

Effect of Mulligan's Pain Release Phenomenon on Pain and Strength in Chronic Lateral Epicondylitis

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ABSTRACT

Aim: To study the effect of Mulligan's Pain Release Phenomenon on pain, disability and grip strength on chronic lateral epicondylitis.

Objectives: Following are the objectives of the study: 1. To determine effect of mulligan pain release phenomenon on pain, disability and grip strength in chronic lateral epicondylitis. 2. To compare the effect of mulligan pain release phenomenon with conventional therapy on pain, disability and grip strength in chronic lateral epicondylitis patient.

Methods: Ethical clearance was obtained from institutional ethical committee. 50 subjects with chronic lateral epicondylitis were assessed and were included in the study based on inclusion criteria, the individuals were allocated into two groups: Both group A (n=25) and B(n=25) will received the standardized treatment used for chronic lateral epicondylitis. The standardized treatment consisted of Cryotherapy, Phonophoresis, and strengthening exercises. In addition to the above-mentioned standardized treatment, group B received pain release phenomenon (PRP) as well. Pre and post-test were done for NPRS (Numerical pain rating scale), sphygmomanometer for grip, PRTEE scale and the outcome measures were analyzed after 7 sessions. Each exercise was done ten times for five sets each with a rest interval of 10 seconds in between each set.

Results: Intergroup statistical analysis for NPRS ($p < 0.0001$), Sphygmomanometry for grip Strength ($p < 0.0001$) and PRTEE Scale ($p < 0.0001$) revealed extremely significant difference post intervention. Analysis of NPRS, Sphygmomanometry for grip strength and PRTEE Scale for group A ($p < 0.0001$) and for group B (< 0.0001) were extremely significant respectively.

Conclusion: The study results concluded that mulligan's pain release phenomenon was significantly effective in relieving pain and improve strength in chronic lateral epicondylitis.

Keywords: chronic lateral epicondylitis. Mulligan's pain release phenomenon, grip strength, pain

INTRODUCTION

Lateral epicondylitis is the tendinopathy of the common extensor-supinator tendon of the elbow which is characterized by lateral epicondylar pain exaggerated by gripping. ⁽¹⁾ Lateral Epicondylitis is a failed healing tendon response depicted by the increased presence of vascular hyperplasia, fibroblasts and

disorganized collagen in the origin of the most commonly affected structure. The most commonly affected muscle is extensor carpi radialis brevis (ECRB). ⁽²⁾ Recent analysis of prevalence of tennis elbow in computer users showed 26%. The study also observed the right elbow was dominantly involved 58% among students, 48.8% in office workers and 46% among bankers.

Location of symptom was more prominent in right elbow compared to left with individual working on computer for 4-6hours per day. ⁽³⁾

In the present scenario lateral epicondylitis being considered with common extensor-supinator tendinitis presence of inflammation of the common tendon reduces the mobility of the elbow joint due to pain. This leads to reduction of the movement at the elbow joint and unless physiotherapy or surgical approach or infiltration is given there is no reduction in pain hence no pain free movement is achieved at elbow. ⁽²⁾ Therefore, overuse of common extensor tendon has been associated with reduced and painful elbow ROM, reduced common extensor tendon mobility, tenderness, changes in wrist biomechanics and pain either at the common origin or sometimes may radiate down to wrist on movement. Additionally, individuals with lateral epicondylitis present with painful daily activities and susceptibility to musculoskeletal injuries pertaining to wrist. ⁽⁴⁾ Microtrauma caused by overuse of the tendon and muscle leads to movement inhibition by the individual which further leads to maintained shortened position of the muscle to avoid pain further causing shortening of the muscle.

ECRB has an exclusive contact with radius owing to its anatomical origin; its abrasion against the lateral edge of the capitulum during excessive elbow motion causes pain. ^[11] Hence its commonly affected muscle in cases of lateral epicondylitis. ECRB muscle helps in stabilizing the wrist when the elbow is extended which is needed during any activity with extended elbow like, tennis groundstroke phase of the game. Hence it is commonly affected during tennis game ⁽⁵⁾ Neuromuscular control differs between healthy and among subjects with lateral epicondylitis which implies potential central nervous system involvement. Rehabilitation of subjects with lateral epicondylitis may reduce pain via neuromuscular control pathways. ⁽⁶⁾

The biomechanical alignment of the joint may change in long term lateral epicondylitis. The inflammation of the common extensor origin leads to less usage of the ECRB muscle which is usually affected in lateral epicondylitis. Hence overuse of brachioradialis muscle takes place leading to exaggerated inflammation of the common extensor tendon. Also, the alignment of the radio-ulnar and humero-radial joint changes in the chronic lateral epicondylitis case.

Overuse of extensor-supinator tendons cause restriction of fascial glide over the tendons leading to pain. Without reduction of inflammation, excessive usage may further lead to decreased gliding of the fascia causing adherence to the underlying tissues and hence a sign of inflammation. Lateral epicondylitis can be treated either conservatively, infiltration or via surgical approach. ^(6,7) Usually recommended conservative treatment is Manual Therapy which reduces pain and improves ROM of elbow joint. There are wide schools of manual therapy which are recommended in the treatment of tennis elbow and each school of manual therapy works by different principles with same aim to reduce pain and improve function. Manual therapy individually or either in combination used to treat lateral epicondylitis is proved effective in reducing pain. ^(8,9) Strengthening exercises have also been proved effective in strengthening the muscle post-pain reduction in such cases. Though there are a variety of treatment options, optimal treatment strategy is not known and more research is needed to discover the most effective treatment in patients with LET. ⁽¹⁰⁾ Pain releasing phenomenon is a technique which provokes pain while the therapy is being given, and the provoking pain pattern is selected during the treatment. ⁽¹¹⁾ The amount of manual force applied in this technique must follow two principles:
(1) pain must not exceed 4 on NPRS
(2) pain must attain level 0 on NPRS after 20 seconds of the sustained pressure.

The provoked pain should ideally settle down within 15-20 seconds and 25-30 seconds for smaller and larger joints respectively. If pain reduces to zero prior to twenty seconds, more force was applied while treating and if pain doesn't diminishes to zero even after twenty seconds means less force was applied. In addition to applied pressure, Physiological movement or accessory movement may be added along with the selected PRPs which further reduces the pain occurring during movement. PRP therapy is continued to perform until a substantial amount of pain relief is achieved during a session.

Types of PRP treatment:

There are basically four types of PRP treatments:

- i. Stretch PRP: here the muscle is eccentrically contracted.
- ii. Contraction PRP: muscle is concentrically contracted.
- iii. Compression PRP: the joint surfaces are compressed together
- iv. Distraction PRP: joint surfaces are distracted away from each other.

The types of PRP are performed along with pertained duration of hold time by the therapist. And always painful PRP technique is chosen for the treatment. ⁽¹²⁾

In the present study stretch type of PRP was used.

Effects of PRP:

PRP is known to reduce pain both in acute and chronic conditions usually preferred in chronic conditions. Also it is known to increase pain-free ROM. Many studies have already proved the effects of PRP on various soft tissue dysfunction but as far as our knowledge this is the first study dealing with Lateral epicondylitis. ⁽¹³⁾ Hence this treatment technique, specifically stretch PRP technique is utilized in the present study. In order to find out whether this technique can be used effectively or not.

METHODS

Study type: Experimental study

Study design: Pre- test Post-test

Study duration: 1 year

Sample size: 50

Study place: Physiotherapy OPD of Krishna hospital, Karad.

CRITERION FOR STUDY

INCLUSION CRITERIA:

1. Subjects diagnosed with chronic lateral epicondylitis
2. Both male and female participants willing to participate under the study
3. Subjects with age range: 20-40 years

EXCLUSION CRITERIA:

1. Acute Lateral epicondylitis
2. Subjects with Elbow and around elbow fracture
3. Subjects with ligament injury around Elbow joint
4. Any Neurological conditions like nerve compression
5. Any open wound around the area of elbow

PROCEDURE

The subjects who were referred to physiotherapy department were diagnosed by doctors of Krishna hospital, Karad, as chronic lateral epicondylitis and those who were willing to participate were enrolled in the study. Each of the subject was screened as per inclusion and exclusion criteria and were informed about the study and intervention.

A written consent was taken from every subject before proceeding to intervention.

Through random sampling method, participants were divided into 2 groups by consecutive sampling method; Group A and Group B. Subjects with chronic lateral epicondylitis were assessed by for pain, grip strength and disability by NPRS, Sphygmomanometer, PRTEE respectively. Both group A and B will received the standardized treatment used for chronic lateral epicondylitis. The standardized treatment consisted of Cryotherapy, Phonophoresis, and strengthening exercises.

In addition to the above mentioned standardized treatment, group B received

pain release phenomenon (PRP) as well. The Pain Release Phenomenon Technique (PRPS) is a manual therapy technique introduced by Brian Mulligan for management of chronic pain in the extremities. Various forms of the abovementioned technique are; joint compression, joint distraction, muscular contraction and stretch. In the present study stretch PRP technique was used which provoked pain stimuli and was maintained for 15-20 seconds.

The intervention was given for 7 sessions. The data was collected and statistically analyzed.

TREATMENT APPROACHES:

1. Phonophoresis
2. Pain release phenomenon
3. Cryotherapy
4. Strengthening exercises

Each exercise was done ten times for five sets each with a rest interval of 10 seconds in between each set.

RESULTS

For group A, the mean NPRS score before the start of the treatment was 7.8±1.225. The value decreased to 2.080±1.017 after 7 sessions of therapy. The p value was found out to be statistically significant (p<0.0001*).

In group B, mean value before the treatment was 8.08±0.9967, which after the

treatment was reduced to 1.440±0.7118. The effect on NPRS scores post-treatment was statistically significant (p<0.0001*).

In the present study, post interventional study mean for the pain on NPRS was 2.080± 1.077 in group A and group B mean was 1.440± 0.7118 intra group statistical analysis revealed significant difference for both the groups. This was done using paired 't' test. (p=0.0168, t=2.479). Also, by tallying the p value for pre-test; no statistical significance was found.

In the present study, post interventional study mean for the grip strength on sphygmomanometer was 95.8± 29.890 in group A and group B mean was 135.2±38.823. Intra group statistical analysis revealed significant difference for both the groups. This was done using paired 't' test. (p=0.0002, t=4.021). Also, tallying the p value for pre-test no statistical significance was found.

In the present study, mean of post interventional study for functional disability on PRTEE was 40.048± 8.496 in group A and group B mean was 15.16± 8.479 intra group statistical analysis revealed significant difference for both the groups. This was done using paired 't' test. (p=0.0001, t=10.548). Also, tallying the p value for pre-test no statistical significance was found.

Table no. 1 Comparison of pre and post NPRS, Grip strength and PRTEE Scale within the group

	Mean±SD	P value	T value	Df
Group A Pre NPRS	7.8±1.225	<0.0001	20.008	24
Group A Post NPRS	2.080±1.017			
Group A pre Grip strength	45.220±16.297	<0.0001	11.058	24
Group A post Grip Strength	95.80±29.89			
Group A pre PRTEE	90.76±10.713	<0.0001	27.115	24
Group A post PRTEE	40.68±8.496			

Table no. 2 Comparison of pre and post NPRS, Grip strength and PRTEE Scale within the group

	Mean±SD	P value	T value	Df
Group B Pre NPRS	8.08±0.996	<0.0001	43.846	24
Group B Post NPRS	1.440±0.711			
Group B pre Grip strength	44.720±21.648	<0.0001	15.661	24
Group B post Grip strength	135.20±38.823			
Group B pre PRTEE	83.92±16.768	<0.0001	22.207	24
Group B post PRTEE	15.16±8.479			

Table no. 3 Comparison of pre pre NPRS, Grip strength and PRTEE Scale between the groups

		Mean±SD	P value	T value	Df
NPRS	pre	7.8±1.225	0.3797	0.8866	48
	Pre	8.08±0.996			
Grip strength	Pre	45.2±16.297	0.9298	0.0857	48
	Pre	44.72±21.648			
PRTEE	Pre	90.76±10.71	0.0921	1.719	48
	Pre	83.92±16.768			

Table no. 4 Comparison of post post NPRS, Grip strength and PRTEE Scale between the groups

		Mean±SD	P value	T value	Df
NPRS	Post	2.080±1.077	0.0168	2.479	48
	post	1.440±0.7118			
Grip strength	Post	95.8±29.890	0.0002	4.021	48
	post	135.2±38.823			
PRTEE	Post	40.048±8.496	<0.0001	10.548	48
	Post	15.16±479			

DISCUSSION

The current experimental trial was carried out to study the quantitative efficacy of pain releasing phenomenon on subjects with chronic lateral epicondylitis. The outcome measures were assessed using pain using NPRS and grip strength using Sphygmomanometer and functional disability by using PRTEE

The result of the present study suggests that pain release phenomenon in combination along with conventional rehabilitation protocol was effective in reducing pain and improving grip strength and decreasing disability score on PRTEE scale.

Intra group NPRS scores were analyzed and were noteworthy in both the groups. The NPRS scores reduced by Mean±SD of 2.080±1.077 in group A and 1.440±0.7118 in group B. Subjects who had received Pain release phenomenon had more reduction in NPRS scores. Study done by Lad R. et al., on Pain Release Phenomenon states that the reduction in subjects with De Quervain's tenosynovitis. Pain occurs in these individuals due to increase tensioning of the tendon due to daily activities which can be one of the major causes for the same. The present study assessed NPRS scores day 1 in clinical OPD till the end of session i.e. on to 7th sessions and found significant reduction in pain in individuals undergoing therapy. The individuals in experimental group had higher baseline pain scores as compared to the individuals in the

conventional group study. A greater reduction in pain was seen post intervention which proves the efficacy of the Pain release phenomenon given along with conventional intervention.

There are literatures available, supporting the effects of progressive strengthening programs on pain and functional status in subjects with lateral epicondylitis. Few studies utilized, progressive strength training which was provided using the rubber bar in open Kinematic Chain position. Therefore greater improvement in outcome scores proved the efficacy of this functional training protocol. As the pain decreases because of PRP, the efficacy of muscle in doing its action improves and this may be the reason for increased grip strength Secondary to pain relief. If correlated with the same, Strength training in the present study consisted of exercise against gravity; which is also a type of open kinematic chain exercises which resembles position attained and required in Activities of daily Living. This rehabilitation approach in the present study justifies the improvement in grip strength in both the groups.

In this study, grip strength was assessed by using sphygmomanometer. The estimation of grip strength by means of reproduction of elevation of mercury is a legitimate and is recorded as efficient as dynamometer in documenting grip strength.

The muscle spindles are a major source of joint proprioceptors along with other soft tissues. As work increases, there develops weakening of certain group of muscle and shortening of certain group of muscle. Therefore stretching exercises given along with strengthening exercises in the present study resulted in greater muscle activation particularly the extensor carpi radialis brevis. Sensory feedback by way of elbow joint mechanoreceptors, i.e., proprioception, acts to modulate and activate the muscles around elbow joint.

In the present study, the PRTEE scores decreased experimental group, suggesting that only PRP was beneficial in

reducing disability score in subjects with lateral epicondylitis. Stretching and PRP techniques both help in inducing the interfibrillar stretch within the muscles which indirectly helps in smooth gliding of the muscle over fascia thus reducing pain during daily activities. Experimental group consisted of both stretching and Mulligan's PRP technique which induced smooth gliding of fascia over muscle, whereas conventional group only consisted of stretching which just induced interfibrillar stretch without having affect on gliding of tendons. Hence reduction of disability score was seen more in experimental group. This suggests that improvement in the strength of the wrist extensors minimizes the compensatory muscle recruitment pattern in greater functional efficacy in these individuals.

CONCLUSION

Based on the statistical presentation, analysis and interpretation it can be concluded that, Pain release phenomenon in chronic LE patients has shown significant improvement. Thus, the present study provided the evidence to support that pain release phenomenon along with conventional physiotherapy showed significantly improvement in reducing pain, functional disability and improve strength on all outcome measures.

Conflict of interest: The author declares that there are no conflicts of interest concerning the content of the present study.

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Ethical clearance: The study was approved by Institutional Ethics Committee, KIMSDU

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