BALNEO RESEARCH Balneo and PRM Research Journal English Edition
e ISSN 2734 - 8458 p ISSN 2734 - 844X ROMANIAN ASSOCIATION OF BALNEOLOGY

Research article

Physical Therapy and Intrinsic Relaxation for Fibromyalgia – A Comparative Cohort Study from Romania

Theodora Florica Borze (Ursu) [1,2], Annamaria Pallag [1,3,*], Anca Maria Drăgan [2], Doriana Ioana Ciobanu [2], Ramona Nicoleta Suciu [4], Carmen Delia Nistor - Cseppento [4] and Mariana Mureșan [1,5]

1 Doctoral School of Biomedical Sciences, Faculty of Medicine and Pharmacy, University of Oradea, Oradea 410073, Romania;
2 Department of Physical Education, Sport and Physical Therapy, Faculty of Geography, Tourism and Sports, University of Oradea, Oradea, 410087, Romania;
3 Department of Pharmacy, Faculty of Medicine and Pharmacy University of Oradea, Oradea, 410073 Romania;
4 Department of Psycho-Neuroscience and Recovery, Faculty of Medicine and Pharmacy University of Oradea, Oradea, 410073 Romania;
5 Department of Preclinical Disciplines, Faculty of Medicine and Pharmacy University of Oradea, Oradea, 410073 Romania.

* Correspondence: Annamaria Pallag, apallag@uoradea.ro

Citation: Borze (Ursu) T.F., Pallag A., Drăgan A.M., Ciobanu D.I., Suciu R.N.,Nistor-Cseppento C.D., Mureșan M - Physical Therapy and Intrinsic Relaxation for Fibromyalgia – A Comparative Cohort Study from Romania *Balneo and PRM Research Journal* ***2025**, 16(1): 788*

Academic Editor(s): Constantin Munteanu

Reviewer Officer: Viorela Bembea

Production Officer: Camil Filimon

Received: 16.02.2025
Published: 31.03.2025

Reviewers:
Mihai Hoteteu
Roxana Bistriceanu

Publisher's Note: Balneo and PRM Research Journal stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Abstract: Fibromyalgia (FM), through the presence of clinical polymorphism and widespread chronic pain, stiffens the musculoskeletal system in specific locations. For patients with FM, this comparative study was conducted to understand the benefits of conservative therapy versus intrinsic relaxation and to help clinicians select the most appropriate interventions for this condition. 60 FM patients from two cohorts (Group A and Group B) were included in the analysis. Group A received physical therapy, and group B received recovery through intrinsic relaxation. Their assessment was conducted using the Brief Pain Inventory (BPI) scale, the Pain Catastrophizing Scale (PCS), mobility tests, and nerve decompression procedures. The results show that experienced pain as well as catastrophizing pain were significantly reduced in both groups, $p = 0.00$. In addition, the mobility score increased in group A ($p = 0.00$), and root compression decreased, indicating a significant change ($p < 0.05$). In group B there are improvements in mobility and compression but not statistically significant ($p > 0.05$). The multidisciplinary intervention had an increased effect size of 0.85 points on the BPI and 0.71 points on the PCS, while relaxation produced a moderate effect of 0.75 points on the BPI scale and a low effect on PCS of 0.39 points. After two weeks of interventions, we observed greater differences in pain intensity reduction in both study groups.
Keywords: fibromyalgia; pain; rehabilitation; catastrophizing

1. Introduction

Fibromyalgia is a syndrome that affects up to 1-5% of the population [1], which, according to the World Health Organization, belongs to the rheumatology field, having been investigated since the nineteenth century. Over time, it has had various names; the term fibromyalgia dates to 1976 [2], coined by Smythe and Moldofsky following the identification of regions of extreme sensitivity known as „pain points" [3]. It originates from the Latin word „fibra" and the Greek words „mys" and „algos," which mean muscle and pain [2].

Fibromyalgia is a chronic pathology whose physiopathological mechanism is uncertain [4,5] and is characterized by migratory muscle pain [6] associated with increased responses to certain nociceptive stimuli that are related to somatic responses [7]. Other characteristics are related to stiffness in movement, manifested especially in the morning or after prolonged rest, hypersensitivity to pressure during the palpation of several bilateral points on the body, being accompanied by symptoms such

as headache, paresthesias, poor sleep, fatigue, attention disorders myalgia, voiding disorders, cognitive disorders, depression and anxiety [5,6,8,9]. The diagnosis of fibromyalgia is based on the American College of Rheumatology criteria developed in 1990, including bilateral pain above and below the waist, characterized by centralised pain [10,11] and a history of chronic diffuse pain of at least 3 months and the presence at the objective examination of 11 pain points on palpation, out of a total of 18 [12,10,13]. The diagnostic criteria were reviewed after their establishment in 2 lines, first in 2010, and then in 2016 [14].

Fibromyalgia is prevalent in people with affective diseases such as unipolar and bipolar depression, in people with anxiety disorders, obsessive-compulsive and post-traumatic stress disorders. Thus, in patients with FM, there is a correlation with the degree of depression and anxiety, with catastrophic thoughts, and with reduced control over pain. The disorder accompanies inflammatory joint diseases in some cases, but it has no specific inflammatory signs and a differential diagnosis should be made against rheumatoid arthritis, systemic lupus erythematosus, or other inflammatory diseases of the musculoskeletal system [15]. In most specialized studies it is emphasized that health is worse than in patients with other chronic diseases [16-19]. Some studies show that 2 out of 3 patients who experience chronic pain have first-degree relatives with chronic pain, one-third of them have relatives suffering from affective disorders, and a third have people who drink alcohol frequently in their family. FM also occurs in people who have suffered physical, emotional, or sexual abuse in childhood. Therefore, biological vulnerability can be the result of the persistent effects of early life stress [20-22]. Factors that may trigger fibromyalgia may be: infections (e.g., parvovirus, Epstein-Barr virus, Lyme disease, excluding common upper respiratory tract infections), physical trauma (car accidents), and, psychological stress, hormonal changes (e.g. hypothyroidism), drugs, vaccines, certain catastrophic events (war, but not natural disasters) [23,24]. Of the rheumatological pathologies, fibromyalgia represents 15%, being the second most frequent cause of these diseases. A number of studies indicate that 10 to 12% of the population suffers from widespread chronic pain due to inflammation. Studies confirm that inflammation is involved in FM [23,25,26], with physiological mechanisms linked to stress and emotions being considered transmitters of neurogenic inflammation [27]. In the United States, fibromyalgia is the second leading cause of chronic pain experienced by the rheumatologist. Gender prevalence indicates that 3.4% of women are affected (40.8% between the ages of 35 and 44) compared to male, which is only 0.5% [23]. In all specialized studies, it is observed that the female sex is reached by FM 5-9 times more than the male one [28].

Recovery of fibromyalgia is complex, so a multidisciplinary approach is currently recommended that includes cognitive-behavioral therapy, physical exercises, and psychotherapy, as well as, along with medication [1]. Consider pain relief, physical reconditioning through proper exercise, and cognitive-behavioral therapy measures. One of the essential means is physical therapy because it is based on movement, essential for life. There are mobilizations, traction for decompressing the nerve roots, active, active exercises with resistance, isometric, stretching, and people with FM having low muscle strength and strength [29]. Radicular compression is a condition in which the nerve root of a spinal nerve is compressed or damaged, causing the pain to spread and radiate to other areas of the body, muscle weakness and impaired reflexes are often observed [30]. Along with kinesiotherapy, a number of other physiotherapeutic means are used with success in the recovery treatment of FM. Thus, therapeutic massage, through its effects, reduces pain and improves the patient's circulation and mobility by helping to relieve muscle tension [31]. Electrotherapy has antialgic effects [32]. Hydrokinetotherapy, by means of the factors that water has (thermal, mechanical, and chemical) [33], is one of the main forms of restoration of diminished functions, since water can support 90% of the weight of the body, reducing the muscle effort required for the execution of movements and increasing the

amplitude of movements [34]. Through these interventions, the nervous system responds to the painful stimulus by releasing endorphins [35]. They are produced by the pituitary gland and hypothalamus during exercise, being important for the fact that they block the transmission of the painful impulse [36]. With chronic pain, either an overactivity of the secretion of endorphins or an increase in the consumption of released endorphins occurs.

Psychological factors must also be considered when treating FM, as they have a significant impact on both symptoms and the success of treatment. Relaxation therapy is an autonomous process and a major goal for prevention and rehabilitation of the patient, as it induces a state of muscle relaxation and inhibits nervous tension. Intrinsic relaxation rebalances the well-being inside the body, while extrinsic relaxation is brought from the outside by various techniques such as massage, kinetotherapy, electrotherapy, and medication. Studies related to the recovery of the body and the mind as a whole are few and limited [37]. By conducting online sessions, patients can be monitored from several dimensions such as the presence of stress in their daily environment, resilience to the program, and coping. Online sessions aim to verify treatment effectiveness, understand patient vulnerabilities, and enable sustained adherence to recovery during pandemics [38-43].

This study aimed to determine the effectiveness of conservative therapy versus intrinsic relaxation therapy on pain and reduction of functional disability in patients with FM and to help clinicians select the most appropriate interventions for recovery.

2. Materials and Methods

2.1. Study Design and Participants

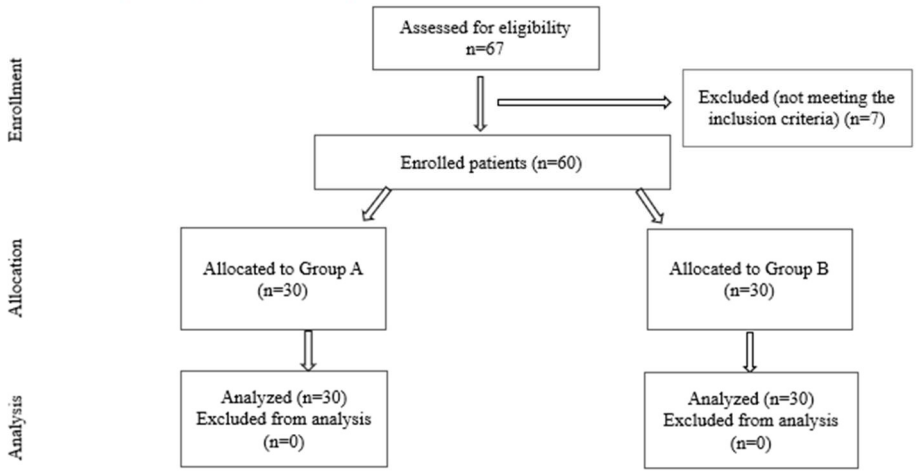

Figure 1. CONSORT flow diagram of the study.

This study included patients with fibromyalgia diagnosed until the study was conducted by the rheumatologist. Subjects were selected from January – November 2024. All patients were informed about the study and the publication of the data and signed a consent for the processing of personal data to ensure voluntary participation

Inclusion/exclusion criteria

Patients were selected following the inclusion criteria. The main criteria for inclusion were the age of at least 18 years, the presence of fibromyalgia diagnosis, voluntary and independent participation in the study, and the lack of contraindications to performing the intervention. At the same time, those who did not show up for the recovery program and those who missed an evaluation were excluded from the study.

A total of 67 patients were informed of the study. Of these, 60 signed the informed consent for study participation, coming from two cohorts. They were randomly assigned by the simple randomization method in the two cohorts, as follows: the participants who followed the recovery program at Băile Felix Recovery Hospital (Romania) were included in Group A, and patients who had their recovery sessions at home were included in Group B.

Group A performed 10 recovery sessions over 2 weeks in the rehabilitation hospital in the presence of a physical therapist. Group A treatment plan is based on low-cost combination therapy: individual kinetotherapy 30 minutes, consisting of aerobic exercises [44], stretching [45], exercises for muscle strengthening [46], etc, low-frequency electrotherapy TENS (Transcutaneous Electric Neuro Stimulation), massage and hydrokinetotherapy 20 minutes. Group B performed at home for 2 weeks, without physical supervision of a physical therapist, 20 minutes of relaxation specific to the author Parow, before bedtime every evening. Parow's relaxation technique is based on intrinsic relaxation, which helps actively induce relaxation and ensures mutual inhibition between the muscles and the psyche. It is carried out without any other help tools; it can be carried out at home. The author recommends maintaining the position of dorsal decubitus in the bed for 20 minutes, breathing unforced, and exhaling with the pronunciation "pff", to automatically attract general muscle relaxation and eliminate the state of mental tension. All patients in this group communicated daily with the physical therapist to note the session and improve the technique. This intervention focused only on intrinsic relaxation is based on the need to integrate a recuperative program as simplified as possible and available to anyone, specialists in the field claim that notable improvements in the clinical profile occur in people who have a high adherence to treatment. Group B patients are disadvantaged by intervention through a single procedure and physical non-monitoring by the physical therapist.

2.2. Assessments

After signing the papers, the basic assessment was carried out consisting of sociodemographic information such as age, gender, height, weight, and medication. The evaluations were carried out before the start of the study, respectively after the last recovery session.

2.2.1. The primary outcome measures

The first variable of the study was the Brief Pain Inventory (BPI) scale [47], a questionnaire that includes 9 items that assess the severity of pain and its interference with some physical and psychosocial aspects of everyday life. The patient evaluates on a scale from 0 to 10 the pain felt in the last 2 weeks, where the responses between 1 and 4 represent mild pain, which is, 5 - 6 moderate pain and 7 - 10 severe pain. It is widely used in clinical settings, especially for chronic pain and cancer-related pain. BPI provides a comprehensive picture of the severity of pain and its interference with the activities of everyday life.

The next variable was the Pain Catastrophizing Scale (PCS) [48] for catastrophic pain. The severity of the pain and disability created by the catastrophic pain lay the foundations for chronic pain specific to FM [49]. Catastrophism has been evaluated using the PCS, a 13-item questionnaire (PCS-13) that allows the patient to describe their thoughts and emotions during pain, which may contribute to higher levels of pain perception and chronic pain conditions. The patient indicates to what extent he has certain thoughts or emotions when he feels pain attributing a score on the Likert scale between 0 (locally) and 4 (all the time) for each item. The total score is the sum of the scores for each question. A value of over 30 points out of the maximum of 52, represents a clinically significant level of catastrophic pain. Sub-scale scores for rumination, enlargement, and powerlessness can also be calculated. One purpose of its use is to identify patients who might benefit from cognitive-behavioral therapy (CBT)

or other interventions aimed at reducing catastrophic thinking. In research, it is commonly used to study the psychological aspects of pain, especially in chronic pain conditions such as fibromyalgia, arthritis, and back pain.

2.2.2. The secondary outcome measures

Secondary measurements included mobility and the presence of nerve compression. Mobility was carried out using the shoulder mobility test by approaching the dactylions on each side. The subject places a hand from above behind the head, over the shoulder, and tries to reach as far as possible to the middle of the back, the palm touches the body and the fingers are pointing downwards. The other arm sits in the back, the palm pointing outwards and the fingers upwards and stretching as far as possible, trying to touch the fingers of each hand. Scoring consists of scoring "well" if the distal points of the middle fingers are touched, "reasonable" if they are less than 5 cm, and "weak" if they are more than 5 cm.

Radicular compression was assessed using the traction test, namely the shoulder abduction test. In the traction test (compression of the nerve roots), the examiner applies one outlet under the chin and the other at the occiput level and pulls upwards, pulling the cervical spine. Because the test is used for patients who experience pain due to compression of the nerve roots, the test is considered positive if this maneuver decreases or makes the pain go away. On the Shoulder Abduction Test (brachial trunk compression check), the subject abdicates the shoulder or the examiner passively abdicates it so that the subject's palm or forearm sits on the head. Because the test is used for patients who experience nerve pain, if this movement decreases pain, then, it means that the test is positive and we are dealing with a problem in the cervical spine such as herniation of the intervertebral disc, compression of the epidural veins, compression of a nerve root.

2.3. Statistical Methods

For statistical processing of the data in the study, IBM SPSS Statistics for Windows, Version 29.0 (30-day trial version) Harmonk, NY: IBM Corp, was used. Nominal data were described as frequency and percentage, and variables continued as mean, median, standard, minimum, and maximum deviation. The analysis of the association between the categorical variables was made using the cross table and the test $\chi 2$. For comparison of the mean by dichotomic variables in the study, the t-test for independent samples was used. To compare two dependent datasets or pairs we used the t-test for dependent samples (pairs). The major advantage of this statistical model is that it captures the intrasubject variation, by the fact that the basis of calculation is the difference between the two values of each subject individually. A value of the coefficient of statistical significance $p<0,05$ was considered significant.

3. Results

3.1.General characteristics

In both groups, the distribution of data was consistent for age ($p=0.484$), gender ($p > 0.05$), body fat ($p = 0.426$), and use of pain medication. This suggests that in terms of these variables group A and group B are comparable.

Table 1. Distribution of demographic data (mean ± standard deviation) in the two studied groups, Group A and Group B (n=60).

Characteristics	Group A (n=30)	Group B (n=30)	p-value
Age (years)	46.97 ± 13.163	44.73 ± 11.317	0.484
BMI (kg/m^2)	24.42 ± 4.416	23.63 ± 3.057	0.426
Gender (%) women	93.3	90.0	0.99
Pain Medication (%)	100	100	1

BMI = body mass index

3.2. Pain assessment

Analysis data obtained at the cohort level suggest that the final PCS and BPI scores decreased from the initial ones (Figures 2a and 2b). In Figure 2c, it can be seen that Group A has higher scores for BPI variables, with a maximum of 101 points and a minimum of 27 points at the initial evaluation, compared to Group B which has a maximum of 80 points and a minimum of 28. In the end, the maximum values decrease to 77 points for group A and 74 points for group B, and the minimum values to 27, respectively 26 points, indicating a more difficult state before intervention for group A (figure 2d). These differences suggest that group A is composed of participants with higher levels of pain and its interference in their lives. The results underline the importance of analysing post-intervention improvements to see if Group A benefits more from the intervention, given the initially high level of pain. Regarding PCS, the maximum values decrease from 52 to 50 points, and the minimum values from 17 points to 16 points in group A. In group B, the maximum decreases from 52 to 51 points and the minimum remains stable at 13 points (Figures 2e and 2f). These results indicate comparable variation across participants and the differences do not reach strict statistical significance ($p < 0.05$), but some variables, such as total PCS and Helplessness, are close to this threshold.

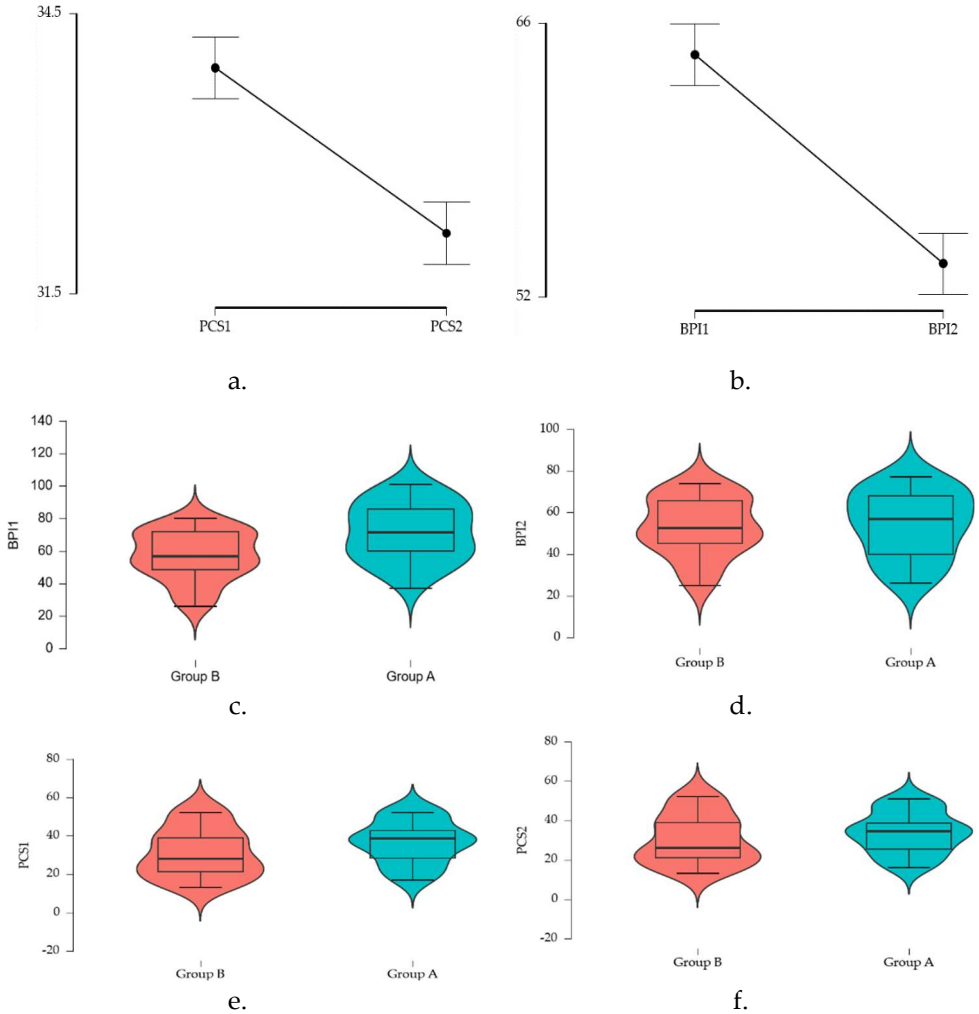

Figure 2. Descriptive analysis of the minimum, maximum, and average values of the analyzed variables. a) The average values of the PCS variable at the initial and final moments in the two groups; b) The average values of the BPI variable at the initial and final moments in the two groups; c) the initial results of the BPI variable in group B, respectively A; d) the final results of the BPI variable in group B, respectively A; e) the initial results of the PCS variable in group B, respectively A; f) the final results of the PCS variable in group B, respectively A.

Referring to group A, in Table 2, all three pairs of variables (total BPI, pain severity, pain interference) show a significant reduction between initial and final measurements. The p-value = 0.00 for all pairs suggests that these improvements are highly statistically significant and likely not due to chance. The decrease in standard deviation suggests a leveling of pain experience between participants, which may reflect the increased effectiveness of the intervention, i.e., as pain severity decreased, differences between participants narrowed. The intervention appears to have had a positive impact in reducing catastrophizing and helplessness, but pain magnification was not significantly affected.

In group B, all three measured BPI dimensions showed significant improvements. The largest reduction was seen for total BPI, p = 0.00, with a moderate effect size of 0.75 points followed by pain severity, and the smallest reduction was for pain interference. The PCS total score decreased significantly, p = 0.00, with a small effect size of 0.39 points indicating a global reduction in pain catastrophizing, but rumination and magnification showed no significant change, suggesting that the intervention did not influence these dimensions. There are no significant differences between the initial and final values for shoulder mobility tests, pull tests, and left and right shoulder abduction. The p-value for each test is greater than 0.05, which means that the observed changes are not statistically significant and the effect size is low.

Comparing the scores of the final evaluation between the two groups shows that none of the studied variables presented significant differences. Regarding pain, the applied interventions reduced or equalized the initial differences between the two groups, leading to similar scores in pain perception at the end of the study period.

Table 2. Evolution and differences of results group A vs. group B after two weeks of intervention.

Parameters	Group A (n=30) (mean± SD)			Group B (n=30) (mean± SD)		p-value (final)	Group A Changes		Group B Changes	
	Initial	Final	p-value (initial)	Initial	Final		t	p	t	p
BPI total	71.70 ± 17,660	54.30 ± 15,897	0.001	57.10 ± 15.160	53.13 ± 13.992	0.764	13.202	0.000	9.460	0.000
Severity pain	25.57 ± 6,033	18.37 ± 4,679	0.000	20.43 ± 3.645	18.17 ± 3.374	0.850	12.673	0.000	9.663	0.000
Pain interference	46.13 ± 14.253	35.93 ± 13.214	0.007	36.67 ± 11.987	34.87 ± 11.434	0.739	10.936	0.000	6.310	0.000
PCS total	36.57 ± 11.022	33.70 ± 10.541	0.091	31.27 ± 12.768	30.60 ± 12.569	0.305	8.478	0.000	4.325	0.000
Rumination	12.13 ± 3.048	11.87 ± 2.849	0.096	10.70 ± 3.495	10.63 ± 3.528	0.142	2.112	0.043	1.439	0.161
Magnification	7.73 ± 3.005	7.63 ± 3.011	0.215	6.73 [a] ± 3.172	6.73 [a] ± 3.172	0.264	1.795	0.083	[a]	[a]
Helplessness	16.77 ± 5.237	14.23 ± 4.953	0.054	13.83 ± 6.265	13.23 ± 6.050	0.486	8.839	0.000	3.844	0.001

[a] The correlation and t cannot be computed because the standard error of the difference is 0; N = the number of patients; SD = standard deviation; t = the t-test of the difference in means; p = statistical significance coefficient.

3.3. Evolution of physical performance

Performance improved significantly in shoulder mobility tests, p = 0.00 (table 3). The Left Shoulder Abduction and Right Shoulder Abduction tests showed a slight decrease in performance, but the differences are significant, indicating a real change (p < 0,05). The traction test showed no significant change between initial and final values. Regarding the size of the effect, the two weeks of intervention suggest an increased effect of 0.85 points on the BPI scale on pain, indicating a clear improvement in the condition of the participants in terms of the severity and impact of pain on daily life. The intervention on pain catastrophizing had a moderate effect of 0.71

points, while for the other analyzed variables the size of the effect was low, corresponding to 0.41 points for shoulder mobility 0.16 for right shoulder abduction, and 0.13 points for the left one.

Table 3. Evolution of physical performance.

Parameters	Group A (n=30) (mean± SD)		p-value	Group B (n=30) (mean± SD)		p-value	Group A Changes		Group B Changes	
	Initial	Final		Initial	Final		t	p	t	p
SM right	1.63 ± 0.928	2.30 ± 1.119	0.084	2.07 ± 0.980	2.13 ± 1.042	0.553	-4.551	0.000	-1.000	0.326
SM left	1.53 ± 0.819	2.13 ± 1.042	0.130	1.87 ± 0.860	1.93 ±0.944	0.439	-4.539	0.000	-1.000	0.326
TT	0.80[a] ± 0.407	0.80[a] ± 0.407	0.744	0.83[a] ± 0.379	0.83[a] ±0.379	0.744	[a]	[a]	[a]	[a]
SAT right	0.67 ± 0.479	0.50 ± 0.509	0.434	0.57[a] ±0.504	0.57[a] ± 0.504	0.441	2.408	0.023	[a]	[a]
SAT left	0.67 ± 0.479	0.53 ± 0.507	0.791	0.63[a] ± 0.490	0.63[a] ± 0.490	0.612	2.112	0.043	[a]	[a]

SM = shoulder mobility; TT = traction test; SAT = shoulder abduction test.

4. Discussion

This study aimed to examine the effects of an extensive 2-week exercise program on pain levels compared to the effects of a simple relaxation procedure that can be performed daily without assistive materials, thus involving no cost. The homogeneity of the groups in terms of age, gender, body mass index, pharmacological treatment, and perceived symptoms demonstrates that the changes occurring during the treatment are due only to the recovery intervention. We expected that multidisciplinary therapy would have significant effects on the improvement of pain and joint range, but the final analysis of the BPI and PCS scales showed statistically significant improvements in both groups, p values = 0.00 confirming that the observed data are not random, but reflect robust and replicable results. Reduction in scores indicates a clinically significant improvement in perceived pain and its impact on daily life. These data support the conclusion that the minutes of relaxation were effective in reducing the severity and interference of pain in the case of group B. The results of the study have clinical relevance and help specialists in the field to improve management.

After two weeks of intervention in the Hospital, the results show performance in terms of shoulder mobility, $p = 0.00$, and significant improvements in root compression, $p < 0.05$, emphasizing the effectiveness of mobility exercises and their practice in water. The results demonstrate that relaxation has low effects on mobility but is not statistically significant as the p-value is greater than 0.05. This is also explained by the fact that the radicular decompression was not performed, and the patients failed to reach the full articular amplitude. Results obtained after the intervention on pain indicate a large size effect in group A and a moderate size effect in group B.

Aerobic exercise [50] has been documented in many studies as the most appropriate exercise to reduce pain. Protocols combining aerobic and strength exercises have unclear results regarding efficacy on pain in patients with fibromyalgia [51]. Conversely, some studies have noted that high-intensity exercise may increase pain because it blocks the anti-inflammatory response and keeps inflammation present [52]. And long-term aerobic exercise does not show statistically satisfactory results [34]. A study by Ruth Izquierdo-Alventosa [53] et al looked at the effectiveness of low-intensity aerobic exercise on pain catastrophizing, anxiety, and depression. The study was conducted on a sample of 32 women divided into 2 groups. Results showed a reduction in pain catastrophizing from 27.31 (11.55) to 20.00 (10.86) with an effect size of 0.65 points.

To emphasize the effectiveness of relaxation on pain, in a study investigating the influence and modification of pain characteristics in patients with fibromyalgia when breathing exercises are added to the exercise program, the results show that pain was significantly reduced ($p<0.01$) both in terms of concerns the severity of pain as well as its interference [54]. This can also be seen in the present study, where pain was reduced by $p < 0.01$ and had less impact on daily functioning.

Discussions on the use of currents in recovery show that electroacupuncture has moderate effects on pain reduction, and non-invasive electrotherapy has low effects [55]. The short time of the intervention is beneficial for group A because some authors attest that fear related to pain is associated in FM patients with decreased tolerance for physical performance, which would explain the behaviors of avoiding physical activities in these patients [56]. Negative cognitive states lead to a low level of physical activity and according to the authors Asimina Lazaridour and collaborators [57], daily physical exercises increase the level of pain especially in people who suffer from pain catastrophizing, by the fact that they cannot adapt to the diagnosis, thus the results study suggests that the association between physical activity and pain intensity is moderated by pain catastrophizing.

Comparing the results obtained with the specialized literature, we can see that the pain threshold has been reduced for most types of intervention, but just as the lack of activity damages the nervous and muscular system, so too does overstimulation have negative effects, necessitating the implementation of a focused recovery program on aerobic exercise [58] and types of breathing or relaxation and on shifting the focus to psychological variables to reduce fear of movement and promote an active lifestyle in people with chronic pain.

Strengths and Limitations of the Study

The study has limitations regarding the short duration and the small number of patients due to the incidence of the diagnosis and due to the legislation in force in Romania. However, the study also has strong points because such comparisons regarding FM have not been made in Romania. To observe the long-term results, the patients in group A will be re-evaluated 3 months after the intervention, and the patients in group B received the recommendation to continue the relaxation technique at home for 3 months, to observe if a treatment based on a single form of relaxation can improve the state of fatigue, by acting on sleep, following that after this period the multidisciplinary treatment should begin if no beneficial results appear on the evaluated variables.

5. Conclusions

Referring to the purpose of the study, we can state that due to the unclear pathogenesis of fibromyalgia, the multidisciplinary approach of restorative treatment has better effectiveness than the therapy focused only on relaxation.

Author Contributions: Conceptualization, T.F.B., A.P., and M.M.; methodology, T.F.B., C.D.Cs.; software, T.F.B.; validation, A.P., R.N.S. and D.A.M.; formal analysis, D.A.M., D.I.C. and M.M.; investigation, T.F.B.; writing—original draft preparation, T.F.B., A.P., M.M.; writing—review and editing, D.A.M., R.N.S., D.I.C. and C.D.Cs.. All authors have read and agreed to the published version of the manuscript.

Funding: The APC was founded by the University of Oradea, Oradea, Romania

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethical Committee of the Faculty of Medicine and Pharmacy of Oradea, approval No. 22 of 26.02.2021.

Informed Consent Statement: Written informed consent was obtained from each participant, ensuring their voluntary participation

Acknowledgments: The authors wish to thank the University of Oradea for supporting the payment of the invoice through an internal project.

Conflicts of Interest: The authors declare no conflicts of interest

References

1. Jones, E.A.; Asaad, F.; Patel, N.; Jain, E.; Abd-Elsayed, A. Management of Fibromyalgia: An Update. Biomedicines 2024, 12(6), 1266. https://doi.org/10.3390/biomedicines12061266
2. Pederson, John A.; New Research on Fibromyalgia. Nova Science Publishers Inc; 1st edition, Statele Unite ale Americii 2006, pp. 9-14.
3. Musekamp, G.; Gerlich, C.; Ehlebracht-König, I.; Dorn, M.; Höfter, A.; Tomiak, C.; Schlittenhardt, D.; Faller, H.; Reusch, A. Evaluation of a self-management patient education programme for fibromyalgia. Results of a cluster-RCT in inpa-tient rehabilitation. Health Educ. Res. 2019, 34, 209–222.
4. Gyorfi, M.; Rupp, A.; Abd-Elsayed, A. Fibromyalgia Pathophysiology. Biomedicines 2022, 10, 3070.
5. Teodoro, T.; Edwards, M.J.; Isaacs, J.D. A unifying theory for cognitive abnormalities in functional neurological disor-ders, fibromyalgia and chronic fatigue syndrome: Systematic review. J. Neurol. Neurosurg. Psychiatry 2018, 89, 1308–1319.
6. Rezuș E. - Reumatologie -Editura „Gr. T. Popa", U.M.F. Iaşi 2014; 252-253.
7. Jurado-Priego, L.N.; Cueto-Ureña, C.; Ramírez-Expósito, M.J.; Martínez-Marto, J.M. Fibromyalgia: A Review of the Pathophysiological Mechanisms and Multidisciplinary Treatment Strategies. Biomedicines 2024, 12(7), 1543.
8. Jones, G.T.; Atzeni, F.; Beasley, M.; Flüß, E.; Sarzi-Puttini, P.; Macfarlane, G.J. The prevalence of fibromyalgia in the gen-eral population: A comparison of the American College of Rheumatology 1990, 2010, and modified 2010 classification criteria. Arthritis Rheumatol. 2015, 67, 568–575.
9. Smith, H.S.; Barkin, R.L. Fibromyalgia syndrome: A discussion of the syndrome and pharmacotherapy. Dis. Mon. 2011, 57, 248–285.
10. Siracusa, R., Di Paola, R., Cuzzocrea, S., Impellizzeri, D. - Fibromyalgia: Pathogenesis, Mechanisms, Diagnosis and Treatment Options Update, Int. J. Mol. Sci. 2021, 22(8), 3891; https://doi.org/10.3390/ijms22083891
11. Gerdle, B.; Bjork, J.; Coster, L.; Henriksson, K.; Henriksson, C.; Bengtsson, A. Prevalence of widespread pain and associations with work status: A population study. BMC Musculoskelet. Disord. 2008, 9, 102.
12. Wolfe F.; Smythe H.A.; Yunus M.B.; Bennett R.M.; Bombardier C.; Goldenberg D.L.; Tugwell, P.; Campbell S.M.; Abeles M.; Clark P.; Fam A.G.; Farber S.J.; Fiechtner J.J.; Michael Franklin C.; Gatter R.A.; Hamaty D.; Lessard J.; Lichtbroun A.S.; Masi A.T.; Mccain G.A.; John Reynolds W.; Romano T.J.; Jon Russell I.; and Sheon R.P. The american college of rhe-umatology 1990 criteria for the classification of fibromyalgia. Arthritis & Rheumatism, 1990, 33:160-172. https://doi.org/10.1002/art.1780330203
13. Bennett, R.M.; Jones, J.; Turk, D.C.; Russell, I.J.; Matallana, L. An internet survey of 2596 people with fibromyalgia. BMC Musculoskelet, Disord. 2007, 8, 27.
14. Wolfe F.; Clauw, D.J.; Fitzcharles, M.-A.; Goldenberg, D.L.; Katz, R.S.; Mease, P.; Russell, A.S.; Russell, I.J.; Winfield, J.B.; and Yunus, M.B. The American College of Rheumatology Preliminary Diagnostic Criteria for Fibromyalgia and Measu-rement of Symptom Severity. Arthritis Care Res. 2010, 62: 600-610.
15. Kasper, D.L.; Braunwald E.; Fauci, A.S,; Hauser, S.L., Longo, D.L.; Jameson, J.L. Fibromyalgia, Harrison's Principles of Internal. Medicine, 1998, 14th ed. International Edition, McGraw Hill. NYC.
16. Birtane, M.; Uzunca, K.; Tastekin, N.; Tuna, H.; The evaluation of quality of life in fibromyalgia syndrome: a comparison with rheumatoid arthritis by using SF-36 Health Survey. Clin Rheumatol. 2007, 26(5):679-84.
17. Burckhardt, C.S.; Clark, S.R.; Bennett, R.M. Fibromyalgia and quality of life: a comparative analysis. J Rheumatol. 1993, 20(3):475-9.
18. Da Costa, D.; Dobkin, P.L.; Fitzcharles, M.A.; Fortin, P.R.; Beaulieu, A.; Zummer, M. et al. Determinants of health status in fibromyalgia: a comparative study with systemic lupus erythematosus. J Rheumatol. 2000, 27(2):365-72.
19. Hoffman, D.L.; Dukes, E.M. The health status burden of people with fibromyalgia: a review of studies that assessed health status with the SF-36 or the SF-12. Int J Clin Pract. 2008, 62(1):115-26.
20. Kaplan, R.M.; Schmidt, S.M.; Cronan, T.A. Quality of well being in patients with fibromyalgia. J Rheumatol. 2000, 27(3):785-9.
21. Martinez, J.E.; Barauna Filho Filho, I.S.; Kubokawa, K.; Pedreira, I.S.; Machado, L.A.; Cevasco, G. Evaluation of the quali-ty of life in Brazilian women with fibromyalgia, through the medical outcome survey 36 item short-form study. Disabil Rehabil. 2001, 23(2):64-8.
22. Salaffi, F.; Sarzi-Puttini, P.; Girolimetti, R.; Atzeni, F.; Gasparini, S.; Grassi, W. Health-related quality of life in fibromy-algia patients: a comparison with rheumatoid arthritis patients and the general population using the SF-36 health sur-vey. Clin Exp Rheumatol. 2009, 27(5 Suppl 56):S67-74.

23. Wolfe, F.; Smythe, H.A.; Yunus, M.B.; Bennett, R.M.; Bombardier, C.; Goldenberg, D.L.; Tugwell, P.; Campbell, S.M.; Abeles, M.; Clark, P. The prevalence and characteristics of fibromyalgia in the general population. Arthritis Rheum. 1995 Jan, 38(1):19-28.
24. Katz, R.S.; Wolfe, F.; Michaud, K. Fibromyalgia diagnosis: a comparison of clinical, survey, and American College of Rheuma-tology criteria. Arthritis Rheum, 2006, 54(1):169-76.
25. Mendieta, D.; De la Cruz-Aguilera, D.L.; Barrera-Villalpando, M.I.; Becerril-Villanueva, E.; Arreola, R.; Hernandez-Ferreira, E.; Perez-Tapia, S.M.; Perez-Sanchez, G.; Garces-Alvarez, M.E.; Aguirre-Cruz, L.; et al. IL-8 and IL-6 primarily mediate the inflammatory response in fibromyalgia patients. J. Neuroimmunol 2016, 290, 22–25.
26. Bote, M.E.; Garcia, J.J.; Hinchado, M.D.; Ortega, E. An exploratory study of the effect of regular aquatic exercise on the function of neutrophils from women with fibromyalgia: Role of IL-8 and noradrenaline. Brain Behav. Immunol. 2014, 39, 107–112.
27. Littlejohn, G.; Guymer, E. Neurogenic inflammation in fibromyalgia. Semin. Immunopathol. 2018, 40, 291–300.
28. Cankurtaran, D.; Tezel, N.; Ercan, B.; Yildiz, S.Y.; Akyuz, E.U. The effects of COVID-19 fear and anxiety on symptom severity, sleep quality, and mood in patients with fibromyalgia: A pilot study. Adv. Rheumatol. 2021 Jun 30, 61(1):41. doi: 10.1186/s42358-021-00200-9
29. Rodríguez-Mansilla, J.; Mejías-Gil, A.; Garrido-Ardila, E.M.; Jiménez-Palomares, M.; Montanero-Fernández, J.; Gonzá-lez-López-Arza, M.V. Effects of Non-Pharmacological Treatment on Pain, Flexibility, Balance and Quality of Life in Women with Fibromyalgia: A Randomized Clinical Trial. J. Clin. Med. 2021, 10, 3826.
30. Magnus, W.; Viswanath, O.; Viswanathan, V.K.; Mesfin, F.B. Cervical Radiculopathy. 2024 Jan 31. In: StatPearls [Inter-net]. Treasure Island (FL): StatPearls Publishing; 2025 Jan.
31. Bidonde, J.; Busch, A.J.; Schachter, C.L.; Webber, S.; Musselman, K.; Overend, T.J.; Góes, S.M.; Bello-Haas, V.D.; Boden, C. Mixed exercise training for adults with fibromyalgia. Cochrane Database Syst. Rev. 2019, 5, CD013340.
32. Sarmento, C.V.M.; Moon, S.; Pfeifer, T.; Steinbacher, M.; Smirnova, I.V.; Colgrove, Y.; Lai, S.M.; Maz, M.; Liu, W. In-flammatory response to a bout of high-intensity exercise in females with fibromyalgia. Sport Sci. Health 2022, 18, 1051-1059.
33. Tarcău, E., Boca, I.C. Balneo-hidro-kinetoterapie, Editura Risoprint, Cluj Napoca, 2024 ISBN 978-973-53-3208-2
34. Bidonde, J.; Busch, A.J.; Schachter, C.L.; Overend, T.J.; Kim, S.Y.; Góes, S.M.; Boden, C.; Foulds, H.J. Aerobic exercise training for adults with fibromyalgia. Cochrane Database Syst. Rev. 2017, 6.
35. Pilozzi, A.; Carro, C.; Huang, X. Roles of β-Endorphin in Stress, Behavior, Neuroinflammation, and Brain Energy Metabolism. International Journal of Molecular Sciences 2020, 22 (1): 338. doi:10.3390/ijms22010338
36. Sprouse-Blum, A.S.; Smith, G.; Sugai, D.; Parsa, F.D. Understanding endorphins and their importance in pain man-agement. Hawaii Medical Journal. 2010, 69 (3): 70-71.
37. Paolucci, T.; de Sire, A.; Ferrillo, M.; di Fabio, D.; Molluso, A.; Patruno, A.; Pesce, M.; Lai, C.; Ciacchella, C.; Saggino, A.; Agostini, F.; Tommasi, M. Telerehabilitation proposal of mind-body technique for physical and psychological outcomes in patients with fibromyalgia. Front Physiol. 2022 Aug 26, 13:917956. doi: 10.3389/fphys.2022.917956
38. Meulenberg, C.J.W.; de Bruin, E.D.; Marusic, U. A perspective on implementation of technology-driven exergames for adults as telerehabilitation services. Front. Psychol. 2022, 13, 840863. 10.3389/fpsyg.2022.840863
39. Theadom, A.; Cropley, M.; Smith, H.E.; Feigin, V.L.; McPherson, K. Mind and body therapy for fibromyalgia. Cochrane Database Syst Rev. 2015 Apr 9, 2015(4):CD001980. doi: 10.1002/14651858.CD001980.pub3
40. Haugmark, T.; Hagen, K.B.; Smedslund, G.; Zangi, H.A. Mindfulness and acceptance-based interventions for patients with fibromyalgia - A systematic review and meta-analyses. PLoS One. 2019 Sep 3, 14(9): e0221897. doi: 10.1371/journal.pone.0221897
41. Agostini, F.; Mangone, M.; Ruiu, P.; Paolucci, T.; Santilli, V.; Bernetti, A. Rehabilitation setting during and after Covid-19: An overview on recommendations. J. Rehabil. Med. 2021 Jan 5, 53(1): jrm00141. doi: 10.2340/16501977-2776
42. Cankurtaran, D.; Tezel, N.; Ercan, B.; Yildiz, S.Y.; Akyuz, E.U. The effects of COVID-19 fear and anxiety on symptom severity, sleep quality, and mood in patients with fibromyalgia: A pilot study. Adv. Rheumatol. 2021 Jun, 30;61(1):41. doi: 10.1186/s42358-021-00200-9
43. Iconaru, I.E., Tarcău, E., Ciucurel, M.M., Drăghici, L., Ciucurel, C. The Relationship between Physical Activity Level and Sociodemographic Factors in Romanian Adults in the Post-COVID-19 Pandemic Period. MDPI Sustainability 2023, Vol 15, Issue 18.
44. Sañudo, B.; Galiano, D.; Carrasco, L.; Blagojevic, M.; Hoyo, M.; Saxton, J. Aerobic Exercise Versus Combined Exercise Therapy in Women With Fibromyalgia Syndrome: A Randomized. Arch. Phys. Med. Rehabil. 2010, 91, 1838-1843.
45. Assumpçao, A.; Matsutani, L.A.; Yuan, S.L.; Santo, A.S.; Sauer, J.; Mango, P.; Marques, A.P. Muscle stretching exercises and resistance training in fibromyalgia: which is better? A three-arm randomized controlled trial. Eur. J. Phys. Rehabil. Med. 2017, 54, 663-670.
46. Jones, K.D.; Burckhardt, C.S.; Clark, S.R.; Bennett, R.M.; Potempa, K.M. A randomized controlled trial of muscle stren-gthening versus flexibility training in fibromyalgia. J. Rheumatol. 2002, 29, 1041-1048.
47. Cleeland, C.S.; Ryan, K.M. Pain assessment: global use of the Brief Pain Inventory. Ann Acad Med Singapore 1994 Mar, 23(2):129-38.

48. Darnall B.D.; Sturgeon, J.A.; Cook, K.F.; Taub, C.J.; Roy, A.; Burns, J.W.; Sullivan, M.; Mackey, S.C. Development and Validation of a Daily Pain Catastrophizing Scale. J Pain 2017 Sep, 18(9):1139-1149. doi: 10.1016/j.jpain.2017.05.003.003
49. Edwards, R.R.; Calahan, C.; Mensing, G.; Smith, M.; Haythornthwaite, J.A. Pain, catastrophizing, and depression in the rheumatic diseases Nat. Nat. Rev. Rheumatol. 2011, 7, 216-224.
50. Rodríguez-Mansilla, J.; Mejías-Gil, A.; Garrido-Ardila, E.M.; Jiménez-Palomares, M.; Montanero-Fernández, J.; Gonzá-lez-López-Arza, M.V. Effects of Non-Pharmacological Treatment on Pain, Flexibility, Balance and Quality of Life in Women with Fibromyalgia: A Randomized Clinical Trial. J. Clin. Med. 2021, 10, 3826.
51. Bidonde, J.; Busch, A.J.; Schachter, C.L.; Webber, S.; Musselman, K.; Overend, T.J.; Góes, S.M.; Bello-Haas, V.D.; Boden, C. Mixed exercise training for adults with fibromyalgia. Cochrane Database Syst. Rev. 2019, 5.
52. Sarmento, C.V.M.; Moon, S.; Pfeifer, T.; Steinbacher, M.; Smirnova, I.V.; Colgrove, Y.; Lai, S.M.; Maz, M.; Liu, W. In-flammatory response to a bout of high-intensity exercise in females with fibromyalgia. Sport Sci. Health 2022, 18, 1051-1059.
53. Izquierdo-Alventosa, R.; Inglés, M.; Cortés-Amador, S.; Gimeno-Mallench, L.; Chirivella-Garrido, J.; Kropotov, J.; Serra-Añó, P. Low-Intensity Physical Exercise Improves Pain Catastrophizing and Other Psychological and Physical Aspects in Women with Fibromyalgia: A Randomized Controlled Trial. Int. J. Environ. Res. Public Health 2020, 17, 3634. https://doi.org/10.3390/ijerph17103634
54. Vrouva, S.; Sopidou, V.; Koutsioumpa, E.; Chanopoulos, K.; Nikolopoulou, A.; Papatsimpas, 40. V.; Koumantakis, G.A. Can Exercise Affect the Pain Characteristics in Patients with Fibromyalgia? A Randomized Controlled Trial. Healthcare 2022, 10, 2426. https://doi.org/10.3390/healthcare10122426.
55. Salazar, A.P.; Stein, C.; Marchese, R.R.; et al. Electric Stimulation for Pain Relief in Patients with Fibromyalgia: A Syste-matic Review and Meta-analysis of Randomized Controlled Trials. Pain Physician 2017, 20(2): 15-25.
56. de Gier, M.; Peters, M.L.; Vlaeyen, J.W. Fear of pain, physical performance, and attentional processes in patients with fibromyalgia. PAIN 2003, 104:121-30.
57. Lazaridou, A.; Paschali, M.; Schreiber, K.; et al. The association between daily physical exercise and pain among women with fibromyalgia: the moderating role of pain catastrophizing. Pain Rep. 2020, 5(4):e832. doi:10.1097/PR9.0000000000000832
58. Hauser, W.; Klose, P.; Langhorst, J.; Moradi, B.; Steinbach, M.; Schiltenwolf, M.; Busch, A. Efficacy of different types of aerobic exercise in fibromyalgia syndrome: a systematic review and meta-analysis of randomized controlled trials. Arthritis Res Ther 2010, 12:R79.