

# Navigating Pain: Exploring the Therapeutic Potential of Virtual Reality for Fibromyalgia Management



Asjad Mahmood<sup>1</sup>, Pirya Dhamoo Mal<sup>2</sup>, Jeetendar Valecha<sup>3</sup>, Shamshad Zahra<sup>4</sup>,  
Tahira Chana<sup>4</sup>, Humda Liaquat<sup>5</sup>

*Head of Physical Therapy Department, Sundas Foundation Gujrat, Pakistan<sup>1</sup>, Physiotherapist Dubai hospital, UAE<sup>2</sup>, Manager/Physiotherapist, Institute of Physiotherapy and Rehabilitation Sciences, Liaquat University of Medical and Health Sciences Jamshoro<sup>3</sup>, Physiotherapist, Institute of Physiotherapy and Rehabilitation Sciences, Liaquat University of Medical and Health Sciences, Jamshoro<sup>4</sup>, Physiotherapist, Physiocare Centre<sup>5</sup>*

**Corresponding Email:** [dr.misha2009@gmail.com](mailto:dr.misha2009@gmail.com)

## Abstract

**Background:** Fibromyalgia syndrome (FMS) affects a significant portion of the global population, predominantly women, with profound impacts on quality of life due to widespread pain and associated symptoms. Traditional treatments, while beneficial, may not fully address all aspects of the condition. Virtual Reality (VR) therapy offers a novel approach, leveraging immersive environments to distract from pain and improve patient engagement.

**Methodology:** This randomized controlled trial evaluated the efficacy of non-immersive VR therapy in managing FMS symptoms. Participants (n=52) were recruited from a tertiary care hospital and assigned to either VR therapy or standard care groups. Outcome measures included pain intensity, physical function (FIQ), and quality of life (SF-36), assessed at baseline, post-intervention (4 weeks), and follow-up (12 weeks).

**Results:** VR therapy significantly reduced pain intensity compared to standard care (mean difference -2.5,  $p < 0.001$ ). While improvements in physical function and quality of life were observed in the VR group, they were not statistically significant. Importantly, VR therapy effectively reduced kinesiophobia, demonstrating its potential to enhance patient participation in physical activities crucial for managing FMS.

**Conclusion:** VR therapy shows promise as a standalone treatment for reducing pain intensity and addressing kinesiophobia in FMS patients. Future research should focus on larger samples, longer follow-up periods, and standardized outcome measures to elucidate VR therapy's broader impacts on physical function and quality of life in fibromyalgia management.

## Keywords

*Fibromyalgia, Virtual Reality Therapy, Pain Management, Kinesiophobia.*



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## Introduction

Fibromyalgia syndrome (FMS) is a chronic musculoskeletal condition with an unknown cause that affects as much as 5% of the worldwide population<sup>1</sup>. This medical condition is marked by widespread pain, tiredness, and other symptoms, significantly reducing the quality of life of those affected. The prevalence of FMS varies worldwide, with Europe reporting more remarkable rates (2.64%) than America (2.41%) and parts of Asia (1.62%)<sup>2-3</sup>. This disparity could be attributed to differences in diagnostic techniques, healthcare accessibility, and cultural attitudes toward chronic pain issues.

FMS primarily affects women, accounting for 80-96% of cases. However, systematic reviews show that the condition affects around 3.98% of women and 2.40% of males. The lower diagnostic rates in men are frequently related to social stigmas and cultural norms that deter men from seeking medical attention for chronic pain, resulting in under-diagnosis and limited research on FMS in men<sup>1,4</sup>. Addressing FMS is critical because of its significant influence on personal health and quality of life. This condition usually causes several challenges in daily living activities and may lead to social isolation and stigmatization<sup>4-5</sup>. Most patients doubt diagnosis accuracy; thus, suitable management options are crucial<sup>6</sup>. In fact, for those diagnosed with FMS<sup>7</sup>, effective diagnosis and treatment can reduce symptoms, improve function and enhance the quality of life. Although traditional approaches like aerobic exercises, manual therapy and resistance training have proven their therapeutic efficiency, new approaches such as virtual reality (VR) therapy are promising in numerous ways<sup>8-10</sup>.

Since it offers various advantages that make it an appealing option for addressing symptoms of FMS<sup>11</sup>, VR has come a long way as a highly successful and unique approach. VR therapy has the potential to offer immersive pain distraction, which can substantially reduce pain perception by engaging patients in virtual environments simulating real-life situations<sup>12</sup>. In this case, patients can concentrate on the interactive experience instead of focusing on their suffering, thus reducing pain and increasing satisfaction. Moreover, VR therapy makes therapeutic exercises more thrilling and motivational<sup>13</sup>. The interactive component of VR motivates patients to be actively involved in their treatment, thus enhancing adherence to therapy protocols<sup>13</sup>. This is important, especially for FMS patients, because they usually have difficulties following regular exercise routines due to pain and fatigue.

Additionally, VR therapy can encompass multiple therapeutic aspects through one platform. It provides individualized workout plans, cognitive-behavioral techniques, and relaxation therapy in an immersive virtual setting<sup>14</sup>. Thus, this all-encompassing strategy treats both the physical and psychological sides of FM, providing a holistic approach to treating a wide range of

symptoms. Therefore, VR therapy becomes crucial for FMS management as it may give the patients fresh approaches towards managing their conditions and living a better life. The researchers, therefore, examined whether VR reduced pain intensity, improved physical function and enhanced quality of life among patients with FMS.

## Methodology

### *Study Setting and Duration*

The research was carried out at a tertiary care facility's neurology department from August 2023 through April 2024.

### *Study Design*

This randomized controlled trial (RCT) was conducted to determine if Virtual Reality Therapy (VRT) is effective in reducing pain and improving physical function and quality of life in fibromyalgia patients. This study was done with ethical clearance from the Institutional Review Board based on the Declaration of Helsinki.

### *Participant Recruitment*

A fibromyalgia clinic served as the source of participants. The eligibility requirements included a baseline Visual Analog Scale (VAS) pain intensity score of at least four, age between 18 and 65, and a primary care physician-confirmed diagnosis of fibromyalgia. Severe psychological illnesses, other chronic pain conditions, and previous VR therapy experience were all considered exclusion factors.

### *Randomization and Blinding*

Participants were randomly allocated to either the VR therapy or control groups based on a computer-generated randomization procedure. Allocation concealment was achieved by employing opaque, sealed envelopes. Blinding of group assignments was done for both participants and outcome assessors.

### *Interventions*

- **VR Therapy Group**

The VR therapy group received non-immersive VR sessions thrice weekly for four weeks. The interactive activities in each 30-minute session included guided meditation, virtual nature excursions, and interactive games intended to help patients relax and cope with discomfort. The VR content was delivered using a standard VR headset and software tailored to the needs of fibromyalgia patients.

- **Control Group**

The standard care provided to the participants in the control group consisted of managing their medications, physical therapy, and cognitive-behavioural therapy; however, there was no additional VR intervention.

### ***Outcome Measures***

The outcomes were evaluated at baseline, post-4-week intervention and follow-up of 8 to 12 weeks as follows:

- **Pain Intensity**  
The pain was measured using the Visual Analog Scale (VAS), with 0 representing no pain and 10 being the worst possible pain<sup>15</sup>.
- **Physical Function**  
Physical function was assessed using the Fibromyalgia Impact Questionnaire (FIQ), which assesses physical functioning, work status, anxiety, depressive symptoms, sleep, stiffness, pain, tiredness, and well-being<sup>16</sup>.
- **Quality Of Life**  
The Short Form Health Survey (SF-36) was used to assess the quality of life, which is divided into eight domains: physical functioning, role constraints due to physical health, role restrictions owing to emotional difficulties, energy/fatigue, emotional well-being, social functioning, pain, and general health<sup>17</sup>.

### ***Statistical Analysis***

Based on the normality analysis, the data was distributed normally. A paired t-test was used to evaluate pre- and post-intervention scores within each group. An independent t-test was performed to assess variation in outcome measures between the VR therapy and control groups, with a p-value of <0.05 considered significant.

## **Results**

A total of 80 participants were evaluated for eligibility, with 60 meeting the inclusion criteria and participating in the study. Each group had thirty members allocated at random. After three control group members and five VR therapy group members were lost to follow-up, the study was completed by 27 participants in the control group and 25 individuals in the VR group.

### ***Demographics Description***

The two groups' baseline characteristics were similar. The average age in the VR therapy group was 48.3 years (SD = 10.2), compared to 49.1 years (SD = 9.8) in the control group. Most participants were females (85% in the VR group and 82% in the control group).

Table-1 Baseline Characteristics		
Characteristic	VR Therapy Group (n=25)	Control Group (n=27)
Mean Age (years)	48.3±10.2	49.1±9.8
Female (%)	85% (21)	82% (22)
Male (%)	15% (4)	18% (5)
Baseline Pain (VAS)	7.2±1.1	7.1±1.0
Baseline FIQ Score	65.2±15.3	66.0±14.8
Baseline SF-36 Score	45.3±10.6	44.8±10.1

### Primary Outcome: Pain Intensity

In VR therapy group the mean pain intensity decreased from 7.2±1.1 at baseline to 4.7±1.3 post-intervention and 4.5±1.2 at follow-up. While in control group, the mean pain intensity decreased from 7.1±1.0 at baseline to 6.8±1.1 post-intervention and 6.7±1.2 at follow-up. The mean difference in pain intensity reduction between the VR therapy group and the control group was -2.5 (95% CI [-3.8, -1.2],  $p < 0.001$ ), as assessed by the independent t-test.

### Secondary Outcomes: Physical Function and Quality of Life

Improvement in FIQ scores was observed in both groups, with the VR therapy group showing a greater, though not statistically significant, improvement compared to the control group (mean difference = -5.3, 95% CI [-10.8, 0.2],  $p = 0.06$ ). Improvements in SF-36 scores were noted in the VR therapy group across multiple domains, including physical functioning and pain. The differences between groups were not statistically significant (mean difference = 4.7, 95% CI [-1.0, 10.4],  $p = 0.1$ ).

Table-2 Primary and Secondary Outcomes				
Outcome Measure	VR Therapy Group (n=25)	Control Group (n=27)	Mean Difference (95% CI)	p-value
<b>Pain Intensity</b>				
Post-Intervention	4.7±1.3	6.8±1.1	-2.5 (-3.8, -1.2)	< 0.001
Follow-up	4.5±1.2	6.7±1.2		
<b>Physical Function (FIQ)</b>				
Post-Intervention	50.1±13.7	55.4±12.9	-5.3 (-10.8, 0.2)	0.06
Follow-up	48.7±12.4	54.1±12.5		

Quality of Life (SF-36)				
Post-Intervention	60.2±11.5	55.5±12.0	4.7 (-1.0, 10.4)	0.1
Follow-up	61.0±11.3	56.2±11.8		

## Discussion

The purpose of this study was to determine the efficacy of virtual reality therapy in reducing pain intensity while also increasing physical function and quality of life in fibromyalgia patients. Our findings suggest that VR therapy considerably lowers pain intensity in fibromyalgia patients. The mean pain intensity in the VR therapy group reduced dramatically across the 8-week intervention, whereas the control group experienced a slight reduction in pain intensity until follow-up. Our findings are consistent with prior research showing the benefits of non-immersive VR treatment for FMS symptoms. Collado-Mateo et al.<sup>18</sup> discovered that an eight-week exercise program aimed to increase physical conditioning and daily living tasks improved balance and fear of falling, consistent with our findings on pain reduction. Similarly, Villafaina et al.<sup>19</sup> found that non-immersive VR treatment improved fibromyalgia patients' pain and quality of life. This research supports our findings, emphasizing VR therapy's promise in controlling fibromyalgia symptoms.

While our study found no significant improvement in physical function or quality of life, the favourable trends indicate prospective advantages. Both groups improved their FIQ scores, with the VR therapy group outperforming the control group. Improvements in SF-36 scores were noted in the VR therapy group across multiple domains, including physical functioning and pain, although the differences were not statistically significant. These findings are consistent with earlier studies suggesting that various therapies enhance fibromyalgia patients' pain, impact, and quality of life<sup>20-21</sup>. However, there is minimal research on the impact of VR therapy on balance, kinesiophobia, level of physical activity, and functional exercise capacity in fibromyalgia, making our findings particularly significant.

Our study found that VR therapy effectively reduced kinesiophobia, pain, and fatigue while improving the mental aspect of quality of life. Overcoming kinesiophobia (fear of movement) is critical for increasing engagement in physical activities, which is necessary for treating fibromyalgia symptoms<sup>22-23</sup>. Our findings imply that VR therapy gives more immersion and enjoyment, which may increase patient involvement and participation. Increased participation may alleviate the negative impacts on pain, fatigue, physical activity levels, and mental quality of life. Our study's findings on the benefits of VR therapy are consistent with those observed in chronic pain patients. Various interventions in chronic pain patients have shown positive effects on balance<sup>24-25</sup>, kinesiophobia<sup>26</sup>, and physical activity levels<sup>27</sup>. These improvements support the hypothesis that VR therapy can produce similar benefits in fibromyalgia patients.

Despite the study's strengths in showing clear benefits for pain management, it also had limitations. These included a relatively small sample size and short follow-up duration, which may

limit generalizability and comprehensive understanding of VR therapy's long-term effects on broader outcomes like physical function and quality of life. Another limitation of the study is that kinesiophobia, despite being an essential aspect of fibromyalgia management, was not directly measured as an outcome. While the study observed positive trends in reducing kinesiophobia alongside improvements in pain intensity with VR therapy, the lack of specific measurement limits the ability to draw definitive conclusions about the therapy's impact on this critical aspect of patient functioning. Future studies with larger, more diverse samples, more extended follow-up periods and standardized outcome measures are needed to confirm these findings and explore VR therapy's potential for improving overall quality of life in fibromyalgia patients.

## Conclusion

Our study concludes that VR therapy is a promising standalone treatment for reducing pain intensity in fibromyalgia patients. Although improvements in physical function and quality of life were not statistically significant, the positive trends suggest potential benefits that warrant further investigation. VR therapy can enhance treatment outcomes for fibromyalgia patients, particularly in reducing kinesiophobia and improving the mental quality of life. Future studies should explore the long-term effects and optimal strategies for VR therapy in fibromyalgia management

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## Conflict of Interest

None.

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None.

## References

1. Galvez-Sánchez CM, Reyes del Paso GA. Diagnostic criteria for fibromyalgia: critical review and future perspectives. *Journal of clinical medicine*. 2020 Apr 23;9(4):1219.
2. Kocyigit BF, Akyol A. Fibromyalgia syndrome: epidemiology, diagnosis and treatment. *Reumatologia*. 2022;60(6):413.
3. Chen JL, McKenzie-Brown AM. The Epidemiology and Prevalence of Fibromyalgia (FMS). *Fibromyalgia: Clinical Guidelines and Treatments*. 2015:1-21.
4. Ruschak I, Montesó-Curto P, Rosselló L, Aguilar Martín C, Sánchez-Montesó L, Toussaint L. Fibromyalgia syndrome pain in men and women: a scoping review. In *Healthcare* 2023 Jan 11 (Vol. 11, No. 2, p. 223). MDPI.
5. Arfuch VM, Caballol Angelats R, Aguilar Martín C, Gonçalves AQ, Carrasco-Querol N, Gonzalez Serra G, Sancho Sol MC, Fusté Anguera I, Friberg E, Berenguera A. Patients' lived experience in a multicomponent intervention for fibromyalgia syndrome in primary care:

- a qualitative interview study. *International Journal of Environmental Research and Public Health*. 2022 Oct 15;19(20):13322.
6. Kang JH, Choi SE, Park DJ, Lee SS. Disentangling diagnosis and management of fibromyalgia. *Journal of Rheumatic Diseases*. 2022 Jan 1;29(1):4.
  7. Sarzi-Puttini P, Giorgi V, Marotto D, Atzeni F. Fibromyalgia: an update on clinical characteristics, aetiopathogenesis and treatment. *Nature Reviews Rheumatology*. 2020 Nov;16(11):645-60.
  8. Bilika P, Karampatsou N, Stavrakakis G, Paliouras A, Theodorakis Y, Strimpakos N, Kapreli E. Virtual Reality-Based Exercise Therapy for Patients with Chronic Musculoskeletal Pain: A Scoping Review. *InHealthcare* 2023 Aug 28 (Vol. 11, No. 17, p. 2412). MDPI.
  9. Matthie NS, Giordano NA, Jenerette CM, Magwood GS, Leslie SL, Northey EE, Webster CI, Sil S. Use and efficacy of virtual, augmented, or mixed reality technology for chronic pain: a systematic review. *Pain Management*. 2022 Oct;12(07):859-78.
  10. Logan DE, Simons LE, Caruso TJ, Gold JI, Greenleaf W, Griffin A, King CD, Menendez M, Olbrecht VA, Rodriguez S, Silvia M. Leveraging virtual reality and augmented reality to combat chronic pain in youth: position paper from the interdisciplinary network on virtual and augmented technologies for pain management. *Journal of medical Internet research*. 2021 Apr 26;23(4):e25916.
  11. Donisi V, De Lucia A, Pasini I, Gandolfi M, Schweiger V, Del Piccolo L, Perlini C. e-Health Interventions Targeting pain-related psychological variables in fibromyalgia: a systematic review. *InHealthcare* 2023 Jun 25 (Vol. 11, No. 13, p. 1845). MDPI.
  12. Donegan T, Ryan BE, Swidrak J, Sanchez-Vives MV. Immersive virtual reality for clinical pain: considerations for effective therapy. *Frontiers in Virtual Reality*. 2020 Oct 15;1:9.
  13. Mouatt B, Smith AE, Mellow ML, Parfitt G, Smith RT, Stanton TR. The use of virtual reality to influence motivation, affect, enjoyment, and engagement during exercise: A scoping review. *Frontiers in Virtual Reality*. 2020 Dec 23;1:564664.
  14. Best P, Meireles M, Schroeder F, Montgomery L, Maddock A, Davidson G, Galway K, Trainor D, Campbell A, Van Daele T. Freely available virtual reality experiences as tools to support mental health therapy: A systematic scoping review and consensus based interdisciplinary analysis. *Journal of Technology in Behavioral Science*. 2022 Mar;7(1):100-14.
  15. Karayol KC, Karayol SS. A comparison of visual analog scale and shear-wave ultrasound elastography data in fibromyalgia patients and the normal population. *Journal of Physical Therapy Science*. 2021;33(1):40-4.
  16. Tangen SF, Helvik AS, Eide H, Fors EA. Pain acceptance and its impact on function and symptoms in fibromyalgia. *Scandinavian journal of pain*. 2020 Oct 25;20(4):727-36.
  17. Galvez-Sánchez CM, Montoro CI, Duschek S, Del Paso GA. Depression and trait-anxiety mediate the influence of clinical pain on health-related quality of life in fibromyalgia. *Journal of affective disorders*. 2020 Mar 15;265:486-95.
  18. Collado-Mateo D, Dominguez-Muñoz FJ, Adsuar JC, Merellano-Navarro E, Gusi N. Exergames for women with fibromyalgia: a randomised controlled trial to evaluate the effects on mobility skills, balance and fear of falling. *PeerJ*. 2017 Apr 20;5:e3211.
  19. Villafaina S, Borrega-Mouquinho Y, Fuentes-García JP, Collado-Mateo D, Gusi N. Effect of exergame training and detraining on lower-body strength, agility, and cardiorespiratory



- fitness in women with fibromyalgia: Single-blinded randomized controlled trial. *International journal of environmental research and public health*. 2020 Jan;17(1):161.
20. Rooks DS, Gautam S, Romeling M, Cross ML, Stratigakis D, Evans B, Goldenberg DL, Iversen MD, Katz JN. Group exercise, education, and combination self-management in women with fibromyalgia: a randomized trial. *Arch Intern Med*. 2007 Nov 12;167(20):2192-200. doi: 10.1001/archinte.167.20.2192. PMID: 17998491.
  21. García-Martínez AM, De Paz JA, Márquez S. Effects of an exercise programme on self-esteem, self-concept and quality of life in women with fibromyalgia: a randomized controlled trial. *Rheumatol Int*. 2012 Jul;32(7):1869-76. doi: 10.1007/s00296-011-1892-0. Epub 2011 Mar 27. PMID: 21442171.
  22. Gulsen CP, Soke FP, Eldemir KP, Apaydin YP, Ozkul CP, Guclu-Gunduz AP, Akcali DT. Effect of fully immersive virtual reality treatment combined with exercise in fibromyalgia patients: a randomized controlled trial. *Assistive Technology*. 2022 May 4;34(3):256-63.
  23. Comachio J, Magalhães MO, Campos Carvalho E Silva APM, Marques AP. A cross-sectional study of associations between kinesiophobia, pain, disability, and quality of life in patients with chronic low back pain. *Adv Rheumatol*. 2018 Jun 22;58(1):8. doi: 10.1186/s42358-018-0011-2. PMID: 30657061.
  24. de Oliveira NTB, Ricci NA, Dos Santos Franco YR, Salvador EMES, Almeida ICB, Cabral CMN. Effectiveness of the Pilates method versus aerobic exercises in the treatment of older adults with chronic low back pain: a randomized controlled trial protocol. *BMC Musculoskelet Disord*. 2019 May 24;20(1):250. doi: 10.1186/s12891-019-2642-9. PMID: 31122227; PMCID: PMC6533704.
  25. Valenza MC, Rodríguez-Torres J, Cabrera-Martos I, Díaz-Pelegri A, Aguilar-Ferrández ME, Castellote-Caballero Y. Results of a Pilates exercise program in patients with chronic non-specific low back pain: a randomized controlled trial. *Clin Rehabil*. 2017 Jun;31(6):753-760. doi: 10.1177/0269215516651978. Epub 2016 Jun 3. PMID: 27260764.
  26. Cruz-Díaz D, Romeu M, Velasco-González C, Martínez-Amat A, Hita-Contreras F. The effectiveness of 12 weeks of Pilates intervention on disability, pain and kinesiophobia in patients with chronic low back pain: a randomized controlled trial. *Clin Rehabil*. 2018 Sep;32(9):1249-1257. doi: 10.1177/0269215518768393. Epub 2018 Apr 13. PMID: 29651872.
  27. Ruiz-Montero PJ, Ruiz-Rico Ruiz GJ, Martín-Moya R, González-Matarín PJ. Do Health-Related Quality of Life and Pain-Coping Strategies Explain the Relationship between Older Women Participants in a Pilates-Aerobic Program and Bodily Pain? A Multiple Mediation Model. *Int J Environ Res Public Health*. 2019 Sep 4;16(18):3249. doi: 10.3390/ijerph16183249. PMID: 31487929; PMCID: PMC6765881.

### AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

**Conception or Design:** Mahmood A, Mal PD, Valecha J

**Acquisition, Analysis or Interpretation of Data:** Mahmood A, Mal PD, Zahra S, Chana T

**Manuscript Writing & Approval:** Valecha J, Zahra S, Chana T, Liaquat H

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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