RESEARCH PAPER

Releasing myofascial trigger point a requisite in treatment of Adhesive capsulitis using Matrix Rhythm Therapy: A randomized controlled trial

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ABSTRACT

Background: Matrix Rhythm Therapy on trigger points is one of the novel approaches which works on a principal of micro-mobilization, increasing the flexibility of a muscle and alleviating pain in various musculoskeletal conditions. The purpose of the study is to lay emphasis on the impact of the mentioned therapeutics on essential reduction of symptoms like pain occurring due to trigger points that ultimately leads to improve in the functional ability of the patient, as myofascial trigger points is the contracted state of a muscle. Adhesive Capsulitis is a common musculoskeletal pain disorder that affects the shoulder joint and has no recognised cause. Myofascial trigger points (MTrPS) in the shoulder girdle muscles may be the cause of pain and restricted range of motion, according to published research. Patients with adhesive capsulitis frequently maintain tensed muscles, which may result in development of trigger points.

Methodology: Patient diagnosed by Orthopedician with adhesive capsulitis were screened and included in the study. 30 patients with informed consent were included in the trial. They were allotted randomly in 2 groups by computerised allocation method. 15 amongst them were given matrix rhythm therapy and 15 patients were given myofascial release technique for trigger points in adhesive capsulitis patients. Outcome measures were NPRS, range of motion, pain threshold of trigger points.

Result: Significant improvement in pain and range of motion was noted with $p < 0.005$. And the pain intensity of the trigger points in various muscles was also improved.

Conclusion: The results of this study showed that releasing myofascial trigger points by matrix rhythm therapy is effective at improving symptoms of pain, reduced ROM and functional disability.

Keywords: Matrix rhythm therapy, myofascial trigger points, adhesive capsulitis, physiotherapy intervention, pain

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INTRODUCTION

Frozen shoulder, another name for adhesive capsulitis, is a painful and incapacitating condition that causes gradually increase in stiffness and limited shoulder joint range of motion.

(1). Disorder frequently results in inflammation and fibrosis of the joint capsule, which severely limits shoulder range of motion(2). A critical but often overlooked aspect of adhesive capsulitis is the occurrence of myofascial trigger points (MTrPs) in adjacent muscles(3). MTrPs are hyperirritable areas in skeletal muscle or fascia that cause pain , motor dysfunction, and autonomic abnormalities(4). It has become more well acknowledged that MTrPs play a critical role in aggravating the symptoms of adhesive capsulitis since they can cause pain, tense muscles, and further limits shoulder motion. Considering trigger points as one of the contributing factors for (5)pain and restricted range of motion, this research attempts to investigate the interplay within the myofascial trigger points and.adhesive capsulitis, focusing on the common muscles affected. The researches proved that prevalence and impact of trigger points is most common in muscles like the deltoid, the pectoralis major and minor, upper trapezius and latissimus dorsi(6,7). The relationship between MTrPs and adhesive capsulitis can provide valuable insights for more effective treatment strategies, potentially enhancing patient outcomes through targeted interventions. Many interventions are established in treatment of trigger points such as dry needling, manual therapy, and specific

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stretching exercises, myofascial release technique(8,9).Since, trigger points are formed due to concentric, eccentric, repetitive or sustained contractions. This contracted state of muscles cause ATP crises that leads to impaired aerobic metabolism, while ATP is required for relaxation as well as contraction(10).During the relaxation phase when ATP is not generated actin-myosin bridge cannot be detached and taut bands of trigger points are generated as the muscle remains in the contracted state(11). The persistent contracture close to an aberrant endplate is sustained by a lack of ATP. This leads to increased metabolic demands, a polarized membrane potential, and restricted capillary circulation, which reduces blood flow and produces local hypoxic conditions.

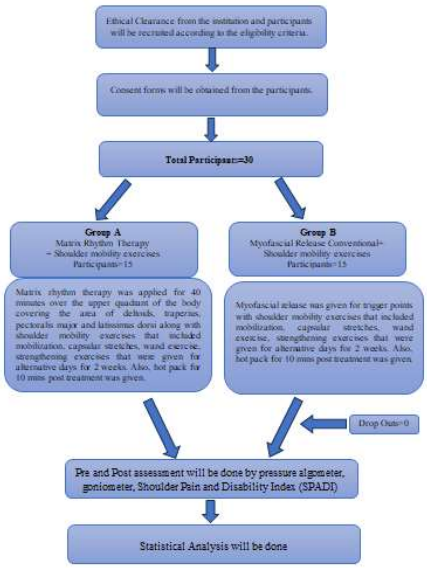
The energy crisis is caused by an imbalance between the supply and demand of ATP, which may lead to the release of neuro-reactive chemicals and metabolic by products such as serotonin (5-HT), bradykinin(BK) and substance P (SP), which may sensitise peripheral nociceptors(12). As postural mechanism as well as muscle quality is altered in this condition, the most commonly affected muscles are Trapezius (14), Deltoid muscles (anterior, middle, posterior fibres), pectorals, latissimus dorsi muscle.

Matrix rhythm therapy plays pivotal role in maintaining the tissue homeostasis(13). Matrix rhythm therapy enhances the nutrient exchange, waste removal and oxygenation. Since, contracted state of muscle leads to ATP crises, improvement in the circulation due to matrix rhythm therapy will lead to improved ATP production and cell metabolism(14). Matrix rhythm therapy also normalizes the muscle tone by regulating the cell health and helps to reduce tone and relax the muscle. The hyper tonicity leading to trigger points can be reduced by reducing the inflammation and improving the extensibility of a muscle(15).

Study Design and Methods

To evaluate the effectiveness of MRT in treating MTrP's in participants with adhesive capsulitis, a randomized controlled trial was conducted. After the Ethical committee approval 30 participants were included in the study who were diagnosed with adhesive capsulitis by the Orthopedician and tested for MTrPs by physiotherapist. Participants were assigned randomly either to the MRT group or control group by computerised allocation method. Each group had 15 participants each where in group A (Control group) The treatment protocol for the MRT group involved sessions of 40 minutes for 2 weeks on alternate days. The outcome measures used were pain using numerical pain rating scale (NPRS), Range of Motion (ROM): measured using a goniometer, trigger Point Sensitivity: assessed using a pressure algometer. Participants pre diagnosed with adhesive capsulitis from an Orthopedician having a history of shoulder pain and stiffness with grade 2 adhesive capsulitis were included and assessed for trigger points in shoulder muscle using pressure algometer. Participants having rotator cuff tears, fracture, shoulder tendinitis, shoulder bursitis, shoulder impingement syndrome were excluded. After ethical clearance, consent was taken from the participants and by computerised allocation method they were allotted in interventional and control group.

Intervention:



Outcome measure

Numerical pain rating scale, Pressure algometer, Goniometer

RESULT

Test of normality for quantitative variables included in the study. Out of 30 subjects included in group A and group B, the normality of data was tested using Kolmogorov-Smirnov test. The result of test indicates that majority of variables included in the study were normally distributed (p>.05)

30 participants with mean age of 49 in group A and 55 in group B were included in the study. Female were more affected than male. Data was analysed using the statistical package SPSS 22.0 and the level of significance was set <0.05. Inferential statistics to find out the difference between the groups was done using independent t test. Pre and post comparison was done using paired t test was used to find the difference in proportion.

A significant improvement was noted within the group for pain at rest and activity in Group A (P = 0.001) and that of Group B (P = 0.001) with 5.81%. Statistical significance was also noted in terms of range of motion in Group A and Group B, except for internal range of motion in group B.

Table 1 indicates Pre-test and Post-test comparison of study parameters in group A. The result of paired t-test indicates a significant difference in the pre-test and post-test Flexion, Abduction, Internal Rotation, External rotation, Trapezius, Anterior Deltoid, Middle deltoid, Posterior deltoid, Pectoralis major, Latissimus dorsi (p<.001).

Table 1. Pre-test and post-test comparison of study parameters in Group A

Study parameter		N	Mean	SD	SEM	t-stat	p-value
Flexion	Pre	15	136.600	30.026	7.753	-6.863	<.001**
	Post	15	147.267	29.004	7.489		
Abduction	Pre	15	99.200	28.320	7.312	-6.815	<.001**
	Post	15	106.400	27.380	7.070		
Internal Rotation	Pre	15	42.133	16.427	4.241	-12.763	<.001**
	Post	15	45.800	16.751	4.325		
External rotation	Pre	15	43.067	16.555	4.274	-13.564	<.001**
	Post	15	48.867	16.690	4.309		
Trapezius	Pre	15	29.640	3.446	0.890	-7.821	<.001**
	Post	15	32.467	3.456	0.892		
Anterior Deltoid	Pre	15	27.907	5.654	1.460	-9.285	<.001**
	Post	15	30.493	5.647	1.458		
Middle deltoid	Pre	15	32.420	7.229	1.866	-3.796	<.001**
	Post	15	34.633	6.822	1.761		
Posterior deltoid	Pre	15	29.853	5.444	1.406	-5.513	<.001**
	Post	15	33.060	5.256	1.357		
Pectoralis major	Pre	15	29.007	5.318	1.373	-5.984	<.001**
	Post	15	31.840	5.797	1.497		
Latissimus dorsi	Pre	15	34.787	7.141	1.844	-6.124	<.001**
	Post	15	37.853	6.528	1.686		

Table 2 indicates Pre-test and Post-test comparison of study parameters in group B. The result of paired t-test indicates a significant difference in the pre-test and post-test Flexion, Abduction, Posterior deltoid, and Latissimus dorsi (p<.001). The study parameters Trapezius, Anterior

Deltoid, Middle deltoid, and Pectoralis major showed no significant difference in the pre-test and post-test scores.

Table 2. Pre-test and post-test comparison of study parameters in Group B

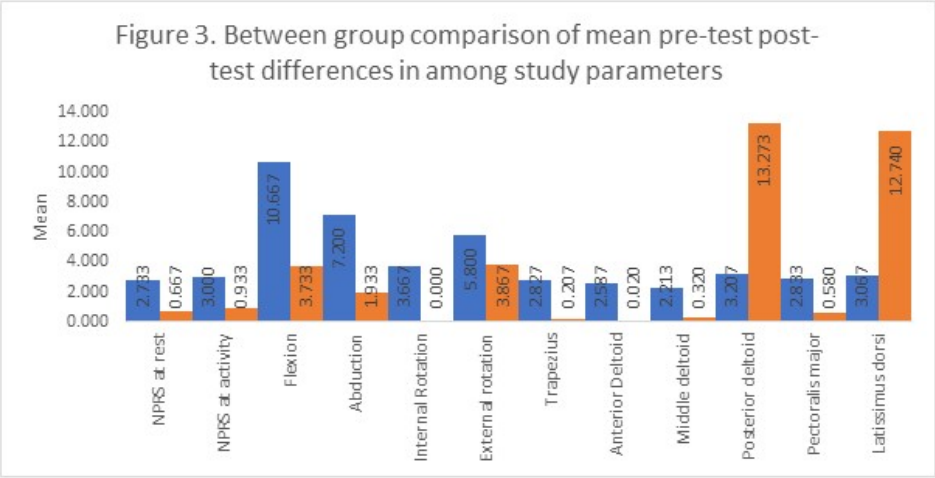
Study parameter		N	Mean	SD	SEM	t-stat	p-value
Flexion	Pre	15	152.333	9.037	2.333	-7.734	<.001**
	Post	15	156.067	8.868	2.290		
Abduction	Pre	15	102.533	19.149	4.944	-2.709	0.017*
	Post	15	104.467	20.657	5.334		
Internal Rotation	Pre	15	46.333	12.128	3.132	-7.187	0.15
	Post	15	44.323	11.125	2.132		
External rotation	Pre	15	48.867	11.351	2.931	-7.250	<.001**
	Post	15	52.733	11.871	3.065		
Trapezius	Pre	15	30.520	3.671	0.948	-0.943	0.362, NS
	Post	15	30.727	4.002	1.033		
Anterior Deltoid	Pre	15	40.387	8.156	2.106	0.061	0.952, NS
	Post	15	40.367	8.340	2.153		
Middle deltoid	Pre	15	38.107	4.534	1.171	-1.583	0.136, NS
	Post	15	38.427	4.436	1.145		
Posterior deltoid	Pre	15	33.700	5.888	1.520	-6.329	<.001**
	Post	15	46.973	7.216	1.863		
Pectoralis major	Pre	15	29.253	3.495	0.902	-1.288	0.219, NS
	Post	15	29.833	3.544	0.915		
Latissimus dorsi	Pre	15	36.273	8.568	2.212	-6.686	<.001**
	Post	15	49.013	6.688	1.727		
***: Significant at 1% level of significance, NS: Not significant*							

Table 3 and figure 3 indicates between group comparison of mean pre-test and post-test differences in study parameters. The result of unpaired t-test indicates a significant difference mean pre-test and post differences (p<.001)

Table 3. Between group comparison of mean pre-test post-test differences in study parameters

Group		N	Mean	SD	SEM	t-stat	p-value
NPRS at rest	Group A	15	2.733	0.961	0.248	7.01	<.001**
	Group B	15	0.667	0.617	0.159		
NPRS at	Group A	15	3.000	1.069	0.276	6.25	<.001**

activity	Group B	15	0.933	0.704	0.182		
Flexion	Group A	15	10.667	6.020	1.554	4.26	<.001**
	Group B	15	3.733	1.870	0.483		
Abduction	Group A	15	7.200	4.092	1.056	4.13	<.001**
	Group B	15	1.933	2.764	0.714		
Internal rotation	Group A	15	3.667	1.113	0.287	12.76	<.001**
	Group B	15	0.000	0.000	0.000		
External rotation	Group A	15	5.800	1.656	0.428	2.83	<.001**
	Group B	15	3.867	2.066	0.533		
Trapezius	Group A	15	2.827	1.400	0.361	6.20	<.001**
	Group B	15	0.207	0.849	0.219		
Anterior Deltoid	Group A	15	2.587	1.079	0.279	6.06	<.001**
	Group B	15	-0.020	1.270	0.328		
Middle deltoid	Group A	15	2.213	2.258	0.583	3.07	<.001**
	Group B	15	0.320	0.783	0.202		
Posterior deltoid	Group A	15	3.207	2.253	0.582	-4.63	<.001**
	Group B	15	13.273	8.123	2.097		
Pectoralis major	Group A	15	2.833	1.834	0.473	3.45	<.001**
	Group B	15	0.580	1.744	0.450		
Latissimus dorsi	Group A	15	3.067	1.939	0.501	-4.91	<.001**
	Group B	15	12.740	7.380	1.905		



DISCUSSION

The present study was designed in order to determine the efficacy of matrix rhythm therapy on management of Adhesive Capsulitis, emphasising particularly on trigger

points release and thereby adding in outcome of adhesive capsulitis. As trigger points are not directly related to pathology of adhesive capsulitis but it can be contributing for pain and discomfort.(16) According to the screening in the present study the most common muscles affected were Trapezius, Deltoid, Pectoralis major, Latissimus dorsi.

Releasing these muscles causes decrease pain and increase range of motion. Trigger points being specific, hyper irritable, hypersensitive areas in muscle that suffer from decreased circulation, increased contraction and spasm(17). They are the most common cause but yet least often addressed problem in this condition. In the study, the comparison of mean pre-test and post-test differences revealed that Group A showed a significant reduction in pain both at rest and during activity, as measured by the Numerical Pain Rating Scale (NPRS). Specifically, Group A had significant improvement in pain at rest and during activity. These findings suggest that Matrix rhythm therapy is highly effective in alleviating pain in patients with adhesive capsulitis,(18) both at rest and during movement. Pain due to trigger points is mainly due to contracted state of muscle that is unable to perfuse the blood and causing the lack of nutrients and oxygen in the muscle tissue(19). MRT's natural vibration promotes skeletal muscle circulation, increases oxygen, nutrients and ATP levels. That causes alleviating of pain substances(20). One of the previous studies showed that MRT increases the blood circulation by 35%(21). Increase in circulation leads to increased oxygenation and exchange of nutrients across the affected tissue(22).

The reduction in pain could be attributed to the therapy's ability to modulate muscle tension and enhance microcirculation, thereby addressing the underlying pathology of increased restricted perfusion of blood due to myofascial dysfunction that often contributes to pain in this population(23). Significant improvements were observed in shoulder range of motion, including flexion, abduction, internal rotation, and external rotation, in Group A compared to Group B. Matrix rhythm therapy significantly enhanced shoulder mobility in patients with adhesive capsulitis(24). The mechanical oscillations of low frequency causes activation of muscle spindles and inhibition of Golgi tendon organ, these vibrations delivered during therapy likely facilitate tissue relaxation, reduce capsular tightness, and enhance overall joint flexibility, which are critical in restoring functional shoulder movement(25). The result is in line with the suggested mechanism of matrix rhythm therapy, which targets hyperactive muscle fibres and encourages relaxation through rhythmic oscillations. The study also evaluates changes in muscle tension caused by trigger points across several important muscles involved in shoulder movement (28,29). Matrix Rhythm Therapy enhances microcirculation, which can help in the removal of these waste products and improve oxygen and nutrient delivery to the affected area(26). Trigger point deactivation may be due to biochemical and metabolic changes caused by the application of a matrix surrounding the trigger point. Earlier studies discovered a considerable variation in the amounts of biochemicals such as Bradykinins (BK), Prostaglandins (PG), Calcitonin gene-related peptide (CGRP), and Substance P (SP) between myofascial trigger points and healthy muscular tissue(27). Trigger points in group B's intervention frequently develop inside constricted and tight fascial tissue. By stretching and releasing these fascial restriction, MFR deactivates the trigger point and restores normal muscular action(28).This can help relieve pressure on the underlying muscle fibres and lessen the pain associated with trigger points or the natural progression of the condition, which paradoxically causes an increase in muscle tension in these muscles(29). Alternatively, this may reflect compensatory mechanisms or differences in muscle activation patterns between the two groups.

CONCLUSION

The study undertaken concludes that both Matrix Rhythm Therapy and conventional therapy were effective in reducing pain, increasing the range of motion and reducing trigger points. Both the treatment reflects highly statistically significant p values with group analysis, although matrix rhythm therapy showed significant improvement in pain at rest, range of motion and also pain threshold of trigger points.

LIMITATION

- Sample group was considerably small
- Unequal male: female ratio
- Wide range of study population

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