



AN EXPERIMENTAL STUDY ON THE EFFECT OF TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS) WITH CAPSULAR STRETCHING AND HOT PACK ON PAIN AND RANGE OF MOTION (ROM) IN ADHESIVE CAPSULITIS.

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ABSTRACT

Objective: - to find the effect of transcutaneous electrical nerve stimulation (tens) with capsular stretching and hot pack on pain and range of motion (ROM) in adhesive capsulitis. **Methods:-** Total 50 subjects of two groups were selected according to inclusion criteria having primary adhesive capsulitis with age group 40-50 years of both male and female. Patients in group A 25 subjects (M=12, F=13), receiving TENS and Conventional therapy for 20 minutes and Capsular stretching (30 sec. stretch with 10 repetitions) for 8 weeks (6 sessions per week with one day rest). Patients in group B 25 subjects (M=12, F=13), receiving Conventional therapy for 20 minutes and Capsular stretching (30 sec. stretch with 10 repetitions) for 8 weeks (6 sessions per week with one day rest). All the subjects had given written consent prior to participation. **Results:-** Pre-test and post-test evaluation of outcome measures- VAS and ROM was done. The mean and S.D. values of VAS group A (4.48 and 0.963) and group B (2.68 and 0.748). The mean and S.D. values of ROM group A (Flexion- 28.24 and 7.573), (Abduction- 27.44 and 4.805), (External rotation- 11.04 and 6.361), group B (Flexion- 16.40 and 7.984), (Abduction- 10.32 and 4.571), (External rotation- 7.52 and 4.144). **Conclusions:** - This study can be concluded that TENS with capsular stretching and hot packs on pain intensity and range of motion (ROM) has an effective role in the treatment of Adhesive capsulitis. Both the groups showed significance in decreasing pain and increasing range of motion. But in group A subjects there is a significant result in reducing pain intensity and improving ROM after the treatment. Group B subjects came back with mild increase in pain intensity and reduced ROM.

KEYWORDS

Capsular stretching, Hot pack, Primary adhesive capsulitis, Pain, ROM, TENS

INTRODUCTION

Adhesive Capsulitis is one of the most common musculoskeletal problems which affects middle age individual characterized by shoulder pain that is increased by its motions and limiting the range of shoulder motion and daily activities. 3-5% of the general population and up to 20% of those with diabetes get adhesive capsulitis. Fibrosis, a condition in which reduction in the volume of the glenoid capsule occurs, and increasing discomfort with loss of range of motion (ROM) are the main hallmarks of the idiopathic disease of the shoulder adhesive capsulitis^[1,2]. Serious impairment is followed by shoulder stiffness and pain.

As a result, this condition—also known as "frozen shoulder"—is a dangerous disease that goes through three stages: the painful stage, the frozen stage, and the thawing stage.

Stage 1- The painful stage is distinguished by the gradual emergence of generalized shoulder pain, which typically lasts one to two months.

Stage 2- The frozen stage is distinguished by a growing loss of motion, which lasts for many months to a year or longer. It also demonstrates decreased capsular volume, which can be detected with MRI, for differential diagnosis.

Stage 3- the thawing stage, the final stage, is characterized by gradual improvement of range of motion over several months to years. With the start of adhesive capsulitis, ROM impairments may persist uncorrected for longer than 3–5 years^[3].

After all other potential causes of pain and loss of motion are ruled out, the diagnosis of idiopathic frozen shoulder is made. Early presentations frequently include pain in the night time and while sleeping. The physical examination aids in documenting shoulder range of motion and identifying secondary causes of frozen shoulder as well as other diagnosis that may resemble related symptoms. External rotation to the side, external and internal rotation in abduction (ideally at 90° of abduction or maximal abduction if the patient cannot achieve 90°), internal rotation up the back, and cross-body adduction should all be measured throughout the evaluation^[5].

A limitation of external rotation with the arm in abduction normally is linked with an antero-inferior capsular restriction, whereas limited internal rotation and crossbody adduction are related with a restriction in posterior capsule pattern. The main method of treating frozen shoulder is avoidance. The objective is to prevent shoulder immobilization for an extended period of time following injury or when shoulder pain first appears. There is little consensus on the best course of treatment, aside from the significance of prevention. Pain relief, motion restoration, and function restoration are the three main

objectives of treatment^[4].

Adhesive capsulitis may be treated surgically or conservatively. Medication, intra-articular injections, exercise regimens, and physiotherapy techniques are all examples of conservative treatment. While joint mobilization procedures used in rehabilitation programs increase the mobility of the joint and soft tissues, researchers have found conflicting effects when it comes to pain management strategies including physical therapy, massage, and exercises^[5,6].

About physical therapy several techniques known as modalities are employed, such as the use of heat or ice, ultrasound, interferential therapy, transcutaneous electrical nerve stimulation (TENS), and laser treatments. To alleviate pain from capsular contracture and increase glenohumeral ROM, exercise regimens combining ROM, strengthening and stretching exercises, Proprioceptive Neuromuscular Facilitation (PNF), and mobilizing strategies are used^[7-11]. In order to increase range of motion, passive stretching is a therapeutic technique used to lengthen pathologically shortened soft tissue by applying external stress for around 30 seconds, either manually or mechanically^[12]. Patients with adhesive capsulitis who undergo capsular stretching also have a considerable decrease in pain and an increase in function^[13].

A variety of stretching techniques are available and almost all are shown to be effective in increasing ROM. Types of stretching: 1. Ballistic stretching, 2. static stretching, and 3. PNF technique of stretching, 4. Dynamic ROM stretching^[14]. TENS is the process of sending electrical energy to the nervous system through the skin's surface. It has been discovered to be a useful technique for controlling discomfort. Currently, it is utilized to treat a wide range of medical, surgical, and orthopedic disorders.^[15]. Therefore, the purpose of study is to determine the effect of TENS with capsular stretching and hot packs for improvement of pain and Range of Motion in adhesive capsulitis.

MATERIAL AND METHODS

Study Design: Experimental study.

Sampling: Convenient sampling.

Duration Of Study: 6 months

Sources Of Data: Relief Care Physiotherapy Center, Burari, New Delhi.

Sample Size: 50 patients (both males and females)

Inclusion Criteria

- Primary adhesive capsulitis (idiopathic)
- Pain in shoulder with loss of range of motion (>2 months but < 1

- year)
- Age group 40-50 year
- Both males and females
- 20-60% of range restriction

Exclusion Criteria

- History of any uncontrolled diabetes.
- Elbow pathology restricting ROM
- Rotator cuff rupture
- Secondary adhesive capsulitis
- Painful stiff shoulder after a serious trauma
- Fracture of the shoulder complex
- Inflammatory diseases such as rheumatoid arthritis
- Tendon calcification

Tools Used For The Study

- TENS Machine
- Electrode Gel
- Electrodes, leads and cable
- Cotton
- Hot pack
- Universal Goniometer

Subjects Were Analysed Using

Visual Analogue Scale (VAS)
Range of Motion by Goniometer

Procedure

Prior to the participation in the study, subjects were explained about the treatments, measurement and the experimental procedures and were made to sign a consent form and an assessment form for their voluntary participation in the study.

After considering about the inclusion and exclusion criteria the individuals were divided into two groups with 25 subjects in each group.

Group A

Patients in group A 25 subjects (M=12, F=13), receiving TENS, were made comfortable in sitting position. Then with the help of electrodes, TENS was delivered to the patient using the computerized vectrostrim (MST) machine. The frequency used was 50 Hz, 10 minutes each on the anterior aspect of the glenohumeral joint and 10 minutes on the posterior aspect of the glenohumeral joint and was receiving Conventional therapy for 20 minutes and capsular stretching (30sec.stretch with10 repetitions) once in a day for 8weeks (6session per week with one day rest).

Group B

Patients in group B 25 subjects (M=12, F=13), receiving Conventional therapy for 20 minutes and Capsular stretching (30 sec. stretch with 10 repetitions) for 8 weeks (6 sessions per week with one day rest).

(Conventional therapy included use of hot pack (moist heat), Codman's exercise, pulley and rope exercise, finger ladder exercise.)

All subjects were also advised not to do any strenuous work with the affected upper limb so that it won't stress the affected shoulder. Patients were advised to stop medication during the course of treatment session.

Conventional Therapy

- Hot pack (moist heat) for 20 minutes.
- Codman's exercises
- Rope and pulley exercises
- Finger ladder exercises
- 5 rep. per set
- 3 set per session 8weeks (6days/week)
- Once in a day.

Data analysis was performed using SPSS software. An unpaired t-test was used to compare difference of VAS, Shoulder ROM between two groups. A statistical significance level was set at p<0.05 and t 'value was estimated.

RESULTS AND DISCUSSION

The aim of present study was to find the effect of TENS with capsular stretching and hot packs on pain and ROM in Adhesive capsulitis. The results of present study revealed significant improvement in ranges of Flexion, Abduction and External Rotation, And Pain intensity in

Group A as compared to Group B.

Overall, 50 subjects who met with the inclusion criteria experimentally allocated into two groups. The subjects, fell into age 40-50 yrs. of both the sexes and who were suffering from Adhesive Capsulitis. 25 subjects of both males and females were treated with TENS, capsular stretching and hot packs in experimental group A and 25 subjects of both males and females were treated with capsular stretching and hot packs in control group B.

Pre treatment values of pain intensity using VAS and Range of Motion by using goniometer and post treatment were assessed. These values were statistically analyzed using unpaired T test.

TENS has an effect on lowering pain and enhancing ROM on shoulder pain patients. Fishbain DA, Chabal C (1996)^[16], and Paxton SL (1980)^[17] all lend support to this. TENS decreases pain by activating the big low threshold beta fibers to create pain inhibition by the pain gate mechanism. By activating the high threshold, A delta and C fibers, which trigger the production of endogenous opioids and adds more sensory information from muscle spindle afferents, it also lessens pain (1996) Ethnel L. Nussbaum.

The increase in range may be caused by extending the capsule, which shortens due to discomfort and diminished mobility. Stretching gradually improves extensibility, which enhances the ranges. Stretching non-contractile connective tissues for an extended period of time at a low intensity causes plastic deformation, which lengthens the tissue^[18]. The results of study also shown significant improvement in VAS scores in Group A. Hot packs application to the shoulder joint helps to improve extensibility and reduce the stiffness. The viscosity of tissues may be reduced, which partly accounts for the reduction of joint stiffness that occurs with heating (Wright v et al 1961)^[19]. Codman's exercises relieve pain and provide early motion of joint structures and synovial fluid helping improvement in ranges (Kisner C, Colby LA, 2007)^[20].

This study implies that TENS has effective role in decreasing pain and increasing ROM in Adhesive capsulitis.

Table 1 Showing Comparison Of Mean Difference Of VAS Between Group A And B

VAS	Group A mean (S.D.)	Group B mean (S.D.)	t value	p value
	4.48 (0.963)	2.68(0.748)	2.01	0.0000

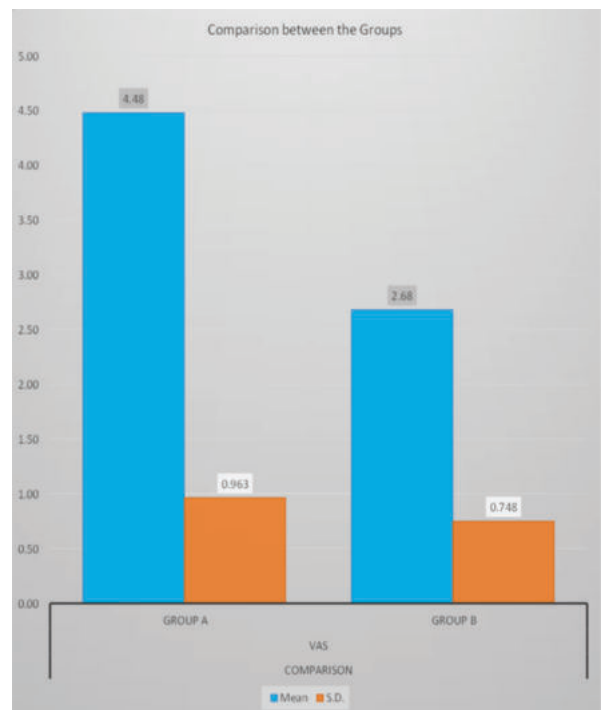


Figure 1 Showing Comparison Of Mean Difference Of VAS Between Group A And B

Table 2 Showing Comparison Of Mean Difference Of Shoulder Rom Between Group AAnd B

ROM	Group A mean (S.D.)	Group B mean (S.D.)	t value	p value
FLEXION	28.24 (7.573)	16.40 (7.984)	2.01	0.0000
ABDUCTION	27.44(4.805)	10.32 (4.571)	2.01	0.0000
EXTERNAL ROTATION	11.04(6.361)	7.52 (4.144)	2.01	0.0247

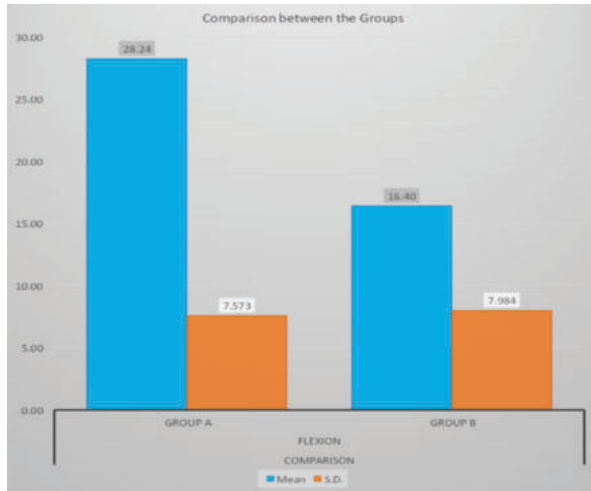


Figure 2 Showing Comparison Of Mean Difference Of Shoulder Rom(Flexion) Between Group AAnd B

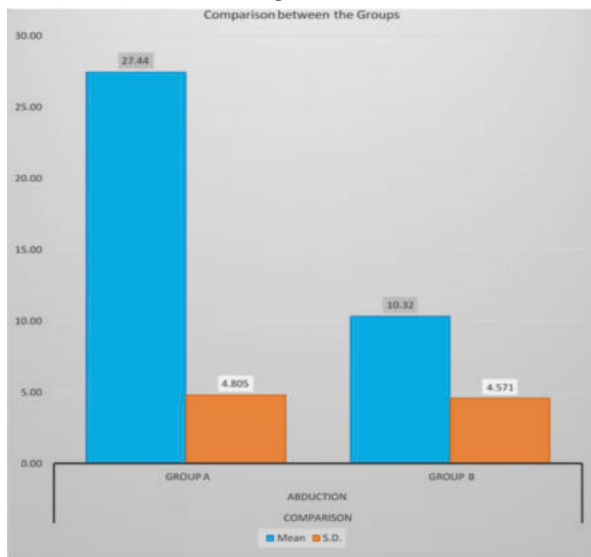


Figure 3 Showing Comparison Of Mean Difference Of Shoulder Rom(Abduction) Between Group AAnd B

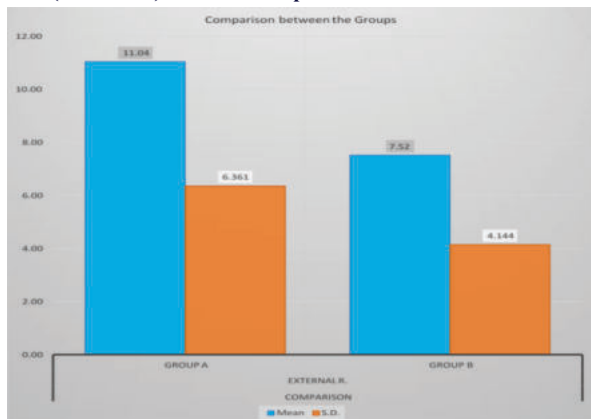


Figure 4 Showing Comparison Of Mean Difference Of Shoulder Rom(External Rotation) Between Group AAnd B

CONCLUSION

This study can be concluded that TENS with capsular stretching and hot packs on pain intensity and range of motion (ROM) has an effective role in the treatment of Adhesive capsulitis.

Both the groups showed significance in decreasing pain and increasing range of motion. But in group A subjects there is a significant result in reducing pain intensity and improving ROM after the treatment. Group B subjects came back with mild increase in pain intensity and reduced ROM.

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Conflict Of Interest: Both authors of this article have no conflicts of interest.

REFERENCES

- Kingkaew Pajareya, Navaporn Chadchavalpanichaya, et al, 2004. Effectiveness of Physiotherapy for patients with adhesive capsulitis: J Med Assoc Thai ; 87(5):473-80
- Neviaser AS, Hannafin JA, et al, 2010. Adhesive capsulitis: a review of current treatment. Am J Sports Med 38: 2346–2356.
- Dudkiewicz I, Oran A, Salai M, et al, 2004. Idiopathic adhesive. capsulitis: long- term results of conservative treatment. Isr Med Assoc J, 6: 524–526.
- Mark A. Harrast & Anita G. Rao, et al, 2004. The stiff shoulder. Physical Medicine & Rehabilitation clinics of North America, 15:557-573.
- Jürgel J, Rannama L, Gapeyeva H, et al, 2005. Shoulder function in patients with frozen shoulder before and after 4-week rehabilitation. Medicine (Kaunas), 41: 30–38.
- Gong WT, Park GD, Kim CS, et al, 2012. Effects of Gong's mobilization in the side-lying position on shoulder abduction. J Physiotherapy Sci, 24: 307–309.
- Bulgen DY, Binder AI, Hazleman BL, et al, 1984. Frozen shoulder: prospective clinical study with an evaluation of three treatment regimens. Ann Rheum Dis, 43: 353–360.
- Carette S, Moffet H, Tardif J, et al, 2003. Intraarticular corticosteroids, supervised physiotherapy, or a combination of the two in the treatment of adhesive capsulitis of the shoulder: a placebo-controlled trial. Arthritis Rheum, 48:829–838.
- Çelik D, 2010. Comparison of the outcomes of two different exercise programs on frozen shoulder. Acta Orthop TraumatolTurc, 44: 285–292
- Bertoft ES, 1999. Painful shoulder disorders from a physiotherapeutic view: a review of literature. Crit Rev Phys RehabilMed, 11: 229–277.
- Gaspar PD, Willis FB, et al, 2009. Adhesive capsulitis and dynamic splinting: a controlled, cohort study. BMC Musculoskelet Disord, 10: 111.
- Shahbaz Nawaz Ansari, I. Lourduraj, et al, 2012. Effect of Ultrasound Therapy with End Range Mobilization Over Cryotherapy with Capsular Stretching on Pain in Frozen Shoulder – A Comparative Study. International journal of current research and review, vol 04 issue 24.
- Umit Bingol, lale Altan, et al. 2005. low power laser treatment for shoulder pain. Photomedicine and laser surgery, 23(5):459-464.
- Carolyn Kisner, Lynn Allen Colby. Therapeutic Exercise. Foundations and Techniques :5th edition F. A. Davis company. Philadelphia: p. No. 77
- Roger M, Nelson, et al, 1987. Clinical Electrotherapy. Appleton and Lange, California, 209- 210
- Fishbain DA, Chabal C, Abbott A, et al, 1996. Transcutaneous electrical nerve stimulation (TENS) treatment outcome in long-term users. Clin J Pain. 12(3): 201-14
- Paxton SL, et al, 1980. Clinical use of TENS: A survey of physical therapists. Physical Therapy. 60(1); 38-44
- Sule K, Rathi M, Palekar TJ, et al, 2015. Comparison of conventional therapy versus sleeper stretch with conventional therapy in adhesive capsulitis. Int J Health Sci Res. 5(11):186-192.
- Wright V, Johns RJ, et al, 1961. Quantitative and qualitative analysis of joint stiffness in normal subjects and in patients with connective tissue diseases. Ann Rheum Dis. 20:36-46.
- Kisner C, Lynn Allen Colby. Therapeutic Exercise. Foundations and Techniques :5th edition F. A. Davis company. Philadelphia: p.p.282
- Wright V, Johns RJ, et al, 1961. Quantitative and qualitative analysis of joint stiffness in normal subjects and in patients with connective tissue diseases. Ann Rheum Dis. 20:36-46.