an improvement in cardiorespiratory capacity. The most notable improvements were observed in case 2 (Δ% = +48.6%) from the in-person group and case 3 (Δ% = +53.3%) from the hybrid group (Table 3). In the within-group analysis, the hybrid modality showed a greater increase in distance walked (Δ = +149.5 m) than the in-person group (Δ = +110.8 m), resulting in a between-group difference of +38.7 m favoring the hybrid modality (Table 4). However, this improvement was not statistically significant in either group.

Discussion

The purpose of the study was to evaluate the effects of the multicomponent physical exercise program *Fibroactívate* on physical fitness and the impact of FM in two delivery modalities: hybrid (one counseling session) and in-person (two supervised training sessions). The results obtained indicate that participation in the *Fibroactívate* program contributed to improvements in physical fitness and reductions in the impact of the disease in both modalities.

In terms of the in-person modality, studies encompassing exercise programs of varying durations (ranging from four weeks to six months) and frequencies (two to five sessions per week) have documented significant improvements in the impact of the disease (Arakaki *et al*., 2021; Britto *et al*., 2020; Estrada-Marcén *et al*., 2023; Gómez-Hernández *et al*., 2020). Furthermore, improvements were observed in cardiorespiratory capacity assessed using the 6-minute walk test (Izquierdo-Alventosa

et al., 2020), muscle strength measured through 1-repetition maximum (1RM; Arakaki *et al*., 2021), and dynamic balance assessed using the 8-foot up & go test (Demir-Göçmen *et al*., 2013). Ceballos-Laita *et al*. (2020) reported that a 10-week therapeutic exercise program implemented in their study did produce changes in the impact of the disease; however, these did not reach statistical significance. In the present study, the 12-week in-person training was associated with improvements in both physical fitness and the impact of the disease, as observed through descriptive and within-group analyses.

Studies conducted in a hybrid modality in women with FM, with durations ranging from 15 weeks to six months and a frequency of two to five sessions per week, have reported significant improvements in the FIQ index (Gandhi *et al*., 2002; Hernando-Garijo *et al*., 2021; Salaffi *et al*., 2020) and in strength levels as reported with the arm curl test (Hernando-Garijo *et al*., 2021). In this instance, a period of 12 weeks was sufficient to achieve satisfactory results in physical fitness and the impact of FM.

The acquisition of the cases presented in this study involved an 18-month data collection period. Despite the dissemination of the call for participation across various media channels (television, radio, social media, healthcare centers, etc.), a larger number of participants completing the intervention was not achieved. Park *et al*. (2021) identified that the most effective recruitment strategy for this population is advertising in local newspapers. Similarly, the use of more cost-effective strategies, such as brochures, web ads, and social media, proved to be equally effective. Although clinical referrals remain a viable and low-cost strategy, their recruitment capability is limited. Additionally, the author highlights that recruiting this population for exercise-related studies has historically been challenging, which is consistent with the difficulties encountered in the present study.

Nonetheless, the high dropout rate among participants during the first few weeks of the study represents a significant limitation in the implementation of such programs. According to the responses obtained, the main causes of dropout were personal or family health issues, difficulties with transportation, and work commitments; in some cases, contact with participants was lost, which aligns with the findings reported by Masquelier & D'haeyere (2021).

During the intervention, some participants experienced exacerbations in localized pain symptoms or fatigue. Although the *Fibroactívate* program guide proved useful for initially classifying participants and prescribing the corresponding treatment, adaptations were made during training sessions (in-person modality) or advisory

sessions (hybrid modality) based on each participant's symptoms and responses. Consequently, it is of paramount importance for the exercise professional to be vigilant in monitoring symptoms and fluctuations in disease control, in order to implement the requisite adjustments to the scheduled training load.

Another important limitation of this study lies in the small sample size of each group (n = 5 and n = 3), which restricts the statistical power of the within-group analyses. While appropriate tests were selected based on distributional assumptions, the results should be interpreted with caution due to the high susceptibility to both false positives and false negatives.

For future research, it is recommended that the effectiveness of this program be evaluated in an online modality in order to increase the reach of this resource. Furthermore, it is recommended that various strategies be analyzed which enhance the interest of this population in participating in training programs, as well as strategies which promote adherence to these programs. In addition, future studies should aim to include larger and more balanced samples to improve the robustness of the statistical analyses and the generalizability of the findings. Larger samples would also allow for between-group comparisons and the use of more complex statistical models that account for individual variability.

Conclusion

The *Fibroactívate* program is regarded as a valuable instrument for guiding the prescription of exercise, particularly for individuals with FM. Participation in the program under the in-person modality was found to have a positive impact on physical fitness, including upper and lower body strength, dynamic balance, and cardiorespiratory capacity. Additionally, the program demonstrated a beneficial effect on the impact of the disease. Moreover, the hybrid training modality, which comprises one in-person counseling session, also proved beneficial in terms of the two aforementioned variables. Although the hybrid modality increases the reach of the program, it is essential for the professional to maintain constant supervision and make necessary program adaptations based on the continuous changes in symptomatology in these cases.

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Author´s Contribution Statement

Author 1: conceptualization, methodology, investigation, resources, writing-original draft, visualization, supervision, project administration, funding acquisition.

Author 2: conceptualization, methodology, formal analysis, investigation, resources, data curation, writing-original draft, visualization, supervision, project administration, funding acquisition.

Author 3: investigation, resources, writing-original draft, writing-review & editing, supervision.

Author 4: investigation, methodology, writing-original draft, writing-review & editing.

Author 5: investigation, methodology, writing-original draft ,writing-review & editing.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.