

EXERGAME AND FIBROMYALGIA: A NARRATIVE REVIEW ON THE THERAPEUTIC TOOL AND ITS EFFECTIVENESS IN THE TREATMENT OF FIBROMYALGIA

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Abstract: “Exergames” refers to virtual reality games that require bodily movement to play. They have recently been studied as a possible non-drug therapy for fibromyalgia, as they can help improve blood pressure, heart rate, oxygen consumption and energy expenditure, in addition to the psychotherapeutic impact of virtual reality. As fibromyalgia is a disease that negatively affects quality of life and is difficult to treat, exergames can be a useful therapeutic option, as they are easily accessible. This study aims to review the existing literature on the effectiveness of exergames in pain control in patients with fibromyalgia.

Keywords: Fibromyalgia, Electronic Movement Games, Treatment.

INTRODUCTION

Fibromyalgia (FM) is a musculoskeletal painful syndrome of chronic duration, in which alterations occur in the processing of afferent sensory centers, causing pain. It mainly presents widespread and persistent pain in the locomotor system and is associated with symptoms such as changes in balance and mobility, stiffness, depression, anxiety and decreased quality of sleep, leading to high levels of fatigue(1).

In Brazil, fibromyalgia is the second most frequent musculoskeletal disease, present between 2.0 and 5.5% of the population, being predominant in females, especially between 35 and 44 years old.(2,3).

It is often accompanied by other manifestations such as temporomandibular joint dysfunction, headache, chronic fatigue syndrome, functional intestinal disorders, mood disorders and cognitive impairment, having an important impact on the quality of life of patients.(1.4).

In functional magnetic resonance imaging studies, individuals with fibromyalgia show brain activation in pain processing areas in response to stimuli such as light pressure

and heat.(5,6), therefore, patients with fibromyalgia have a change in pain perception.

A study published in 2009 carried out with twins suggests that genetic factors are responsible for 50% of the risk of developing fibromyalgia, while environmental factors are responsible for another 50% of the risk of developing the disease.(7). Among the potentially modifiable environmental factors are lack of sleep, obesity, sedentary lifestyle, low professional or personal satisfaction and catastrophizing, that is, the fear that pain intensifies with movement is an indicator of worse prognosis(8).

Fibromyalgia treatment must combine pharmacological and non-pharmacological strategies, with the patient having an active role in the process. Drug therapies can act to reduce the action of excitatory neurotransmitters or increase the action of inhibitory neurotransmitters. Currently, there are drugs with strong evidence of efficacy in the treatment of FM, such as tricyclic antidepressants, gabapentinoids and selective serotonin reuptake inhibitors(8).

Among non-drug therapies for the treatment of FM, health education, cognitive-behavioral therapy and physical exercise show the greatest evidence of success(8).

Regarding physical exercise, recent studies have highlighted the possible benefits of using exergames, or active games.(9). Exergames are games that require movement of the entire body to perform tasks, providing the practitioner with a motor experience, with benefits related to blood pressure, heart rate, oxygen consumption and energy expenditure, similar to performing physical activity.(10).

Being a disease that causes a great decrease in people’s quality of life, especially due to pain, in addition to significant treatment difficulties, exergames emerge as a therapeutic possibility, especially due to their ease of access.

METHODS

The present study is a narrative review of the literature. A search was carried out in the PubMed database with the descriptors: exergame, treatment and fibromyalgia.

We selected 5 randomized clinical trials that evaluated the effects of exergames on

muscle strength, agility, cardiorespiratory adaptation, mobility, balance, pain and quality of life in women with fibromyalgia.

The articles evaluated, their authors, types of studies and main findings are shown in the table below:

AUTHOR/TITLE/YEAR	KIND OF STUDY	MAIN FINDINGS
VILLAFAINA S.; BORREGA-MOUQUINHO Y.; FUENTES-GARCIA JP; COLLADO-MATEO D.; GUSI N. (2019) Effect of Exergame Training and Detraining on Lower-Body Strength, Agility, and Cardiorespiratory Fitness in Women with Fibromyalgia: Single-Blinded Randomized Controlled Trial(11).	Single-blind. Controlled and randomized test.	An exergame intervention was performed with 55 women for a training period of 24 weeks followed by 24 weeks of detraining, focusing on lower limbs, agility and cardiorespiratory fitness. There was improvement in lower body strength and respiratory fitness, however, after the detraining time, only cardiorespiratory fitness remained.
COLLADO-MATEO D.; DOMINGUEZ-MUÑOZ F.; ADSUAR JC; MERELLANO-NAVARRO E.; GUSI N. (2017) Exergames for women with fibromyalgia: a randomized controlled trial to evaluate the effects on mobility skills, balance and fear of falling(12).	Randomized controlled trial	Through a randomized clinical trial, women between 30 and 75 years old diagnosed with fibromyalgia with preserved cognitive capacity were recruited. It was concluded that the implementation of exergame as a form of rehabilitation therapy helped to improve balance and mobility problems in this population.
OAK MS; CARVALHO LC SILVA ALVES R.; MENEZES FS; GOMES EC; FRAZIN A.; IUNES DH (2021) Analysis of the Muscular Activity, Peak Torque in the Lower Limbs, and Static Balance after Virtual Rehabilitation in Women with Fibromyalgia: A Randomized Controlled Study(13).	Randomized controlled trial	It was shown that exergaming has the ability to increase peak torque in dorsiflexion and plantar flexion movements in women with fibromyalgia. A decrease in tender point counts was also documented, however, there was no evidence of changes in static balance during the study.
COLLADO-MATEO D.; DOMINGUEZ-MUÑOZ FJ; ADSUAR JC; GARCIA-GORDILLO MA; GUSI N. (2017) Effects of exergames on quality of life, pain and disease impact in women with Fibromyalgia: A randomized controlled trial(14).	Randomized controlled trial	The conclusion of the study was obtained through an 8-week intervention with the use of exergame to perform physical activity in groups of women with fibromyalgia. Significant improvement was found on pain, stiffness, mobility and anxiety in women with fibromyalgia.
OAK MS; CARVALHO LC; MENEZES FS; FRAZIN A.; GOMES EC; IUNES DH (2020) Effects of Exergames in Women with Fibromyalgia: A Randomized Controlled Study(15).	Randomized controlled trial	The study aimed to evaluate the impact of exergames on pain threshold and physical variables compared to stretching exercises. Thirty-five women were included and randomly divided into 2 groups. It was concluded that exergames increased functional capacity and decreased the impact of fibromyalgia, reducing pain threshold and lower limb fatigue.

Chart 1. Analysis of studies on the relationship between exergame and fibromyalgia.

DISCUSSION

Exergames provide the performance of systemic physical activities, requiring the whole body to move, thus promoting cardiovascular, locomotor and metabolic adaptations to exercise (16,17). Simultaneously, in the Central Nervous System, neural alterations occur due to stimuli called dual task. Such adaptations are necessary for integration of virtual stimuli, provided by the game, with body movement, for the execution of the game. This interaction between motor and cognitive abilities is fundamental for understanding this therapeutic method and its benefits, especially in patients with FM (10).

The practice of activities of daily living (ADLs) requires that the cognitive and motor functions act simultaneously, because, during the execution of a certain primary motor task, the individual's attention is often focused on another activity. The combination between the simultaneous action of two distinct capacities is called dual-tasking (18).

Conducting training with interactive games provided improved performance in intellectual activities dependent on the prefrontal cortex (19), in addition to structural alterations, such as an increase in the volume of the hippocampus, cerebellum, dorsolateral prefrontal cortex and parietal lobe (20).

Giggins, Persson and Caulfield (2013) show that the visual feedback provided by games allows greater precision in performing exercises, increasing dexterity, grip strength and motor control. The motivation provided by the video game makes individuals show a higher level of interest in activities and increase their participation and adherence to treatment (21).

Furthermore, Doyle et al. also shows that the visual feedback provided by interaction with virtual reality during motor practice results in greater precision in the execution of movements compared to execution without

concomitant feedback or after viewing a video with instructions. The main clinical potential of virtual reality is an increase in the performance duration of physical exercise prescribed as rehabilitation. The therapeutically recommended exergame is related to increasing motivation regarding oriented physical programming (22).

In a small case study, Teasell et al. demonstrated that training with virtual feedback concomitant with manual exercises improved the motor function of the post-stroke affected hand (23).

Fitzgerald et al. also showed that performing exercises with biofeedback can bring, among other benefits, greater motivation to perform tasks, resulting in greater adherence of patients to treatment, through increased interest in activities (24).

Tonssini et al. in a case study, evaluated the effect of virtual reality associated with the practice of physical exercises aiming at changes in pain, fatigue, functional capacity and quality of life of a patient with fibromyalgia. This study used several evaluation methods, such as questionnaires and visual scales and, during the 6-week treatment, it was concluded that this association improved the impact of fibromyalgia and consequently the quality of life of the study patient (25).

According to Giggins, exergames show potential for pleasurable cognitive stimulation, facilitating the performance of tasks that require intellectual activity. The main area evaluated in the study was the activity of the left frontal cortical region of young adults, observing the execution function and also the neurophysiological response after a session of virtual reality exercises. Therefore, it was concluded that the practice of exergames promoted an immediate increase in brain execution function and that this change is strongly related to left cerebral cortical activity (10).

CONCLUSION

The present study showed the great potential of using exergames in the treatment and management of patients with fibromyalgia. This therapeutic proposal presented several benefits, such as an increase in the ability to perform physical exercises, better cardiovascular adaptation, improvement in static and dynamic balance, greater patient adherence to exercise and, mainly, a decrease in the intensity of pain

and the number of tender points, with a consequent improvement in the quality of life of patients. The main limitation of this work is still the small number of studies that have evaluated this theme, in particular, studies that evaluate the duration of the adaptive effects of the exergame over time. Finally, we suggest that new studies can evaluate the effects of exergames in fibromyalgia patients for a longer period of time,

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