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Research article

Efficacy of passive stretching vs muscle energy technique in Postoperative Elbow stiffness

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ABSTRACT

The elbow, which is the upper limb's intermediate joint, is prone to pathological occurrences and stiffness in particular. As a patient's ability to perform compensatory motions deteriorates, intolerance develops. Individuals frequently suffer from fractures and dislocations. Prior to treatment, a thorough examination is required. Physical therapy is crucial in the recovery of function. The purpose of this research is to examine the benefits of regular stretching vs. PIR in the muscle energy technique on postoperative elbow stiffness, discomfort, and range of motion. A Randomized Control Trial will be used to conduct the research. A total of 20 participants will be chosen from AVBRH and RNPC OPD, Sawangi (Meghe) , based on inclusion and exclusion criteria. Twenty subjects will be divided into two groups, with one group receiving Stretching (static stretching) and other receiving Muscle Energy Technique (Post isometric relaxation). The patient's outcome measurements will be the Visual Analogue Scale for Pain and the Universal Goniometer Range of Motion Assessment. When compared to stretching, this study found that employing muscular energy approach can be more beneficial. It may aid in to the recovery of muscular strength, as well as the patient's ability to conduct compensatory movements in nearby joints. The majority of studies found Muscle energy approach to be more helpful in expanding range of motion, but only a few studies found stretching to be effective.

Keywords: Postoperative elbow stiffness, Post isometric Relaxation, Restoration of ROM.

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INTRODUCTION

Postoperative elbow stiffness, a frequently disabling complication which poses serious challenges for its management. Elbow stiffness is poorly tolerated in adjacent joints due to lack of compensatory motions. Bending arc of 30° to 130° is sufficient to perform most activities of daily living. Some patients complain of functional weakness and ask for help if they cannot stretch post 40^0 or more than 120^0. Fracture-dislocation accounted for 38% of cases, 20% dislocation and 30% isolated fractures. After elbow trauma, post-traumatic elbow stiffness is a common cause of functional disability. Patient's ability to position their hand in space for optimal upper extremity use is limited by a stiff elbow, which is a common reason for reoperation [1].

Normal functioning requires the capacity to move freely at the elbow joint. A series of events may occur after a trauma, leading in a reduction in passive range of motion from the usual anatomic arc. To perform ordinary daily activities, a 100° arc of elbow motion, from 30° of extension to 130° of flexion, and a 100° arc of forearm rotation, from 50° of pronation to 50° of supination, can be used. The goal is to restore functional, range of motion in elbow. Treatment options currently available range from conservative to surgical, with different success rates, invasiveness, and consequences. Physiotherapy is a common strategy used by surgeons to avoid post-traumatic elbow stiffness as well as to restore motion following the start of stiffness [2].

Posttraumatic elbow stiffness is poorly tolerated due to lack of compensatory motion. Supination and Pronation are reduced too. Elbow Stiffness impairs hand work, since this is highly dependent on the forearm's elbow extension and bending and rotation. A 50% in elbow movement would reduce the position of the upper extremity by nearly 80% [2].

There isn't much proof to back up supplementary approaches' effectiveness.ost basic daily tasks. Elbow stiffness is linked to high morbidity which is classed as intrinsic or extrinsic. Development of heterotopic ossification (HO) and who have sustained severe elbow injuries. Prophylaxis, either by indomethacin or by radiation therapy. Early HO excision proved safe and successful. From examination, it is essential to determine the patient has a physically

compromised elbow ROM that has been proven to be stable and successful. Through history and physical examination, it is important to assess if the patient has an elbow ROM functionally [3].

A typical complication of elbow injuries is loss of mobility. It can be difficult, time-consuming, and costly to restore joint motion in a posttraumatic stiff elbow. An arc of flexion from 30^0 to 130^0 degrees is described as a functional arc required to execute m In the early phases of elbow injuries, physiotherapy is utilized to alleviate pain, edema, and inflammation [4].

Physiotherapy focuses on pain, edema, and inflammation reduction in the early stages of elbow damage. When it comes to long-term elbow contractures, physiotherapy's effectiveness starts to wane. As the stiff elbow is difficult to cure, a postoperative treatment and rehabilitation program is required, with the goal of restoring elbow flexibility, muscular strength, and resuming everyday activities [4].

The target will never be accomplished without intense physiotherapy. Muscle will be elongated manually through low force and appropriate hold duration. (Usually 30 sec) which diminishes muscle spindle performance resulting in reduced stretch reflex activity. Muscle Energy Technique (post isometric relaxation) - is the result of a brief period of submaximal contraction reducing muscular tone in single or group of muscles .It works on the autogenic inhibition concept. Stretching (Passive) has the following purposes: It increases muscle strength and minimizes the risk of injury. Muscle Energy Technique (Post isometric relaxation) has following purposes: A) It helps lengthen muscle through its method of contraction and relaxation. B) It affects subsequent tone reduction experienced by the muscle or muscle group [5].

Elbow stiffness is a typical condition in people who have had an elbow injury, both traumatic and non-traumatic. Day-to-day tasks may be hampered by pain and poor performance. So, a structural physiotherapy intervention is necessary to reduce the pain and improve functionality of the elbow [6].

Need for the study will be as elbow stiffness is a common problem seen in postoperative patients of traumatic and non-traumatic injury. Pain and a drop in performance might make it difficult to go about your daily routine. As a result, treatment is required that will relieve discomfort in the shortest possible time. The study's goal is comparing effectiveness of stretching against Muscle Energy Technique in treating post-operative elbow stiffness, as well as to assess pain reduction after stretching, and to enhance elbow flexibility. The goal of study is comparing effects of regular stretching against post isometric relaxation (PIR) in the muscular energy technique on postoperative elbow stiffness in terms of pain and range of motion.

METHODOLOGY

This is a comparative study design performed in Physiotherapy OPD, Ravi Nair Physiotherapy College and AVBRH hospital Sawangi Meghe, Wardha. Purposive Sampling technique is used in which 20 patients were taken in age group of 10 to 30 years in which 10 patients were in Experimental group (Group A) were as 10 patients were in Control group (Group B). After the Institutional Ethical Committee clearance 20 participants will be selected randomly from RNPC, AVBRH. Participants will be divided into two groups after written consent form will be obtain from the participants meeting the inclusion criteria will be involved in this study. 1 month old Postoperative cases of elbow stiffness, pain on palpation, structural deformity and muscle hyperactivity were taken for the study, after distal end extraarticular or intraarticular humerus fractures without ligament injury, patients develop postoperative elbow stiffness, both genders. Subjects not willing to participate, subjects with compartment syndrome, fresh skin graft and hypermobility. Experimental Group (Group A) 10 subjects, Control Group (Group B) 10 subjects Subjects in the experimental group were given 5 repetitions of the post isometric relaxation method (PIR) in muscular energy technique. Simple passive stretching was administered to the subjects in the control group.Total 5 repetitions was given in one session.

Procedure

A) Experimental group-

For Flexion

The Patient is in supine position. The affected arm is placed in extension. The angle of elbow extension should not exceed beyond pain. Therapist should resist flexion. After the contraction, the patient was requested to inhale and hold isometric resistance to flexion for 7-10 seconds. After the contraction, the patient was instructed to exhale and hold the arm in flexion until resistance was noted, and the stretch was held for 10-30 seconds. The method is repeated 5 times after 3 seconds of relaxation, starting with a fresh barrier.

For Extension

The patient is lying on his back in a supine position. The injured arm is in a flexion position. The angle of elbow flexion should not be greater than that which causes pain. Extension should be avoided by the therapist. After the contraction, the patient was asked to inhale and receive isometric resistance to extension for 7-10 seconds. After the contraction, the patient was instructed to exhale and have their arm extended until resistance was noted and the stretch was maintained for 10-30 seconds (Fig.1). After 3 seconds of relaxation, the technique is repeated 5 times, starting with a new barrier.

B) Control group-

For Flexion

Patients were placed in supine position. The tested arm is placed in to flexion. The angle of elbow flexion was not exceed if the pain persists. Stretch is maintained for 10 to 30 seconds with rest period 15 sec between each stretch and repeat for 5 times in one session (Fig 2).

For Extension

Patients were placed in supine position. The tested arm is placed in to extension. The angle of elbow extension was not exceed if the pain persists. Stretch is maintained for 10 to 30 seconds with rest period 15 sec between each stretch and repeat for 5 times in one session.

Home exercise program

1) In supine, active flexion and extension.
2) Active flexion and extension.
3) Both active and active-assisted. Each exercise is repeated 10 times for a total of 2 sets.

Prior to and after the experiment, the settings were re-evaluated. Pre- and post-intervention measurements were made.

Outcome measures

VAS (visual analog scale), Upper Extremity Functional Index. At baseline (0 day), post intervention (8th day), and follow-up, all outcome measures were recorded (15th day).

Visual analog scale (VAS)- The VAS is a solid and dependable technique for measuring pain that is commonly used in clinical studies. It is proved that VAS is a reliable and valid for both acute and chronic pain. The VAS scores are better suited for usage in clinical settings.

The Upper Extremity Functional Scale-It is used to assess functional impairment and consists of 20 questions on a 5-point rating scale that assesses the level of difficulty in doing daily tasks with the upper extremities.

RESULT

Table 1: Comparison of Pain on VAS score at Day 0, Day 8 and Day 15 in two groups

	Experimental Group	Control Group	t-value
Day 0	9±0.81	9±0.81	0.00,p=1.00,NS
Day 8	5±1.05	7.30±0.67	5.81,p=0.0001,S
Day 15	1.70±1.41	5.70±0.67	8.05,p=0.0001,S

Figure 1: Comparison of Pain on VAS score in two groups

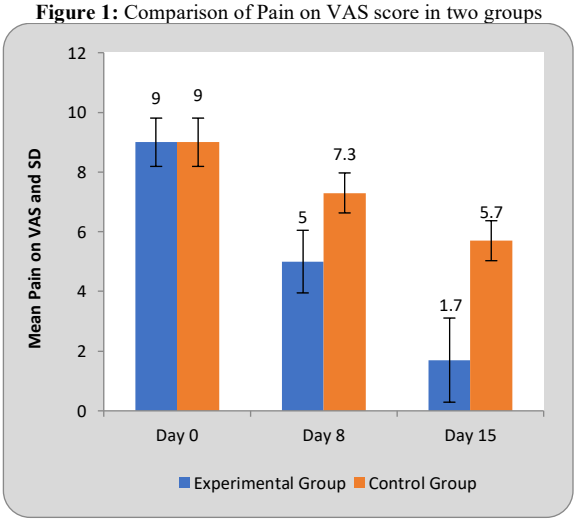
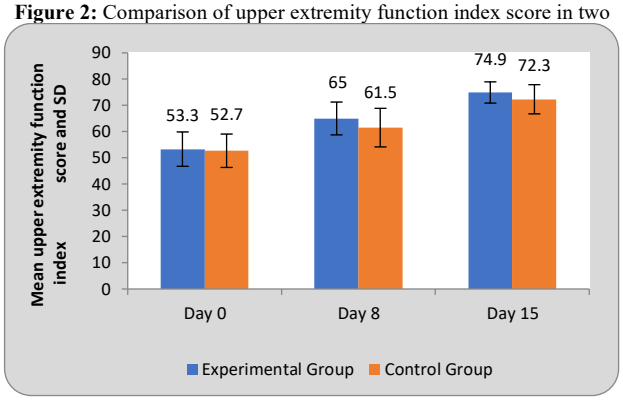


Table 2: Comparison of upper extremity function index score at Day 0, Day 8 and Day 15 in two groups

	Experimental Group	Control Group	t-value
Day 0	53.30±6.54	52.70±6.37	0.20,p=0.83,NS
Day 8	65±6.27	61.50±7.36	1.14,p=0.26,NS
Day 15	74.90±4.04	72.30±5.57	1.19,p=0.24,NS

Figure 2: Comparison of upper extremity function index score in two



The present study titled "Efficacy of stretching vs Muscle energy technique in post-operative elbow stiffness-A Research Protocol" which comprised of 20 patients undergone elbow trauma from age group 10 to 30 out of which 10 of them received stretching and 10 were (PIR) of muscle energy technique.

Table 1 states that Muscle energy technique shows significant change in reducing the pain which shows descriptive and paired statistical analysis for the intra group comparison of VAS Scale experimental group between pre-treatment (0 Day) 9,post-treatment(8th day) 5 and on follow-up (15 days) 1.70.The results demonstrate that on the day after therapy, there is a highly significant difference (t=5.81 p=0.001,S) and follow-up day (t=8.05 ,p=0.0001,S).In Table 2 that Muscle energy technique shows significant change in increasing the score of functional activity in day to day living which shows descriptive and paired statistical analysis for the intra group comparison of Upper Extremity Functional Scale experimental group between pre-treatment(0 Day) 53.30,post-treatment(8th day) 65 and on follow-up (15 days) 74.90.The results demonstrate that on the day after therapy, there is a highly significant difference (t=1.14 p=0.26,S) and follow-up day (t=1.19 ,p=0.24,S)

DISCUSSION

The study protocol is to propel with postoperative elbow stiffness has been selected to restore the functional range of motion. Stretching appears to be insufficient on its own, although it is beneficial as a supplement to stiffness. In this study, group A treated with static stretching showed a substantial improvement in recovering Range of Motion compared to group B treated with muscular energy technique-Post isometric relaxation.

Trauma to the elbow joint is the major cause for the elbow stiffness. prolonged pain leads to involuntary or voluntary muscle guarding during motion [7]. And capsule into contractures and structures around it. Which impair its functional activities in children's and adults. The technique involves voluntary contraction of the muscle against the force of therapists in a regulated direction [8]. The effect decreases pain, tone, and helps to restore weak muscle strength and joint mobility. In various stages of rehabilitation, MET has proven to be useful [9]. However, it was necessary to consider its applicability in

post-fracture rehabilitation. There were no adverse effects in either group during the intervention in this trial, such as an increase in pain, discomfort, or other symptoms. In patients with reduced elbow ROM, MET was found to be more helpful in improving ROM [10]. In this research study there were no adverse responses associated with the use of MET in the post-operative period. The use of MET to promote myofascial tissue extensibility appears to change viscoelastic and plastic tissue properties [11]. Both groups improved their elbow ROM in both flexion and extension, according to the findings of this study. Elbow ROM improved more in the MET group [12]. This might be explained by Taylor et al's hypothesis, which argued that a combination of contractions and stretches could be advantageous (as used in MET). Because the larger forces create more viscoelastic change and passive extensibility, it may be more successful than passive stretching alone in causing viscoelastic changes [13].

Therapeutic exercise, particularly stretching exercises, is essential part of in the treatment of elbow stiffness [14]. Primary goal of stretching exercise is improving connective tissue's ability to adapt to tensile pressure by enhancing its elastic and plastic deformation capabilities [15]. MET has aided in the reduction of impairment and improvement of function in a variety of disorders [16]. This study demonstrates that MET can be utilised as a supplement to a medically controlled rehabilitation plan with open reduction and stiff internal fixation. This study did not look at the long-term impact of the therapy intervention [17]. The authors may also have utilised the intention to treat analysis to account for the missing data.

Future research could focus on evaluating the intervention's long-term effects on a bigger sample size. To enhance the therapy benefit, the authors recommend a longer length of the intervention [18]. Physiotherapy helps patients recover to pre-fracture functional levels by reducing the negative consequences of immobility [19][20].

CONCLUSION

This study has been carried out to explain that early effects of manual therapy (MET) is helpful in improving range of motion for the patients who have undergone surgery after elbow fracture and how it is necessary to deal with them by adding a proper intervention in the daily routine which will be helpful to cope up and the patient should be able to initiate activities of daily living.

The given study compared the two different interventions. Out of which one intervention included stretching while the other intervention involved Muscle energy technique. The study concluded that the given intervention i.e. The MET post isometric relaxation approach has been shown to be beneficial in reducing pain and consequently enhancing range of motion, which contributes to individual's well-being in handling day-to-day activities.

Both interventions have been shown to be beneficial in reduction of pain and an increase in range of motion. However, when compared, muscle energy technique has been proven effective tan stretching. Both methods have been demonstrated to help with pain relief and range of motion expansion.

Limitations & future scope

Limitations of this study are that the effectiveness of the intervention was not evaluated in relation to any other outcome, such as disability and the study's sample size is quite modest

Future scope of this study is that the longer study duration will be helpful in achieving the desired effect for both the groups and larger sample size might aid in obtaining a clear image also in order to get more structured data, it is necessary to promote such studies.

Conflict of interest

The authors declare that they have no conflict of interest.

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