EFFECT OF FASCIAL DISTORTION MODELS AND CELLULAR MATRIX RHYTHM THERAPY ON THE LEVELS OF NOCIOCEPTION IN THE INDIVIDUALS WITH CHRONIC MYOFASCIAL NECK PAIN

Harmanpreet Kaur[1], Kani Mozhi[2], Divya Midha[3], Narkeesh Arumugam[4]

[1]PostGraduate Student,[2] Professor and Principal,[3]HOD and Professor,Department of Physiotherapy, Desh Bhagat University, Mandi Gobindgarh, Punjab. Author [4] details???

ABSTRACT

Background: Chronic Myofascial Neck Pain (CMNP) is a prevalent musculoskeletal disorder often managed with conventional physiotherapy techniques, which may not address underlying fascial and cellular dysfunctions.

Objective: To evaluate the combined effect of Fascial Distortion Models (FDM) technique and Cellular Matrix Rhythm Therapy (CMRT) on the intensity of nocioception, cervical mobility, disability and psychological status in individuals with CMNP.

Method: Study design is a quasi-experimental study involved 20 participants diagnosed with CMNP, randomly assigned to two groups. Group A received FDM, real CMRT and conventional physiotherapy while Group B received FDM, sham CMRT and conventional physiotherapy. Interventions were administered for 5 consecutive days. Outcome measures included Numeric Pain Rating Scale (NPRS), Cervical Range of Motion (CROM),Neck Disability Index (NDI) and Beck's Depression Inventory (BDI). Data were analyzed using paired and unpaired t-tests.

Results: Group A showed significantly greater improvements than Group B in NPRS, all directions of CROM, NDI and BDI scores ($p<0.05$), suggesting a synergistic effect of real CMRT and FDM.

Conclusion: The combination of FDM and CMRT is effective in reducing pain, improving cervical mobility, functional ability and psychological well-being in individuals with CMNP.

Keywords: Myofascial Neck Pain (MNP), Fascia, Myofascial Trigger Point (MTrP), Fascial Distortion Model (FDM), Cellular Matrix Rhythm Therapy (CMRT)

INTRODUCTION

Myofascial pain syndrome (MPS) is a regional musculoskeletal paindisorder originating from the muscles and their surrounding connective tissue, known as fascia (Plaut,2022). This condition is primarily characterized by the presence of hyperirritable nodules called myofascial trigger points (TrPs) within taut bands of skeletal muscles(Cesar et al., 2023). These trigger pointsare highly sensitive muscle foci, that are painful to touch and when compressed it produce a characteristic pattern of referred pain to a distant region(Touma et al., 2023).The diagnostic criteria for a TrP, supported by expert consensus from a Delphi study, include the presence of a hypersensitive spot within a taut band of muscle and the elicitation of referred pain upon stimulation of that spot. Trigger points are broadly classified as either active or latent. An active TrP causes spontaneous local and referred pain that the patient recognizes as their familiar symptom. In contrast, a latent TrP does not cause spontaneous pain and only becomes tender upon palpation, without reproducing the patient's typical pain experience (Fernandez et al.,2023).

ChronicMyofascial Neck Pain(CMNP) is one of the most prevalent musculoskeletal disorders and ranks as the 4th leading cause of disabilityworldwide (Khan et al., 2022). It is estimated that approximately 70% of the population will experience neck pain at some point in their lives, with the annual incidence ranging from 15% to 50%. Global burden of disease data highlights the widespread nature of neck pain, with significant prevalence ratesacross worldwide including Asia at 10.14%, Australia at 10.13%, the Caribbean at 9.7%, Central Asia at 9.8%, Central Europe at 9.9%, East Asia at 11.8%, Eastern Europe as 9.9%, Latin America as 10.12%, and Southeast Asia as 7.6% (Khan et al., 2022).

The impact of CMNP on quality of life and work productivity is substantial. The one-year prevalence of CMNP in the general population is reported to be between 30% and 50% (Manuel et al., 2020). From 1990

to 2020, the global age-standardized prevalence rate remained consistently high, at approximately 2450 per 100,000 population. A notable gender disparity exists, with females demonstrating a higher age-standardized prevalence rate (2890 per 100,000) compared to males (2000 per 100,000). The prevalence for both sexes typically peaks between the ages of 45 and 74 years(Wuet al., 2024).

The development of CMNP is multifactorial. The key risk factors that contribute to CMNP are a sedentary lifestyle, prolonged daily use of computers and mobile phones, high levels of perceived stress and being female (Somaye et al., 2022). Other contributing factors include psychological factors (stress, anxiety, sleep problems, depression, cognitive problems, behavior, social support), biological factors (pre-existing neuromuscular or autoimmune disorders, aging, genetic) (Somayeet al.,2022), traumatic events, ergonomic factors (overuse activities, abnormal posture), structural factors (spondylosis, scoliosis, osteoarthritis), systemic factors (hypothyroidism, vitamin D deficiency, iron deficiency) which contribute to development of fascial restrictions and can cause MNP (Tantanatip & Chang, 2018).

The etiology of MPS is often linked to myofascial injury, such as microtears, which trigger an inflammatory response. This leads to muscle fiber contractions, vasoconstriction and circulatory disturbances. The reduced blood flow results in local ischaemia and hypoxia, forming a "spasm-ischaemia-pain" cycle (Peijue et al., 2023). This physiological cascade leads to an uncontrolled release of calcium which combines with ATP and causes abnormal increase in acetylcholine which leads to sustained muscle fiber contraction, resulting in muscle fiber bundle tension and the formation of taut bands. The resulting metabolic stress triggers the release of sensitizing substances like histamine, bradykinin, 5-hydroxytryptamine, prostaglandins. These substances increase the sensitivity of sensory nerve fibers, which transmit pain signals to the spinal cord.This can lead to central sensitization and the phenomenon of referred pain. Concurrently, connective tissue proliferation can lead to tissue sclerosis, lead to the formation of one or more active myofascial trigger points (MTrPs) in the muscles, which causes myofascial pain (Peijue et al., 2023).

Individualswith CMNP typically present with a range of symptoms including persistent, burning regional pain, muscle stiffness, proprioceptive disorders and psychological distress.The pain is characterized by regional pain, associated with burning, persistent and aggravating pain which is exacerbated by cold, fatigue and muscle overload. The most commonly affected muscles includethe trapezius, rhomboids, infraspinatus, levator scapulae and suboccipitals causes limited joint range of motion (Lam et al., 2024). Proprioceptive disorders involve dizziness, tinnitus and imbalance feeling. CMNP or long term myofascial pain syndrome can also lead to psychological distress, including depression and sleep disturbances (dyssomnia), which can lower the pain thresholdand form a vicious cycle (Cao et al., 2021).

A clinical diagnosis of CMNP is based on physical examination findings. The key signs of chronic CMNPinclude identifiable myofascial trigger points (TrPs) that reproduce pain upon compression; palpable muscle taut bands consisting of group of tense muscle fibers which is sensitive and persistently stiff at palpation; muscle spasm; local tenderness; restricted neck movement and a visible local twitch response when TrP is stimulated (Cao et al., 2021). While CMNP is a clinical diagnosis, other examinations may be used to rule out different pathologies. Radiography can identify structural bony defects, MRI can identify disc and nerve pathologies, diagnostic ultrasound can exclude bursitis and electromyography can assess for neuromuscular diseases. Laboratory tests may also identify potential hormone and nutritional deficiency related to MNP like

hypothyroidism and Vitamin D deficiencies (Tantanatip &Chang , 2018).

The comprehensive assessment of individuals with CMNP involves evaluating several clinical parameters. Pain intensity is typically measured using standardized pain assessment tools such as the Numerical Pain Rating Scale (NPRS) or the Visual Analogue Scale (VAS). Functional limitations and disability are commonly evaluated using the Neck Disability Index (NDI), a widely accepted tool for determing the impact of neck pain on daily activities. Cervical mobility is quantified through measurements of the Cervical Range of Motion (CROM) in various plane of cervical spine. In addition to physical assessments, it is essential to consider associated psychological symptoms and co-morbidities. Depression, which frequently coexists with chronic pain conditions, is assessed using Beck Depression Inventory (BDI), a validated instrument for measuring the severity of depressive symptoms (Rodríguez et al., 2022)

The management of CMNP often begins with conservative approaches. Pharmacological treatment includes Non-steroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, topical creams and TrP injections. Conventional physiotherapy interventions consists of manual therapy (myofascial release), therapeutic exercises (stretching, strengthening), thermotherapy, cryotherapy and various electrotherapymodalitiessuch as TENSand ultrasound (Khan et al., 2022).

Despite the widespread implementation of conventional physiotherapy including thermotherapy, cryotherapy, electrotherapy and therapeutic exercise, their efficacy in addressing the underlying etiopathogenesis of CMNP remains subopyimal. These interventions primarily provide symptomatic relief and are often palliative in nature, lacking the capacity to rectify fascial densification responsible for chronic pain syndromes. Many individuals experience recurrence of symptoms due to the limited impact of modalities like TENS, Ultrasound and Isometric Exercises on deep fascial layers and neuromuscular coordination (Batool et al., 2023) This has led to an interest in advanced techniques that specifically target the fascial tissue. Fascia is a dynamic connective tissue structure whose health is critical for stability and mobility. Physical and physiological stress can increase fascial stiffness, stimulating nociceptors and contributing to chronic pain (Bruck et al., 2021). Therefore, treatments that address fascial restrictions may offer a more comprehensive approach. Two such advanced techniques are the Fascial Distortion Models (FDM)and Cellular Matrix Rhythm Therapy (CMRT).

Fascial distortion models (FDM)was introduced by Stephen Typaldos in 2002, a Doctor of Osteopathic Medicine and is characterized by the ability to determine the diagnosis and treatment plan based on the individual's body language and clinical symptoms. Typaldos found six different types of fascial distortions i.e, Trigger bands (TB's) - results in a band of wrinkled fascia, Herniated trigger points (HTP's) - soft tissue pushes through the fascial plane, Continuum distortion (CD's) - alteration of fascia between 2 different tissue types, Folding distortions - result of pressure or traction that pulls, pushes, twists or contorts the fascia, Cylindrical Distortions - tangled coiling of the fascia, Tectonic Fixations- fascia cannot glide in its plane (Boucher and Figueroa, 2018). Many therapeutic methods and systems target fascia but FDM is the only method whose basic assumption is to eliminate the densification of fascia. In this case, the individual may experience discomfort during treatment because of strong pressure of thumb but it gives immediate effect is the advantage and has a positive effect on pain sensitivity and flexibility in individuals with CMNP (Kweon and Kim, 2023).

CellularMatrix Rhythm Therapy (CMRT) was developed by Dr. Ulrich Georg Randoll in 1989-1997 is based on research carried out at the department of oral

and maxillofacial surgery and trauma surgery of Erlangen university (Maruthy et al., 2019). CMRT is an advanced electrotherapeutic modality which works on mechanical and magnetic vibrations and delivers physiological rhythmical oscillations, whose frequency changes according to the individuals tissue required that synchronizes with internal body rhythm. The main aim of CRT is to convert pathology into physiology which is required for healing of tissues (Deshmukh et al., 2023). Matrix reactivates the cell metabolism and normalizes the physiological process by depth-effective rhythmical phase synchronous magneto mechanical oscillations. The frequency of matrix is modulated between 8 to 12 Hz. In this process the cells are stimulated and the entire tissue is rhythmically resynchronized. It basically improves the tissue extensibility and circulation. Thus the contracted areas of the musculature get relaxed by increased circulation which increases oxygenated blood followed by ATP synthesis and dissolution of the tension (Maruthy et.al, 2019).

Considering these therapeutic shortcomings, integrative interventions or a combinational approach using Fascial Distortion Models (FDM) and Cellular Matrix Rhythm Therapy (CMRT) may offer synergistic benefits. FDM directly manipulates fascial distortions that contribute to mechanical dysfunction, while CMRT works at the cellular level to restore rhythmic physiological activity, together addressing both macroscopic and microscopic contributors of CMNP (Kweon and Kim, 2023; Deshmukh et al., 2023).

Hence, the present study aimed to investigate the combined effect of Fascial Distortion Models(FDM) technique and Cellular Matrix Rhythm Therapy (CMRT) on the intensity of nocioception in individuals with Chronic Myofascial Neck Pain (CMNP)

MATERIALS AND METHODS

Study Design

This Quasi-experimental Pre-Post Design study was carried out at Kanishk Pain and Paralysis Clinic and Osteocare Clinics, Patiala in which the combined effect of Fascial distortion models (FDM) technique and Cellular Matrix Rhythm Therapy on the individuals with Chronic Myofascial Neck Pain (CMNP) was determined.The study was approved by the Institutional Ethical Committee, Desh Bhagat University, Mandi Gobindgarh. Research Personnel approached the eligible individuals and a written informed consent form was obtained to indicate their willingness to participate in the study..

Participants

A total of 20 individuals were recruited by Purposive Sampling Method within the age group of 20-55 years, both males and females with Chronic Myofascial Neck Pain (CMNP)included as the sample of this study.Individuals with inflammatory conditions, skin infections, bony lesions, other neurological and cardiac disorders, surgical and traumatic history of upper region, disc pathologies, cervical spondylosis, carcinoma, torticollis and non-cooperative individuals were excluded from the study. The computer generated random sampling method was used to distribute participants equally into two different groups: Group A i.e., Experimental Group A, received a combination of FDM, real CMRT and conventional physiotherapy and Group B i.e., Experimental Group B administered FDM, a sham version of CMRT and conventional physiotherapy. The total population of the study was N=20, with N=10 in each group.

Interventions

Participants were selected as per selection criteria. Before the commencement of the study, written informed consent was obtained from the participants. Baseline evaluation was done at Day 0 and post-intervention assessment was done at Day 5 for Numeric Pain Rating Scale (NPRS), Cervical Range of Motion (CROM), Neck Disability Index (NDI) and Beck's Depression Inventory (BDI). The participants were randomly divided into two groups: Experimental Group A and Experimental Group B.

In both the groups, the conventional physiotherapy treatment was given which included 10 minutes of hot pack and 10 minutes of TENS and also the FDM treatment was given according to the evaluation until the MTrP, muscle taut bands get release. The real CMRT was applied for 15 minutes with 8-12 Hz frequency along the muscle fibers of upper trapezius from distal to proximal with patient sitting in relaxed position in Group A while the sham CMRT was applied in Group B.

Fascial Distortion Models (FDM) –It is a hands-on manual therapy technique focused on correcting fascial distortions identified through specific body language and palpatory findings. It is applied directly by the therapist without the use of any mechanical equipment. FDM aims to restore normal fascial integrity, reduce pain and improve functional mobility.

Fig 1: FDM for Upper Trapezius Trigger Band Fig. 2: FDM for Levator Scapulae HTP

Cellular Matrix Rhythm Therapy Device - A mechanical oscillation device delivering low-frequency rhythmic impulses (8-12 Hz) that mimic the natural microvibrations of healthy skeletal muscle. This therapy helps improve extracellular matrix dynamics, lymphatic drainage and cellular metabolism. In the Experimental Group A, real cellular matrix rhythm therapy applied over the neck and upper back regions for 15 minutes per session while the Experimental Group B received sham Cellular Matrix Rhythm Therapy where the device was placed but not switched on, serving as a placebo.

Fig. 3: Cellular Matrix Rhythm Therapy Device applied over the Upper Trapezius

Outcome Measures

Numeric Pain Rating Scale **(NPRS)**

Cervical Range of Motion **(CROM)**

Neck Disability Index **(NDI)**

Beck's Depression Inventory **(BDI)**

Numeric Pain Rating Scale(NPRS) – The NPRS is a valid and reliable method commonly used to assess the intensity of pain. Individuals were asked to indicate the intensity of their current pain level using an 11-point scale.It is scored from 0-10, 0 means no pain and 10 means the worst pain imaginable. It has been shown to possess high test – retest reliability and good construct validity for use in clinical populations experiencing musculoskeletal pain(Nugent et al.,2021).

Cervical Range of Motion (CROM) – Cervical mobility was assessed using a universal **Goniometer,** a reliable and valid instrument for measuring joint range of motion. The cervical movements that is assessed are flexion, extension, right and left rotation, right and left side bending. This method has demonstrated strong inter-rater and intra-rater reliability and is widely used in both clinical and research settings (Zahra and Yamada,2020).

Neck Disability Index(NDI) – The NDI is a valid and reliable outcome measure designed especially for cervical conditions. It was designed in 1991 by Vernon and Mior based on Oswestry Low Back Pain Index (OI) and was the first self-reporting disability measure specific to the neck. It determines activity limitations due to neck pain. The questionnaire comprises 10 questions concerning pain intensity, personal care, lifting, work, headaches, concentration difficulties, sleeping, driving, reading, and recreational activities. The response to each question is scored on six-point scale with a possible 0 –5 value. For each question, only one answer is marked. The total score obtained after summing up the individual numerical values for each question can range from 0 to 50. Larger values determine higher levels of self-reported neck disability. To report the result as a percentage, the final value of the score should be multiplied by two.Interpretation of the score is made as 0-4 as no disability, 5-14 as mild disability, 15-24 as moderate disability, 25-34 as severe disability and score above 35 is considered as complete disability (Szarejko et al.,2023).

Beck's Depression Inventory (BDI) - The BDI is a psychometrically sound, validated questionnaire used to assess the severity of depressive symptoms. It comprises 21 items, each scored on a scale from 0 to 3, reflecting the intensity of depressive symptoms over the previous two weeks. The total score ranges from 0 to 63, with higher scores indicating a greater level of depression. The BDI has shown high internal consistency and test-retest reliability in both clinical and non-clinical populations (Szarejko et al.,2023).

Statistical Analysis

Statistical analysis was conducted using SPSS Statistics version 20.0. Descriptive statistics including mean and standard deviation were used to summarize demographic data and outcome variables. Within-group comparisons of pre- and post- intervention scores were analyzed using paired t-tests, while between group comparisons were conducted using unpaired t-tests. A significance level of $p<0.05$ was considered statistically significant for all analyses. All outcome data were expressed as mean ± Standard Deviation and results were interpreted.

RESULTS

Participant Characteristics

After screening 35 participants, 20 participants who fulfilled the inclusion criteria were enrolled in the study. Participants were randomly allocated into two groups with 10 participants in each group. The results shows that mean age was 38.4 and 36.9 for Group A and Group B, respectively. On Comparison, the t value is found to be -0.58 and P value is $p > 0.05$ indicating both groups were found to be similar in context to age of the participants. The gender distribution in both groups

showed a higher proportion in females, with 60% in Group A and 70% in Group B. Males accounted for 40% in Group A and 30% in Group B.

Characteristics	Group	Mean±SD
Age	Group A Group B	38.4±5.08 36.9±4.21
Gender	Group A – Male Female Group B – Male Female	4 (40%) 6 (60%) 3 (30%) 7 (70%)

Table 1. Participants Demographic Characteristics

Mean Values of the Outcomes during Subsequent Measurements

A repeated - measures Paired T-test and Unpaired T-test was performed to determine the effect of the FDM with real CMRT as compared to the FDM with sham CMRT along with conventional physiotherapy on dependent variables within the group and between group anlaysis respectively.

Numeric Pain Rating Scale (NPRS)

Both groups demonstrated statistically significant improvements in pain scores from pre- to post-intervention. However, Group A showed a significantly greater reduction in pain levels (Pre: 7.6 ± 0.69; Post: 2.8 ± 0.35) compared to Group B (Pre: 7.4 ± 0.96; Post: 4.6 ± 0.52), with a between-group post-test comparison yielding $p = 0.00$.

Cervical Range of Motion (CROM)

Significant improvements were observed in all planes of cervical motion in both groups, with Group A showing more substantial gains as compared to Group B. The between group differences post treatment were statistically significant for all the movements ($p < 0.0001$) except cervical rotation ($p > 0.05$).

Neck Disability Index (NDI)

The NDI scores significantly decreased in both groups. However, Group A demonstrated greater reduction in disability levels (Pre: 28.7 ± 1.16; Post: 12.6 ±0.84) compared to Group B (Pre: 27.8 ±1.75; Post: 18/.26), with the between-group post-intervention comparison reaching $p = 0.00$.

Beck's Depression Inventory (BDI)

A substantial improvement in psychological status was observed in both groups, with Group A showing superior outcomes (Pre: 19.2±0.63; Post: 11.3±0.95) compared to Group B (Pre: 18.6±1.58; Post: 13.9±0.87). The difference in post-intervention BDI scores between the groups was statistically significant ($p = 0.00$).

Outcomes	Group A PRE (Mean ±SD)	Group A P0ST (Mean ±SD)	Group B PRE (Mean ±SD)	Group B POST (Mean ±SD)	P value
NPRS	7.6 ± 0.699	2.8±0.35	7.4 ± 0.96	4.6±0.52	0.00
CROM-					
Flexion	36.2±1.135	48.30±1.16	35.8±0.919	42.5±1.581	0.00
Extension	32.4±0.97	44.7±0.95	32.1±1.1	39.6±1.35	0.00
Rt. Side Bending	25.1±0.99	35.6±1.07	25.3±1.41	30.8±1.03	0.00
Lt. Side Bending	24.7±1.06	34.8±1.03	24.2±1.39	29.9±0.87	0.00
Rt. Rotation	42.8±0.78	54.2±1.13	41.7±1.56	48.5±0.71	0.00
Lt. Rotation	43.5±0.97	55.4±1.07	42.3±0.95	49.2±0.78	0.00
NDI	28.7±1.16	12.6±0.84	27.8±1.75	18.2±1.13	0.00
BDI	19.2±0.63	11.3±0.95	18.6±1.58	13.9±0.87	0.00

Table 2: Comparison of Pre and Post mean values of the outcomes within Group A and Group B Participants

DISCUSSION

The present study aimed to evaluate the combined effect of Fascial Distortion Model (FDM) and Cellular Matrix Rhythm Therapy (CMRT) on individuals with Chronic Myofascial Neck Pain (CMNP). The findings demonstrate that the integration of FDM and real CMRT produced significantly superior outcomes compared to FDM with sham CMRT across all measured parameters, including pain intensity, cervical range of motion, neck disability, and psychological status.

Pain Reduction

The significant reduction in pain intensity observed in Group A (mean NPRS reduction from 7.6 to 2.8) supports the hypothesis that combining manual fascial manipulation with a rhythmic cellular-based therapy can effectively reduce nociceptive responses. The effect can be attributed to the fascial release provided by FDM, which addresses mechanical restrictions, and the CMRT's rhythmic stimulation, which enhances local circulation and metabolic activity. These results are consistent with previous studies by Kweon & Kim (2023) and Deshmukh et al. (2023), which independently highlighted the pain-relieving potential of both modalities.

Improvement in Cervical Range of Motion (CROM)

Group A demonstrated significantly greater improvements in cervical flexion, extension, side bending, and rotation. This suggests that the dual approach effectively alleviated fascial densification and restored tissue extensibility, facilitating improved joint mobility. In contrast, although Group B showed improvement, the absence of real CMRT limited the depth and extent of therapeutic benefit. These findings are in line with prior evidence showing that fascial interventions such as FDM enhance mechanical tissue mobility, and CMRT contributes to muscular relaxation and cellular alignment (Pawlukiewicz et al., 2022; Maruthy et al., 2019).

Reduction in Disability and Psychological Symptoms

The study also found significant reductions in NDI and BDI scores in Group A compared to Group B, indicating better functional recovery and psychological outcomes. Chronic pain often coexists with depressive symptoms, forming a vicious cycle that can affect rehabilitation outcomes. The combined intervention not only reduced

physical symptoms but also positively influenced psychological well-being, likely through improved body function and reduced discomfort. These findings support the biopsychosocial model of pain management and reinforce the utility of multimodal interventions for chronic musculoskeletal conditions.

Clinical Relevance

The synergistic application of FDM and CMRT appears to address both the **macrostructural (fascial restrictions)** and **microstructural (cellular rhythm and metabolism)** components of CMNP. This integrative approach offers an advantage over conventional physiotherapy modalities that often target only superficial symptoms without correcting the underlying pathology.

LIMITATIONS OF THE STUDY

While the findings of this study are promising, it is important to acknowledge its limitations.

- Small Sample Size – The study was conducted on a small sample of 20 participants (10 in each group). This small size limits the generalizability of the findings to a larger population and reduces the statistical power of the study, which may explain why some clinically meaningful differences (like in the NDI scores) did not reach statistical significance in the between-group analysis.
- Short-term follow up – The post-intervention assessment was conducted immediately after the 5-day treatment period. The follow up was done after 2 weeks of intervention to assess whether the observed benefits were sustained over time.
- Lack of a True Control Group – The study compared two active treatment protocols. Group B, which received FDM and sham CMRT, still received an effective manual therapy intervention. This make it difficult to ascertain the absolute effect size of FDM and CMRT compared to standard care alone.
- Potential for Therapist Bias – As the manual therapy (FDM) was applied by the therapist directly, there is a potential for performance bias, although the use of standardized protocols aimed to minimize this. The therapist was not blinded to the group allocation.

These limitations should be taken into consideration when interpreting the results and provide a clear direction for future research in this area.

FUTURE SCOPE

The promising results of this study open up several avenues for future research to build upon these findings and address the identified limitations.

- Larger Randomized Controlled Trials - Future studies should be conducted with a larger and more diverse sample size to increase statistical power and enhance the generalizability of the results. This would allow for a more robust comparison between the treatment groups and could help to confirm the trends observed in this study (e.g., for the NDI).
- Long-term Follow-up - Incorporating long-term follow-up assessments at intervals such as 3 months, 6 months, and 1 year would be crucial to evaluate the sustainability of the treatment effects and to see if the combined FDM and CMRT protocol reduces the rate of symptom recurrence.
- Inclusion of a True Control Group - Future research designs should include a third group that receives only conventional physiotherapy or a minimal intervention. This would allow for a clearer determination of the absolute efficacy and added value of the FDM and CMRT interventions compared to standard care.
- Investigating Specific Patient Subgroups - It would be beneficial to investigate whether the combined FDM and CMRT protocol is more effective for specific subgroups of patients with CMNP, such as those with a certain duration of symptoms, specific

fascial distortion patterns, or particular comorbidities.

By addressing these areas, future research can further validate the use of this innovative combined therapy and help to establish its place in the clinical management of Chronic Myofascial Neck Pain (CMNP).

CONCLUSION

This study was conducted with the aim to determine the combined effect of Fascial Distortion Models technique and Cellular Matrix Rhythm Theray on the intensity of nociception in individuals with Chronic Myofascial Neck Pain. The present study concludes that -

- The combination of Fascial Distortion Models (FDM) and Cellular Matrix Rhythm Therapy (CMRT) is more effective in reducing pain, improving cervical mobility, decreasing neck disability and enhancing psychological well-being in individuals with CMNP.
- FDM effectively addresses mechanical fascial restrictions, while CMRT complements it by enhancing tissue metabolism and restoring rhythmic cellular oscillation.
- This integrative therapeutic approach holds potential as a non-invasive, safe and clinically impactful intervention in the rehabilitation of Chronic Myofascial Neck Pain.

Recommendations

It is recommended that a randomized control trials with large sample size be conducted to confirm the findings and enhance generalizability. Further studies with long-term follow up should be conducted to evaluate the durability of treatment effects and physiotherapists should consider integrating FDM with CMRT for enhanced therapeutic outcomes in managing CMNP.

REFERENCES

1. RBrück, K., Jacobi, K. and Schmidt, T., 2021. Fascial treatment versus manual therapy (HVLA) in patients with chronic neck pain: a randomized controlled trial. Journal of back and musculoskeletal rehabilitation, 34(6), pp.997-1006.
2. Battecha, K.H., Kamel, D.M. and Tantawy, S.A., 2021. Investigating the effectiveness of adding microcurrent therapy to a traditional treatment program in myofascial pain syndrome in terms of neck pain and function. Physiotherapy Quarterly, 29(1), pp.17-23
3. Batool, S.A., Shakil-ul-Rehman, S., Tariq, Z. and Ikram, M., 2023. Effects of fasciatherapy versus fascial manipulation on pain, range of motion and function in patients with chronic neck pain. BMC Musculoskeletal Disorders, 24(1), p.789.
4. Boucher, J.D. and Figueroa, J., 2018. Restoration of full shoulder range of motion after application of the fascial distortion model. Journal of Osteopathic Medicine, 118(5), pp.341-344.
5. Cao, Q.W., Peng, B.G., Wang, L., Huang, Y.Q., Jia, D.L., Jiang, H., Lv, Y., Liu, X.G., Liu, R.G., Li, Y. and Song, T., 2021. Expert consensus on the diagnosis and treatment of myofascial pain syndrome. World journal of clinical cases, 9(9), p.2077.
6. Dach, F. and Ferreira, K.S., 2024. Treating myofascial pain with dry needling: a systematic review for the best evidence-based practices in low back pain. Arquivos de Neuro-psiquiatria, 81, pp.1169-1178.
7. Deshmukh, A.K. and Sheth, M.S., 2023. Matrix Rhythm Therapy–A Novel Treatment. Journal of Integrated Health Sciences, 11(2), pp.92-94.
8. Fernández-de-Las-Peñas, C., Nijs, J., Cagnie, B., Gerwin, R.D., Plaza-Manzano, G., Valera-Calero, J.A. and Arendt-Nielsen, L., 2023. Myofascial pain syndrome: a nociceptive condition comorbid with neuropathic or nociplastic pain. Life, 13(3), p.694.
9. He, P., Fu, W., Shao, H., Zhang, M., Xie, Z., Xiao, J., Li, L., Liu, Y., Cheng, Y. and Wang, Q., 2023. The effect of therapeutic physical modalities on pain, function, and quality of life in patients with myofascial pain syndrome: a systematic review. BMC Musculoskeletal Disorders, 24(1), p.376.
10. Hernandez, J.V.L., Calvo-Lobo, C., Zugasti, A.M.P., Fernandez-Carnero, J. and Alacreu, H.B., 2021. Effectiveness of dry needling with percutaneous electrical nerve stimulation of high frequency versus low frequency Iin patients with myofascial neck pain. Pain Physician, 24(2), p.135.
11. Islam, M.S., Ahmed, F., Hossain, M.A., Haque, M.O., Xiao, J., Uddin, M.K., Hossain, M.S., Shanta, B.A., Moula, G. and Islam, M.Y.M.M.M., 2024. Effectiveness of Myofascial Release Along with Conventional Physiotherapy for Chronic Neck Pain Patients: A Randomized Controlled Trial. Journal of Orthopedics and Physiotherapy, 2(2), pp.1-8.
12. Khan, Z.K., Ahmed, S.I., Baig, A.A.M. and Farooqui, W.A., 2022. Effect of post-isometric relaxation versus myofascial release therapy on pain, functional disability, rom and qol in the management of non-specific neck pain: a randomized controlled trial. BMC Musculoskeletal Disorders, 23(1), p.567.
13. Kazeminasab, S., Nejadghaderi, S.A., Amiri, P., Pourfathi, H.,

Araj-Khodaei, M., Sullman, M.J., Kolahi, A.A. and Safiri, S., 2022. Neck pain: global epidemiology, trends and risk factors. BMC musculoskeletal disorders, 23, pp.1-13.

14. Kweon, M. and Kim, J., 2023. Comparison of immediate effects of myofascial release and fascial distortion model on the range of motion, pain pressure threshold, and balance in healthy adults. Journal of Bodywork and Movement Therapies, 35, pp.33-37.
15. Lam, C., Francio, V.T., Gustafson, K., Carroll, M., York, A. and Chadwick, A.L., 2024. Myofascial pain–A major player in musculoskeletal pain. Best Practice & Research Clinical Rheumatology, p.101944.
16. Lytras, D., Koulis, N. and Sykaras, E., 2017. Comparison of two Exercise Programs in Patients with Chronic Neck Pain.
17. Maruthy, T., Bindu, P.H. and Kauser, M.S., 2019. Effects of matrix rhythm therapy in patients with myofascial trigger points. J Soc Indian Physiother, 3(2), pp.27-9.
18. Naik, V.C., Kerkar, M. and Mascarenhas, S., 2022. Efficiency of matrix rhythm therapy on pain, strength, and quality of life in forward neck posture: A randomized controlled trial. Journal of the Scientific Society, 49(3), pp.331-338.
19. Nugent, S.M., Lovejoy, T.I., Shull, S., Dobscha, S.K. and Morasco, B.J., 2021. Associations of pain numeric rating scale scores collected during usual care with research administered patient reported pain outcomes. Pain Medicine, 22(10), pp.2235-2241.
20. Nastiti, A.Z., 2020. THE EFFECTIVENESS OF FASCIAL MANIPULATION FOR NECK PAIN AMONG UNIVERSITY STUDENTS. Journal of asian orthopedic manipulative physical therapy, 1, pp.51-6
21. Oliveira, A.K.D., Dibai-Filho, A.V., Soleira, G., Machado, A.C.F. and Guirro, R.R.D.J., 2021. Reliability of pressure pain threshold on myofascial trigger points in the trapezius muscle of women with chronic neck pain. Revista da Associação Médica Brasileira, 67, pp.708-712.
22. Pawlukiewicz, M., Kochan, M., Niewiadomy, P., Szuścik-Niewiadomy, K., Taradaj, J., Król, P. and Kuszewski, M.T., 2022. Fascial manipulation method is effective in the treatment of Myofascial Pain, but the treatment protocol matters: a Randomised Control Trial—Preliminary Report. Journal of Clinical Medicine, 11(15), p.4546.
23. Plaut, S., 2022. Scoping review and interpretation of myofascial pain/fibromyalgia syndrome: An attempt to assemble a medical puzzle. PloS one, 17(2), p.e0263087.
24. Qureshi, A.M., Bashir, M.S., Farooq, U., Shahbaz, A. and Raheem, A., 2023. Effects of Fascial Distortion Model with and without Neck Isometrics in Patients with Cervical Spine Overload. Journal of Medical Care Research and Review, 6(12), pp.06-10.
25. Raja G, P., Bhat, S., Gangavelli, R., Prabhu, A., Stecco, A., Pirri, C., Jaganathan, V. and Fernández-de-Las-Peñas, C., 2023. Effectiveness of Deep Cervical Fascial Manipulation® and Sequential Yoga Poses on Pain and Function in Individuals with Mechanical Neck Pain: A Randomised Controlled Trial. Life, 13(11), p.2173.
26. Rodríguez-Huguet, M., Rodríguez-Almagro, D., Rodríguez-Huguet, P., Martín-Valero, R. and Lomas-Vega, R., 2020. Treatment of neck pain with myofascial therapies: a single blind randomized controlled trial. Journal of Manipulative and Physiological Therapeutics, 43(2), pp.160-170.
27. Rodríguez-Huguet, M., Vinolo-Gil, M.J. and Góngora-Rodríguez, J., 2022. Dry needling in physical therapy treatment of chronic neck pain: systematic review. Journal of clinical medicine, 11(9), p.2370.
28. Szarejko, K.D., Gołębiewska, M., Lukomska-Szymanska, M. and Kuć, J., 2023. Stress Experience, Depression and Neck Disability in Patients with Temporomandibular Disorder—Myofascial Pain with Referral. Journal of Clinical Medicine, 12(5), p.1988.
29. Sharma, M.R., Saharan, A.K., Dubey, S., Pilaniya, M., Taneja, D. and Ranjeeta, W., Effectiveness of Conventional Physiotherapy in the Management of Neck Pain.
30. Soysal, A.N.O., Aslan, U.B., Telci, E.A. and Ozfidan, E., 2022. Matrix hythm therapy in chronic neck pain: A pilot study. Annals Of Clinical And Analytical Medicine.
31. Touma, J., May, T. and Isaacson, A.C., 2018. Cervical myofascial pain.
32. Tantanatip, A. and Chang, K.V., 2018. Myofascial pain syndrome.
33. Wu, A.M., Cross, M., Elliott, J.M., Culbreth, G.T., Haile, L.M., Steinmetz, J.D., Hagins, H., Kopec, J.A., Brooks, P.M., Woolf, A.D. and Kopansky-Giles, D.R., 2024. Global, regional, and national burden of neck pain, 1990–2020, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. The Lancet Rheumatology, 6(3), pp.e142-e155.
34. Wiaderna, K., Selegrat, M. and Hadamus, A., 2020. Effect of a single session of facial distortion model manual physiotherapy and a selected foam rolling technique on treatment outcomes in cervical spine overload. Pilot study. Ortopedia Traumatologia Rehabilitacja, 22(2), pp.131-141.