The Journal of Community Health Management 2023;10(2):52–57

Content available at: https://www.ipinnovative.com/open-access-journals

The Journal of Community Health Management

Journal homepage: https://www.jchm.in/

Original Research Article

Effect of matrix rhythm therapy on pain, disability, and quality of life among patient with frozen shoulder

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ARTICLE INFO

Article history:
Received 12-05-2023
Accepted 09-06-2023
Available online 10-07-2023

Keywords:
ROM
Quality of Life
Matrix Rhythm therapy

ABSTRACT

Introduction: Frozen shoulder also known as adhesive capsulitis is a condition that causes pain and stiffness in the shoulder joint. It occurs when the tissues in the shoulder joint become thick and stiff and making it difficult to move the shoulder.
Material and Methods: It is an experimental design conducted in SGT medical college amongst 40 to 60 years population in the department of physiotherapy collaborative to the department of community medicine.
Objectives: To investigate the impact of Matrix Rhythm Therapy on shoulder joint discomfort, restricted ROM, and quality of life.
Results: There were three scale used NPRS, SPADI and WHOQL. It was observed that in comparison of conventional group the experimental group was more significant with highly effective results.
Conclusion: Shoulder pain was common in today's perspective due to cause of change in lifestyle and quality of life.

1. Background

The major cause of shoulder dislocation is traumatic injury. Ninety-six percent of shoulder dislocations result from a forceful collision, a fall on an outstretched arm, or a sudden wrenching movement.[1] About 4% of dislocations are atraumatic in origin, caused by such minor incidents as raising the arm or moving during sleep. Anterior dislocation usually occurs when the arm is forcibly abducted and externally rotated. Posterior traumatic dis-location of the glenohumeral joint usually occurs when load is placed through a flexed and slightly adducted arm.

2. Epidemiology

The shoulder is a joint evolved for mobility. To some extent, the structural stability of the shoulder has been sacrificed to achieve a wide range of motion.[1] Instabilities usually defined as a clinical syndrome that occurs when shoulder laxity produces symptoms. Dislocation and subluxation of the glenohumeral joint occurs relatively frequently in athletes. Especially in the growing age the body is flexible and the child is experimenting with movements. Rowe identified a bimodal distribution of shoulder dislocation with peaks in the teenage and 2^{nd} decade.[2] In 98% of cases, the shoulder displaces anteriorly and in about 2% of cases It displaces posteriorly.[3] In young people, most dislocations are intracapsular, with capsular and labral detachments.[4] In 89% of people with a first-time dislocation after age 40, a rotator cuff tear has also resulted.[5]

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https://doi.org/10.18231/j.jchm.2023.013

3. Recurrent Dislocations

An important complication of primary dislocation is recurrent dislocation. Rowe suggests that about 70% of those who have already experienced dislocation can expect a dislocation again within 2 years of the initial injury.[1] In another study, 71% of all recurrences were in male subjects.[6] According to Rowe, young and old subjects have a comparable incidence of primary shoulder dislocation. However, the incidence of recurrent dislocations highly age-dependent.[1] Recurrent dislocation occurs much more frequently in adolescents than in the older population.[7] Dislocation recurs in 83% to 90% of people 20 years of age or younger, in 60% to 63% of people between ages 20 and 40, and in 10% to 16% of people 40years of age or older. In patients with primary dislocation the mean age was 48 years, whereas in patients with recurrent dislocation the mean age was 23 years.[6,7]

4. Age-Related Changes

The traumatic gleno-humeral joint dislocation is an injury frequently observed in adult and adolescent population. While it has commonly observed in full-grown patients.

It is rarely described in toddlers and children. It is necessary to consider the specific features of growing patients to well understand as joint dislocation are unusual in these specific populations. Indeed, in young children, ligaments are stronger than the bone[8] this explains why a fracture can be more common in the presence of an open proximal humeral physis than a ligament rupture.[9] Among all dis-location, the 95% of gleno-humeral dislocations are anterior and the 98% occurs in patients older than 10 years old.[10] For the rarity of this injury in toddlers, there is a lack of specific guidelines and standard care management are not available.

4.1. Collagen changes with age

Collagen is the major protein of ligaments and tendons. In new born, type III (soluble) collagen is synthesized, and the fibres formed from type III collagen are supple and elastic. With each passing decade, collagen-producing gcells make less type III collagen and progressively convert to synthesizing type I collagen, which is insoluble and more stable. Type I collagen has sulfur groups that have a high tendency to cross-link and form bridges between the collagen filaments, causing the fibres, they compose to be relatively tough and nonelastic. This changing ratio of collagen types I and III throughout the body is so reliable that the chronologic age of a person can be determined by analysing the type III collagen content of a skin sample. Thus, the higher content of stretchy type III collagen in tendons and ligaments helps account for the observation that young people who have already had a dislocated shoulder are much more prone to recurrent dislocation than are older people. Once excessively stretched, the capsule and ligaments may be too loose to provide the secure and stable shoulder support required for maximum athletic performance.

4.2. Research question

Comparison of conventional therapy to the conventional therapy with matrix rhythm therapy.

5. Materials and Methods

5.1. Study design

An experimental study.

5.2. Sampling technique

Simple random sampling (chit method).

5.3. Study setting

SGT Hospital

5.4. Study duration

Total duration of the study was 6 months. Each patient was treated for a period of 3 sessions. Thrice a week.

5.5. Methodology

Procedure: Total 30 subjects (male and female) Frozen shoulder were recruited in the study with duration of 3 weeks from age group of 40 to 60 years. A written consent were taken from all the subjects.

1. Intervention consisted of 45-minute session thrice per week. Both groups completed 5-minute rest post.
2. All exercises were progress based on individual participants tolerance.
3. In case of pain ice pack was given.

Conventional Therapy + hot pack (10-15 min) +exercise (Group A) (wand exercise-flexion/extension/internal rotation/external rotation/abduction/adduction).

1. (a) Active assisted shoulder forward flexion with wand.[11]
   (b) Active assisted shoulder external rotation with wand.[12]
   (c) Pendulum exercise.[12]
   (d) Strengthening exercise.[12]
2. Scapular retraction
3. Posterior capsular stretch
4. Isometric shoulder external rotation (the scapula are pulled towards each other).[11]
5. Minutes rest.[12]

Conventional Therapy with Matrix Rhythm Therapy (Group B)

1. (a) Active assisted shoulder forward flexion with wand
   (b) Active assisted shoulder external rotation with wand
   (c) Pendulum exercises
   (d) Strengthening exercises
2. Scapular retraction
3. Posterior capsular stretch
4. Isometric shoulder external rotation (the scapular are pulled towards each other) [13]

Stretching Exercises-Patient Lying position in bed stretching applied Cyclic stretching is applied short duration stretching force that is repeatedly but gradually applied, release and then applied it is applied 10 to 15 times. [12]

Home Exercise: Self stretching and strengthening exercise patient is taught with low load and duration depending on pain tolerance self exercises perform twice a day with a day with 20 repetitions Strengthening exercises for the scapulothoracic and rotator cuff muscles twice a day with 10 reps. [11,12]

Self-stretching shoulder flexion on the table, Self-stretching shoulder abduction on the table. [12]

MRT: Subject was lying down on the couch comfortably as instructed by the therapist. [12] The area to be treated (around the deltoid, pectorals, trapezius, scapula pectorals and axilla) was expose and powder was applied over it in order to avoid the friction caused by the MRT probe. The application of MRT was longitudinal stroking by pushing the probe of the device into the soft tissues. The application was over entire muscle length including shoulder joint line.

1. Duration is 60 to 75 minutes thrice per week
2. Frequency 8 to 12Hz
3. 5 minutes rest. [11,12]

6. Results

The study data was collected from department of physiotherapy, SGTU and then analysed by using R-software as given below.

In this present study, Table 1 and bar diagram represents the distribution of age of group A & B. the mean age of group A was found to be 50.50 years with 5.60 standard deviation. The average age of group B was calculated as 54.11 years with 5.81 variation from the mean. Student's t-test was applied with t-value as 1.90 and the result was statistically in significant at 0.05 level of significance.

In our study, Table 2 shows the comparison of NPRS scale within the group A. it was observed that at baseline the mean & SD score was 7.67±0.9, at 1^{st} week it was 6.83±0.86 and at 2^{nd} week it was found to be as 6.44±0.70. ANOVA test was applied and the calculated value as 22.45 with p-value significant at 0.01 level of significance.

It also depicts the comparison of SPADI score within the group A. it was observed that at baseline the mean & SD score was calculated as 115.83 & 4.54, at 1^{st} week it was 108 & 8.04 SD and at 2^{nd} week it was found to be as 102.17 with 7.25SD. ANOVA test was applied and the calculated value as 90.6 with p-value significant at 0.01 level of significance.

Similarly, it also shows the comparison of WHOQL Score within the group A. it was observed that at baseline, the mean & SD score was 18.94±2.86SD, at 1^{st} week it was 20.67±2.09and at 2^{nd} week it was found to be as 21.83±1.89. ANOVA test was applied and the calculated value as 22.83 with p-value significant at 0.01 level of significance.

In this present study, table 3 depicts the comparison of NPRS score within the group B. It was observed that at baseline the mean & SD score was calculated as 7.94 with 0.73, at 1^{st} week it was 6.72 with 0.83SD and at 2^{nd} week it was found to be as 4.06 with 0.73SD. ANOVA test was applied and the calculated value as 161.75 with p-value significant at 0.01 level of significance.

In also depicts the comparison of SPADI score within the group B. It was observed that at baseline the mean & SD score was found to be as 115.61 with 5.12SD, at 1^{st} week it was 103.00 with 5.42SD and at 2^{nd} week it was calculated as 78.22 with 9.75SD. ANOVA test was applied and the calculated value as 189.27 with p-value significant at 0.01 level of significance.

In also revealed the comparison of WHOQL score within the group B. It was observed that at baseline the mean & SD score was calculated as 18.61 & 2.91SD, at 1^{st} week it was 21.94 & 2.01SD and at 2^{nd} week it was found to be as 25.72 with 2.01SD. ANOVA test was applied with calculated value as 131.39 and the p-value remains significant at 0.01 level of significance.

In this present study, Table 4 shows the comparison of NPRS, SPADI score & WHOQL score between the groups at baseline. It was observed that the average score of NPRS of group A was 7.67 and for group B it was 7.94. The mean score of SPADI of group A was 115.83 and 115.61 for group B. similarly, for WHOQL 18.94 average value for group A and 18.61 for group B. independent t-test was applied and therefore, the results were insignificant at 0.05 level of significance. It means at baseline the several scores of all parameters of both the groups are same.

In this present study, table 5 shows the comparison of NPRS, SPADI score & WHOQL score between the groups at 1^{st} week. It was observed that the average score of NPRS of group A was 6.83±0.86SD and for group B it was 6.72±0.83SD. The mean score with SD of SPADI of group A was 108.00±8.04 and 103.94±5.42 for group B. Similarly, for WHOQL average value for group A was

Table 1: Comparison of conventional therapy and conventional therapy with matrix rhythm therapy according to age

Variable	Group	Mean	Std. Deviation	t-value	p-value
Age	Group A	50.50	5.60	1.90	0.066^{NS}
	Group B	54.11	5.81		

NS=Not Significant.

Table 2: Distribution of pain score (NPRS), SPADI & WHOQL score of study participants according to conventional therapy (group A).

Variables	Duration	Mean ± SD	F-value	p-value
NPRS	Baseline	7.67 ± 0.91	22.45	0.001**
	1^{st} Week	6.83 ± 0.86		
	2^{nd} Week	6.44 ± 0.70		
SPADI	Baseline	115.83 ± 4.54	90.60	0.001**
	1^{st} Week	108.00 ± 8.04		
	2^{nd} Week	102.17		
WHOQL	18.94 ± 2.86	18.94 ± 2.86	22.83	0.001**
	20.67 ± 2.09	20.67 ± 2.09		
	21.83 ± 1.89	21.83 ± 1.89		

**= Significant at 0.01 level

Table 3: Distribution of NPRS, SPADI & WHOQL score of study participants according to conventional with matrix rhythm therapy (group B).

Variables	Duration	Mean ± SD	F-value	p-value
NPRS	Baseline	7.94 ± 0.73	161.75	0.001**
	1^{st} Week	6.72 ± 0.83		
	2^{nd} Week	4.06 ± 0.73		
SPADI	Baseline	115.61 ± 5.12	189.27	0.001**
	1^{st} Week	103.94 ± 5.42		
	2^{nd} Week	78.22 ± 9.75		
WHOQL	Baseline	18.61 ± 2.91	131.39	0.001**
	1^{st} Week	21.94 ± 2.01		
	2^{nd} Week	25.72 ± 2.16		

** Significant at 0.01 level.

Table 4: Distribution of different scores of study participants at baseline according to between the groups

Baseline	Group	Mean	Std. Deviation	t-value	p-value
NPRS	Group A	7.67	0.91	1.01	0.318^{NS}
	Group B	7.94	0.73		
SPADI	Group A	115.83	4.54	0.14	0.891^{NS}
	Group B	115.61	5.12		
WHOQL	Group A	18.94	2.86	0.35	0.731^{NS}
	Group B	18.61	2.91		

NS= Not Significant.

Table 5: Distribution of different scores of study participants at 1^{st} week according to between the groups

1^{st} Week	Group	Mean	Std. Deviation	t-value	p-value
NPRS	Group A	6.83	0.86	0.396	0.695^{NS}
	Group B	6.72	0.83		
SPADI	Group A	108.00	8.04	1.77	0.085^{NS}
	Group B	103.94	5.42		
WHOQL	Group A	20.67	2.09	1.87	0.070^{NS}
	Group B	21.94	2.01		

NS= Not Significant.

20.67±2.09SD and 21.94±2.01SD for group B. Independent t-test was applied and the results were not significant at 0.05 level of significance. It means at 1^{st} week results the several scores of all parameters effects of both the groups are same.

Table 6: Distribution of different scores of study participants at 2^{nd} week according to between the groups

2^{nd} Week	Group	Mean	Std. Deviation	t-value	p-value
NPRS	Group A	6.44	0.70	10.02	0.001**
	Group B	4.06	0.72		
SPADI	Group A	102.17	7.24	8.36	0.001**
	Group B	78.22	9.75		
WHOQL	Group A	21.83	1.89	5.75	0.001**
	Group B	25.72	2.16		

** Significant at 0.01 level.

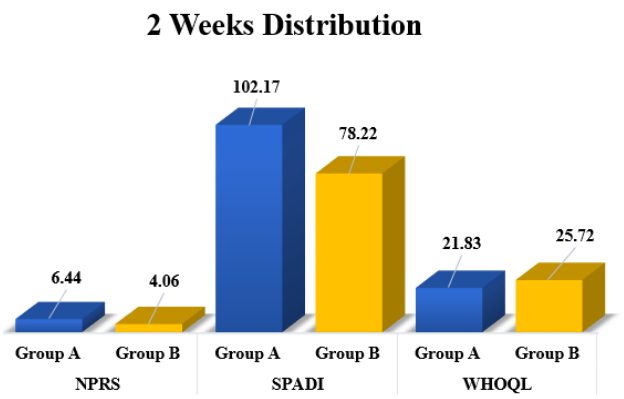

Fig. 1: Two week distribution

In this present study, table 6 and diagram 6.1 represents the comparison of NPRS, SPADI score & WHOQL score between the groups at 2^{nd} week. It was observed that the average score of NPRS of group A was 6.44 and for group B it was 4.06. The mean score with SD of SPADI of group A was 102.17 with 7.24SD and 78.22 with 9.75 standard deviation for group B. Similarly, for WHOQL average value for group A was 21.83 and 25.72 for group B. Independent t-test was applied and the results were significant at 0.01 level of significance. It means at 2^{nd} week results of several scores of all parameters are different of both the groups.

7. Discussion

Frozen shoulder is a debilitating condition that affects the shoulder joint causing pain, stiffness and restricted range of motion. Matrix rhythm therapy (MRT) is a non-invasive treatment that uses rhythmic vibrations to stimulate tissue and improve circulation. In recent years, MRT has gained popularity as treatment for frozen shoulder with many studies reporting positive outcomes.

A study published in the international journal of therapeutic massage and bodywork in 2019[13] investigated the effects of MRT on pain, disability and quality of life among patients with frozen shoulder. The study included 30 participants with frozen shoulder who were randomly assigned to either a treatment group (MRT) or a control group (Conventional physiotherapy) which is similar to our study.

After six weeks of treatment, the MRT group showed a significant reduction in pain as measured by the visual analogue scale (VAS). The mean VAS score decreased from 7.7 to 2.6 in the MRT group compared to a decreased from 7.3 to 5.5 in the control group. The MRT group also showed a significant improvement in disability as measured by the shoulder pain and disability index (SPADI). The mean SPADI score decreased from 73.2 to 28.8 on MRT group as compared to a decrease from 70.8 to 52.5 in the control group.

In terms of quality of life, the MRT group showed a significant improvement in the EuroQol-5D55L(EQ-5D-5L) index score which measures health related quality of life. The mean EQ-5D-5L index score increased from 0.38 to 0.82 in MRT group as compared to an increase from to 0.40 to 0.56 in the control group.

In this study, table 2 and table 5 having NPRS mean score of conventional group was decreased from 7.67 to 6.44 as compared to MRT group was decreased from 7.94 to 4.06 which is almost similar to above study. The SPADI score of group A was decreased from 115.83 to 102.17. however, it was found that in experimental group the mean score was decreased from 115.61 to 78.22 which is statistically significant. According to quality of life, the mean score of WHOQL at baseline to 2^{nd} week was found to be 18.94 to 21.83 in control group and in experimental group the value are changed was more hike as compared to control group i.e., 18.61 to 25.72 and the results were statistically significant in both the groups.

These findings suggest that MRT is an effective treatment for frozen shoulder with significant improvement in pain, disability and quality of life.

8. Conclusion

In conclusion, MRT is a promising treatment option for frozen shoulder offering significant improvements in pain, disability and quality of life. Healthcare practitioners should consider MRT as viable treatment option for patients with frozen shoulder, in addition to conventional physiotherapy. This study suggests that matrix rhythm therapy may have a positive effect on reducing pain improving range of motion and enhancing quality of life in patients with frozen shoulder. However, more high quality randomized controlled trials are needed to confirm these findings and determine the optimal dose and duration of therapy.

9. Source of Funding

None.

10. Conflicts of Interest

None.

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Cite this article: Chamola SK, Kanuja, Chamola Y, Mohapatra SC. Effect of matrix rhythm therapy on pain, disability, and quality of life among patient with frozen shoulder. *J Community Health Manag* 2023;10(2):52-57.