



RESEARCH ARTICLE

EFFECTIVENESS OF ULTRASOUND THERAPY IN COMBINATION WITH ELASTIC BAND EXERCISE FOR SHOULDER IN MALE SUBJECTS

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ABSTRACT

Background: Shoulder instability is the most common problem of shoulder joint. The ultrasound and elastic band exercise plays essential role in treating the shoulder instability.

Objective: The study aims to determine the effect of ultrasound and elastic band

Study Design: prospective case study.

Method: The study is Prospective case study, the total subjects were thirty five for three weeks assessment of pain and ROM were taken in beginning of the study and after three weeks for both group, the patient will be randomly assigned for this study, assessment were taken on 0 day and 21 day of ROM, VAS and SPDAI.

Result: The scores of VAS, SPADI and ROM are improved after intervention of elastic band exercises with ultrasound.

Conclusion: the study concludes that the elastic band exercise are beneficial along with ultrasound therapy in patients of shoulder instability.

INTRODUCTION

The shoulder instability refers to the inability to maintain the humeral head centrally on the glenoid fossa stated about incidence of traumatic shoulder instability has been reported 1.7% of the total population (Dumont, 2011). Over 90% of the shoulder instability is anteriorly, usually the shoulder dislocation occur when arm in abduction and external rotation (Morella Giovanni). The shoulder stability depends primary on the muscles and ligaments rather than bones for its support, stability and integrity. The primary ligaments of the glenohumeral joint the superior, middle, and inferior glenohumeral ligaments play an important role in stabilizing the shoulder joint (Hayes Kimberley, 2002). Physiotherapy has been found effective in reducing pain and disability in patients with shoulder instability, movement of the human shoulder represents the result of a complex dynamic structural bony anatomy and biomechanics (Terry Glenn, 2000). Ultrasound is a physical modality that has been used for its thermal effect and reconstruction of soft tissue in continuous mode. The greatest analgesic effect is attributed to the thermal effect of ultrasound because it leads to increased metabolic activity in the tissues, improving circulation and relaxation of rigid structure of the soft tissues and reduced viscosity of fluid elements in the tissue (Morishita Katsuyuki, 2014). In this study ultrasound is used in soft tissue injuries and there are rational theories for its use, sound evidence for its effectiveness

in such conditions, the dose of therapeutic ultrasound is determined by many factors, the previous studies have revealed that therapeutic ultrasound on rotator cuff muscle reduced muscle stiffness and increased the active range of motion⁶. However some of the studies have found that use of ultrasound does not significantly improve shoulder problem (Anas Pinar Doruk, 2015). Elastic resistance devices such as elastic band are being increasingly used for muscular conditioning for shoulder instability, the elastic band exercises leads to improvement in pain intensity and muscle strength (McGirr Kate, 2015). These devices allow for a larger range of motion with both concentric and eccentric muscle contraction. These resistance training program are performance based and risk factors be addressed a priori as means of preventing injury (Kolber Morey, 2010). The aim of this study is to assess the effectiveness of ultrasound therapy when added to elastic band exercise in the rehabilitation of patients with anterior shoulder instability. This study hypothesized that the ultrasound therapy is beneficial when combined with elastic band and exercise in the physiotherapy management of patients with anterior shoulder instability to reduce pain, increase range of motion and strength (Nitz Arthur, 1986). Resisted training for rehabilitation of injured muscle is an essential part of the rehabilitation protocol.

MATERIAL AND METHODS

Study design

Total thirty five subjects were taken in group. This study is prospective case study, subject where selected by simple

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sampling method from the hospital outpatient department. The entire subjects diagnosed with anterior shoulder instability by Orthopedics Doctor. All the patients were informed and explained about the objective of the study along with duration and nature of the study. The study was approved by the ethical committee for research.

Inclusion Criteria

The subject diagnosed with anterior shoulder instability, aged between 18 to 55 year, shoulder is painful in external rotation, internal rotation, abduction and flexion. One of the instability test positive, anterior drawers test¹¹ or load and shift test. The patient should be available for three weeks; the patient should understand the language and instructions.

Exclusion Criteria

Patient with past history of shoulder surgery, diagnosed with rotator cuff, primary scapulothoracic dysfunction due to paresis, pain due to adhesive capsulitis, involvement with sensory and muscular deficit.

Procedure

The design of the study is prospective case study, subjects were randomly selected. After receiving the written consent form from the participants, the demographic variables including age, weight, gender and height of the groups were recorded at baseline. Baseline scores of the dependent variables of the study were recorded including pain score; SPADI (Shoulder pain and disability index) disability index score; SPADI pain index score (Williams John, 1995); shoulder ROM (range of motion) for flexion, abduction. All variables were recorded done by same blinded tester at baseline zero day (0 day) and twenty one day (21 days) of interventions. All interventions were done by same physiotherapist supervising the test and intervention procedures. Test and retest of the groups was conducted in the same place, environment and at same time of the day. All respective subjects of the group were given interventions as per the protocol. Treatment interventions were done by same physiotherapist for the 5 days in week for 3 weeks (hence total 15 sessions). The duration of each individual treatment session was about 40 minutes per session.

Variables

Dependent Variables of the study were perceived level of pain intensity, range of motion (flexion, abduction), SPADI pain score, SPADI disability scores. The independent variables of the study included ultrasound treatment and Elastic band exercises.

Pain: Pain score was scored as the participants were asked to mark the currently experienced level of pain on a 10 cm horizontal line called as VAS (Williams John, 1995), (Visual analogue scale). Two extremes of this line were labeled as "0" indicating no pain at all; and the "10" indicating maximum intensity of pain as subjectively perceivable by the specific participant. The distance of the point marked by the participant from the "0" point indicates the level of pain as perceived.

SPADI: Participants were also requested to complete the shoulder pain and disability index (SPADI) Questionnaire. Shoulder Pain and Disability Index (SPADI) is a tool to measure the self-reported current level of shoulder pain and disability in an outpatient setting for the patients suffering from shoulder problems (Williams John, 1995). The SPADI contains 13 items that assess two domains; a 5-item subscale that measures pain and an 8-item subscale that measures disability. In both domains of SPADI the each item is scored on a visual analogue scale (VAS).

Elastic band treatment group

The elastic band exercises were performed by the therapist. The elastic band tension was adjusted according to each participant. The participants were then asked to perform three sets of 10 repetitions resembling a normal training load in the physical therapy department (Colado Juan, 2008). Shoulder abduction, flexion and external rotation were performed with three second eccentric contraction phase. There was two second break between each repetition where there was no tension in the exercise. To assist the participants in maintaining the correct time under tension during exercises, the patient was supervised by therapist to reach the required range of motion. If the exercise were not performed correctly then therapist must stop the exercise and allow the participant to take rest, instruct the participant correct technique (Anderson Lars, 2010). Data from exercise set not completed correctly were deleted, only the correct data was collected and stored.

ULTRASOUND treatment group

For ultrasound treatment the coupling medium was applied (Speed, 2001), over the target marked area and then ultrasound transducer head was moved in uniform circular motion to cover the entire area and to make the uniform exposure over the region. The purpose of the coupling medium is to exclude air from the region between the patient and the transducer so that ultra sonic waves can get to the area to be treated. The dose of therapeutic ultrasound is determined by many factors, the continuous ultrasound was used in circular motion for 15 sessions (with a frequency of 5 times per week) the transducer head size of 5 cm² was used. Dosimeter :Frequency 1MHz, Duty Cycle – continuous, Pulse Frequency 100 Hz, Pulse duration 1msec, Output power 1MHz, 5cm² crystal – 0-10 watts 1 MHz, effective radiation area 5cm² and maximum treatment time 10 minutes.

Data analysis

Statistical analysis was done by using SPSS version 16.0 and ANOVA was used to compare the variables with time.

RESULTS

Demographic data

A total of 35 participants volunteered for this study. The mean age in the study was 32.57±8.47 mean height was 169.74±7.89 and weight was 59.52±8.20.

Table 1. ANOVA comparison among the variable scores with time show that, the performance of the ultrasound therapy with elastic band and group shows that for all variables the scores improved significantly with time

	0 day	21 day	p- value
VAS (Mean± SD)	7.05±1.39	4.14±1.49	0.0001*
ROM Flexion (Mean± SD)	95.42±24.53	129.14±22.14	0.0001*
ROM Abduction (Mean± SD)	92.28±21.01	129.28±23.5	0.0001*
SPADI pain Score (Mean± SD)	36.17±3.07	14.54±2.03	0.0001*
SPADI disability Score(Mean± SD)	55.85±4.82	21.31±3.87	0.0001*

The mean value for pain measured using Visual Analogue Scale came out to be 7.05±1.39 for day 0 and 4.14±1.49 for day 21. Whereas ROM i.e. Flexion & Abduction was measured using calibrated goniometer, of participants during various stages of the study came out to be 95.42±24.53 and 92.28±21.01 for day 0 and 129.14±22.14 and 129.28±23.5 for day 21 respectively. SPADI pain score mean was 36.17±3.07 for day 0 and 14.54±2.03 for day 21, the SPADI disability score was 55.85±4.82 for day 0 and 21.31±3.87 at day 21. Within the group comparison of values of VAS, ROM (Flexion & Abduction) and SPADI pain and disability score was done using ANOVA, with level of significance, p set at 0.05. The comparison of VAS readings for pain, ROM for Flexion & Abduction and SPADI at various stages of group A, was found to be statistically significant (0.001).

DISCUSSION

The aim of the study was to know the effectiveness of ultrasound therapy along with elastic band in patients of anterior shoulder instability in improving the pain, range of motion and SPADI score. The similar study concluded that after the intervention of the ultrasound improved more than the placebo and control group. However, no change in stretch pain was experienced in a subjective pain assessment i.e. VAS. These result showed ultrasound increase the threshold of stretch pain. Given the above study revealed that therapeutic ultrasound provided increase in both range of motion accompanied by an increased stretch pain threshold for at least 20 minutes after the conclusion of interventions (Morishita Katsuyuki, 2014). By standardizing the position of the Bandcizer sensor on the theraband, it was possible to distinguish which type of shoulder movement was being performed, due to the corresponding movement relevant axis. Using the Bandcizer it is possible to measure time under tension, ROM and differentiate between 3 commonly used shoulder exercises (McGirr Kate, 2015). The result of the study done by Lars L. Anderson showed that resistance exercises with dumbbells and elastic tubing showed increasing EMG amplitude and perceived loading with increasing resistance. Thus they concluded comparably high levels of muscle activation were obtained during resistance exercises with dumbbells and elastic tubing, indicating that therapists can choose either type in clinical practice (Anderson Lars, 2010). Therapeutic US is commonly used for the conservative treatment of shoulder disease and is prescribed in conjunction with other interventions. When applied with appropriate intensity and frequency, it increases the temperature in soft tissues with the high protein density. The physiological effects of US are increase blood flow, vascular permeability and local metabolism and enhanced fibrous tissue extensibility and muscle relaxation (Anas Pinar Doruk, 2015).

Thus, elastic band in combination with ultrasound therapy found as effective treatment for anterior shoulder instability with significant reduction in pain, disability and increase in range of motion.

Conclusion

The current study concluded that after intervention of ultrasound therapy along with elastic band in patients of anterior shoulder instability the scores of range of motion increased while the scores of VAS, SPADI pain and SPADI disability decreased with time. Thus, ultrasound therapy in combination with elastic band exercises was found to be effective in patients with anterior shoulder disability as significant improvements are seen after treatment.

Limitations of the study

Small sample size
Small Study Duration

Conflict of Interest: None

Ethical clearance: The methodology of the study was approved by the research committee of the Monad University, Hapur, Uttar Pradesh, India. The purpose and details of the study were explained to the study subjects and assurance was given regarding confidentiality of the participant's identity related data.

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REFERENCES

- Anas Pinar Doruk Et Al, 2015. Effect of therapeutic ultrasound and exercises on pain, function, and isokinetic shoulder rotator strength of patients with rotator cuff disease, *J. Phys. Ther. Sci.*, 27: 3113-3117.
- Anderson Lars L., 2010. Muscle activation and perceived loading during rehabilitation exercises: comparison of dumbbells and elastic resistance, *Pt journal.*, Vol. 90, No. 4, 538-549.

- Colado Juan, C. 2008. Effects of a short term resistance program using elastic band versus weight machines for sedentary middle aged women, *Journal of strength and conditioning research.*, Vol. 22, No.5, September 1441-1448.
- Dumont, Ds. Guillaume, Et Al, 2011. Anterior shoulder instability: areview of pathoanatomy, diagnosis and treatment, *curr. Rev. Musculoskeletal Med.*, 4 200-207
- Farber, J. Adam, Castillo Renan, Clough Mark at all, clinical Assessment of Three Common Tests for traumatic Anterior Shoulder Instability, *The Journal of bone & joint surgery*, Vol. 88-No.7, July 2006
- Hayes Kimberley, Callanan mary, Walton Judie et al, Shoulder instability: Management and Rehabilitation, *journal of orthopaedic & Sports physical therapy*. Vol. 32, No. 10, October 2002.
- Kolber Morey j. et al, 2010. Shoulder injuries attributed to resistance training: A Brief review, *Journal of strength and conditioning research*, June, Vol.24,no. 6.
- McGirr Kate, 2015. An elastic exercise band mounted with a bandcizer can differentiate between commonly prescribed home exercise for the shoulder, *The International journal of sports physical therapy*, Vol. 10,Nov.3.
- MorellaGiovanni, Atraumatic shoulder instability:pathology, clinical assessment and practical management,
- Morishita Katsuyuki et al, 2014. Effect of therapeutic ultrasound on range of motion and stretch pain, *J. Phy. Ther. Sci.*, 26: 711-715, 2014.
- Nitz Arthur, J., 1986. Physical therapy management of the shoulder, *P.T. journal*, Vol.66,No. 12,December
- Speed, C. A. 2001. Therapeutic ultrasound in soft tissue lesions, *British society for Rheumatology*, 40:1331-1336.
- Terry Glenn, C. 2000. Functional anatomy of the shoulder, *Journal of athletic training*, 35(3); 248-255.
- Williams John W., Holleman Donald R. at all, 1995. Measuring shoulder function with the shoulder pain and disability index, *The journal of rheumatology.*, 22;4.
- Williams John, W., Holleman Donald, R. at all, 1995. Measuring shoulder function with the shoulder pain and disability index, *The journal of rheumatology.*, 22;4.
- Yildirim Mustafa Aziz et al, Comparision of ultrasound therapy of various durations in the treatment of subacromial impingement syndrome, *J. Phy. Ther. Sci.*, 25: 1151-1154, 2013.
