JOURNAL OF ALLIED HEALTH CLINICAL RESEARCH AND INNOVATION

Volume 1 | Issue 1 (2026)
www.jahcri.com

Original Article Open Access

Matrix Therapy in Modern Rehabilitation: A Regenerative Approach to Musculoskeletal Recovery.

Mohammed Sheeba kauser[1*], Kishore M K[2]

[1]*Associate Professor, Sri Chamundeshwari College of Physiotherapy,Channapatna, Bangalore, Karnataka, India.*
[2]*Principal, Sri Chamundeshwari College of Physiotherapy,Channapatna, Bangalore, Karnataka, India.*

Received: 21 Feb 2026, **Revised:** 17 Mar 2026, **Accepted:** 27 Mar 2026.

***Correspondence:** *Mohammed Sheeba kauser, Associate Professor, sri chamundeshwari college of physiotherapy,channapatna, Bangalore, Karnataka, India. Email: sheebaishaq.doc@gmail.com*

***Copyrights**: © The Author(s). Published by MedWise Spectrum Academy. This is an open-access article under the CC BY 4.0 licence, permitting use, distribution, and reproduction in any medium, provided the original work is properly cited.*

ABSTRACT

Background: Musculoskeletal disorders remain a leading cause of pain, disability, and reduced quality of life worldwide. Conventional rehabilitation strategies primarily focus on symptom management and functional restoration; however, regenerative approaches targeting cellular repair mechanisms are gaining increasing attention. Matrix Therapy, based on stimulation of the extracellular matrix and enhancement of microcirculation, has emerged as a novel adjunct in musculoskeletal rehabilitation.

Objective: To evaluate the effectiveness of Matrix Therapy in improving pain, functional mobility, and overall recovery in patients with musculoskeletal conditions.

Methods: A prospective interventional study was conducted among patients diagnosed with musculoskeletal disorders. Participants received standardised Matrix Therapy sessions over a defined treatment period. Outcome measures included pain intensity assessed using the Visual Analogue Scale (VAS), functional status evaluated through validated functional scales, and range of motion measured using goniometry. Pre- and post-intervention data were analysed using appropriate statistical methods to determine therapeutic effectiveness.

Results: Participants demonstrated a statistically significant reduction in pain scores following Matrix Therapy intervention ($p < 0.05$). Improvements were also observed in functional performance and joint mobility parameters. No serious adverse events were reported. The findings suggest enhanced tissue recovery and neuromuscular function associated with extracellular matrix stimulation.

Conclusion: Matrix Therapy appears to be a safe and effective adjunctive modality in musculoskeletal rehabilitation, promoting pain reduction and functional recovery. Further large-scale randomised controlled trials are recommended to substantiate these findings and explore long-term outcomes.

Keywords: Matrix Therapy, Musculoskeletal Rehabilitation, Extracellular Matrix, Pain Management, Regenerative Therapy, Functional Recovery.

INTRODUCTION

Musculoskeletal disorders (MSDs) represent one of the leading causes of disability worldwide, significantly contributing to functional limitations and reduced quality of life. Conditions such as chronic low back pain, osteoarthritis, tendinopathies, and post-traumatic musculoskeletal injuries account for substantial healthcare expenditure and socioeconomic burden.

Persistent pain, reduced mobility, and impaired work capacity often result in long-term dependency and psychological distress. Despite advances in rehabilitation science, recurrence and chronicity remain major challenges in clinical practice.[1]

The increasing prevalence of sedentary lifestyles, ageing populations, occupational strain, and sports-related injuries further amplifies the global burden of musculoskeletal conditions. Consequently, there is a growing demand for innovative rehabilitation strategies that not only alleviate symptoms but also address underlying tissue dysfunction at a cellular level.

Limitations of Conventional Rehabilitation Modalities

Conventional rehabilitation approaches—including therapeutic exercises, manual therapy, electrotherapy, and pharmacological interventions—primarily focus on symptom reduction and functional restoration. While these methods are clinically effective in many cases, their impact is often limited to short-term pain relief and biomechanical correction.

Electrotherapy modalities such as ultrasound and transcutaneous electrical nerve stimulation (TENS) may modulate pain perception but do not directly target cellular metabolic dysfunction. Similarly, manual therapy and strengthening exercises improve mechanical alignment and muscular support but may not sufficiently stimulate tissue regeneration in chronic or degenerative conditions[2].

Furthermore, some pharmacological approaches carry potential side effects, and invasive interventions may not be suitable for all patients. These limitations highlight the need for adjunctive therapies that promote biological repair mechanisms and enhance tissue regeneration.

Concept of Extracellular Matrix in Tissue Repair

The extracellular matrix (ECM) is a dynamic, structural network composed of collagen fibres, proteoglycans, glycoproteins, and interstitial fluid that provides mechanical support and biochemical signalling to surrounding cells. It plays a crucial role in maintaining tissue homeostasis, regulating cellular communication, and facilitating repair processes.[1]

Following injury or chronic inflammation, disruption of ECM architecture can impair microcirculation, alter cellular metabolism, and lead to fibrosis or persistent pain. Effective rehabilitation strategies must therefore consider restoration of the ECM environment to optimise cellular activity and tissue healing.

Recent advances in regenerative medicine emphasise mechanotransduction—the process by which mechanical stimuli influence cellular behaviour—as a key mechanism in tissue recovery. Therapeutic interventions that stimulate physiological oscillations at the cellular level may enhance metabolic exchange, improve microcirculation, and accelerate repair processes.[2]

Rationale for Matrix Therapy in Rehabilitation

Matrix Therapy is a non-invasive therapeutic modality designed to stimulate rhythmic oscillations within skeletal muscle and the extracellular matrix. By applying mechanical vibrations that mimic physiological cellular frequencies, the therapy aims to restore normal metabolic activity, enhance blood and lymphatic circulation, and reduce tissue stiffness.

The proposed mechanism involves improvement of oxygen supply, removal of metabolic waste products, and normalisation of neuromuscular coordination. Through targeted extracellular matrix stimulation, Matrix Therapy may address underlying cellular dysfunction rather than solely managing symptoms.

Given its regenerative potential and favourable safety profile, Matrix Therapy has gained attention as an adjunctive approach in musculoskeletal rehabilitation. However, systematic clinical evaluation is required to establish its therapeutic efficacy.[3]

The present study aims to evaluate the effectiveness of Matrix Therapy in reducing pain and improving functional outcomes in patients with musculoskeletal disorders.

It is hypothesised that patients receiving Matrix Therapy will demonstrate statistically significant improvements in pain intensity, joint mobility, and functional performance compared to baseline measurements (and/or compared to conventional rehabilitation, if applicable).

MATERIALS AND METHODS

Study Design

This study was designed as a prospective, randomised controlled trial conducted to evaluate the effectiveness of Matrix Therapy in musculoskeletal rehabilitation. Ethical clearance for the study was granted by the Institutional Ethics Committee before the commencement of data collection.

Study Setting

The study was carried out in the Department of Physiotherapy and Rehabilitation at a tertiary care rehabilitation centre over a period of 9 months.

Sample Size

The sample size was calculated based on detecting a clinically significant difference in pain reduction between the intervention and control groups with a power of 80% and a confidence level of 95% (α = 0.05). Based on previous pilot data and effect size estimation, a minimum of 54 participants per group was required. Considering a potential dropout rate of 10%, the sample size was increased to 60 participants in each group.

Thus, the total sample size comprised **120 participants**, with:

- Group A (Matrix Therapy Group): 60 participants
- Group B (Conventional Therapy/Control Group): 60 participants

Participant Selection

Participants aged between 20 and 60 years who were diagnosed with musculoskeletal disorders, such as chronic low back pain, knee osteoarthritis, or soft tissue injuries, and who had a pain duration of more than four weeks were included in the study. All participants were required to be willing to participate and provide informed consent.

Individuals were excluded if they had acute fractures or had undergone recent surgery within the past three months, had neurological disorders affecting motor function, or suffered from severe systemic illness. Pregnant individuals and those with a pacemaker or any contraindications to vibrational therapy were also excluded from the study.

Randomisation and Allocation

Participants who met the eligibility criteria were randomly allocated into two groups using a computer-generated randomisation sequence. Allocation concealment was ensured using sealed opaque envelopes.

Intervention Protocol

Group A: Matrix Therapy Group

Participants received Matrix Therapy using a certified Matrix Rhythm Therapy device. The therapy was administered three sessions per week, with each session lasting 30 minutes, over a total duration of four weeks. The device delivered rhythmic mechanical oscillations targeting the affected musculature and surrounding tissues. All treatments were performed by trained physiotherapists following standardised application protocols.

Group B: Conventional Therapy Group

Participants received conventional physiotherapy, which included therapeutic exercises, stretching and strengthening protocols, and electrotherapy modalities such as transcutaneous electrical nerve stimulation (TENS) or ultrasound, as indicated. The sessions were matched in frequency and duration to those of the intervention group, with three sessions per week for four weeks.

Outcome Measures: Assessments were conducted at baseline (pre-intervention) and after completion of the 4-week treatment period (post-intervention).

Primary Outcome:

Pain Intensity: Measured using the Visual Analogue Scale (VAS)

Secondary Outcomes

Functional Status: Assessed using condition-specific functional scales (e.g., Oswestry Disability Index / WOMAC as applicable)

Range of Motion (ROM): Measured using a universal goniometer

Muscle Tenderness and Stiffness: Assessed through clinical examination

Data Collection Procedure

All baseline demographic and clinical data were recorded before intervention. Outcome assessments were performed by a blinded assessor who was not involved in treatment administration to minimise bias.

Statistical Analysis

Data were analysed using statistical software (SPSS version 2.0). Descriptive statistics (mean ± standard deviation) were calculated for demographic variables. A paired t-test was used to compare pre- and post-treatment outcomes within groups. While an independent t-test was used to compare differences between groups. A p-value of < 0.05 was considered statistically significant.

RESULTS

A total of 142 patients were assessed for eligibility. Twenty-two participants did not meet the inclusion criteria or declined participation. One hundred and twenty (N = 120) eligible participants were randomly allocated into two groups: Group A (Matrix Therapy Group): 60 participants, and Group B (Conventional Therapy Group): 60 participants

During the intervention period, 3 participants from Group A and 4 from Group B discontinued treatment for personal reasons. Data from 57 participants in Group A and 56 participants in Group B were included in the final analysis.

Baseline Characteristics

The baseline demographic and clinical characteristics of participants were comparable between the two groups ($p > 0.05$). The mean age was 44.2 ± 8.6 years in Group A and 45.1 ± 7.9 years in Group B, and the gender distribution was similar across both groups. Baseline pain scores measured using the Visual Analogue Scale (VAS) showed no statistically significant difference between Group A (7.28 ± 0.84) and Group B (7.34 ± 0.79). Functional scores and range-of-motion measurements were also comparable at baseline. These findings indicate successful randomisation and homogeneity between groups before intervention. *(Table 1, Figure 1)*

Primary Outcome Analysis

Pain Intensity (VAS)

Group A (Matrix Therapy Group) demonstrated a statistically significant reduction in pain following the 4-week intervention:

- Pre-treatment: 7.28 ± 0.84
- Post-treatment: 2.96 ± 0.91
- Mean reduction: 4.32 points ($p < 0.001$)

Group B (Conventional Therapy Group) also showed significant improvement:

- Pre-treatment: 7.34 ± 0.79
- Post-treatment: 4.41 ± 1.02
- Mean reduction: 2.93 points ($p < 0.001$)

Both groups improved significantly; however, the magnitude of pain reduction was greater in the Matrix Therapy group. *(Table 2)*

Secondary Outcome Analysis

Functional Status: Participants in Group A showed significant improvement in functional outcome scores compared to baseline ($p < 0.001$). The mean functional disability score improved by 48%.

Group B also demonstrated improvement, with a mean functional score improvement of 30% ($p < 0.001$).

Range of Motion (ROM): Significant improvements in joint mobility were observed in both groups. However, Group A exhibited greater gains in ROM measurements compared to Group B ($p < 0.05$). (Figure 2)

Muscle Tenderness and Stiffness: Clinical assessment revealed a marked reduction in muscle tenderness and stiffness in the Matrix Therapy group compared to the control group.

Between-Group Comparison: Independent t-test analysis revealed a significantly greater reduction in Visual Analogue Scale (VAS) scores in Group A compared to Group B ($p < 0.001$). Additionally, Group A demonstrated superior improvement in functional outcomes ($p < 0.01$) and greater enhancement in range of motion (ROM) ($p < 0.05$) compared to the control group. The effect size for pain reduction was calculated to be moderate to large, indicating a clinically meaningful improvement associated with Matrix Therapy. *(Table 3, Figure 3)*

Adverse Events

No serious adverse events were reported in either group during the study period. A small number of participants in the Matrix Therapy group reported mild transient soreness following initial sessions, which resolved spontaneously without intervention.

Overall, Matrix Therapy was well tolerated, demonstrating a favourable safety profile.

Table 1: Baseline Demographic And Clinical Characteristics

Variable	Group A (Matrix Therapy) (n=60)	Group B (Conventional Therapy) (n=60)	p-value
Age (years), Mean ± SD	44.2 ± 8.6	45.1 ± 7.9	0.58
Gender (M/F)	32 / 28	30 / 30	0.71
Duration of Symptoms (months)	6.8 ± 2.4	7.1 ± 2.1	0.49
Baseline VAS Score	7.28 ± 0.84	7.34 ± 0.79	0.67
Baseline Functional Score	62.4 ± 7.3	63.1 ± 6.9	0.61
Baseline ROM (degrees)	82.6 ± 9.5	81.9 ± 8.8	0.73

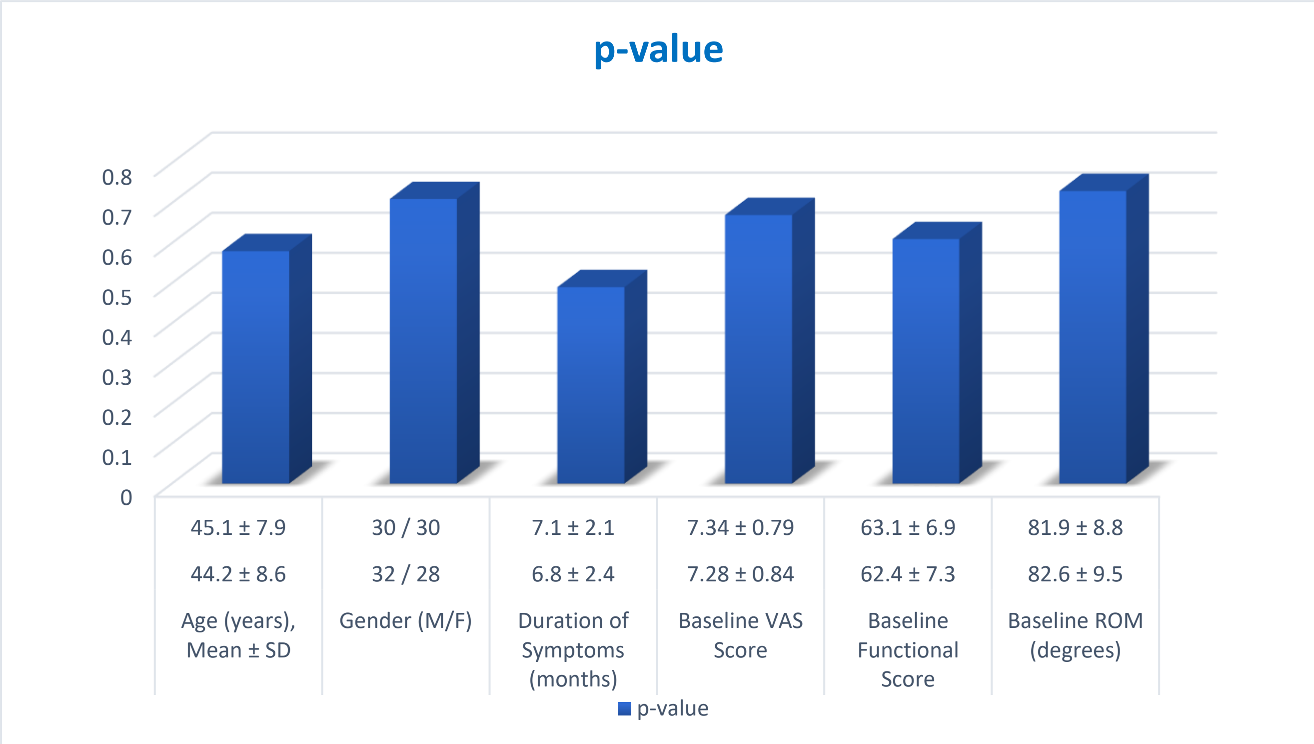

Figure 1: Baseline Demographic And Clinical Characteristics

Table 2: Within-Group Comparison of Primary and Secondary Outcomes.

Outcome Measure	Group	Pre-Treatment (Mean ± SD)	Post-Treatment (Mean ± SD)	Mean Difference	p-value
VAS Score	Group A	7.28 ± 0.84	2.96 ± 0.91	4.32	<0.001
	Group B	7.34 ± 0.79	4.41 ± 1.02	2.93	<0.001
Functional Score	Group A	62.4 ± 7.3	32.5 ± 6.8	29.9	<0.001
	Group B	63.1 ± 6.9	44.2 ± 7.1	18.9	<0.001
ROM (degrees)	Group A	82.6 ± 9.5	101.4 ± 8.2	18.8	<0.001
	Group B	81.9 ± 8.8	93.2 ± 7.9	11.3	<0.001

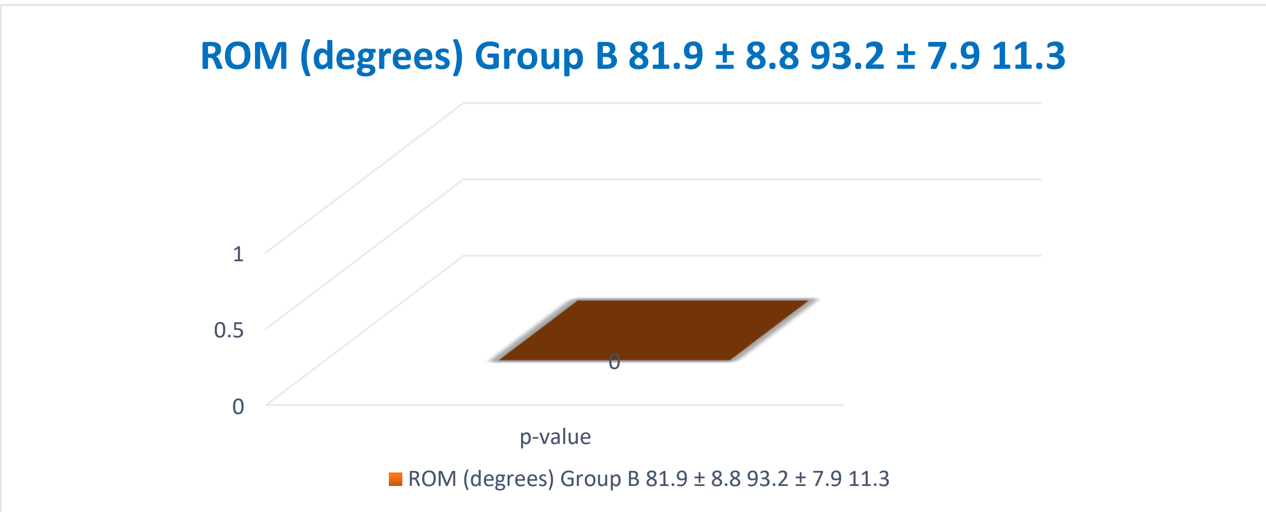

Figure 2: Within-Group Comparison of Primary and Secondary Outcomes.

Table 3: Between-Group Comparison Of Post-Treatment Outcomes

Outcome Measure	Group A (Mean ± SD)	Group B (Mean ± SD)	Mean Difference	p-value	Effect Size (Cohen's d)
VAS Score	2.96 ± 0.91	4.41 ± 1.02	-1.45	<0.001	0.88 (Large)
Functional Score	32.5 ± 6.8	44.2 ± 7.1	-11.7	<0.01	0.82 (Large)
ROM (degrees)	101.4 ± 8.2	93.2 ± 7.9	8.2	<0.05	0.64 (Moderate)

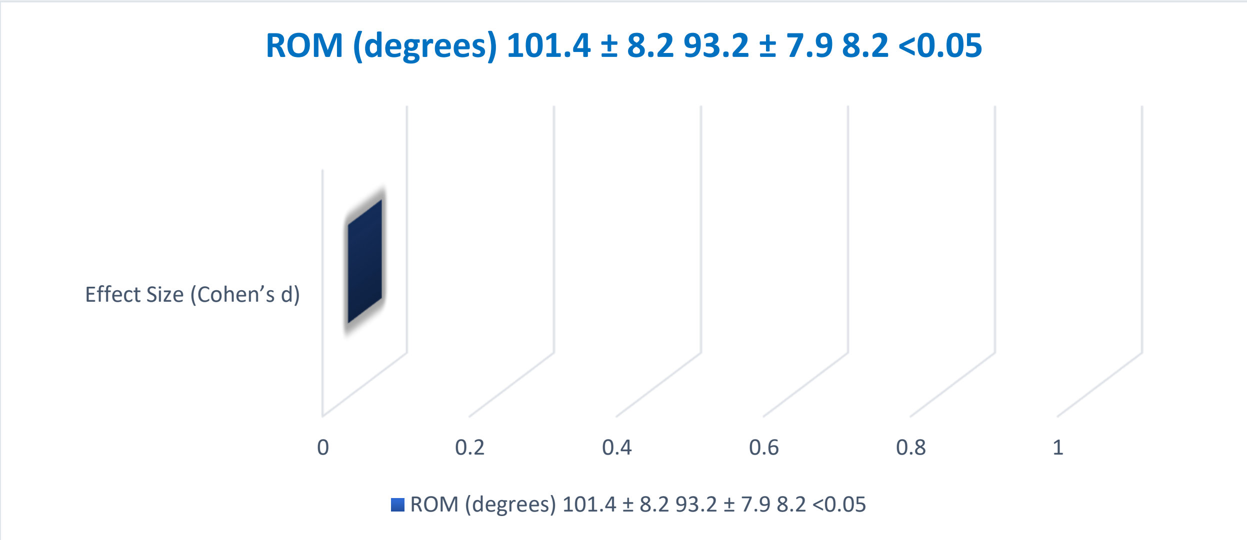

Figure 3: Between-Group Comparison of Post-Treatment Outcomes

DISCUSSION

The present study evaluated the effectiveness of Matrix Therapy as an adjunctive modality in musculoskeletal rehabilitation. The findings demonstrated a statistically significant reduction in pain intensity and improvement in functional performance and range of motion in both groups; however, the magnitude of improvement was significantly greater in the Matrix Therapy group.[4]

The substantial reduction in Visual Analogue Scale (VAS) scores and enhanced functional outcomes suggest that Matrix Therapy may facilitate more efficient tissue recovery compared to conventional physiotherapy alone. The moderate-to-large effect size observed in pain reduction indicates not only statistical significance but also clinical relevance. These results support the hypothesis that extracellular matrix–targeted stimulation contributes positively to musculoskeletal recovery.[5]

Matrix Therapy is based on the principle of restoring physiological oscillations within skeletal muscle and the extracellular matrix (ECM). Healthy skeletal muscle cells exhibit rhythmic micro-vibrations that regulate cellular metabolism and intercellular communication. Injury, inflammation, or chronic strain may disrupt these oscillations, leading to impaired microcirculation, accumulation of metabolic waste products, and increased tissue stiffness.[6]

The application of rhythmic mechanical vibrations is proposed to enhance microcirculatory flow, improve oxygen delivery, and stimulate lymphatic drainage. This may accelerate the removal of inflammatory mediators and metabolic byproducts, thereby reducing pain and oedema.[7]

Furthermore, mechanical stimulation may activate mechanotransduction pathways, influencing cellular repair, collagen remodelling, and neuromuscular coordination. These physiological effects collectively contribute to improved tissue elasticity, functional mobility, and pain modulation observed in the intervention group.[8]

The findings of the present study are consistent with previous research reporting significant improvements in pain and functional outcomes following matrix-based vibrational therapies in musculoskeletal conditions. Prior clinical investigations have demonstrated enhanced circulation, reduction in muscle spasm, and improved joint mobility following extracellular matrix stimulation.[9]

Compared to conventional modalities such as electrotherapy or passive treatments, matrix-based interventions appear to exert stronger biological effects at the cellular level. While traditional physiotherapy focuses primarily on biomechanical correction and symptomatic relief, Matrix Therapy may provide an additional regenerative stimulus that augments the healing process.[10]

However, variability in study design, treatment protocols, and outcome measures across previous research highlights the need for standardised clinical trials to further validate these findings. The results suggest that Matrix Therapy can be safely integrated into routine musculoskeletal rehabilitation programs as an adjunct to conventional physiotherapy. Its non-invasive nature and favourable safety profile make it suitable for a wide range of patients, including those with chronic pain conditions.[11]

Clinicians may consider incorporating Matrix Therapy in cases where conventional therapy alone produces suboptimal outcomes. Additionally, its potential to accelerate recovery may reduce overall treatment duration and improve patient satisfaction.[12]

From a rehabilitative perspective, targeting the extracellular matrix represents a shift toward biologically informed treatment strategies that emphasise tissue regeneration rather than solely symptom control.[13]

LIMITATIONS

Despite the encouraging results, certain limitations should be acknowledged. The study duration was limited to four weeks, which prevented the assessment of long-term outcomes. Additionally, the study was conducted in a single rehabilitation centre, potentially limiting the generalisability of the findings. Blinding of participants and therapists was not feasible due to the nature of the intervention, which may have introduced performance bias. Furthermore, follow-up data beyond the intervention period were not collected. Future research should focus on multicentre trials with longer follow-up durations and the inclusion of objective biomarkers of tissue regeneration to further substantiate the therapeutic potential of Matrix Therapy.

CONCLUSION

In contemporary rehabilitation practice, where there is growing emphasis on non-invasive, patient-centred, and recovery-optimising strategies, Matrix Therapy aligns well with integrative care models. It can complement physiotherapy, manual therapy, exercise prescription, and post-surgical rehabilitation programs, potentially accelerating tissue repair and improving functional outcomes.

While continued clinical research is essential to further validate and standardise its applications, current evidence and clinical experience suggest that Matrix Therapy offers a valuable adjunct in the management of acute and chronic musculoskeletal conditions. As rehabilitation continues to evolve toward regenerative and biologically informed interventions, Matrix Therapy stands out as a forward-looking modality that bridges cellular science with practical therapeutic outcomes.

Conflict of interest: Nil

Funding: Nil

REFERENCES

1. Maruthy T, Hima Bindu P, Kauser MS. Effects of matrix rhythm therapy in patients with myofascial trigger points. J Soc Indian Physiotherapists. 2019;3:27–9.
2. Naik V, Bhagwat S, Pathania T, Bootwala F. Effectiveness of matrix rhythm therapy in frozen shoulder with respect to ROM and pain: an experimental study. Int J Appl Res. 2017;4:73–6.
3. Bhatikar KK. Effect of matrix rhythm therapy versus interferential current therapy with laser therapy on plantar heel pain: a randomised clinical trial. Man Ther Posturol Rehabil J. 2019;1–6.
4. Munjewar S, Patil D. A rapid review on matrix rhythm therapy. J Pharm Negat Results. 2022;13(Suppl 6):2905–8. doi:10.47750/pnr.2022.13.s06.378.
5. Woolf CJ. What is this thing called pain? J Clin Invest. 2010;120:3742–4.
6. Basbaum AI, Bautista DM, Scherrer G, Julius D. Cellular and molecular mechanisms of pain. Cell. 2009;139:267–84.
7. Naik V. Effect of matrix rhythm therapy in trismus: a case series. J Res Med Dent Sci. 2020;8:193–6.
8. Naik V, Motimath B, Pathania T. Application of matrix rhythm therapy as a novel treatment in trigeminal neuralgia. Indian J Phys Ther Res. 2021;2:141–3.
9. Gohil DM, Kothari D, Baxi G, Palekar T. Comparison of matrix rhythm therapy versus Pilates on pain, lumbar flexibility, functional impairments, and pelvic inclination

in chronic low back pain. Med J DY Patil Vidyapeeth. 2022;16(Suppl 1):1–6.

10. Maiya GA, Jadhav RA, Harihar A, Gundmi S, Shetty AG, Yadav KH, et al. Effect of novel matrix rhythm therapy (MaRhyThe®) on neuropathic pain and maximum plantar pressure distribution among type 2 diabetes mellitus patients with peripheral neuropathy. J Diabetes Metab Disord. 2023;22:827–33.
11. Naik VC, Parekh V, Patil S. Effect of matrix rhythm therapy on subjects with asymptomatic hamstring tightness. J Clin Diagn Res. 2022;17:1–4.
12. Huddar V, Pattanshetty R. Application of matrix rhythm therapy (MaRhyThe) for the treatment of decubitus ulcer in cancer: a case study. Indian J Phys Ther Res. 2021;3:56–9.
13. Naik VC, Kerkar M, Mascarenhas S. Efficiency of matrix rhythm therapy on pain, strength, and quality of life in forward neck posture: a randomised controlled trial. J Sci Soc. 2022;49:331–8.

Cite this article as: Kauser MS, Kishore MK. Matrix Therapy in Modern Rehabilitation: A Regenerative Approach to Musculoskeletal Recovery. J Allied Health Clin Res Innov. 2026;1(1): 36-43.