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COMPARATIVE EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AND MYOFACIAL RELEAS IN ROTATOR CUFF TEAR: A RANDOMIZED CLINICAL TRIAL

Running Title: Proprioceptive Neuromuscular vs. Myofacial Release Facilitation in rotator cuff tear

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Abstract

Objectives: The purpose of the study is to analyze and compare the effects of PNF and myofascial release technique in the patients with rotator cuff tear.

Methods: A single blinded, randomized clinical design was conducted. Patients from DHQ, MTH, Allied Hospital Faisalabad was screened and 28 patients were randomly allocated into two groups. One group received proprioceptive neuromuscular facilitation and one group received myofascial release technique. Shoulder range of motion was checked by goniometer. Treatment was given for 4 weeks, 3 sessions per week. Pre, mid and post treatment data was analyzed through SPSS.20.

Results:

Proprioceptive neuromuscular facilitation and myofacial release were significantly effective ($p<0.05$) in improving shoulder range of motion. Proprioceptive neuromuscular facilitation was more effective compare to myofacial release.

Conclusion:

Both proprioceptive neuromuscular facilitation and myofascial release were effective in improving shoulder ROM but proprioceptive neuromuscular facilitation was more effective than myofascial release.

Keywords: Rotator cuff tear; Proprioceptive neuromuscular facilitation; Myofascial release

Introduction

The rotator cuff is a group of muscles and tendons that hold the shoulder joint in place and allow you to move your arm and shoulder. Problems occur when part of the rotator cuff becomes irritated or damaged. This can result in pain, weakness and reduced range of motion (1). The frequency of full-thickness rotator cuff tears ranges from 5-40%, with an increasing incidence of cuff pathology in advanced age (2). Cadaveric studies by Bigliani et al found that 39% of individuals older than 60 years had full-thickness rotator cuff tears with an even higher incidence of partial tears (3).

Recurrent pain, especially with certain activities, pain that prevents you from sleeping on your injured side ,grating or cracking sounds when moving your arm and limited ability to move your arm, muscle weakness are some common symptoms in patients with rotator cuff tear. There are 2 main causes of rotator cuff tears: injury and degeneration (4). An injury to the rotator cuff, such as a tear, may happen suddenly when falling on an outstretched hand (5). It may also develop over time due to repetitive activities. Rotator cuff tears may also happen due to aging, with degeneration of the tissues. The risk of a rotator cuff injury increases with age (6). Rotator cuff tears are most common in people older than 60. Some occupations that require repetitive overhead arm motions, such as carpentry or house painting, can damage the rotator cuff over time (7).

Complications includes subacromial impingement syndrome and bursitis, rotator cuff tendonitis, partial or full-thickness rotator cuff tears. Chronic rotator cuff syndrome can increase the risk for the development of glenohumeral degenerative disease and rotator cuff arthropathy (8).

If left untreated, a rotator cuff tear can severely restrict function and range of motion. The tear can also increase over time (9). This may cause partial rotator cuff tears to progress to total tears. Rest, nonsteroidal anti-inflammatory medicines, strengthening and stretching exercises, ultrasound therapy, corticosteroid injection, surgery (for severe injuries) are some treatments options for rotator cuff tear injury (10). The three techniques most commonly used for rotator cuff repair include traditional open repair, arthroscopic repair, and mini-open repair. In the end, patients rate all three repair methods the same for pain relief, strength improvement, and overall satisfaction (11).

Aims & Objectives

- To determine and compare the effects of proprioceptive neuromuscular facilitation and myofascial release on shoulder range in patients with rotator cuff tear.

Research questions

Which manual technique proprioceptive neuromuscular facilitation technique or myofascial release is more effective for patients with rotator cuff tear**?**

Hypothesis

- **Null hypothesis:** There is no significant difference in the effects of PNF and myofascial release in improving shoulder range of motion.
- **Alternative hypothesis:** There is a significant difference in the effects of PNF and myofascial release in improving shoulder range of motion.

Methods

Study Design

It was a Single blinded Randomized Clinical trial. Data was collected from DHQ Hospital Faisalabad, Allied Hospital Faisalabad and Madinah Teaching Hospital Faisalabad. Duration of the study was 6 months. A permission letter signed by the head of department was used to take permission from respective hospitals. The sample size of the study was 28 that were determined using the Open epitool software for precise calculation. 55 patients were assessed for eligibility, 28 were selected through convenient sampling methodology that fulfilled the eligibility criteria. Patients were randomly allocated to two groups using lottery method, ensuring an allocation ratio of 1:1 for each group. 14 participants were included in group A and 14 in group B. Pre, midline and post treatment values were recorded before the start of first session, after treatment of 2 weeks and at the end of last session after 4 weeks**.**

Selection and description of participants

Participants were included who fulfilled the inclusion criteria

Participants who were socially active

- Age; 25-40 years
- Gender males and females
- Pain; mild to moderate

Exclusion criteria

- Patients with the history of Infections
- Previous shoulder Surgery
- Previous shoulder Fracture
- Previous implants of shoulder
- Age; More than 40 years

Data Collection Procedure

This, randomized clinical trial employed a convenient sampling technique to recruit 28 eligible subjects who met the inclusion and exclusion criteria. Each participant provided informed consent prior to their involvement in the study. Following the enrollment phase, Lottery method was used to randomly allocate the participant into two treatment groups. It was a single blinded randomization trial.14 patients were present in each group. For lottery method, each patient was asked to pick one paper from two pieces of paper, with group A and group B written on them. Participants were divided into treatment groups according to the paper they choose. After completing 14 patients in one group, all other participants was assigned to the other treatment group, so that both groups have equal participants. Group A received Proprioceptive neuromuscular facilitation and group B received myofascial release.

Outcome measures

The subjective assessment of patients was made by VAS for shoulder pain intensity. The objective assessment of the patients was made by Goniometer to check shoulder range of motion.

Ethical Consideration

All ethical concerns were taken into consideration. To get authorization from the individual hospitals, a permission letter signed by the head of department was utilized. All volunteers were informed about the study's technique, importance, and aim. Only individuals who were willing to participate in this research were considered. Personal information was kept private. Any participant in the study was not be harmed in any way. The participants' dignity was be respected. Prior to the trial, patients were asked to sign an informed consent form.

Statistical analysis

The Shapiro-Wilks test was used to determine the normality of the data. If the significance value of the test statistics is greater than 0.05, the data is considered to be normally distributed. The shoulder range of motion was following the assumptions of the normal distribution so parametric test i.e., for the within group analysis repeated measures ANOVA and for between group analysis independent samples t-test was used.

Results

Interpretation of Shoulder Range of Motion

The interpretation of the shoulder ranges of motion i.e., shoulders flexion, extension, abduction, internal and external rotation is given below. The shoulder ranges of motion were measured at three-time intervals i.e., at baseline, after 2nd week and after 4th week and the shoulder ROM were following the assumptions of normal distribution so, parametric tests i.e., for within group analysis repeated measures ANOVA and for between group analysis independent samples t-test were used.

Shoulder Flexion within Group Analysis

Table 1 Repeated measures ANOVA shoulder flexion within group analysis

Groups		Mean	Std. Deviation	N	Asymp. Sig.
Group A	Shoulder flexion range of motion at baseline	141.8571	8.89128	14	**0.001**
	Shoulder flexion range of motion after 2nd week	148.4286	9.39488	14	

	Shoulder flexion range of motion after 4th week	152.2143	9.03990	14	
Group B	Shoulder flexion range of motion at baseline	141.4286	9.85834	14	**0.003**
	Shoulder flexion range of motion after 2nd week	148.3571	9.61255	14	
	Shoulder flexion range of motion after 4th week	154.8571	8.37448	14	

The table 1 given above shows the descriptive statistics and repeated measures ANOVA test statistics within group analysis, the table above shows the groupwise description. The data shows that mean of shoulder flexion within group A before the intervention was 141.24 ± 8.89 degrees and post intervention it was 152.21 ± 9.03 degrees and the level of significance is below 0.05 i.e., p=0.001, which means that the Myofascial release technique has brought a difference of 10.35 degrees in the shoulder flexion among the patients of supraspinatus tendonitis.

The table above shows that mean of shoulder flexion within group B before the intervention was 141.42 ± 9.86 degrees and post intervention it was 154.86 ± 8,37 degrees and the level of significance between the pre and post-test values is below 0.05 i.e., p=0.003, which means that the Hold-relax PNF has brought a difference of 13.43 degrees in the shoulder flexion among the patients of supraspinatus tendonitis.

Shoulder Flexion between Group A and B Analysis

Table 2 Independent samples t-test statistics shoulder flexion between group A and B

	Group	N	Mean	Std. Deviation	Asymp. Sig.
Shoulder flexion range of motion at baseline	Myofascial release technique	15	142.4000	8.82205	**0.533**

	Hold relax PNF	15	140.1333	10.74288	
Shoulder flexion range of motion after 2nd week	Myofascial release technique	14	148.4286	9.39488	**0.728**
	Hold relax PNF	15	147.1333	10.40513	
Shoulder flexion range of motion after 4th week	Myofascial release technique	14	152.2143	9.03990	**0.430**
	Hold relax PNF	14	154.8571	8.37448	

The table 2 given above shows the independent samples t-test statistics on shoulder flexion between group A and B, the data shows that the significance value at the pretest shoulder flexion was above 0.05 i.e., p= 0.533 which means the values of shoulder flexion between both groups at baseline were not significant from each other, which indicates that the data was taken from a similar sample. The data shows that the post-test values of shoulder flexion between group A and B had the significance value above 0.05 i.e., p=0.430 which means that there was no statistically significant difference between the effects of Myofascial release technique and the Hold-relax PNF on the shoulder flexion which means that both the exercises were equally effective in improving the shoulder flexion range of motion.

Shoulder Extension Within Group Analysis

Table 3 Repeated measures ANOVA shoulder extension within group analysis

Groups		Mean	Std. Deviation	N	Asymp. Sig.
Group A	Shoulder extension range of motion at baseline	27.7143	4.00823	14	
	Shoulder extension range of motion after 2nd week	30.1429	3.86019	14	**0.001**

	Shoulder extension range of motion after 4th week	33.4286	3.89703	14	
Group B	Shoulder extension range of motion at baseline	29.0714	3.22166	14	**0.002**
	Shoulder extension range of motion after 2nd week	32.4286	3.36759	14	
	Shoulder extension range of motion after 4th week	37.2143	4.04168	14	

The table 3 given above shows the descriptive statistics and repeated measures ANOVA test statistics within group analysis, the table above shows the groupwise description. The data shows that mean of shoulder Extension within group A before the intervention was 27.71 ± 4.01 degrees and post intervention it was 33.43 ± 3.89 degrees and the level of significance is below 0.05 i.e., p=0.001, which means that the Myofascial release technique has brought a difference of 5.72 degrees in the shoulder Extension among the patients of supraspinatus tendonitis.

The table above shows that mean of shoulder Extension within group B before the intervention was 29.07 ± 3.22 degrees and post intervention it was 37.21 ± 4.04 degrees and the level of significance between the pre and post-test values is below 0.05 i.e., p=0.002, which means that the Hold-relax PNF has brought a difference of 8.14 degrees in the shoulder Extension among the patients of supraspinatus tendonitis.

Shoulder Extension Between Group A and B Analysis

Table 4 Independent samples t-test statistics shoulder Extension between group A and B

	Groups	N	Mean	Std. Deviation	Asymp. Sig.
Shoulder extension range of motion at baseline	Group A	15	27.5333	3.92550	**.291**
	Group B	15	28.9333	3.15021	
Shoulder extension range	Group A	14	30.1429	3.86019	

of motion after 2nd week	Group B	15	32.2667	3.30512	**.125**
Shoulder extension range of motion after 4th week	Group A	14	33.4286	3.89703	**.018**
	Group B	14	37.2143	4.04168	

The table 4 given above shows the independent samples t-test statistics on shoulder Extension between group A and B, the data shows that the significance value at the pretest shoulder Extension was above 0.05 i.e., p= 0.291 which has meaning that the values of shoulder Extension between both groups at baseline were not significant from each other, which indicates that the data was taken from a similar sample. The data shows that the post-test values of shoulder Extension between group A and B had the significance value below 0.05 i.e., p=0.018 which means that there was statistically very significant difference in between the effects of Myofascial release technique and the Hold-relax PNF on the shoulder Extension, it can be seen from the descriptive statistics in the within group tables, Hold-relax PNF technique has produced significant change on the shoulder extension in supraspinatus tendonitis patients.

Shoulder Abduction within Group Analysis

Table 5 Repeated measures ANOVA shoulder Abduction within group analysis

Groups		Mean	Std. Deviation	N	Asymp. Sig.
Group A	Shoulder abduction range of motion at baseline	96.2857	16.33509	14	**0.001**
	Shoulder abduction range of motion after 2nd week	103.5714	16.47242	14	
	Shoulder abduction range of motion after 4th week	110.0714	16.42449	14	
Group B	Shoulder abduction range of motion at baseline	98.4286	15.58951	14	

	Shoulder abduction range of motion after 2nd week	111.2857	17.12142	14	**0.001**
	Shoulder abduction range of motion after 4th week	121.7143	18.01038	14	

The table 5 given above shows the descriptive statistics and repeated measures ANOVA test statistics within group analysis, the table above shows the groupwise description. The data shows that mean of shoulder abduction within group A before the intervention was 96.28 ± 1.33 degrees and post intervention it was 110.07 degrees and the level of significance is below 0.05 i.e., p=0.001, which means that the Myofascial release technique has brought a difference of 13.79 degrees in the shoulder abduction among the patients of supraspinatus tendonitis.

The table above shows that mean of shoulder abduction within group B before the intervention was 98.43 ± 15.59 degrees and post intervention it was 121.71 ± 18.01 degrees and the level of significance between the pre and post-test values is below 0.05 i.e., p=0.001, which means that the Hold-relax PNF has brought a difference of 23.29 degrees in the shoulder abduction among the patients of supraspinatus tendonitis.

Shoulder Abduction Within Between Group A and B Analysis

Table 6 Independent samples t-test statistics shoulder abduction between group A and B

	Groups	N	Mean	Std. Deviation	Asymp. Sig.
Shoulder abduction range of motion at baseline	Group A	15	97.2667	16.19288	**.723**
	Group B	15	99.3333	15.42571	
Shoulder abduction range of motion after 2nd week	Group A	14	103.5714	16.47242	**.172**
	Group B	15	112.2667	16.93039	
Shoulder abduction range of motion after 4th week	Group A	14	110.0714	16.42449	**.036**
	Group B	14	121.7143	18.01038	

The table 6 given above shows the independent samples t-test statistics on shoulder abduction between group A and B, the data shows that the significance value at the pretest shoulder abduction was above 0.05 i.e., p= 0.723 which means the values of shoulder abduction between both groups at baseline were not significant from each other, which indicates that the data was taken from a similar sample. The data shows that the post-test values of shoulder abduction between group A and B had the significance value below 0.05 i.e., p=0.036 which means that there was statistically significant difference between the effects of Myofascial release technique and the Hold-relax PNF on the shoulder abduction, so after looking at the descriptive statistics from the within group analysis, it can be seen that the Hold-relax PNF technique produced significant results as compared to myofascial release technique on the shoulder abduction in patients with supraspinatus tendonitis.

Shoulder Internal Rotation within Group Analysis

Table 7 Repeated measures ANOVA shoulder internal rotation within group analysis

Groups		Mean	Std. Deviation	N	Asymp. Sig.
Group A	Shoulder internal rotation range of motion at baseline	41.0714	2.26900	14	**0.006**
	Shoulder internal rotation range of motion after 2nd week	43.2143	2.32639	14	
	Shoulder internal rotation range of motion after 4th week	46.2857	2.36736	14	
Group B	Shoulder internal rotation range of motion at baseline	39.7857	3.04274	14	**0.003**
	Shoulder internal rotation range of motion after 2nd week	44.7857	2.88707	14	

	Shoulder internal rotation range of motion after 4th week	50.2857	5.20988	14	

The table 7 given above shows the descriptive statistics and repeated measures ANOVA test statistics within group analysis, the table above shows the groupwise description. The data shows that mean of shoulder internal rotation within group A before the intervention was 41.07 ± 2.26 degrees and post intervention it was 46.28 ± 2.36 degrees and the level of significance is below 0.05 i.e., p=0.006, which means that the Myofascial release technique has brought a difference of 5.21 degrees in the shoulder internal rotation among the patients of supraspinatus tendonitis.

The table above shows that mean of shoulder internal rotation within group B before the intervention was 39.78 ± 3.04 degrees and post intervention it was 50.28 ± 5.21 degrees and the level of significance between the pre and post-test values is below 0.05 i.e., p=0.003, which means that the Hold-relax PNF has brought a difference of 10.50 degrees in the shoulder internal rotation among the patients of supraspinatus tendonitis.

Shoulder Internal Rotation between Group A and B Analysis

Table 8 Independent samples t-test statistics shoulder internal rotation between group A and B

	Groups	N	Mean	Std. Deviation	Asymp. Sig.
Shoulder internal rotation range of motion at baseline	Group A	15	40.6667	2.69037	**.530**
	Group B	15	40.0000	3.04725	
Shoulder internal rotation range of motion after 2nd week	Group A	14	43.2143	2.32639	**.095**
	Group B	15	44.8667	2.79966	
Shoulder internal rotation range of motion after 4th week	Group A	14	46.2857	2.36736	**.017**
	Group B	14	50.2857	5.20988	

The table 8 given above shows the independent samples t-test statistics on shoulder internal rotation between group A and B, the data shows that the significance value at the pretest shoulder

internal rotation was above 0.05 i.e., p= 0.530 which means the values of shoulder internal rotation between both groups at baseline were not significant from each other, which indicates that the data was taken from a similar sample. The data shows that the post-test values of shoulder internal rotation between group A and B had the significance value below 0.05 i.e., p=0.017 which means that there was statistically significant difference between the effects of Myofascial release technique and the Hold-relax PNF on the shoulder internal rotation, so, from the descriptive statistics of the within group table it can be seen that the Hold-relax PNF technique has produced significant results as compared to myofascial release technique on shoulder internal rotation among supraspinatus tendonitis patients.

Shoulder External rotation Within Group Analysis

Table 9 Repeated measures ANOVA shoulder External rotation within group analysis

Groups		Mean	Std. Deviation	N	Asymp. Sig.
Group A	Shoulder external rotation range of motion at baseline	40.4286	3.79705	14	**0.009**
	Shoulder external rotation range of motion after 2nd week	43.5000	3.77746	14	
	Shoulder external rotation range of motion after 4th week	47.1429	3.77964	14	
Group B	Shoulder external rotation range of motion at baseline	39.3571	2.84489	14	**0.004**
	Shoulder external rotation range of motion after 2nd week	44.7143	2.75761	14	
	Shoulder external rotation range of motion after 4th week	49.5714	2.95386	14	

The table 9 given above shows the descriptive statistics and repeated measures ANOVA test statistics within group analysis, the table above shows the groupwise description. The data shows that mean of shoulder external rotation within group A before the intervention was 40.42 ± 3.79 degrees and post intervention it was 47.14 ± 3.77 degrees and the level of significance is below 0.05 i.e., p=0.009, which means that the Myofascial release technique has brought a difference of 6.72 degrees in the shoulder external rotation among the patients of supraspinatus tendonitis.

The table above shows that mean of shoulder external rotation within group B before the intervention was 39.35 ± 2.84 degrees and post intervention it was 49.57 ± 2.96 degrees and the level of significance between the pre and post-test values is below 0.05 i.e., p=0.004, which means that the Hold-relax PNF has brought a difference of 10.22 degrees in the shoulder external rotation among the patients of supraspinatus tendonitis.

Analysis of External Shoulder Rotation in Group A & B

Table 10 Independent samples t-test statistics shoulder external rotation between group A and B

	Groups	N	Mean	Std. Deviation	Asymp. Sig.
SER range of motion at baseline	Group A	15	40.1333	3.83344	**.426**
	Group B	15	39.1333	2.87518	
SER range of motion after 2nd week	Group A	14	43.5000	3.77746	**.238**
	Group B	15	45.0000	2.87849	
Shoulder external rotation range of motion after 4th week	Group A	14	47.1429	3.77964	**.070**
	Group B	14	49.5714	2.95386	

The table 10 given above shows the independent samples t-test statistics on external rotation of shoulder between two groups that is A and B. The data shows that the significance value at the pretest shoulder external rotation was above 0.05 i.e., p= 0.426 which gives the values of external rotation of shoulder between these two groups at baseline were not significant from each other, which indicates that the data was taken from a similar sample. The data shows that the post-test values of SER in between group A and B had the significance value above 0.05 i.e., p=0.070 which means that there was no statistically very great difference in the effects of Myofascial release technique and the Hold-relax PNF on the shoulder external rotation which means that both the exercises were effective equally in improving the shoulder external rotation range of motion.

Discussion

Aksan Sadikoglu B et. al conducted a study to compare the ischaemic compression (IC) and instrument-assisted soft tissue mobilization (IASTM) in the treatment of MTrPs in addition to standard rehabilitation program in patients with rotator cuff tears. Participants with rotator cuff tears were included the study (n = 46). Patients were randomly divided into two groups; which were Group 1 (IC + standard rehabilitation program (n = 23)), and Group 2 (IASTM + standard rehabilitation program (n = 23)) groups. Pain were assessed by visual analog scale (VAS). Range of motion (ROM) was assessed by a universal goniometer. Active MTrPs were assessed according to the Travel and Simons criteria. Pressure pain threshold (PPT) were assessed by a digital algometer. Function was evaluated by the Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH) and American Shoulder and Elbow Surgeons Standardised Shoulder Assessment (ASES) Form. Anxiety and depression were evaluated by the Hospital Anxiety and Depression (HAD) scale. Satisfaction was assessed by the Global Rating of Change scale after 6 weeks treatment. He concluded that patients with low functionality accumulated in the IC group, the IC is more effective than the IASTM in increasing the PPT and functional improvement according to the results of the DASH score (12). In recent study results of two different techniques proprioceptive neuromuscular facilitation and myofascial release have been observed to treat patients with rotator cuff tear

Desjardins-Charbonneau A et. al conducted a systemic review to evaluate the efficacy of manual therapy (MT) for patients with rotator cuff (RC) tendinopathy. Twenty-one studies were included. The majority had a high risk of bias. Only 5 studies had a score of 69% or greater, indicating a moderate to low risk of bias. A small but statistically significant overall effect for pain reduction of MT compared with a placebo or in addition to another intervention was observed (n = 406), which may or may not be clinically important, given a mean difference of 1.1 (95% confidence interval: 0.6, 1.6) on a 10-cm visual analog scale. Adding MT to an exercise program (n = 226) significantly decreased pain (mean difference, 1.0; 95% confidence interval: 0.7, 1.4), as reported on a 10-cm visual analog scale, which may or may not be clinically important. Based on qualitative analyses, it is unclear whether MT used alone or added to an exercise program improves function. For patients with RC tendinopathy, based on low- to moderate-quality evidence, MT may decrease pain; however, it is unclear whether it can improve function. More methodologically sound studies are needed to make definitive conclusions (13). In recent study proprioceptive neuromuscular facilitation is more effective than myofascial release in treating patients with rotator cuff tear.

Menek B et. al conducted a study on 30 patients with Rotator cuff syndrome. The patients were randomized into Mulligan and control group. All the patients participating in this study were treated with conventional physiotherapy. Additionally, the Mobilization with movement (MWM) technique was used in the Mulligan group. Visual Analog Scale (VAS), Disabilities of the Arm, Shoulder, and Hand (DASH), goniometer for the normal range of motion (ROM) and Short Form-36 (SF-36) questionnaires were used for assessment. RESULTS: Statistically significant improvement was found in the post-treatment VAS, DASH, SF-36, and ROM values significantly improved in both groups ($p< 0.05$). However, the Mulligan group showed much better results when compared to the control group in ROM, VAS, DASH ($p< 0.05$). In the SF-36 questionnaire, significant results were obtained for both groups, except the social function parameter. For the SF-36 parameters, both groups performed equally. CONCLUSIONS: Mulligan mobilization was more effective than general treatment methods for pain as well as normal joint motion, DASH scoring and some parameters of SF-36 compared with general treatment methods (14). But recent study showed that both Proprioceptive Neuromuscular Facilitation and Myofascial Release are effective in improving range of motion but Proprioceptive Neuromuscular Facilitation is more effective than myofascial release.

CONCLUSION

Both Proprioceptive Neuromuscular Facilitation and Myofascial Release are effective in improving range of motion but Proprioceptive Neuromuscular Facilitation is more effective than myofascial release.

Recommendations

- Further trials are recommended with larger sample size and to evaluate long term benefits of the treatment techniques by obtaining follow ups of patients for extended period.
- A double or triple blinded study design is recommended for future studies.

- It would be beneficial to organize training sessions and workshops for physiotherapists and rehabilitation specialists to familiarize them with the most effective application of both techniques. Proper training can ensure optimal outcomes for patients.
- Researchers should consider follow-up sessions with patients after the completion of therapy to monitor the longevity of the therapeutic effects and determine if and when repeat sessions are needed.

CONFLICT OF INTEREST

There are no conflicts of interest that the authors of this work need to disclose.

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Data Availability statement

The datasets generated and analyzed in this study are not publicly available due to privacy and confidentiality concerns, ethical restrictions, legal or contractual obligations, and intellectual property considerations. However, the corresponding author is open to sharing the datasets upon reasonable request.

Limitation of study

This study is restricted by certain factors. Firstly in the recent study sample size was small only 28 Participants were allocated which can disturb the validity and generalizability of results. Secondly, long term effects were not assessed due to short duration so it is not known whether the effects of treatment could be maintained for long period of time or not.

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