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ORIGINAL ARTICLE

EFFECTIVENESS OF MULLIGAN MOBILISATION VERSUS ECCENTRIC EXERCISE IN SUBJECTS WITH LATERAL EPICONDYLITIS

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ABSTRACT

Background of the study: It was proposed to study the effect of mulligan mobilization (MWM) and eccentric exercise program in subjects with lateral epicondylitis (LE). **Methods**: An experimental study 60 Subjects having clinical diagnosis of LE and full filled with the inclusive criteria and randomly assigned. Group A & B with 30 subjects in each group. Group A MWM is given with subject lying in supine position having their elbow extended and forearm pronated. Group B performed Eccentric exercises for LE should be performed on a bed with the elbow supported on the bed in full extension position ,and the wrist hanging over the edge of the bed .In this position ,patients should flex their wrist slowly until full flexion is achieved, and then return to the starting position. Both groups performed the exercises 3 times per week for the duration of 4 weeks. After the treatment, subjects were evaluated for their pain profile using visual analogue scale (VAS), hand grip strength(HGS)using hand grip dynamometer (HGD), functional activity using patient rating tennis elbow evaluation (PRTEE).**Results**: - For within group comparison Paired t-test analysis, for Between group comparisons Independent t-test used for statistical analysis. At the end of 4 weeks, it was found that subjects treated with MWM and eccentric exercise showed significant improvement in terms of VAS,HGS, PRTEE scores P=0.02. When compared between Groups the PRTEE showed a significant improvement in both group P=0.02. **Conclusion**: This study concludes that the 4 weeks of MWM and Eccentric exercises found statically and clinically significant effect on improving VAS, HGS, PRTEE for subjects with LE.

Keywords: Lateralepicondylitis, mulligan mobilization , eccentric exercise, Visual analog scale, Patient rating tennis elbow evaluation ,Handgrip strength,Hand grip dynamometer

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INTRODUCTION

Tennis elbow or lateral epicondylitis is an acute or chronic inflammation of the tendons that join the forearm muscle of elbow which get damaged from overuse repeating the same strenuous motions repeatedly. [(1)]The incidence of tennis elbow in practice is approximately 4 to 7 per 1000 patients per year with the annual incidence of 1-3% in the general population which increases to 19 % in 30 -60 years old population specifically and appears to be more long standing in India. [(2)]Women are more prone to get tennis elbow than men. Because women tend to have more joint inflammation, laxity and tissue structure[3].

It is characterized by pain at the lateral aspect of the elbow especially in gripping activities and resistance application to extensor muscle of the forearm. It may be degenerative in nature or failed healing tendon response that increases fibroblasts, vascular hyperplasia, proteoglycans and glycolsamino-glycans together with disorganized and immature collagen may all take place in the absence of inflammatory cells that form scar tissue which increases the severity of pain and reduces the mobility.[(4,5)]Extensor carpi radialis brevis (ECRB) is the most commonly involved structure and occasionally the extensor digitorum ,extensor carpi radialis longus and rarely extensor carpi ulnaris[6]. This is combination of valgus forces and rapid extension during tennis results in tensile forces along the medial side, compression on the lateral portion of the elbow and shear forces in posterior compartment[7]. Symptoms are aggravated during holding tools, shaking hands and lifting a kettle which involves gripping actions of hand [8]. Diagnosis can be done both radiologically and physically. Ultrasonography is presented with a unclear, homogenous fribrillar structure with thin parallel hyperechoic lines and a irregular and without a well defined outline bordered which is without a continuous hyperechoic[9].

Eccentric strengthening loads the musculo-tendinous unit to induce hypertrophy and increased tensile strength, reducing the strain on the tendon during movement. An eccentric contraction may provide a greater stimulus for the tendon cells to produce collagen and trains the tendons to withstand a greater force than encountered in the inciting activity[10]. Magnus Peterson and Stephen butter (2014) have suggested that eccentric strengthening is beneficialfor improving outcomes in tendiopathy[11].

Mulligan incorporated kaltenborn's principles of passive mobilization. They are thought to achieve painless movement by restoring the reduced accessory glide. Similar principles can be applied to the treatment of peripheral musculoskeletal disorders and are termed mobilization with movement .In essence ,the limited painful physiological movement is performed actively while the therapist applies a sustained accessory glide at right angles or parallel to the joint aiming to restore a restricted ,painful movement to a pain free and full range state[12,13,14]. A number of studies have attempted to compare the effect of MWM with those of other forms of interventions. Geetu and Deepak (2008) found that MWM led to statistically significant improvement in strength and functional performance[15].

Research examining the effectiveness of both MWM and eccentric exercise technique is available, but there are no studies have been found on comparative effectiveness between MWM and Eccentric exercise for improving

grip strength, functional activity , reducing pain.

Therefore the present study with research question, whether there is any difference in effect of MWM technique versus eccentric exercise on pain, grip strength, functional activity ? hence ,the purpose of this study to compare the effects of MWM and eccentric exercises on subjective pain ,grip strength, functional activity for subjects with lateral epicondylitis. It was null hypothesized that there is a significant difference in effect of MWM versus eccentric exercise on pain, grip strength, functional activity in lateral epicondylitis.

METHODOLOGY

An experimental study design with two groups .MWM group and eccentric exercise group. As this study involved human subjects the ethical clearance was obtained from the ethical committee of swantra college of physiotherapy and swantra hospital , rajamundry as per the ethical guidelines of bio medical research on human subjects . This study was registration number 14036003 .Subjects included in study were with Age group of 30-60 years with symptomatic lateral epicondylitis on either side, Pain with gripping, Pain with resisted wrist extension.Pain with passive wrist flexion with the elbow extension.

Tenderness are on palpation over the lateral epicondyle of humerus. Contraindication is to the Patient having history of trauma, surgery, acute infections. Patient who have received steroid injections within last 30 days in elbow joint. Severe neck or shoulder problems are with radiating pain to upper limb. Fractures around elbow complex[16.] Subjects were recruited and study was conducted at swantra hospital rajamundry. Subjects who meet inclusion criteria were informed about the study and a written informed consent was taken. Total 60 subject (n=60), 30 in each group completed the studied. Total duration of intervention was 3 sets 10 times per session for 3 sessions per week for 4 weeks.

Intervention

Group A: Mobilization With Movement Group Mobilization with movement were given with subject lying in supine position having their elbow extended and forearm pronated. The therapist was stabilised the the distal part of the arm(FIGURE 1) .Placing the belt around therapist shoulder and subject's forearm, belt placed closed to elbow joint line.

The therapist performed lateral glide of forearm using belt sustaining this glide, subjects were asked to perform fist without pain. Dosage -10 mobilizations with movement in one set.3 sets were given per session .treatment was given for 12 sessions. Christopher R.Herd 2008

Figure 1: Mulligan mobilization with belt

Group B: Eccentric Exercises;

Figure 2: eccentric exercise of the wrist with dumbels

Eccentric exercises for lateral epicondylitis should be performed on a bed with the elbow supported on the bed in full extension position (as high as possible),and the wrist hanging over the edge of the bed .In this position ,patients should flex their wrist slowly until full flexion is achieved, and then return to the starting position (Figure 2).

Use a light dumbbell weight (e.g.1 -2 kg.. or a small can from the kitchen cupboard).Sit in a chair that preferably has an armrest .Rest your forearm on the armrest while holding the weight /can with palm facing down. Now let your wrist slowly drop down .Lift and extend your wrist back up to the starting position. Patients are instructed to continue with the exercise even if they experience mild pain. However, they are instructed to stop the exercise if pain becomes disabling.

Magnus Peterson 2014;They should perform 3 sets of 10 repetitions at each treatment session, with at least a 1 min rest interval between each set for 12 sessions. When patients are able to perform the eccentric exercises without experiencing any minor pain or discomfront, the load is increased using free weights or thera bands

Outcome Measures

Visual analogue scale: The VAS was used to assess the intensity of the pain at the time of data collection, with 10 denoting the worst pain imaginable and 0 denoting no pain. [16]

Hand grip dynamometer: Maximum grip strength (MGS, Kg) was measured by using a hand grip dynamometer. [16]

Patient rating tennis elbow evaluation: It is valid, reliable, and sensitive outcome measure for rating pain and difficulties while performing functional activities. [16]

Statistical methods

Statistical method; descriptive statistical analysis has been carried out in the present study ,student test (two tailed and independent)has been used to find out the significance of the study parameter on continuous scale in between groups and student test (two tailed dependent)has been used to find out the significance within the group.

The statistical software ;spss 2.0, Microsoft word and excel have been used to generate graphs tables.The results of the study was indicated by decrease in elbow pain and increased function on PRTEE scale ,increased elbow flexion and extension range of motion on hand grip dynamometer.

RESULTS

GROUP: A

Table 1: Mean changes in pre and post VAS,HGS,PRTEE

		Mean	P value	Inference
Pair 1	Pre VAS	7.33	.000	Highly significant
	Post VAS	4.83		
Pair 2	Pre HGS	12.40	.000	Highly significant
	Post HGS	15.30		
Pair 3	Pre PRTEE	73.83	.000	Highly significant
	PostPRTEE	42.03		

GROUP B

Table 2: Mean changes in pre & post VAS,HGS,PRTEE

		Mean	p value	Inference
Pair 1	Pre vas	7.27	.000	Highly significance
	Post vas	5.13		
Pair 2	Pre hgs	12.63	.000	Highly significant
	Post hgs	14.97		
Pair 3	Pre prtee	72.40	.000	Highly significant
	Post prtee	47.47		

Group A & B (Between groups)

Table 3 Mean changes in post VAS,HGS,PRTEE

post VAS	groups	Mean	pvalue	Inference
	MWM	4.83	.418	Insignificant
	ECCENTRIC	5.13	.418	Insignificant
post HGS	MWM	15.30	.337	Insignificant
	ECCENTRIC	14.97	.337	Insignificant
Post PRTEE	MWM	42.03	.002	Significant
	ECCENTRIC	47.47	.002	Significant

DISCUSSION

In this study found that there is statistically significant improvement in both groups i.e mobilization with movement and eccentric exercises.The results of the study showed a significant Change in VAS, Grip strength PRTEE Questionnaire in both the groups.Group A which received Mulligan mobilization has a significant change with a p value of 0.02 .Similar findings were demonstrated by Miller (2000) who showed that full function was achieved among those LE patients who received MWM.[(17)]Gokan Doner et al showed that pain relief in mulligan group by neurophysiological mechanism of production of initial hypoalgesia based on stimulation of peripheral mechanoreceptors and the inhibition of nociceptors .The activation of apical spinal neurons as a result of peripheral mechanoreceptor by the joint mobilization produces presynaptic inhibition of nociceptive afferent activity[18].

The mechanism for pain relief in mulligan mobilization -Paungmali et.al (2004) showed that mobilization with movement produces sensory input sufficient to recruit and activate descending pain.Inhibitory systems that result in some or all of the pain relieving effects .It produces hypoalgesic effects during and following its application, as well as sympathoexcitatory effect[19.]

Bill vicenzino (2006) Hypothesized that malpositioning of the ulna and radius occurs in relation to humerus in tennis elbow, the reduction of pain could be due to repositioning of the ulna and radius with respect to humerus achieved by lateral glide to elbow joint[20]. Group B which received eccentric exercise has a significant change with P value of 0.02 and the results of the study is similar to studies conducted by Peterson et al concluded that eccentric graded exercise reduced pain and increased muscle strength in chronic tennis elbow more effectively than concentric graded exercise ($p<0.02$)[21].

In eccentric excercises appears to reduce pain and improve function, reversing the pathology of lateral epicondylitis[22]. D.stasinopoulos et al -

mechanism of eccentric training results in tendon strengthening by stimulating mechano –receptor in tenocytes to produce collegen ,which is probably the key cellular mechanism that determines recovery from tendon injuries .In addition ,eccentric training may induce a response that normalises the high concentrations of glycosaminoglycans .It may also improve collagen alignment of the tendon and stimulate collagen cross –linkage formation,both of which improve tensile strength[23] .

Martinez –silvestrini et al . describes in detail the use of the contralateral hand to lengthen the resistance band atthe end of each eccentric exercise repetition in order to exclude a concentric component of the exercise[24]. Woodely et al that found limited evidence that eccentric exercise has a positive effect on pain ,function and patient satisfaction /return to work[25].

A systematic review by Raman et al. found moderate research evidence to support isotonic eccentric exercise for improving pain ,strength and function over time. The way that eccentric training achieves the goals remains uncertain ,as there is a lack of good quality evidence to confirm that physiological effects translate into clinically meaningful outcomes and vice versa[26].

At the end of the 4 week session, the patient reported significantly less pain .No aggravation of the complaint was noted during competition.The only remaining complaint was minor discomfort over the lateral epicondyle while performing weighted shoulder flys during weekly workout sessions.The patient subjectively claimed to be back to full strength in the forearm.Objectively the visual analog scale pain rating dropped from 9/10 to 4/10 (week 4).Average grip strength testing from two trails changed 22lbs to 37 lbs with no pain reproduction reported.Both groups showed significant improvement in only PRTEE functional activity of P value 0.02.But eccentric group showed greater improvement in functional activity than mulligan group.

Limitations:

Sample was small so the results could not be generalized to population. Long term follow-up was not carried out.

Recommendations:

The period of the study should be increased as the disease process is long hence it may lead to better and valuable results.

Sample size can be increased with inclusion of more number of subjects to generalize the effects of these techniques in larger population.

CONCLUSION

The present study concludes that the 4 weeks of MWM and Eccentric exercises found statiscally and clinically significant effect on improving VAS,HGS,PRTEE functional activity for subjects with lateral epicondylitis There is no significant difference between groups in VAS and HGS .PRTEE showed significant improvement in both the groups functional activity ($P<0.002$) Comparatively eccentric group showed greater improvement PRTEE than mulligan group .

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Conflicts of interest: none

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