

Comparison of effectiveness of manual therapy vs ultrasound therapy for shoulder pain due to secondary impingement

Abstract

Background: Shoulder disorder has a high occurrence in physically active and adult population can be due to most prevalent shoulder impingement.

Objective: This study was conducted to compare effectiveness of manual therapy vs ultrasound therapy for shoulder pain due to secondary impingement.

Methodology: A double blind study done through the interview and assessment of 24 subjects among adult population from different occupation with unilateral shoulder pain. Subjects were randomly allocated in experimental and control group to receive prescribed treatment for continuous 5 weeks with informed consent.

Result: The experimental group showed the better improvement in all aspects than the control group. From the measurement the difference of standard deviation of Visual Analogue Scale was 1.31, abduction was 13.46, external rotation was 2.23 and disability score was 1.67 in control group whereas in the experimental group the VAS was 0.83, abduction was 15.83, external rotation was 4.51 and disability score was 1.82.

Conclusion: As a whole manual therapy with other common item of treatment for both groups can be more effective but further large scale research should be done in this respect.

Keywords: manual therapy, shoulder pain, secondary impingement

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Background

Approximately 10% of the general adult population will experience an episode of shoulder pain in their lifetime¹ Pain in the shoulder is the third most commonly experienced type of musculoskeletal pain, exceeded only by low back and neck pain.² Shoulder pain is a common reason for care seeking as it impacts upon a range of activities of daily living, including sleep. It is estimated that around 95% of people with shoulder pain are treated in primary care settings.³ There is no universal definition of shoulder pain, shoulder refers to the articulations of the scapula, clavicle and humerus together with the ligaments, tendons, muscles and other soft tissues with a functional relationship to these structure. Shoulder disorders, of which subacromial impingement syndrome (SAIS) is the most prevalent, have a high occurrence in the physically active population.^{4,5} Impingement syndrome is a generic term of the rotator cuff lesions encompassing all stages of tendon diseases.⁶ In 1983 Neer⁷ described three stages of impingement syndrome. He noted that “the symptoms and physical signs in all three stages of impingement are almost identical, including the ‘impingement sign’..., arc of pain, crepitus, and varying weakness”.⁷

In 2005, Park et al.⁸ published their findings which concluded that a combination of clinical tests were more useful than a single physical examination test. For the diagnosis of impingement disease, the best combination of tests were “any degree (of) a positive Hawkins-Kennedy impingement sign, a positive painful arc sign, and weakness in external rotation with the arm at the side,” to diagnose a full thickness rotator cuff tear, the best combination of tests, when all three are positive, were the: “the painful arc, the drop-arm sign, and weakness in external rotation”. Our most body parts especially hands are more moving quicker than most machines in activities of

daily living, so it is not surprising due to repetitive using that our hands or upper limb cries out occasionally or refuses to do what we want to do such as overhead activities. Physiotherapy is an effective way to treat successfully of this condition by speeding up healing process, reduce pain and stiffness and increase overall mobility with functional activities. Choosing an effective intervention strategy for achieving the best rehabilitation outcome represents a significant clinical challenge in shoulder pain. In this respect, the importance of manual therapy and exercise for management of shoulder pain due to secondary impingement is unquestionable; though the available study for management of this condition are moderate qualities.

Methodology

Study design

This research was an experimental quantitative study design from December 2007 to February 2008, had been used to evaluate the effectiveness of the manual therapy for the shoulder pain due to impingement in the physiotherapy department & outpatient department of Gonoshasthaya Kendra at Mirzanagar in Savar of Dhaka.

Materials

The following materials were used for the study

- Goniometer & Measuring tape.
- Treatment Table
- Elastic band
- Dumbbell

- e. Ultrasound
- f. Pen & paper
- g. Hot packs & cold packs.

Criteria of patient selection

Patients were selected by interview & through assessment. Patients were selected according to their ages 25 to 40 years without sex discrimination, unilateral shoulder pain from 0 to 3 months, pain exaggerated in overhead and hand behind activities, limited active & passive range of motion of shoulder, no history to receive physiotherapy, yes or no history of painkillers before. All patients were agreed about informed consent to receive prescribed physiotherapy treatment for 5 weeks with minimum 4 days per week and they had flexibility to drop out from the study. They were agreed to continue maintenance exercise and inform the author about their any problem related condition. Overall 24 patients were selected in various dates and they were randomized into equal number of patients in experimental group and control group. Physiotherapy Interventions: The following physiotherapy treatments were provided from 1 to 3 weak & then from 3 to 5 weeks for both groups separately:

From 1 to 3 week

For experimental group

- a. **Manual therapy:** Soft tissue mobilization mainly Swedish & Remedial type for 10 min, 5 days per week. Maitland grade 1 & 2 inferior & posterior mobilization of Glenohumeral joint in scapular plane 20 mobs each, 2 sets per session, 5 times per week
- b. **Exercises:** Range of motion, pendulum and active assisted exercises of the shoulder within pain threshold, dose was 10 reps 4 times per day regularly.
- c. **Strengthening exercises:** Submaximal isometric exercises for external rotators, internal rotators, biceps, and deltoid 10 reps 4 times per day.

For control group

Ultrasound therapy in 1 watt/square cm, for 8 minutes over the shoulder joint 5 times per week.

- a. **Exercises:** were advised same as experimental group.
- b. **Others:** Patient education, active rest, 5 min ice after exercises were advised for both groups.

From week 3 to week 5

For experimental group

- a. **Manual therapy:** Soft tissue mobilization such as deep transverse friction trigger point therapy, myofascial release, muscle energy techniques of different muscles as required and stretching of glenohumeral joint in anterior, posterior and inferior directions. Maitland grade 2, 3, 4 joint mobilizations in inferior, posterior and anterior directions 25 mobs, 2 sets per session, 4 times per week.
- b. **Exercises:** Continue ROM & Isometric exercises as before.
- c. **Strengthening Exercise:** Initiate elastic band or dumbbell exercises of external and internal rotators in scapular plane with abduction progression. Dose was 1 RM, 2 sets per session, 3 times per week.

Initiate extension and horizontal abduction exercise in prone lying position 10 reps 4 times per day regularly. Initiate scapular stabilization exercises 10 reps, 3 sets, 2 times per day. Initiate overhead activities as tolerated and endurance exercises of upper limb. Others as before.

For control group

Ultrasound therapy, exercises and others were as before.

Measurement: The assessor took the measurement before and after treatment in both groups on Range of Motion of external Rotation, Abduction by Goniometer, pain assessment by VAS Scale, disability score was measured by asking and observing patient's arm movements.

VAS was measured subjectively by asking patient about their pain experience where 0 scale was indicated no pain and 10 scale was indicated worst pain. According to severity of pain VAS was counted from 0 to 10. Abduction was measured by instructing the patient to elevate actively of upper limb laterally as high as possible, where normal motion was counted 180 degrees. For external rotation measurement patient was instructed to elevate the upper limb approx 90 degrees with neutral position where forearm were perpendicular to the arm and 45 degrees external rotation was normal standard for this study. For functional disability score was counted where 20 score was normal in the following functional activities:

- a. Functional reach by hand over 30 cm score 4, over 20 cm score 3, over 10 cm score 2, under 10 cm score 1 and unable to move score 0.
- b. Bathing, dressing, grooming, sleep over affected side and other activities of daily living were measured on no difficulty to perform activities score 4, mild difficulty score 3, moderate difficulty score 2, severe difficulty score 1, unable to perform score 0.

Results

From the study of 24 patients in the control and experimental group through the measurements of VAS, AROM & Functional disability score. In the control group the improvement of difference mean in VAS was 2.92, active abduction range was 45.83 degrees, external rotation was 16.42 degrees, functional disability score was 4.08 whereas in the experimental group the improvement of difference mean in VAS was 6.17, active abduction was 88.83 degrees, ER was 28.83 degrees, mean functional disability score was 7.67. The difference of standard deviation of VAS was 1.31, external rotation was 2.23, abduction was 4.51, disability score was 1.67 in control group whereas VAS was .83, external rotation was 4.51, abduction was 15.87 and disability score was 1.82 in the experimental group which indicating that experimental group had better improvement in all aspects than other (Figure 1-4).

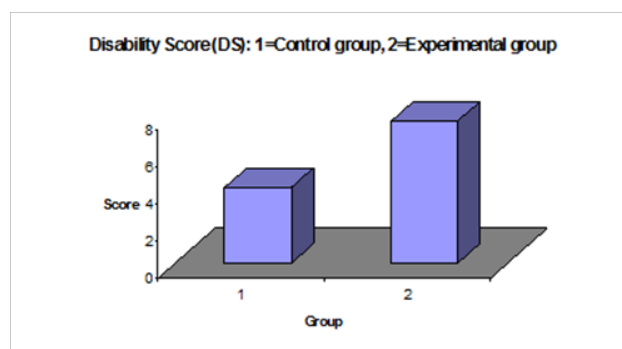


Figure 1 Disability Score in control group and experimental group.

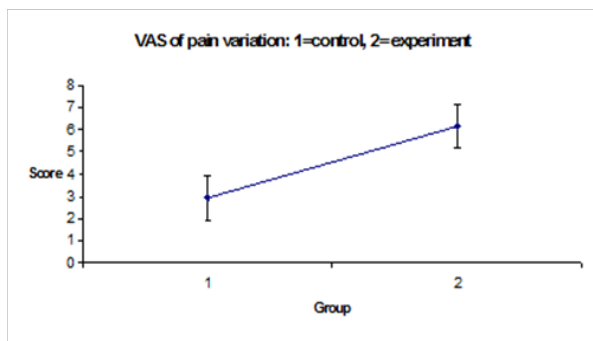


Figure 2 VAS of pain variation in control group and experimental group.

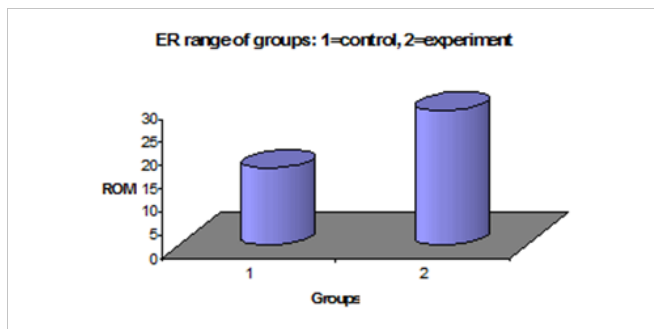


Figure 3 ER range in control group and experimental group.

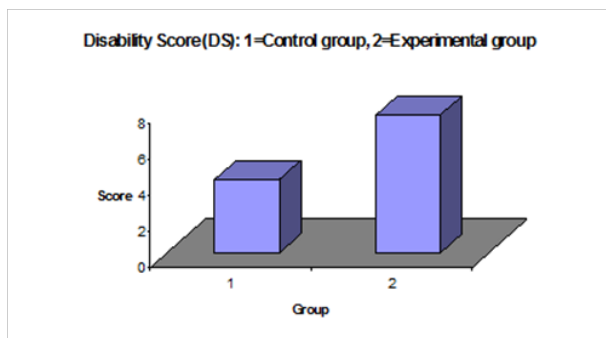


Figure 4 Abduction range in control group and experimental group.

Discussion

Physical rehabilitation techniques such as exercise, mobilization on MEDLINE, CINAHL and Cochrane review from 1993 through 2003 found that physical rehabilitation was effective in reducing pain and functional loss of disability for patients with shoulder pain due to impingement.⁹ This review reported that therapeutic exercise with manual therapy including massage and mobilization were the most effective form of physical interventions and demonstrated short-term and long-term effectiveness for decreasing pain and reducing functional loss than exercise alone. Michener et al.¹⁰ reported that therapeutic exercises such as strengthening of rotator cuff muscles and scapular stabilizing exercises with joint mobilization were the most well investigated and effective form of rehabilitation for pain and disability reduction and as well improvement of mobility and strength of affected shoulder. In this study the age group from 25 to 40 years was targeted who can be in different types hand activities with or without related health conditions. The number of patients was not enough, though all patients were committed to continue treatment during whole period.

As all patients were informed to us after treatment completion to follow up but no patients communicated within two months though time was very short, that can be the weakness of the study. The assessment of the study was done in double blind. So the reliability of the study can be accepted. In this study we had to a lot of counseling about the purposes of the study, treatment protocol, measurement procedures with the patients many times to maintain the standard the research. Every time in each assessment whatever before and after treatment every patient was informed a clear explanation what we are going to do and what will happen about their conditions. So the subjects were almost cooperative with us. The procedures of treatment and measurements as discussed earlier with details. As all the patients were in informed consent with flexibility to drop out, but no patients did not drop from the study. The experimental group was received mainly manual therapy and exercise which indicated more improvement in the shoulder pain. In this sample, subjects were trained to corrective form of exercises regularly at home and prescribed exercises were monitored regularly, so patients were easily carried the instructed exercise programs. Manual therapy was applied according to the basis of pain scale, soft tissue pathophysiology, range of motion of shoulder. Restriction in the ROM in one of the shoulder girdle joints is treated by mobilizations and exercises, muscle imbalance at the scapulo-humeral junction or rotator cuff is addressed by specific, monitored and graduated exercises.¹¹

Electrotherapy modalities may be employed to reduce inflammation and pain, thus facilitating appropriate muscle activity.¹² Ginn et al.¹³ found evidence to support the use of physiotherapy for painful shoulder what makes scientific and biomechanical sense. Though the control group received Ultrasound therapy and exercises which also shown improvement. Several studies showed that ultrasound can be more effective in controlling pain and ultrasound therapy in conjunction with exercises can have further improvement than many others. Ultrasound can help in alleviating pain of shoulder conditions but if we look from the aspects of functional disability and mobility of shoulder than we have to think about manual therapy and definitely corrective form of exercise therapy as required. It makes sense to reduce the person's pain so that muscle activity can be restored, to correct muscle imbalances and weakness, to reduce inflammation by various methods and physiotherapy is one of the most important from the sense of function in biomechanical perspectives.

Conclusion

Shoulder is the most unstable joint in the body, so before providing any treatment or interventions it is very important to consider all the aspects of the conditions whatever subjective or objective or in the real sense of biomechanical issues to find the actual cause of the problem. As there are a lot of variations in the treatment protocols for management of shoulder pain due to secondary impingement with variable improvement. Manual therapy in combination of specific supervised exercise is more effective for treating pain and function loss caused by shoulder impingement (Pain & central nervous system week, 2000). From the study and literature review from different article it should be recommended that for the effective management of shoulder pain due to secondary impingement, physiotherapy has to be the first line of treatment protocol. From the research and different literatures it is clear and indicative that manual therapy with corrective specific exercises was the most useful interventions. So manual therapy including massage and joint mobilizations and supervised exercise with patient education can be effective treatment for shoulder impingement. Overall I would like to suggest clarifying

and valid well designed further research with valid tools can be done with more patient number and adequate follow up for such type of patients.

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