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Original Research Article

Comparison of Effectiveness of Movement with Mobilization Using Belt and Therapeutic Eccentric Exercise in Patients with chronic Lateral Epicondylitis: A Randomized Clinical Trial

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ABSTRACT

Objective: Comparison of Effectiveness of Movement with Mobilization (MWM) Using Belt and Therapeutic Eccentric Exercise (TEE) in Patients with chronic Tennis Elbow.
Materials and Methods: *Design.* Randomized clinical trial. *Subjects*. 30 chronic tennis elbow patients.
Intervention: Group A (N=15) had received Mobilization with Movement (MWM) using belt. Group B (n=15) was treated and Therapeutic Eccentric Exercise (TEE). All patients received three treatment sessions per week for six weeks (18 treatment sessions).
Outcomes: Pain was evaluated using Visual Analogue Scale (VAS), and functional status was evaluated by Patient Rated Elbow Evaluation Questionnaire (PREEQ) which were recorded at base line and at the end of six week.
Results: Both the Movement with Mobilization using belt and Therapeutic Eccentric Exercise were found to be significantly effective in reducing pain and improvement functional status. The Therapeutic eccentric exercise Program resulted in greater improvement in comparison to Movement with Mobilization using belt.
Conclusion: Therapeutic Eccentric Exercise program is effective treatment choice for management tennis elbow as well as Movement with Mobilization.
Key Words: Chronic lateral epicondylitis, Mobilization with Movement (MWM) using Belt, Therapeutic Eccentric Exercise (TEE).

INTRODUCTION

Lateral epicondylitis is commonly seen among tennis players and less commonly among electricians, carpenters and plumbers. Almost 45% of the tennis players are commonly affected because they do forceful pronation and supination movements in a faulty way. [1] Chronic lateral epicondylitis occurs due to low grade repetitive stresses placed upon the tendon over a prolonged period of time. Involved tendon shows signs of collagen degeneration because of repeated stresses. [2,11,12]

Movement with Mobilization (MWM) the mechanism by which manipulation work is poorly understood. Theoretically intended to repositioning of 'positional faults' changes in the shape of articular surfaces, thickness of cartilage, orientation of fibres of ligaments and capsules, or the direction and pull of

muscles and tendons. MWM correct this by repositioning the joint causing it to track normally. [3]

Therapeutic Eccentric Exercise (TEE) effectively "lengthens" the muscle-tendon complex resulting in structural remodeling of the tendon with hypertrophy and increased tensile strength of the tendon. It may also provide neuromuscular benefits through central adaptation of agonist and antagonist muscles. [4]

AIM: The purpose of the study was to compare the effectiveness of Mobilization with Movement using Belt and Therapeutic eccentric exercise program in the reduction of pain and improving functional status in patients with chronic tennis elbow.

MATERIALS AND METHODS

A randomized clinical trial was conducted between July 2016 and December 2016 in an outpatient, Physiotherapy and Rehabilitation Center, Alahsa, Saudi Arabia. Patients were referred by orthopedic department, Rheumatology, and Physiotherapy clinic. Patients were included if they were between 20 to 55 years of age and had been diagnosed with tennis elbow, and the duration of symptoms was more than 6 weeks, with Positive Cozens test and Mills test, both males and females. [7]

Inclusion Criteria

(1) Lateral elbow Pain with hand gripping
(2) Lateral elbow Pain with resisted wrist extension
(3) Lateral elbow Pain with passive wrist flexion with the elbow extension
(4) Tenderness on palpation over the lateral epicondyle of humerus
(5) No medications were given to patient before maneuver (Naive Patient)
(6) Tennis elbow greater than 6 weeks duration of illness (Chronic tennis elbow).

Exclusion criteria: Patient diagnosis other than tennis elbow and come at elbow pain, patient had taken medical treatment before the illness. Radial tunnel syndrome, brachial neuralgia, radio humeral bursitis, myositis ossificans at elbow, joint effusion in the affected elbow, osteoarthritis of elbow, associated injuries to the affected elbow, generalized hypermobility, hemophilia, metabolic joint disorders, neurological disorders, cervical radiculopathy, posterior interosseous nerve syndrome,

The study was approved from hospital ethical committee and a written informed consent was taken from all individuals agreed to contribute in the study with full information about the study and procedures may request to do.

Treatment: Patients divided into 2 Groups, Group A &B, **Group A:** Patient undergoing Movement with Mobilization using belt Technique, patient position patient supine lying with upper limb fully supported on treatment table. [9] Therapist in walk stands position is shown in Figure 1, adjacent to the affected elbow facing across the body of the patient. Therapist right hand stabilizes distal humerus and left hand maintains the forearm pronation. [21,22,23] The therapist is in a walk stand position facing across the patient and towards the patients' feet in such a position that the belt is over the therapists' right shoulder and the other end is vertically up from the floor such that a small knee bends and extension by the therapist exerts the desired treatment force to the elbow. Repetition: 10, Session: once a day, Duration: 6 weeks. [14, 20] [Figure.1].

Figure 1: Movement with mobilization using belt

Group B: Patient undergoing Therapeutic eccentric exercise, patients were positioned comfortably in the Hold Flex bar in involved hand with maximum wrist extension. Grab other end of Flex bar with

uninvolved hand. Twist Flex bar with non involved wrist while holding the involved wrist in extension. [25] Bring arms front of the body with elbows in extension while maintain twist in Flex bar by holding the non-involved wrist in full flexion and the involved wrist in full extension. Slowly allow Flex Bar to 'untwist' by involved wrist to move into flexion (i.e., eccentric contraction of the involved wrist extensors). Repetition: 15, Session: 3 sets/day, Duration: 4secs, Rest: 30secs, Frequency: 3 times /week (figure 2).

Figure 2: Therapeutic eccentric exercise

Outcome measures. Outcome measures used in the study includes pain intensity and functional status which were measured at the base line (pretest) and at the end of 6 weeks measured posttest scores. An independent observer, who was blinded to the patient group allocation, assessed the outcome measures. Pain intensity was assessed by Visual analogue scale (VAS). [6] The VAS consists of a 1 mm horizontal line with two ends labelled as 0 cm representing the ''least pain imaginable'' and 100 mm the ''worst pain imaginable''. Patients were given instructions to intersect this VAS scale with a vertical line depending on their current level of pain. The VAS assessment tool has been found to be a valid and also a reliable method of measuring patients' perceived pain. [10] Patients functional status was assessed by completion of the Patient Rated Elbow Evaluation Questionnaire |(PREEQ). (15) In PREEQ scale the patients were instructed to perform certain set of task that can be difficult to perform as a result of their problem (i.e. lifting, combing, dressing, throwing, carrying etc.) and were informed to accordingly rate the intensity of their pain. Higher scores are indicative of greater levels of disability. The PREEQ assessment tool has been found to have high test-retest reliability intra-class correlation coefficient (icc0.92) and moderate construct validity (Pearson's correlation coefficient 0.47. [15,19]

Statistical Analysis

Statistical analysis was performed with SPSS version 16.0.Stastistical analysis including mean and standard deviation was calculated for all measurement. The mean differences with standard deviation for outcome measures of pain intensity and function scale were calculated before the treatment and also the end of 6 weeks. The results value considered significant improvement in each group at $p<0.05$

RESULTS

(A)PAIN ASSESSMENT

Pre – Post Test Comparison of VAS Scores in Group A

There was a statistically reduction in the pain intensity at the end of 6 weeks of Movement with Mobilization (MWM) using belt. (Table 1)

Table 1.VAS- Paired 't' Test –Movement with Mobilisation using belt – GROUP A

VAS Mean±SD (0-100mm)	Pre- Test	Post- Test	P value
	66.66±3.68	43.33±6..07	< 0.00001 Significant

Pre – Post Test Comparison of VAS Scores in Group B

There was a statistically reduction in the pain intensity at the end of 6 weeks of Therapeutic Eccentric Exercise (TEE). Table. 2

Table 2.VAS-Paired 't' Test – Therapeutic Eccentric Exercise (TEE) – GROUP B

VAS Mean±SD (0-100mm)	Pre- Test	Post- Test	P value
	64.86±3.07	42.73±3.39	< 0.0001 Significant

Post Test Comparison of VAS Scores between the Groups

Though both groups showed significant reduction in pain posttest when compared to the pretest score, the intergroup comparison of VAS scores showed a statistically not significant reduction in VAS scores in Group A than Group B. Table.3

Table 3.VAS-Independent't' Test -Between GROUP A & B

VAS Mean±SD (0-100mm)	Post- Test	
	Group A	Group B
	43.33±6.07	42.73±3.39
'p' value	0.37 Not Significant	

(B) FUNCTIONAL ASSESSMENT

Pre – Post Test Comparison of PREEQ Scores in Group A

There was a statistically improvement in the functional status at the end of 6 weeks of Mobilization with Movement (MWM) using belt. (Table 4.)

Table 4.PREEQ Scores-Paired' Test -Movement with Mobilization using belt- GROUP A

PREEQ Mean ±SD (0-100mm)	Pre- Test	Post- Test	P value
	63.66±5.07	43.40±4.70	< 0.00001 Significant

Pre – Post Test Comparison of PREEQ Scores in Group B

There was a statistically improvement in the functional status at the end of 6 weeks of Therapeutic Eccentric Exercise (TEE). (Table.5)

Table 5. PREEQ Scores-Paired 't' Test-Therapeutic Eccentric Exercise (TEE)-GROUP B

PREEQ Mean±SD (0-100mm)	Pre- Test	Post- Test	P value
	62.8±4.31	36.46±3.62	< 0.00001 Significant

Post Test Comparison of PREEQ Scores between the Groups

Though both Groups showed significant improvement in the functional status posttest when compared to the pretest score, the intergroup comparison of PREEQ scores showed a higher statistically significant reduction in PREEQ scores in Group A than Group B. Table.6

Table 6.PREEQ Scores-Independent 't' Test -Between GROUP A & B

PREEQ Mean±SD (0-100mm)	Post- Test	
	Group A	Group B
	43.40±4.70	36.46±3.67
'p' value	0.00051 Significant	

DISCUSSION

Lateral epicondylitis, is a common clinical problem, which can be effectively managed by physiotherapy. The effects of Mobilization with Movement (MWM) using belt and Therapeutic Eccentric Exercise (TEE) have been compared on the basis of pain and Patient Rated Elbow Evaluation Questionnaire. [1,27] Lateral epicondylitis is a work related or sports related disorder due to microscopic tears in the Extensor Carpi Radialis Brevis (ECRB), usually caused by excessive quick, monotonous, repetitive eccentric contractions and gripping activities of the wrist. [2,8,16] Lateral epicondylitis patients excessive overload to ECRB muscle, combined with the disadvantage leverage system caused by sloping the lateral epicondyle, creates a fulcrum effect around the prominent radial head and then increased tension of the soft tissues in that area, particularly when the forearm is working in the hyperpronated position. [5,13,17,18,27]

The results of this study demonstrate that both the Movement With Mobilization (Group A) and Therapeutic Eccentric Exercise treatment (Group B) groups experienced significant improvements in pain and function following 6 weeks treatment sessions. The Therapeutic Eccentric Exercise group experienced greater outcomes for all variables in comparison to those receiving Movement with Mobilization treatment.

Proposed mechanism for pain in chronic lateral epicondylitis cited by Mulligan (1995) is that a minor positional fault of joint may occur following an injury or strain, resulting in movement restriction or pain. [3] Lewit (1985) has shown that,

reduced joint mobility can often be a result of reflex muscle splinting. It is suggested that treatment directed at the joint will have an effect on muscle activity and vice –versa. Paungmali A (2003) concluded that MWM using belt for chronic lateral epicondylitis is capable of producing concurrent hypoalgesic effects during and following MWM application as well as altering physiological effects. [20] Vicenzino demonstrated beneficial effects of applying MWM using belt technique on the pain and dysfunction that classically associated with chronic lateral epicondylitis. They reported improvement in function, and reduction in pain level. The Mobilization with Movement (MWM) using belt had been proved for its effects in reducing pain and improving functional activity in chronic lateral epicondylitis. During the mobilization the adhesions are broken, within tenoosseous junction, there by relieving pain and increase extensibility at the affected area. [18,24]

Therapeutic Eccentric Exercise (TEE) increases the force being transmitted to tendons and bones, which will maintain and generally increase the strength and functional capacity of the structures. [26] Therapeutic Eccentric Exercise (TEE) program introduced in this study proved to be an effective method of treating chronic lateral epicondylitis. All outcome measures for chronic lateral epicondylitis were markedly improved with the Therapeutic Eccentric Extensor Exercise (TEE), compared with the Mobilization with Movement (MWM) using belt. This novel exercise, using a FlexBar, provides a practical means of adding isolated eccentric training for ECRB, which was chronically inflamed. [4, 26] The additional benefit of this treatment is, it can be performed as part of a home program and does not involve continued medical supervision. It is a self-therapy and cost effective. This is to improve the collagen alignment, tissue healing in spite of some evidence that the therapeutic levels of eccentric exercise may increase collagen synthesis. It produces positive results when applied during later stages of healing. [27]

In comparing the results of these trials to those experienced by the Therapeutic Eccentric Exercise treatment group in the present study, two points must be considered. First, none of the above-mentioned trials used a true control group, thereby not controlling for the natural course of the disorder or spontaneous recovery. Second, the present study did not assign patients to receive Therapeutic Eccentric exercise as an isolated treatment. Therefore, comparisons between our results and those of previous trials should be made with caution as it is not possible to determine which intervention made the greatest contribution to the treatment effect.

Limitations and Suggestions

1) The number of subjects included in this study is only fifteen per group .The validity of the results can be enhanced by repeating the study with larger number of participants.
2) The term effects of these interventions and the incidence of recurrence of the condition can be studied by adequate follow up and longitudinal study was recommended.
3) Therapeutic eccentric exercise with variable tension tubing should be incorporated in order to get more desired effects in muscle strength.

CONCLUSION

We rejected the null hypothesis that no difference would be seen in pain intensity and functional status after 6 weeks as compared Mobilization with Movement using belt treatment. The groups that performed Therapeutic eccentric Exercise program for 6 weeks showed significantly greater improvement in reduction of pain and functional status than the Mobilization with Movement using belt treatment. The favorable results in the present study indicate the need for future research examining the incorporation of Therapeutic Eccentric Exercise program into multimodal treatment regimens.

Conflicts of Interests

The authors declare that there is no conflict of interests.

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