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“EFFECTIVENESS OF PERCUSSIVE THERAPY ,GROSS-MYOFASCIAL RELEASE TECHNIQUE AMONG THE FROZEN SHOULDER PATIENT”

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Abstract

Background: Frozen shoulder is characterized by subtle and progressive inflammation in glenohumeral joint capsule premier to its contractures, hence resulting in stiffness and decrease of shoulder movements. In general population 2-5% prevalence has been delineated.

Methods: A Randomized Controlled Trial. total of 45 subjects were randomized according to the inclusion and exclusion criteria and divided into 3 groups, Group A: (n=15) Was given Percussive therapy and Conventional therapy (US+TENS+home exercise programme) Group B:(n=15) Was given Gross MFR+Conventional therapy (US+TENS)+home exercise programme. Group C:(n=15) Was given Conventional therapy (US +TENS)+home exercise programme. All the groups were treated for 3 days a week for 3 week. The outcomes were measured by Visual analog scale, Range of motion by using universal goniometer, shoulder pain and disability index scale (SPADI) and Pittsburgh sleep quality index (PSQI). Baseline values for all the outcome measures were taken and post intervention treatment on 3rd week was recorded.

Results: Results of multiple comparison showed no significant difference between group A and group B, in post intervention as p-value $0.247 > 0.05$. There was significant difference between group A and group C, group B and group C as ($p < 0.05$). Therefore the Internal rotation mean \pm S.d. of group B (60.13 ± 5.139) is significantly higher than group A (56.93 ± 5.363) and group C (51.87 ± 5.680). In comparison of Paired - t test Intra group between post and pre intervention there was significantly higher effective in mean paired difference on Group B and followed by Group A and Group C in ROM, visual analog scale, SPADI and PSQI.

Conclusion: The findings of the present study indicate that all the 3 groups, percussive group, MFR group and conventional group were found effective in all outcome measures to frozen shoulder patients after the 3 weeks of treatment.



Keywords: frozen shoulder, percussive therapy , theragun, gross-MFR, conventional therapy, effectiveness, shoulder pain.

INTRODUCTION

Frozen shoulder is one of the most common type of joint disease. This illness is also known as adhesive capsulitis. For both active and passive movements, the afflicted shoulder experiences pain, as well as a restriction or complete loss of mobility in all directions. Thickening of the fibroid at the joint capsule and compliance of the head to the glenohumeral joint limit mobility and intra-articular volume in the glenohumeral joint. The disorder has been found to affect between 2% and 5% of the general population. Women are more prone than men to be affected by this.^(1,2,3)

Frozen shoulder can be caused by both primary and secondary causes. The core component is made up of the idiopathic effect, systemic variables including diabetes and hypertension, and age-related reasons. Also common were operations like coronary artery bypass graft (CABG) and arm immobilisation for an extended period of time after surgery.⁽²⁾ Rotator cuff and deltoid muscles are the most typically affected in frozen shoulder. People between the ages of 40 and 70 are the most common victims. Frozen Shoulder is characterised by glenohumeral joint capsule inflammation, which results in contractures that limit shoulder movement. It takes roughly 30 months for the symptoms to manifest themselves in each of the three basic stages ⁽⁴⁾

The Freezing stage/painful phase lasts between 10 and 36 weeks for the majority of patients. At night, the patient's symptoms include an voluntary onset of shoulder discomfort, which is more severe. During the Freezing Stage/Painful phase an four to twelve month stiffening period is typical. If a patient has a tight capsule, they may experience tremendous acute pain while engaging in activities they enjoy the most. People frequently express their dissatisfaction with the discomfort they experience when sleeping. Lastly, The Thawing / Resolution For five to twenty-six months is the duration of this stage. As the discomfort lessens, there will be gradual increase in range of motion.⁽⁴⁾

For treating soft tissue dysfunction, Myofascial release technique is one of the most fundamental and effective treatments that relieves tightness and constriction in order to promote effective mobility. A method known as "combination release" can be used in conjunction with gross and focused myofascial release.⁽²⁾

Focused myofascial release can be applied on individual's specific type of muscles after the first stretch generated by gross myofascial release. By focusing on minor limitations within the myofascial unit, it is possible to recognise and rectify refined mal-alignments that are the cause of patient difficulties.⁽²⁾

In recent years, treatment utilising a portable percussive massage device have become increasingly popular. Both self-massage and massage by a therapist with the Theragun are available. Up to and including 53 Hz, theragun's frequency can be varied. Various attachment heads can be held by the devices. A short-term benefit of theragun is that it reduces muscle pain and increases range of motion. several makers have a range of models with varied settings that will embody different speeds/frequencies , amplitudes, and device tips (e.g., big and tiny ball, flat tip, bullet or pointy tip, fork are displayed in Figure 1). Using a wide range of frequencies and amplitudes (e.g., from five to 300 Hz) can produce myofascial outcomes.^(5,6)

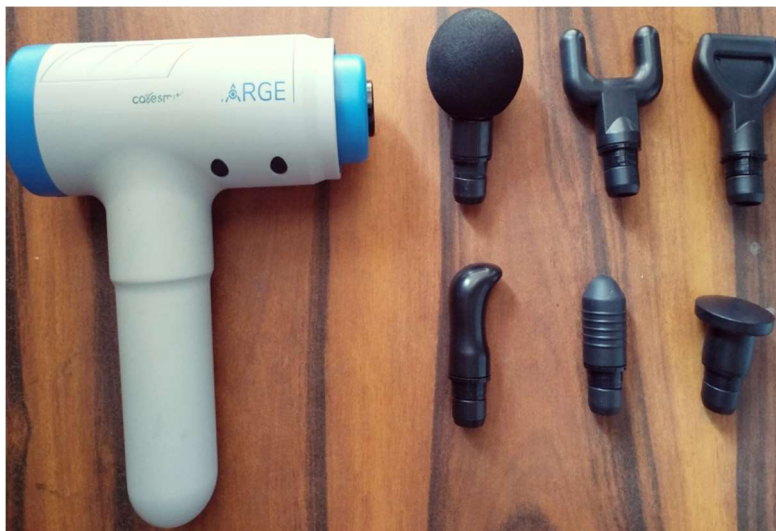


Figure 1: Caresmith percussion massage gun with various application tips.

OBJECTIVES

A frozen shoulder patient's discomfort/pain, range of motion and overall well-being will be evaluated to see if percussion therapy will assist.

To find out the effect of Gross-MFR technique on shoulder pain, ROM, functional disability and quality of life in frozen shoulder patient.

To compare between Gross-MFR technique and percussive therapy on shoulder pain, ROM, functional disability and quality of life in frozen shoulder patient.

METHODOLOGY

The study has been approved by the Institutional ethics committee. The research was conducted between 1st July of 2021 to 30th April 2022. The Ethics Committee of Institution granted ethical permission for this work (IEC no. SU/SMS&R/76-A/2022/36), informed written consent was obtained from patients prior to start the data collection.

Study Design: Randomized Controlled Trial

Study Subjects: 45

Study Setting: The study was conducted at physiotherapy department of Sharda Hospital Greater Noida in Uttar Pradesh.

Study duration: 1 year.

Inclusion Criteria:^[7,8,14] Above eighteen years old, pain in shoulder over three months and more, passive shoulder joint mobility is reduced by 50% compared to the unaffected side, in at least 2 or 3 directions of movement (i.e., frontal flexion, abduction on frontal plane, external rotation in 0 degree of abduction)

Exclusion Criteria:^[8,15] Shoulder girdle dislocations/clavicle fractures, Arthritis and tumors in the shoulder area, thoracic Outlet Syndrome, history of shoulder surgery in last few months, following a traumatic occurrence or the rotator cuff was ruptured, Neurological injury that affects the function of shoulder, elbow/wrist/ hand discomfort or problems and tendon calcification are all conditions associated with the cervical spine.

Method of Selection⁽¹⁵⁾

Participants were randomly assigned to one of three groups based on their eligibility. Patients who met the requirements for the therapy session granted their consent.

There were a number of people involved who directed to randomly pick out a lottery slip or a piece of paper where the name of the group names was written on it and later, individual was allocated accordingly which group he has been picked during the selection process.

Procedure

The patient was informed and signed an informed consent form before starting of the study.

A total of 45 individuals were randomised into three different groups, According to the inclusion and exclusion criteria. There were three groups, A, B, and C, and each was given a letter.

Participants in Group A (n=15) received percussion treatment as well as conventional therapy (US+TENS+home exercise programme) for a total of three weeks.

Group B (n=15) received the Gross MFR+US+TENS+home exercise programme three times a week for three weeks.

Group C, 15 participants, who received regular therapy (US +TENS), underwent a three-week home exercise programme in addition to their standard therapy. A wide range of evaluation instruments/questionnaire has been used for research to monitor the progress of each individuals, including the visual analogue scale, the universal goniometer, the shoulder pain and disability index, and the Pittsburgh sleep quality index (PSQI). By the end of the third week of the trial, pre- and post-intervention values for every single outcome measure had been obtained.

Protocol for Group - A

Group A participants received a combination of percussion, conventional therapy, and home exercise instructions. Percussive Therapy : The patient was seated on the treatment bed in comfortable position while Theragun was applied in Supraspinatus muscle, Deltoid muscle(all three fibers) and Subscapularies muscle from up to downward movement with the use of large ball head (Figure no. 2,3,4). The session was given for 10 minutes duration on Deltoid, Subscapularies and Supraspinatus muscle groups for three times each week over the course of three weeks. With each of the three weeks escalating in severity Intensity of Theragun intervention was Ranges from level 1 to 6, for example :1st week- (Level 1 and level 2), 2nd week-(range of 3,4), 3rd week-(range of 5, 6) followed by 10 minutes treatment duration of each session.



Fig no.2: Theragun applied to deltoid(all fibers) muscle.



Fig no.3: Theragun applied to subscapularis muscle.



Fig no.4: Theragun applied to supraspinatus muscle.

Protocol for Group - B

Patients in Group B has been received Gross MFR (combined release technique) and Conventional therapy+home exercise programme.

Gross MFR (Combination release) :

1. Gross Myofascial Release: The patient was in supine laying position where the Initial stretch was given by arm pull technique rely upon the response that received through the patient's tissue. The arm is abducted upto 90 degree on affected side and the pull was given by the therapist with holding of one hand to grasping the patient's wrist. Each stretch 90 second has been held and relaxed.
2. Focused Myofascial Release: The focused myofascial was Given along with the arm pull where the focus was on lesser restrictions inside the myofascial unit. The subtle mal-alignments were determined and released. It was applied on the muscles like, pectoralis major and minor muscle, deltoid muscle, subscapularis and trapezius. And each stretch position was held for 90 seconds. The duration of the treatment was 15 minutes, 90 seconds each stretch, 5 repetitions / session, 3 days per week for 3 weeks.

Protocol for Group -C

The patient in Group C received conventional therapy (TENS+UST+home exercise routine).

Conventional physiotherapy⁽¹⁵⁾ -

UST : For Ultrasound therapy patient was seated in position, and it was applied on localized site of Symptom. Treatment was given 3 session/week, for 3weeks on 3MHz frequency with intensity 1.5w/cm2 for 5-10 minutes duration.

TENS : The patient position was in prone laying position and electrodes were placed according to location/site of the patient. Treatment was given 3 session /week, for 3 weeks in frequency of 150 which given for fifteen minutes. The amplitude/intensity was set between 25 and 35 mA to accommodate the preferences of each participant. ⁽¹¹⁾

The home exercise therapy programme includes active range of motion exercises, isometric workouts, Codman's pendulum and finger ladder exercises, capsular and pectoral stretch's, scapular stabilisation activities. To complete the HEP regimen three weeks of protocol has been recommended , which included three sets of ten repetitions each, separated by a two-minute rest interval between every exercise for two times in a day.

STATISTICAL ANALYSIS

The data has been gathered or processed. SPSS version 16.0 was used for all statistical analysis. The mean, standard deviation, and 95% confidence range for each parameter have been determined. A parametric test has been employed to determine whether or not the data are significant after the Shapiro-Wilks test revealed that the data were normally distributed. Bonferroni and Paired-t tests were used to examine the significance of the differences in mean values between groups and within groups. There was a 5% level of significance (Ist-type error) and a 95 percent confidence interval in the results.

RESULTS

The study evaluates the effectiveness of percussive therapy and gross-myofascial release technique among the frozen shoulder patients. For this study total 45 no. of frozen shoulder patients were recruited and treated with percussive therapy + conventional therapy + home exercise programme in Group A(n=15), or Gross MFR and conventional therapy + home exercise programme in Group B(n=15) or conventional therapy and home exercise programme in Group C(n=20). The outcome measures used in study were visual analog scale(VAS), range of motion(ROM), Shoulder pain and disability index (SPADI), Pittsburgh sleep quality index(PSQI). All the outcome measures were assessed at pre and post intervention. Specifically objective of the study was to compare outcome measures among the 3 groups in frozen shoulder patients.

Table 1. Distribution of Age mean and s.d. in three groups

| Group | N | Minimum | Maximum | Mean | Std. Deviation |
|---------|----|---------|---------|-------|----------------|
| Group A | 15 | 28 | 62 | 49.67 | 9.774 |
| Group B | 15 | 36 | 67 | 49.27 | 8.319 |
| Group C | 15 | 22 | 67 | 43.67 | 16.321 |

Graph 1: Distribution of patients Age mean in three groups

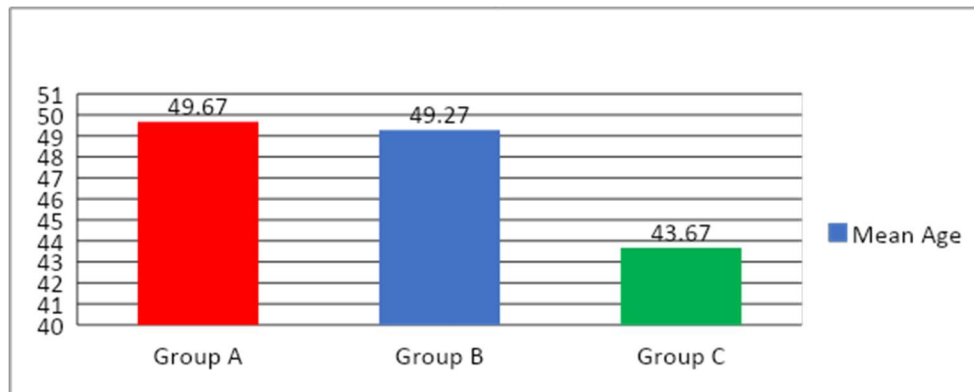
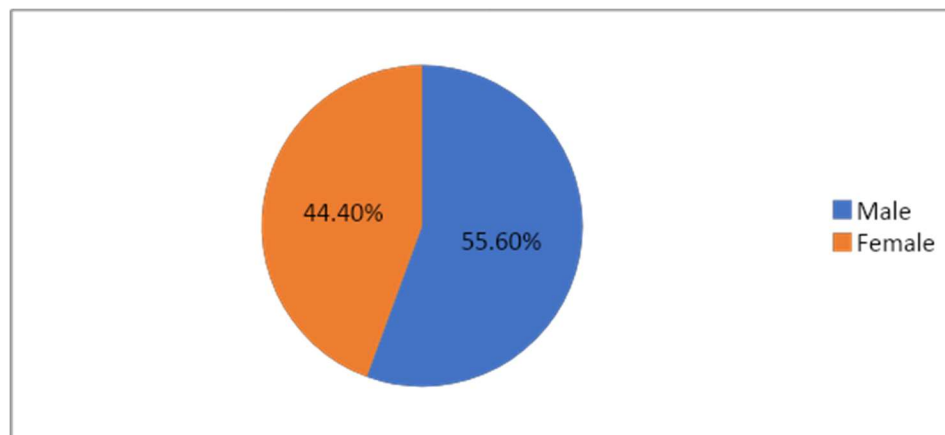


Table 2. Frequency Table of gender

| GENDER | | | | | |
|--------|--------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Male | 25 | 55.6 | 55.6 | 55.6 |
| | Female | 20 | 44.4 | 44.4 | 44.4 |
| | Total | 45 | 100.0 | 100.0 | 100.0 |

Graph 2: Frequency (%) distribution of male and female



Inter Group Comparison:

There was no significant difference among group A, group B and group C on pre intervention flexion, abduction, internal rotation, external rotation and extension, Pain (VAS), Total SPADI and PSQI Scores. Since p-value is greater than 0.05. There was no significant difference among group A, group B and group C on post intervention flexion, abduction, external rotation and extension, Total SPADI and PSQI Scores. Since p-value is greater than

0.05. But there was a significant difference among group A, B and C on post intervention internal rotation and VAS.

Table 3: Comparison of means of Post Intervention Internal rotation between three groups by one-way ANOVA.

| | N | mean ± Std. Deviation | ‘F’ Value | ‘P’ value |
|---------|----|-----------------------|-----------|-----------|
| Group A | 15 | 56.93±5.363 | 8.940 | .001** |
| Group B | 15 | 60.13±5.139 | | |
| Group C | 15 | 51.87±5.680 | | |

Table 4: Post hoc multiple comparison of Post Intervention Internal rotation by Bonferroni test

| Group | Group | Mean Difference ±Std. Error | P value |
|------------|---------|-----------------------------|----------|
| Group A vs | Group B | -3.200±1.972 | 0.247NS |
| Group A vs | Group C | -5.067±1.972 | 0.036* |
| Group B vs | Group C | 8.267±1.972 | .0.000** |

Internal Rotation : Post intervention Internal Rotation, ANOVA F-value18.940 and P- value 0.001<0.05 hence there was a significant difference between groups.

Results of multiple comparison showed no significant difference between group A and group B, in post intervention as p-value 0.247>0.05. There was significant difference between group A and group C, group B and group C as (p<0.05).Therefore the Internal rotation mean ±S.d. of group B (60.13±5.139) is significantly higher than group A (56.93±5.363) and group C (51.87±5.680).(Ref. Table 3, 4 and graph 3)

Graph 3: Distribution of mean Internal rotation among three groups by one-way ANOVA.

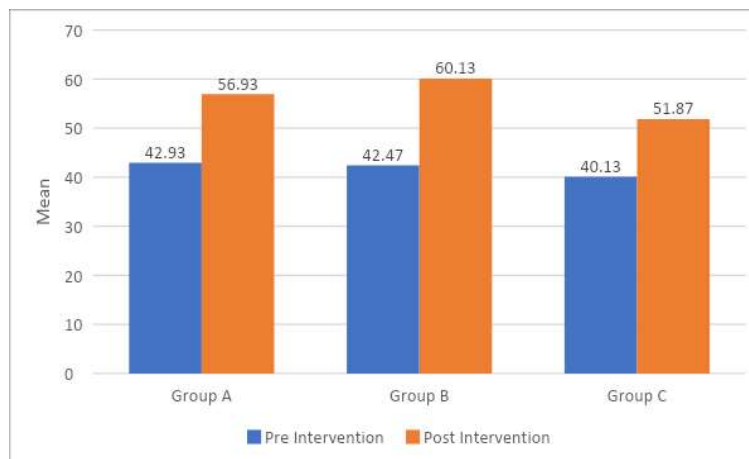


Table 5: Comparison of means of Post Intervention VAS between three groups by one-way ANOVA

| | N | mean ± Std. Deviation | F Value | P value |
|---------|----|-----------------------|---------|---------|
| Group A | 15 | 1.80±1.265 | 5.317 | .009** |
| Group B | 15 | 2.00±1.690 | | |
| Group C | 15 | 3.47±1.598 | | |

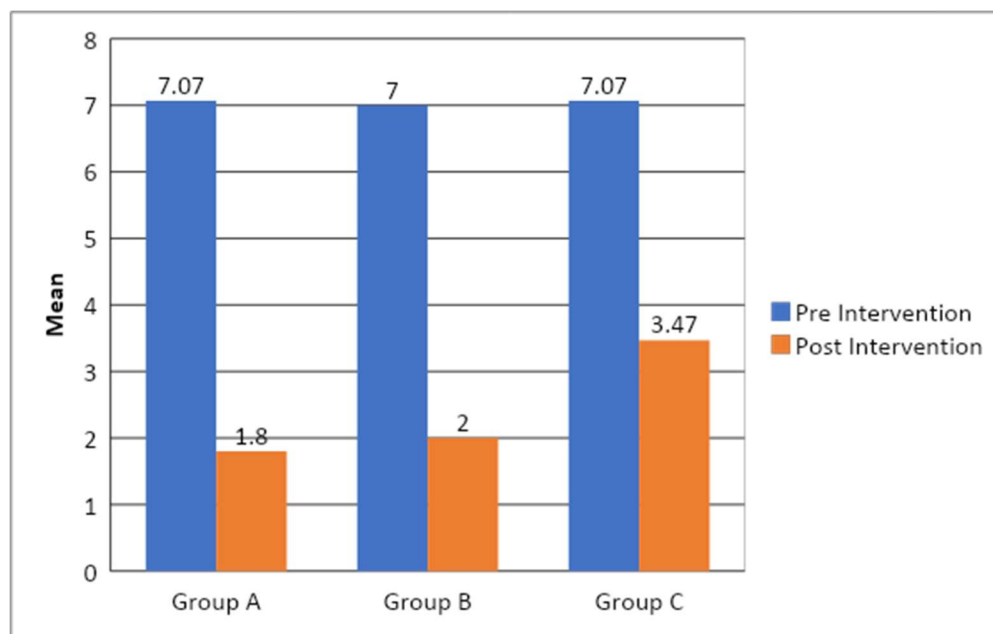
Table 6: Post hoc multiple comparison of Post Intervention VAS by Bonferroni test

| Group | Group | mean Difference ± Std. Error | P value |
|------------|---------|------------------------------|----------|
| Group A vs | Group B | -0.200±0.588 | 0.932NS |
| Group A vs | Group C | -1.667±0.588 | 0.013* |
| Group B vs | Group C | -1.467±0.588 | .0.031 * |

Pain (VAS) : Post intervention Pain (VAS), ANOVA F-value 5.317and P- value 0.009<0.05 hence there was a significant difference between groups.

Results of multiple comparison showed no significant difference between group A and group B, in post intervention as p-value 0.932>0.05. There was significant difference between group A and group C, group B and group C as (p<0.05).Therefore the Pain (VAS) mean ±S.d. of group C (3.47±1.598) is significantly higher than group A (1.80±1.265) and group B (2.00±1.690).(Ref. Table 5, 6 and graph 4)

Graph 4: Distribution of mean Pain (VAS) among three groups



Intra Group Comparison: Range of motion (ROM), Visual analog scale(VAS), Shoulder pain and disability index(SPADI), Pittsburgh sleep quality index(PSQI) an Paired - t test Intra group comparison between post and pre intervention of the Group.

Table 7: Intra group comparison of Flexion between two time intervals by Paired - t test

| GROUP | Intervention | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|--------|---------|
| GROUP A | Post Intervention - Pre Intervention | 39.333±14.316 | 10.641 | .000** |
| GROUP B | Post Intervention - Pre Intervention | 36.867±12.235 | 11.670 | .000** |
| GROUP C | Post Intervention - Pre Intervention | 31.333±10.513 | 11.543 | .000** |

From the above table the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 10.641, 11.670 and 11.543 respectively, as p value- 0.000<0.05 hence there is significant difference between the means of Flexion when compared Pre intervention to Post intervention.(Ref. table no.7 and graph 5)

Graph 5: Distribution of mean Flexion among three groups

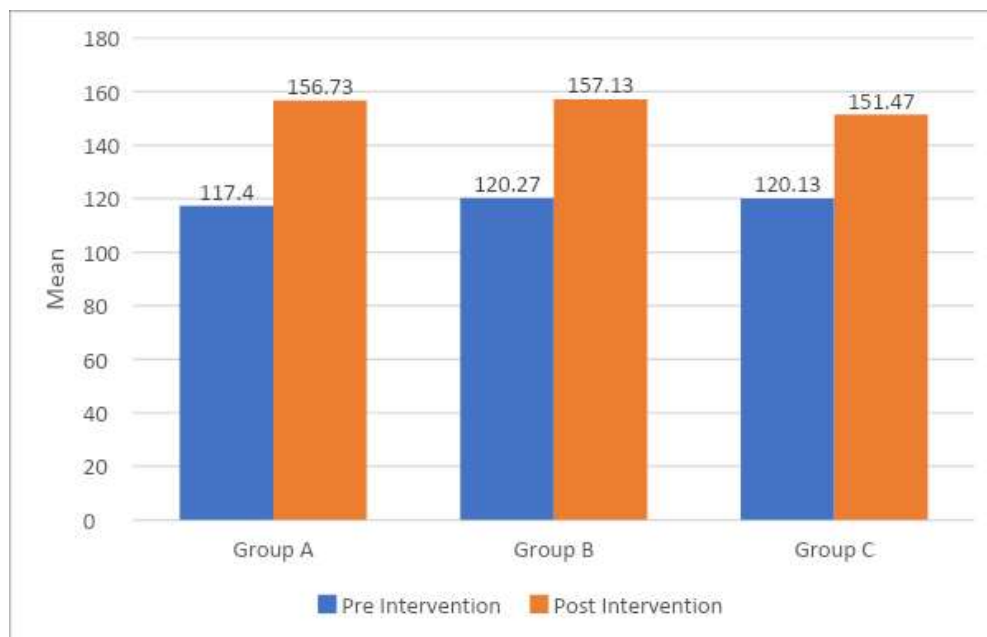


Table 8: Intra group comparison of Extension between two time intervals by Paired -t test.

| | | Paired diff. Mean±S.d. | t | P value |
|--|--|------------------------|---|---------|
| | | | | |

| | | | | |
|---------|--------------------------------------|---------------|--------|--------|
| GROUP A | Post Intervention - Pre Intervention | 16.733±4.234 | 15.308 | .000** |
| GROUP B | Post Intervention - Pre Intervention | 16.733±5.713 | 11.344 | .000** |
| GROUP C | Post Intervention - Pre Intervention | 31.333±10.513 | 11.543 | .000** |

From the above table the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 15.308, 11.344 and 11.543 respectively, as p value- 0.000<0.05 hence there is significant difference between the means of Extension when compared Pre intervention to Post intervention. (Ref. Table no.8 and graph 6)

Graph 6: Distribution of mean Extension among three groups.

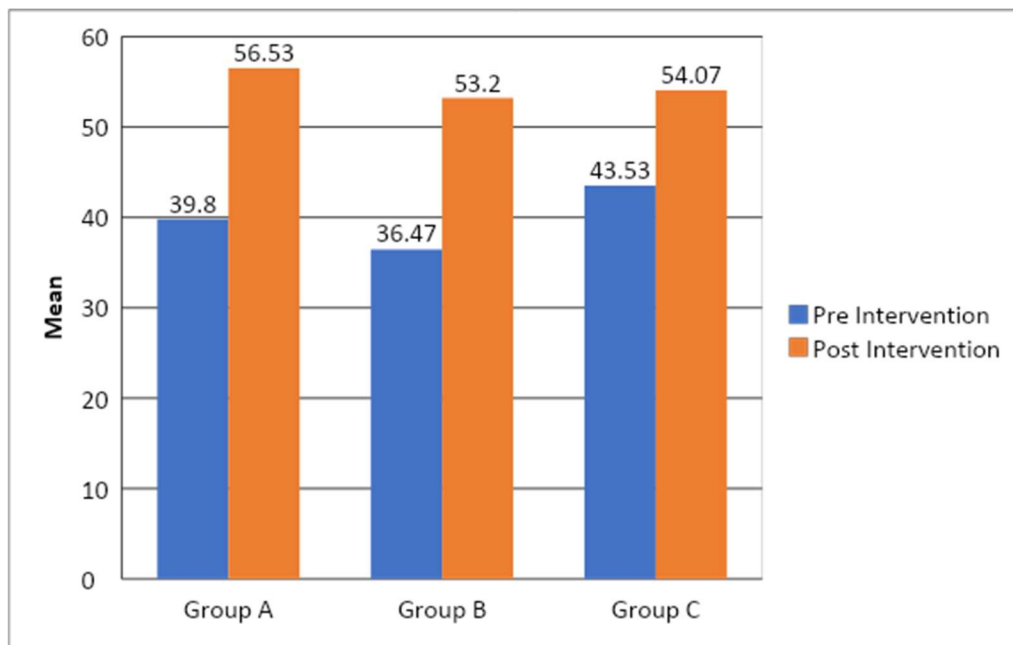


Table 9: Intra group comparison of Adduction between two time intervals by Paired - t test.

| | | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|-------|---------|
| GROUP A | Post Intervention - Pre Intervention | 86.00±4.7778 | 6.971 | .000** |
| GROUP B | Post Intervention - Pre Intervention | 7.000±4.645 | 5.837 | .000** |
| GROUP C | Post Intervention - Pre Intervention | 5.867±2.850 | 7.972 | .000** |

From the above table the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 6.971, 5.837 and 7.972 respectively, as p value- 0.000<0.05 hence there is significant difference between the means of Adduction when compared Pre intervention to Post intervention. (Ref. table no.9 and graph 7)

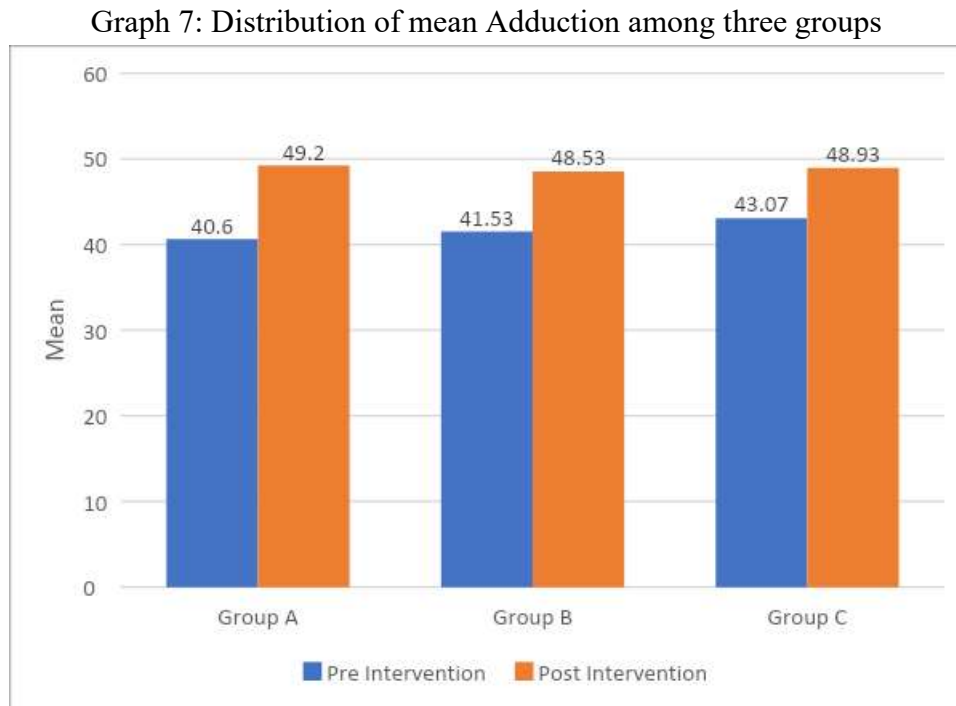


Table 10: Intra group comparison of Abduction between two time intervals by Paired - t test

| | | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|-------|---------|
| GROUP A | Post Intervention - Pre Intervention | 43.00±18.545 | 8.981 | .000** |
| GROUP B | Post Intervention - Pre Intervention | 44.333±27.215 | 6.309 | .000** |
| GROUP C | Post Intervention - Pre Intervention | 30.467±14.232 | 8.291 | .000** |

From the above table the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 8.981, 6.309 and 8.291 respectively, as p value- 0.000<0.05 hence there is significant difference between the means of Abduction when compared Pre intervention to Post intervention. (Ref. table no.10 and graph 8)

Graph 8: Distribution of mean Abduction among three groups.

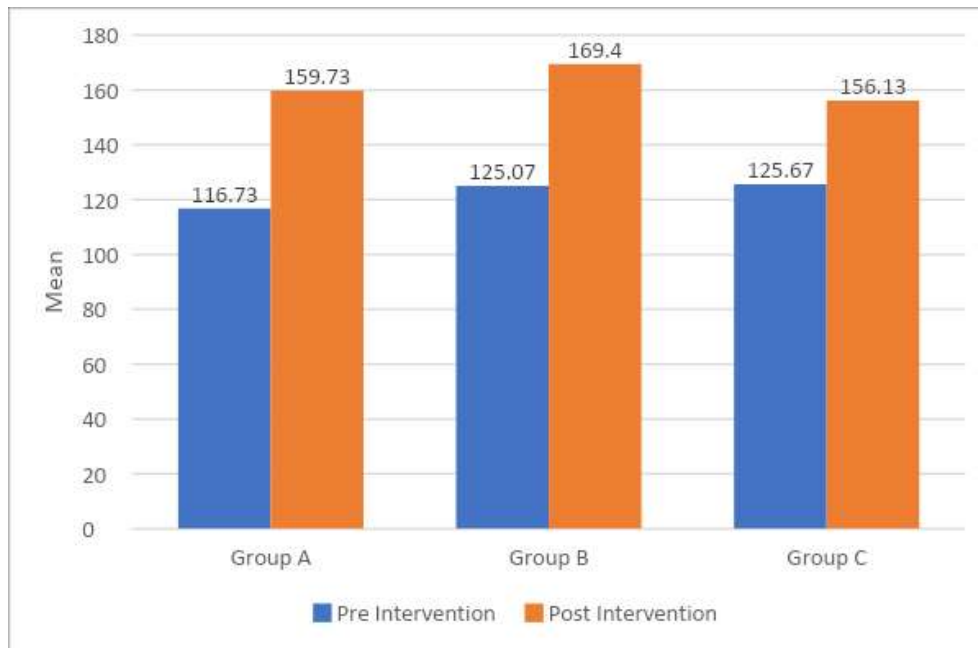


Table 11: Intra group comparison of Internal rotation between two time intervals by Paired - t test.

| | | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|-------|---------|
| GROUP A | Post Intervention - Pre Intervention | 14.000±6.43 | 8.468 | .000** |
| GROUP B | Post Intervention - Pre Intervention | 17.667±7.697 | 8.890 | .000** |
| GROUP C | Post Intervention - Pre Intervention | 11.733±4.574 | 9.935 | .000** |

From the above table the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 8.468, 8.890 and 9.935 respectively, as p value- 0.000<0.05 hence there is significant difference between the means of Internal rotation when compared Pre intervention to Post intervention. (Ref. table no.11 and graph 9)

Graph 9: Distribution of mean Internal rotation among three groups

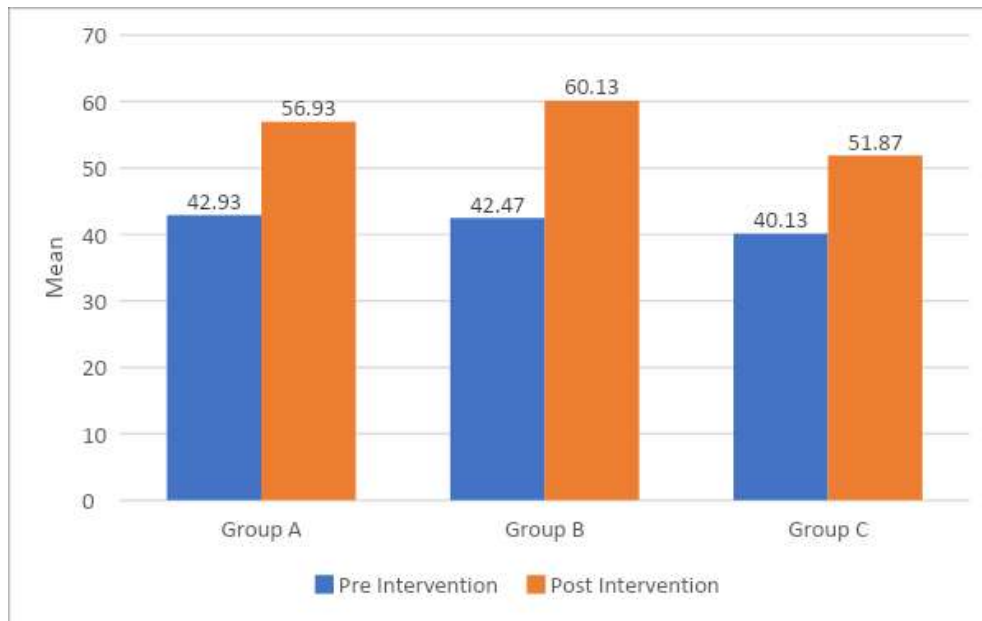


Table12: Intra group comparison of External rotation between two time intervals by Paired - t test.

| | | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|--------|---------|
| GROUP A | Post Intervention - Pre Intervention | 17.667±9.582 | 7.141 | .000** |
| GROUP B | Post Intervention - Pre Intervention | 20.533±5.630 | 14.126 | .000** |
| GROUP C | Post Intervention - Pre Intervention | 9.133±4.502 | 7.857 | .000** |

Above table shows the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 7.141,14.126 and 7.857 accordingly, as the value of p is 0.000<0.05 hence , There is an significant difference between the means of External rotation when compared Pre intervention to Post intervention. (Ref. table no.12 and graph 10).

Graph 10: Distribution of mean External rotation among three groups

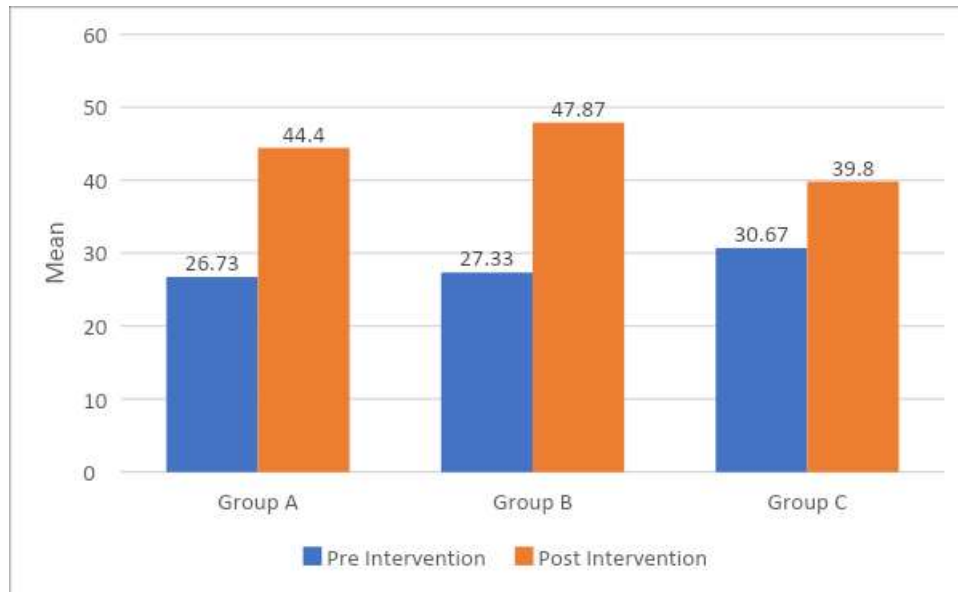


Table13: Intra group comparison of Pain (VAS) between two time intervals by Paired - test

| | | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|---------|---------|
| GROUP A | Post Intervention - Pre Intervention | -5.267±0.961 | -21.222 | .000** |
| GROUP B | Post Intervention - Pre Intervention | -5.000±1.363 | -14.210 | .000** |
| GROUP C | Post Intervention - Pre Intervention | -3.600±1.121 | -12.435 | .000** |

Above table shows the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 21.222,14.210 and 12.435 accordingly, since the p value is 0.000<0.05 hence, there is an significant difference between the means of Pain (VAS) when compared Pre intervention to Post intervention. (Ref. table no.13 and graph 11)

Graph11: Distribution of mean Pain (VAS) among three groups

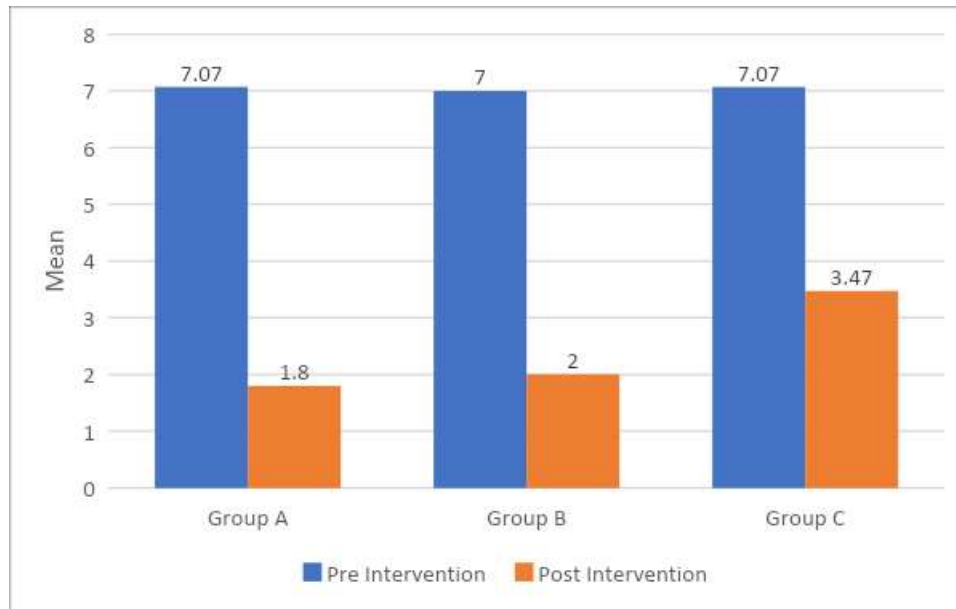


Table14: Intra group comparison of Total SPADI Score between two time intervals by Paired - test.

| | | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|---------|---------|
| GROUP A | Post Intervention - Pre Intervention | -20.072±6.888 | -11.286 | .000** |
| GROUP B | Post Intervention - Pre Intervention | -21.523±8.772 | -9.502 | .000** |
| GROUP C | Post Intervention - Pre Intervention | -17.792±6.546 | -10.526 | .000** |

Above table shows the paired t-test values of Pre intervention versus Post intervention in group A, group B and group C are 11.286,9.503 and 10.526 accordingly, since the value of p is 0.000<0.05 hence, There is a significant difference between the means of Total SPADI Score when compared Pre intervention to Post intervention. (Ref. table no.14 and graph 12)

Graph 12: Distribution of mean Total SPADI Score among three groups

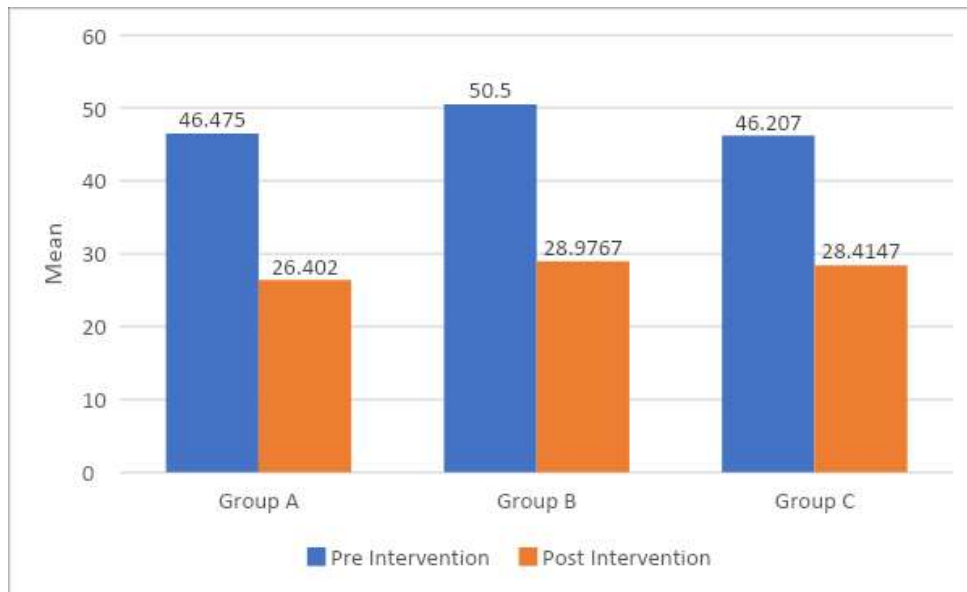
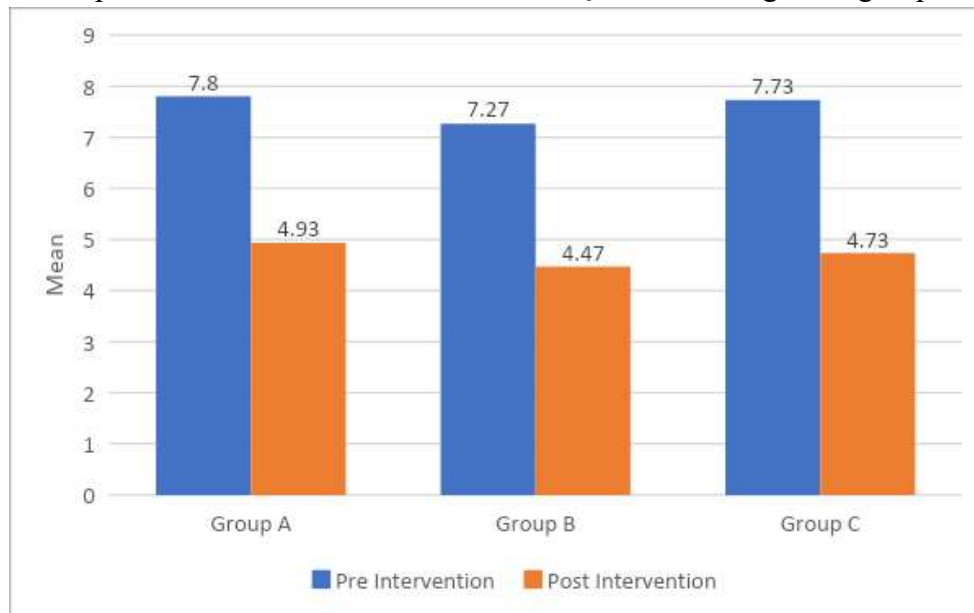


Table15: Intra group comparison of Total PSQI Score between two time intervals by Paired - test.

| | | Paired diff. Mean±S.d. | t | P value |
|---------|--------------------------------------|------------------------|--------|---------|
| GROUP A | Post Intervention - Pre Intervention | -2.867±2.031 | -5.467 | .000** |
| GROUP B | Post Intervention - Pre Intervention | -2.800±1.699 | -6.384 | .000** |
| GROUP C | Post Intervention - Pre Intervention | -3.000±1.604 | -7.246 | .000** |

Above table shows the paired t-test values of Pre intervention verses Post intervention in group A, group B and group C are 5.467,6.384 and 7.246 accordingly, since value of p is 0.000<0.05 Hence, There is an significant difference between the means of Total SPADI Score when compared Pre intervention to Post intervention. (Ref. table no.15 and graph 13)

Graph 13: Distribution of mean Total PSQI Score among three groups



DISCUSSION

This study has been initiated to investigate the “Effectiveness of Percussive therapy and Gross-myofascial release technique among the Frozen shoulder patient”. Over a 18 years old individuals were only included for this study. Participants were randomly divided by lottery method into three groups and each group ‘15’ people were allocated. Group A was treated with percussive therapy and Conventional therapy along with Home exercise programme while, Group B was treated with Gross MFR and conventional therapy + home exercise programme and Group C was treated with conventional therapy +home exercise programme.

Pre and post-intervention data were collected on the first and third days of week three, respectively. The results demonstrated that patients treated in Group A, B, and C shows substantial improvements in VAS, ROM, SPADI, and PSQI, according to the Paired-t test intra-group comparison between post and pre intervention of the Groups. However, in terms of post-intervention inter group comparison on range of motion, VAS, SPADI, and PSQI scores, there were no significant changes between groups A and B.

Therefore, according to study results we uphold the Hypothesis that there is no significant difference of percussive therapy and gross-MFR technique on pain, ROM, quality of life and functional outcomes in frozen shoulder patient. During the comparison of Paired - t test Intra group between post and pre intervantion there was significantly higher effective in mean paired difference on group ‘B’ followed by group A and C in range of motion, visual analog scale, SPADI and PSQI.

In a study by Gurudut et al., has found that a combination of Maitland mobilisation, standard physiotherapy, and MFR had a good effect on trigger points, mobility, and function in frozen shoulder patients when performed together. For this reason, they hypothesised that the reduction in pain could be attributable to the neuro reflexive and biomechanical aspects of the method. Increased range of motion (ROM) and mechanical changes in the tissue produced by the breakage of adhesions, which in turn leads to collagen realignment, are two possible explanations for the decreased neurophysiological discomfort and improved muscular extensibility seen with the MFR approach.

The neurological system's transmission and circulation are reported to be improved as a result of the myofascial release technique's extension of fascia and liberation of blood vessels or nerves. In order to improve range of motion and flexibility, it is beneficial to stretch while carrying a load.⁽⁸⁾

Similarly, Deshmukh et al; Has proved in their study that using gross MFR with conventional physiotherapy treatment in frozen shoulder patients has greater impact on outcome measures such as range of motion, visual analogue scale (VAS), Shoulder pain, and disability index (SPDI) than conventional physiotherapy alone.⁽¹⁵⁾

In the year of 2020 a study carried out by Konrad et al on “The Acute Effects of a Percussive Massage Treatment with a Hypervolt Device on Plantar Flexor Muscles’ Range of Motion and Performance”, They found the increase in muscular performance (MVC) but did not see any changes in MVC torque output after the 5 min massage on calf muscles. while 16 participants were subjected for session, over the course of two days. They advised athletes to warm up with a percussion-based massage to increase their flexibility without affecting muscle function.⁽⁵⁾

According to Dr. Roshni Patel and Dr. Atit Patel's research Theragun therapy was effective for improving horse riding performance and increase in back flexibility due to the application of theragun activates the golgi tendon organ and provide relief effect from the higher center, which reduces the stress in the hamstring muscle and improvement in circulation and nutrition to the tissue that would lead to release tightness and improvement on back flexibility.⁽¹⁶⁾

Further study reported by Dr. Vidhya Rajput and Dr. YashSeju, where they compared the effectiveness of Theragun and Surge Faradic Stimulation on trapezitis patients in a study. A total of 45 persons took part in the research over the course of two weeks (3 sessions per week). Trapezitis patients' pain and movement limitations was assessed with outcome measures such as Visual analogue scale (VAS) and range of motion (ROM). Researchers found that theragun had a more significant effect on pain and range of motion (ROM) in those with trapezitis when compared to a surge of faradic current (FCC).⁽¹⁹⁾

CONCLUSION

The study concludes that Group B, Gross MFR technique along with conventional therapy and home exercise programme has more significant effect in comparison to group A (Percussive therapy+conventional therapy and home exercise programme) and group C (Conventional therapy and home exercise programme) among the frozen shoulder patients. Although Percussive therapy technique have been used for the first time in frozen shoulder disease, it has shown good effect but Myofascial release with conventional therapy + home exercise programme proved to be more beneficial to frozen shoulder patients.

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