EFFICACY OF MILL'S MANIPULATION TO REDUCE PAIN AND IMPROVE GRIP STRENGTH IN THE MANAGEMENT OF LATERAL EPICONDYLITIS

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Abstract : This study has been undertaken to investigate the subjects who are suffering from Lateral Epicondylitis will have problems including progressive loss of grip strength, dependent on squeezing and twisting movement of upper extremity functions. Grip strength is a major component required for the activities of daily living and functions. The objective of study was to compare the effectiveness of Mill's manipulation to reduce pain and improve grip strength in the management of lateral epicondylitis. Study design was experimental study. 30 subjects (16 males & 14 females) with lateral epicondylitis between the age group of 35-50, were assigned in to two treatment groups. The first group (n=15) treated with conventional methods. The second groups were treated with Mill's manipulation along with conventional treatment. The duration for the treatment was 2 weeks with 5 days per week. Outcome was measured by VAS for pain and SPHYGMOMANOMETER for grip strength. Both groups showed significant improvement in reducing pain and improving grip strength after the rehabilitation program. The experimental group showed a statistically significant improvement in reducing in pain and improving grip strength when compared to the control group ($p<.01$). Lateral epicondylitis patients who received mill's manipulation along with conventional physical therapy showed a statistically significant improvement in reducing pain and improving grip strength than control group. It can be a management of lateral epicondylitis patients for reducing pain and improving grip strength. A well designed trial is needed to study the effectiveness of mill's manipulation to reducing pain and improving grip strength a large group and long term effect.

Index Terms **- Lateral epicondylitis, Mill's manipulation, Physiotherapy management, rehabilitation, Grip strength.**

I. INTRODUCTION

Tennis elbow is one of the commonest conditions which hampers the daily activities of people. Morris (1882) who called "lawn tennis elbow" first named the condition. Any exercise involving repeated and forcible extension movement at the elbow. The characteristics age of this condition is between 35 and 50 with peak occurrence in the 4th and 5th decade of life. It has been estimated that approximately 4 adults per thousand are affected annually, although in some occupational groups, such as tennis players, the incidence can be as high as 40% to 50% the prevalence of tennis elbow ranges from 1-3% in the overall population (Allander 1974).

Cyriax summarized the different types of tennis elbow as (1) tenoperiosteal, (2) tendinous and (3) musculo- tendinous. Much evidence has been brought forward to show that in Tennis elbow, the lesion is a tear between the common extensor tendon and periostium of lateral humeral epicondyle (Cyriax1936, Quarsen 1961). In nine out of ten cases the painful scar lies at the teno- periosteal junction where the common extensor tendon takes origin, that is from the lateral epicondyle (Text book of Orthopedic medicine Vol:2).

The patho-physiology of lateral epicondylitis is poorly understood, although it is generally believed that trauma at extensor carpi radialis brevis and its origin are major components of pathogenesis (Ljung et al 1999). Given the position and dynamics of extensor carpi radialis brevis, eccentric contraction may predispose it to injury with resultant development of chronic granulation tissue (Gabel 1999).

Cyriax, an orthopedic surgeon advocated Mill's manipulation. The effects of Mills manipulation as described by Cyriax: it pulls apart the two surfaces joined by painful scar. If full separation is attained, permanent lengthening results in that part of common tendon relevant to extensor carpi radials muscle. The rest of tendon now takes the strain; fibrous tissue under no tension fills the gap, cure results from freedom from liability to recurrence. (Text book of orthopedic medicine. Vol: 2)

Treatment technique involving, Mill's manipulation, that reducing pain and improve grip strength. Therefore the purpose of this study is to determine the efficacy of Mill's manipulation in the management of lateral epicondylitis. With the present study the researcher in trying to find out whether there will be any significant improvement in reducing pain and improving grip strength. With Mill's manipulation and if in case of the positive finding, it can be included in the conventional rehabilitation of lateral epicondylitis.

Objective of study were to find out the effectiveness of Conventional physiotherapy in the management of lateral epicondylitis. To find out the effectiveness of Mill's manipulation in the management of lateral epicondylitis. To compare the effectiveness of Mill's manipulation along with conventional therapy in the management of lateral epicondylitis.

II. RESEARCH METHODOLOGY

Subjects with Lateral epicondylitis satisfying the inclusion criteria were referred to the physiotherapy department of S.H medical center Kottayam. The inclusion criteria were subjects with Grade II Lateral epicondylitis patients referred by the orthopaedician. Cervical spine pathologies. Neurological deficits (carpel tunnel syndrome radial nerve symptom).Shoulder joint pathologies. Connective tissue disorders. Recent injuries or fracture of upper limb, Malignancy. Cardiovascular disease. Generalized myalgia.

Subjects of either gender between the age group of Age 50-65 years were included in the study. Detailed information about the study was given and Informed consent was obtained from the subjects who were willing to participate. 30 subjects were recruited for the study and were selected purposive sampling and randomly allocated into two groups.. The control group (n = 15) was treated with conventional methods like ultrasound, stretching and strengthening. The experimental group (n = 15) was treated with mill's manipulation along with conventional therapy. The effects of the fourteen session treatment programme on alternative days were measured using the VAS for pain and SPHYGMOMANOMETER for grip strength.

III. PROCEDURE

CONTROL GROUP

Ultra sound therapy

The ultrasound therapy unit (Pulsonic; Elecrocare Ltd India) was used for the treatment. The frequency of 1 MHz was given in continuous mode. The Ultrasound probe was applied for 10 minutes to each treated region: over, lateral side. The patient was positioned in sitting position hand supported on table.

Ice massage

5-10 min

Stretching exercise

Gentle stretching exercises including wrist flexion, extension and rotation. The elbow should be extended and not flexed to increase the amount of stretch as required. These stretches should be held for 20- 30 seconds and repeated 3-5 / session.

Strengthening exercise

- wrist extension - Place 1lb weight in hand with palm facing downward support forearm at the edge of the table or on knee so that only the hand move. Raise wrist/ hand up slowly and lower slowly. Performs 3 sets of 10 repetition
- wrist flexion - Place 1lb weight in hand with palm facing upward support forearm at the edge of the table or on knee so that only the hand move. Bent wrist up slowly and lower slowly. Perform 10 repetition 3-5 times a day.
- Forearm supination/ pronation- Grasp hammer or wrench in hand with forearm supported. Rotate hand to palm down position, return to start position, rotate palm up position repeat. To increase or decrease resistance, by move hand further away or closer towards the head of the hammer. Performs 10 repetitions 3-5 times/session
- Ball squeeze - Place a rubber ball or tennis ball in palm of hand squeeze 25 times repeat 3 times if pain is reproduced squeeze a folded sponge or piece of foam.

Range of motion exercise

Wrist flexors, extensors, radial and ulnar deviators. Perform 10 repetitions 3-5 times / session.

IV. EXPERIMENTAL GROUP

Experiment group received both conventional and Mills manipulation as described below.

Conventional exercise : same as the control group.

Mill's manipulation

Mill's manipulation for tennis elbow should be conducted as follows, Position the patient on a chair with a backrest and stand behind the patient. Support the patient's arm under the crook of the elbow with the shoulder joint abducted to 90˚ and medially rotated. The forearm will automatically fall into pronation. Place the thumb of your other hand in the web space between the patient's thumb and index finger and fully flex the patient's wrist and pronate the forearm. Move the hand supporting the crook of the elbow on to the posterior surface of the elbow joint and, while maintaining full wrist flexion and pronation, extend the patient's elbow until you feel that all the slack has been taken up in the tendon. Step sideways to stand behind the patient's head, taking care to prevent the patient from leaning away either forwards or sideways, which would reduce the tension on the tendon. Apply a minimal amplitude, high velocity thrust by simultaneously side flexing your body away from your arms and pushing smartly downwards with the hand over the patient's elbow. Mill's manipulation is carried out once in each session.

V. OUTCOME MEASURESRS

The outcomes used were VAS for pain and SPYGMOMANOMETER for grip strength measuring in lateral epicondylitis patients. Each group received 14 sessions after which post assessment of outcome measures was done.

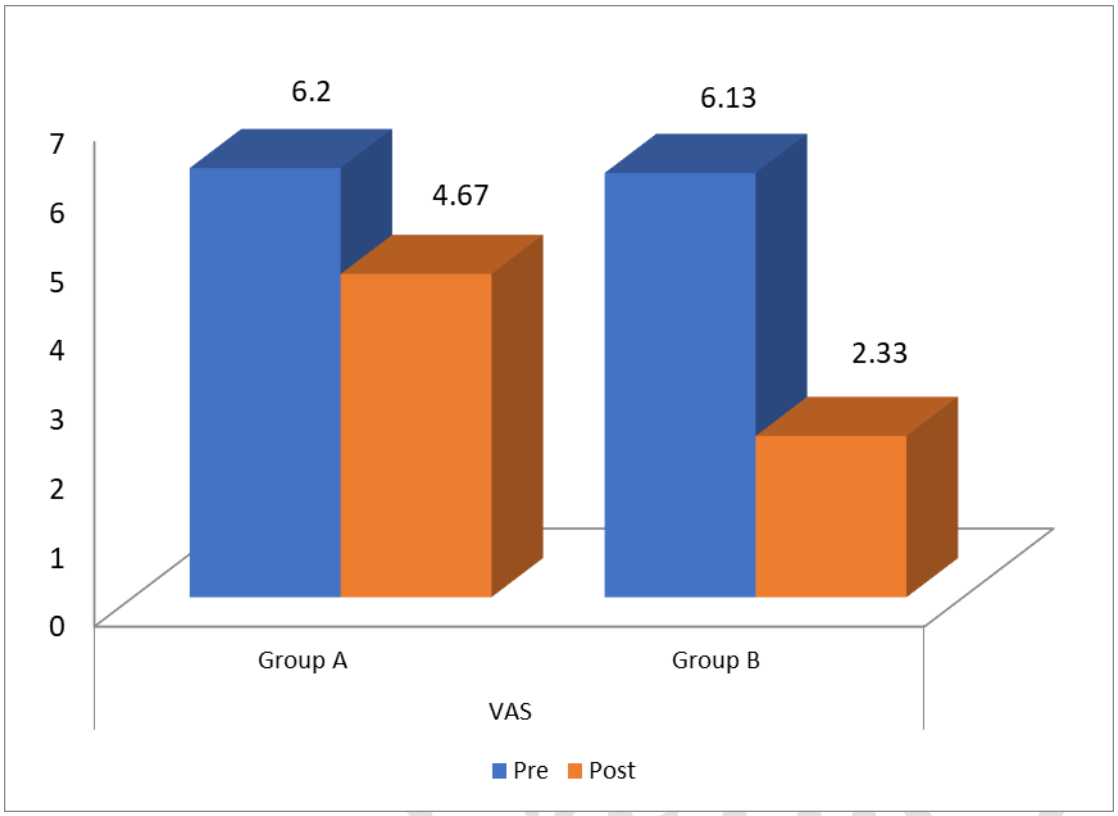
Data analysis: Data analysis was performed by SPSS (version 17) for windows. P-value was set as 0.05. Descriptive statistics was performed to find out mean, standard deviation for the demographic variable and outcome variables.

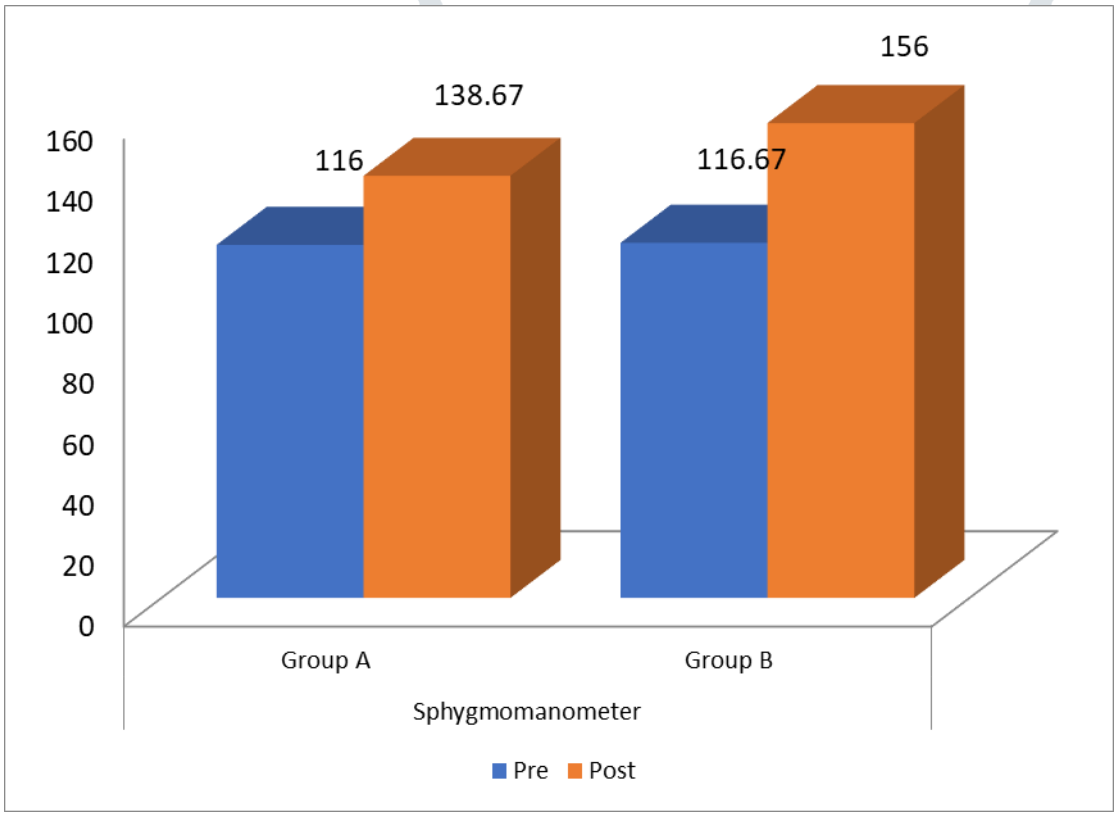
Paired t test was used to find out significant difference with in group for VAS & SPHYGMOMANOMETER. Microsoft excel, word was used to generate graph and tables.

VI. RESULTS

Demographic variables taken into consideration in the present study were age, gender and duration. In the group A, the mean age was 41.73 with the standard deviation of 4.67 and in the group B, the mean age was 41.93 with the standard deviation of 5.57 which were not statistically significant (Þ-value .539). In both groups there were 8 males and 7 females. In the group A patients with mean age of 41.73. The mean pretest score of group A using visual analogue scale score is 6.20 with the standard deviation of 0.94 and Sphygmomanometer for grip strength pretest score is 116 with the standard deviation of 26.13 and the mean post test score of group A using visual analogue is 4.67 and Sphygmomanometer for grip strength post score is 138. In the group A, the mean VAS was 4.67 with the standard deviation of 0.72 and in the group B, the VAS was 2.33 with the standard deviation of 0.82 which were not statistically significant (Þ-value <0.0001). In the group A, the mean Sphygmomanometer was 138.67 with the standard deviation of 25.32 and in the group B, the mean Sphygmomanometer was 156.00 with the standard deviation of 19.20 which were not statistically significant (Þ-value >0.56). In summary baseline data of demographic and outcome variable were homogenous among both groups prior to intervention.

Pre post comparison for both groups were statistically significant (p <.0001) for both VAS and Sphygmomanometer (Graph I&II). However comparing between groups both VAS and Sphygmomanometer were better in group B compared to group A (p<.0001). (Table I)





Difference between groups

Sl.No:	Variables	Group A	Group B	þ-value
1	VAS	4.67±0.72	2.33±0.82	<0.0001
2	Sphygmomanometer	138.67±25.32	156.00±19.20	>0.056

VII. DISCUSSION

The result of the present study indicate that to reduce pain and improved grip strength. Significantly when mill's manipulation was given, there by supporting the alternative hypothesis.

(J.A.N.Verhaar et_al, 1995) states that mill's manipulation breaks the scar and thereby permanent lengthening result in that part of common tendon. This reduces the stress on the tendon, which results in reduction of pain.Stretching tension along the muscle tendon stimulates axial collagen alignment and increase in the efficient tensile loading of the tendon. These factors contribute to reduction in pain. (Jonathen Clutte, 2009) The pain occur in tennis elbow is due to the result of an incomplete healing response in an area of that does not have good blood flow and therefore has difficulty accessing nutrition and oxygen for healing. This leads to degeneration of the tendon

causing small tears. Although inflammation can be involved in the initial stages of injury, it is the inability of the tendon to heal that perpetuates the pain and disability.

(K.M Khan et al., 2000) the pain in tendinopathy may be biochemical not only structural in origin. Certain byproducts of increased cellular activity or tendon degeneration such as lactic acid, glutamate and chondroitin sulphate act on biochemical irritant that activate peritendinous nociceptors. Concentrations of glutamate, known chemical mediator of pain in the CNS were significantly higher in tendons with tendinosis compared to those that were pain free. Their presence provides alternative mechanism for pain medication. The mechanism behind control group is due to the physical and mechanical effect of ultrasound therapy. Ultrasound can alter membrane permeability to various ions like calcium which have profound effect on cell activity by increasing protein synthesis and increase in tensile strength, reduction in inflammation and energy absorbing capacity of the tendon with therapeutic ultrasound. The mechanical effect of ultrasound helps to remove traumatic exudates and reduces the danger of adhesion formation. Accelerated protein synthesis occurs during ultrasound therapy which stimulates the rate of repair of damaged tissue. These effects of ultrasound therapy might have caused healing of the tendon or might have caused reduction of inflammation present. If any which indirectly might have caused reduction in pain. Cryotherapy directly and rapidly modifies the pain sensation by gating pain transmission with activity of the cuetaneous thermal receptors. It can also reduce pain indirectly by alleviating the underlying cause of this symptom such as inflammation.

In experimental group the better results obtained in reduction of pain may be due to application of mill's manipulation in addition to conventional therapy, which might have helped in reducing pain and improving grip strength. Mill's manipulation (D.Stasinopoulos, M.I Johnson 2004) is defined as a passive movement performed at the end range that is, once all the slack has been taken up and is minimal amplitude, high velocity thrust. The aim of this technique is to elongate the scar tissue by rupturing adhesions within the teno -oseous junction making the area mobile and pain free.

Reduction in pain and improvement in grip strength were also observed in control group. This may be because ultrasound might have altered the pain transmission and perception of the condition causing the pain. The reduction in pain and the standard exercise given might have improved grip strength.

Thus from the results obtained in statistical analysis it is clear that mill's manipulation along with the conventional physiotherapy is more effective than conventional physiotherapy in the management of lateral epicondylitis.

One of the limitations The study assessed short term effect of Mill's manipulation since the duration of the study was less. Sample size for the study was small which might have affected the generalization of the study. Both genders were included in the study .Gender variation might have affected the reliability of the study. No follow up could be done to determine whether the effect was maintained. Duration of study was less.

Further recommendation of the study is long term follow up is needed to evaluate whether there occurs any sustained or carry over effect after the treatment. Long term follow up is needed to evaluate whether there occurs any sustained or carry over effect after the treatment. The study should replicate in large scale randomized clinical trial that would include a large group. The study should be conducted in both genders separately. It is suggested that the treatment session could be increased and the effect could be analyzed. Grip strength of the patient were measured with the help of sphygmomanometer instead of hand held dynamometer.

VIII. CONCLUSION

Pain and dysfunction caused by lateral epicondylitis are relatively common. The present study provides evidence that a 2 week program of Mill's manipulation for lateral epicondyle is capable of relieving pain and improving grip strength of the arm. Supplementing rehabilitation program for patients with Mill's manipulation may be helpful in improving treatment effectiveness. In this context, Mill's manipulation is more beneficial and it relieves pain and improving grip strength.. The technique is also cost effective to be utilized in clinical settings. The outcome measures of pain and grip strength improved significantly following the technique in lateral epicondylitis patients. These results indicates that more randomized controlled trials should be undertaken to investigate the unique effects of a more intense or longer Mill's manipulation for patients with lateral epicondylitis.

IX. REFERENCES

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