

Effect of Eccentric Muscle Strengthening on Pain of Lateral Epicondylitis of Elbow.

Prof. (Dr) Deepak Kumar Singh¹

Principal, Jai Durga College Of Physiotherapy¹

Dr Manali Parashar²

Professor, Swasthya Kalyan College of Physiotherapy²

Dr. Aditi Buliya³

Assistant Professor, Swasthya Kalyan College of Physiotherapy³

Dr. Ravish Yadav⁴

Associate professor Jai Durga College Of Physiotherapy⁴

Dr. Ranu Singh⁵

Professor, Jai Durga College Of Physiotherapy⁵

Dr. Priyanka Jadon⁶

Assistant Professor, Jai Durga College Of Physiotherapy⁶



<https://doi.org/10.55041/ijssmt.v2i10.063>

Cite this Article: Singh, (. D. K., Parashar, D. M., Buliya, A., Yadav, R., Singh, R. & Jadon, P. (2026). Effect of Eccentric Muscle Strengthening on Pain of Lateral Epicondylitis of Elbow.. International Journal of Science, Strategic Management and Technology, 02(10), 1-9.
<https://doi.org/10.55041/ijssmt.v2i10.063>

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ABSTRACT

BACKGROUND AND PURPOSE:

Tennis elbow is a condition that results in pain around the outside of the elbow. It often occurs after strenuous overuse of the muscles and tendons of the forearm, near the elbow joint. One method of treatment for lateral epicondylitis and other tendinopathies that has gained recent attention is eccentric strengthening. Because lateral epicondylitis and other tendinopathies are degenerative conditions of the tendon with few inflammatory cells, the theoretical effectiveness of anti inflammatory treatments is doubtful. In this regard, the purpose of this study to see the effect of Eccentric Muscle Strengthening on pain of Lateral epicondylitis of elbow.

METHOD:

60 patients of confirmed diagnosis of lateral epicondylitis were collected from different physiotherapy clinics and hospitals. Patients were informed about the research protocols.

Consent forms were taken from the patients. 60 patients were divided in group A and group B. Group A was experimental group and group B was control group. VAS scale of all the participants of group A was noted and Group A patients were treated with eccentric muscle strengthening of wrist extensors and other conventional physiotherapy method. Conventional therapy include wrist extensor stretching, ultrasound, cross-friction massage, heat and ice.

The eccentric exercise involved twisting a rubber bar (Thera-Band ® FlexBar, The Hygenic Corporation, Akron OH) with concentric wrist flexion of the non involved arm and slowly releasing the twist with eccentric wrist extension of the involved arm. Three sets of 15 repetitions were performed daily as part of a home program with intensity increased progressively during the treatment period. VAS scale of all the participants of group B was noted and Group B patients were treated with only conventional physiotherapy method. Then comparison of VAS scale was done between Group A and Group B.

RESULT:

Pain relief done with eccentric muscle strengthening exercise with conventional exercise were significant higher than only conventional exercise.

CONCLUSION:

This study suggests that eccentric muscle strengthening exercise with conservative treatment gives more pain relief than only conservative treatment in the lateral epicondylitis of elbow patients.

KEY WORDS: *Lateral epicondylgia (LE), Tennis elbow (TE), Visual analogue Scale (VAS).*

INTRODUCTION

Lateral epicondylitis, commonly known as tennis elbow, is a musculoskeletal condition characterized by pain and tenderness around the lateral epicondyle of the humerus. It primarily involves the common extensor tendon, particularly the extensor carpi radialis brevis (ECRB), which plays an important role in wrist extension and stabilization during gripping activities. Despite its traditional name, lateral epicondylitis is not limited to tennis players and may occur in individuals who perform repetitive upper-limb activities at work, during sports, or in daily life. The condition is frequently associated with repetitive loading of the wrist extensor muscles, excessive gripping, and repeated wrist extension movements. These activities may contribute to tendon overload, impaired tissue healing, and degenerative changes within the common extensor tendon. Lateral elbow pain can interfere with occupational performance, recreational activities, and routine tasks, making it an important clinical concern in musculoskeletal physiotherapy.

Lateral epicondylitis commonly affects adults who engage in repetitive manual activities, although it may occur across different age groups and occupational categories. Individuals involved in computer work, carpentry, plumbing, painting, weight training, and racket sports may be exposed to repetitive wrist and forearm loading. The condition may develop gradually and is often aggravated by activities such as lifting objects, carrying bags, shaking hands, opening jars, and gripping tools. Patients typically report localized pain over the lateral aspect of the elbow, which may radiate into the forearm. Pain is frequently reproduced during resisted wrist extension, gripping, and stretching of the wrist extensor muscles. In persistent cases, reduced grip strength and difficulty performing functional activities may significantly affect quality of life and work productivity.

The pathophysiology of lateral epicondylitis is associated with repetitive mechanical stress and inadequate adaptation of the common extensor tendon to loading. Although the term epicondylitis suggests inflammation, persistent cases are often characterized by tendinopathic changes, including disorganized collagen, altered tendon structure, and impaired tissue repair. Repeated loading beyond the tendon's capacity may contribute to the development and persistence of symptoms. The extensor carpi radialis brevis is particularly relevant because it assists with wrist extension and helps stabilize the wrist during gripping. When the wrist extensors are repeatedly loaded, especially during forceful gripping or repetitive manual work, excessive mechanical stress may contribute to pain and functional limitations. Therefore, rehabilitation aims to manage symptoms, improve the capacity of the affected musculotendinous structures, and restore the ability to perform daily activities.

Pain is one of the most prominent clinical features of lateral epicondylitis and may limit both active movement and functional performance. Pain intensity can vary according to the duration of symptoms, the degree of tendon involvement, and the demands placed on the upper limb. Individuals may experience discomfort during resisted wrist extension, lifting with the forearm pronated, and sustained gripping. Persistent pain may also lead to reduced use of the affected arm, decreased muscular performance, and difficulty performing work-related activities. Appropriate pain assessment is therefore essential for determining the severity of the condition and evaluating the effectiveness of physiotherapy interventions. Commonly used outcome measures include the Visual Analogue Scale (VAS) and the Numeric Pain Rating Scale (NPRS), which help quantify perceived pain before and after treatment.

Physiotherapy plays a significant role in the conservative management of lateral epicondylitis. Treatment approaches may include activity modification, patient education, therapeutic exercises, stretching, manual therapy, and progressive strengthening. The primary goals are to reduce pain, improve muscle and tendon function, restore grip strength, and facilitate a gradual return to functional activities. Exercise-based rehabilitation is particularly important because it can progressively improve the load-bearing capacity of the affected tendon and surrounding musculature. The selection and

progression of exercises should be individualized according to symptom irritability, functional limitations, and the patient's response to loading.

Eccentric muscle strengthening is a therapeutic exercise technique in which a muscle produces force while lengthening under load. During eccentric wrist extensor training, the wrist extensors control the movement as the wrist gradually moves into flexion against an external resistance. This controlled loading approach is commonly incorporated into rehabilitation programmes for tendinopathies. Eccentric exercise may help improve muscle strength, increase tolerance to mechanical loading, and promote adaptations in the musculotendinous unit. It also provides a structured method of progressively exposing the affected tissues to loading demands that resemble activities encountered during work and daily life.

The potential benefits of eccentric strengthening in lateral epicondylitis may be related to its ability to improve the functional capacity of the wrist extensor muscles and their associated tendons. Progressive eccentric loading may help improve the tolerance of the tendon to repetitive mechanical stress while supporting the restoration of strength and movement control. As the individual becomes better able to tolerate loading, activities involving gripping, lifting, and wrist extension may become more manageable. Eccentric strengthening may also be combined with concentric exercises, stretching, and other rehabilitation strategies to provide a comprehensive treatment programme. However, the effectiveness of eccentric exercise can vary according to exercise dosage, resistance, frequency, adherence, symptom severity, and the duration of the condition. It should therefore be introduced and progressed according to the patient's tolerance rather than performed at an intensity that substantially aggravates symptoms.

The application of eccentric strengthening in lateral epicondylitis is clinically relevant because the wrist extensor muscles are repeatedly engaged during gripping and many functional upper-limb activities. Improving the capacity of these muscles may help individuals tolerate mechanical demands with less discomfort and greater efficiency. Nevertheless, pain reduction cannot be assumed solely from improvements in muscle strength. Pain is influenced by several factors, including tendon sensitivity, activity levels, duration of symptoms, and individual responses to rehabilitation. Therefore, the effects of eccentric strengthening should be assessed using validated pain measures alongside functional outcomes where appropriate.

Although various conservative interventions are used to manage lateral epicondylitis, exercise-based rehabilitation remains an important component of treatment. Investigating the effect of eccentric muscle strengthening specifically on pain may provide useful information regarding its role in reducing symptoms and supporting functional recovery. A structured intervention programme with clearly defined exercise techniques, resistance, repetitions, frequency, and duration can help determine whether eccentric strengthening is associated with meaningful changes in pain intensity. Consistent assessment before and after treatment is essential to evaluate the outcome of the intervention objectively.

Therefore, the present study, entitled **“Effect of Eccentric Muscle Strengthening on Pain of Lateral Epicondylitis of Elbow,”** aims to investigate the effect of eccentric muscle strengthening exercises on pain among individuals with lateral epicondylitis. Pain intensity will be assessed before and after the intervention using an appropriate standardized outcome measure, such as the Visual Analogue Scale or Numeric Pain Rating Scale. The study seeks to determine whether a structured eccentric strengthening programme is associated with a reduction in pain and to contribute to the evidence supporting exercise-based physiotherapy in the conservative management of lateral epicondylitis. The findings may help physiotherapists make informed decisions regarding the inclusion of eccentric strengthening in individualized rehabilitation programmes intended to improve pain, upper-limb function, and the performance of daily activities.

METHODOLOGY

SOURCE OF DATA: All the data collected from different physiotherapy clinics and hospitals of Jaipur

STUDY DESIGN: Experimental study.

POPULATION: Patients were included in this study those had pain in elbow due to lateral epicondylitis of elbow.

SAMPLING: Random sampling technique.

SAMPLE SIZE: 60.

STUDY DURATION: 6 months.

INCLUSION CRITERIA:

- (1) Patient of any age.
- (2) Patients of both gender.
- (3) Patients having no traumatic injury at elbow.
- (4) Patients having confirmed diagnosis of lateral epicondylitis
- (5) Maximal tenderness localized to the lateral epicondyle and pain with two maneuvers resisted wrist extension, resisted middle finger extension.

EXCLUSION CRITERIA:

- (1) Substantial osteoarthritis, Rheumatoid arthritis or inflammatory arthropathy affecting the elbow or wrist.
- (2) Connective tissue disease.
- (3) Diffuse pain syndrome. (eg. Generalized tension myalgia or fibromyalgia)
- (4) Carpal tunnel syndrome.
- (5) Cervical radiculopathy.
- (6) History of fractures of the radius, ulna or humerus with resultant deformity of the affected extremity.
- (7) Numbness or tingling of the dorsum of the forearm or hand of the involved extremity.
- (8) Instability to perform strengthening extension exercise because of pain.
- (9) Unable to return for follow up evaluation.

VARIABLES:

1. Dependent:- Pain.
 2. Independent:- Forearm muscle strengthening and conventional physiotherapy method.
- Conventional physiotherapy method includes Ultrasound, friction massage, strengthening exercise.

OUTCOME MEASURE: Visual analogue scale.

INSTRUMENTATION: Chair, Ultrasound machine, Visual analogue scale sheet, Rubber Band, Dumbbells, Pen, Paper, Pillows, Theraband.

PROCEDURE OF DATA COLLECTION:

- 60 patients of confirmed diagnosis of lateral epicondylitis were collected from different physiotherapy clinics and hospitals.
- Patients were informed about the research protocols.
- Consent forms were taken from the patients.
- 60 patients were divided in group A and group B.
- In which group-A includes 32 patients and Group -B includes 28 patients.
- Group A was experimental group and group B was control group.
- VAS scale of all the participants of group A was noted and Group A patients were treated with eccentric muscle strengthening of wrist extensors and other conventional physiotherapy method. Conventional therapy include wrist extensor stretching, ultrasound, cross-friction massage, heat and ice. The eccentric exercise involved twisting a rubber bar (Thera-Band ® FlexBar, The Hygenic Corporation, Akron OH) with concentric wrist flexion of the non involved arm and slowly releasing the twist with eccentric wrist extension of the involved arm. Three sets of 15 repetitions were performed daily as part of a home program with intensity increased progressively during the treatment period.
- VAS scale of all the participants of group B was noted and Group B patients were treated with only conventional physiotherapy method.
- Then comparison of VAS scale was done between Group A and Group B by the analysis of each numbers with Graph pad prism5 software.

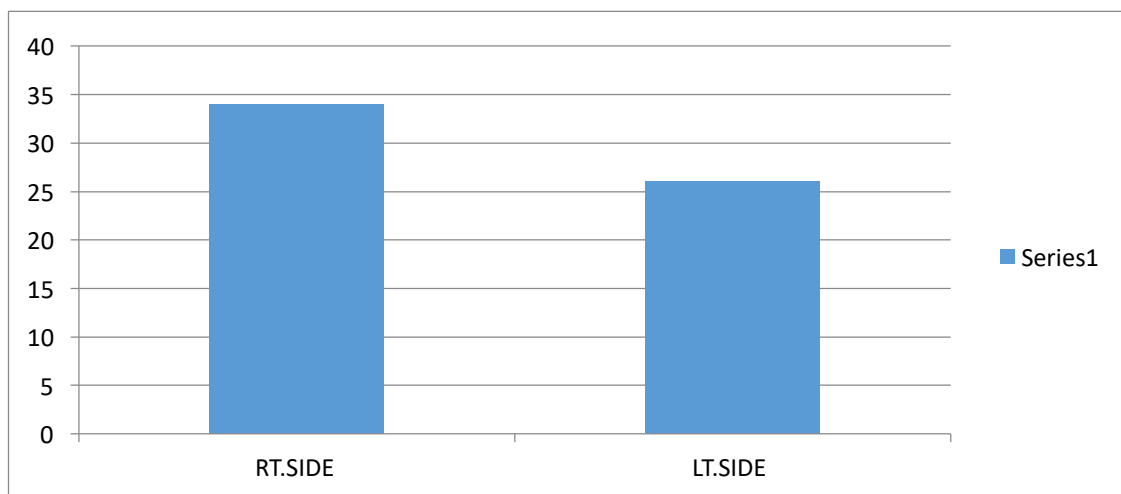
RESULT

In this study 60 subjects of all age group were taken. All the subjects completed treatment protocol as prescribed by physiotherapist. The data obtained in this study is as follows. Graph Pad Prism5 was used for data analysis.

TABLE:1 Age and gender distribution of subjects.

GENDRE DISTRIBUTION	NUMBER OF SUBJECTS	AGE(mean±SD)
MALE	32	51.27±11.41 Years.
FEMALE	28	

Here, 32 Male and 28 Female participants with age 51.27±11.41 years have participated in the present study, as shown in Table and Graph.

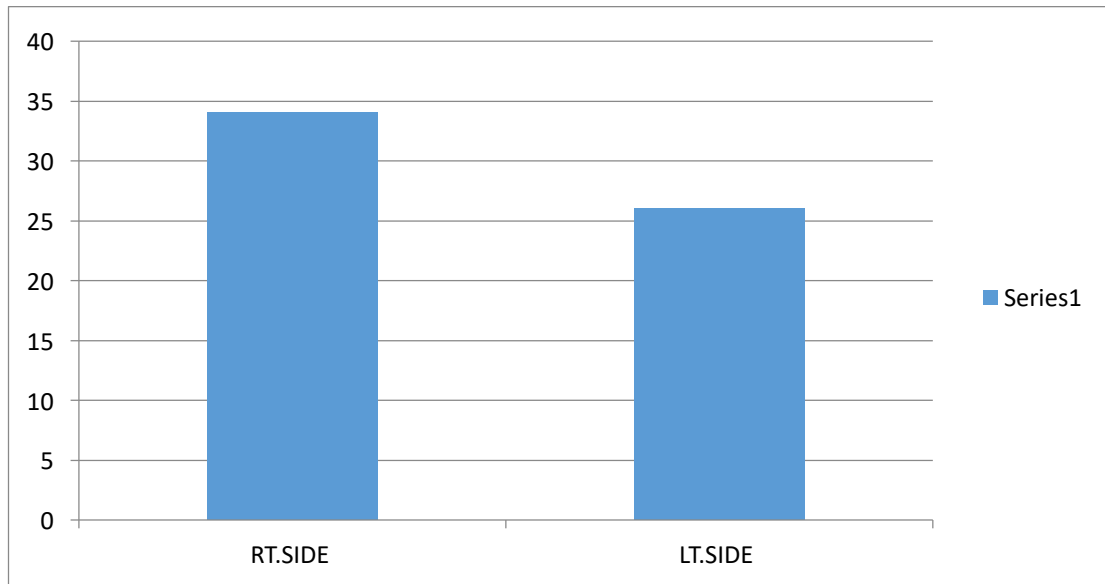


GRAPH-1.Side of pain.

TABLE-2: SIDE OF PAIN DISTRIBUTION OF THE SUBJECTS.

NO. OF PARTICIPANTS	RT.SIDE PAIN	LT.SIDE PAIN
60	34	26

Here,60 subjects of tennis elbow have participated in which 34 had rt.side elbow pain and 26 had lt. side elbow pain, as shown in table and graph.

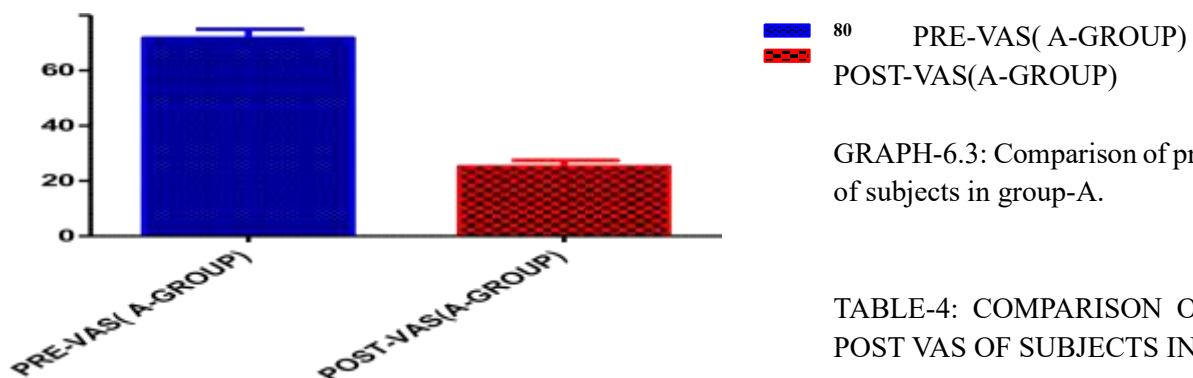


GRAPH-6.2.Side of pain distribution of the subjects.

TABLE-3: COMPARISON OF PRE AND POST VAS OF SUBJECTS IN GROUP-A.

SUBJECTS OF GROUP-A	PRE VAS(mean±SD)	POST VAS(mean±SD)	P	T
	72.87±11.54	25.93±8.005	<0.0001	32.81

Here,comparison between Pre-VAS and Post-VAS done in the subjects of Group-A by using paired t-test at 95% confidence interval. It was showed that there was statistically significant difference found between Pre-VAS and Post-VAS in Group-A($p < 0.0001$, $t = 32.81$, $df = 14$),as shown in table and Graph.

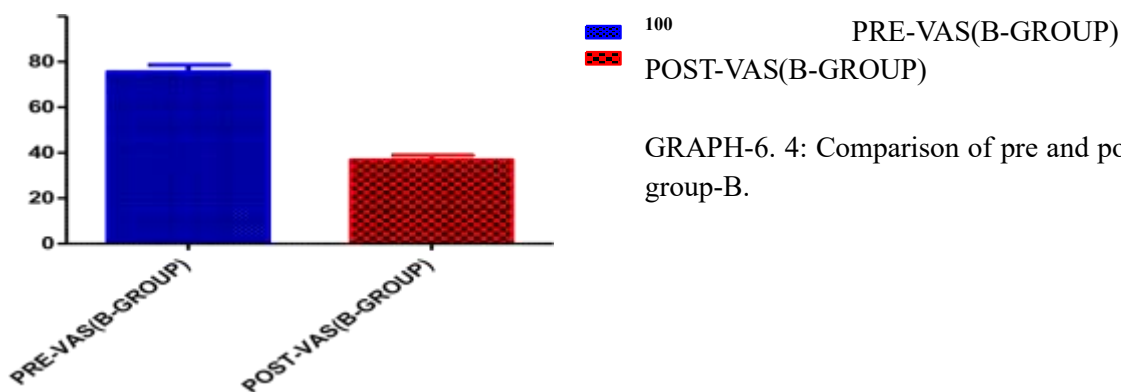


GRAPH-6.3: Comparison of pre and post vas of subjects in group-A.

TABLE-4: COMPARISON OF PRE AND POST VAS OF SUBJECTS IN GROUP-B.

SUBJECTS OF GROUP-B	PRE VAS(mean±SD)	POST VAS(mean±SD)	P	t
	75.90±9.99	37.43±17.007	<0.0001	18.60

Here, comparison between Pre-VAS and Post-VAS done in the subjects of Group-B by using paired t-test at 95% confidence interval. It was showed that there was statistically significant difference found between Pre-VAS and Post-VAS in Group-B ($p < 0.0001$, $t = 18.60$, $df = 14$), as shown in table and Graph.

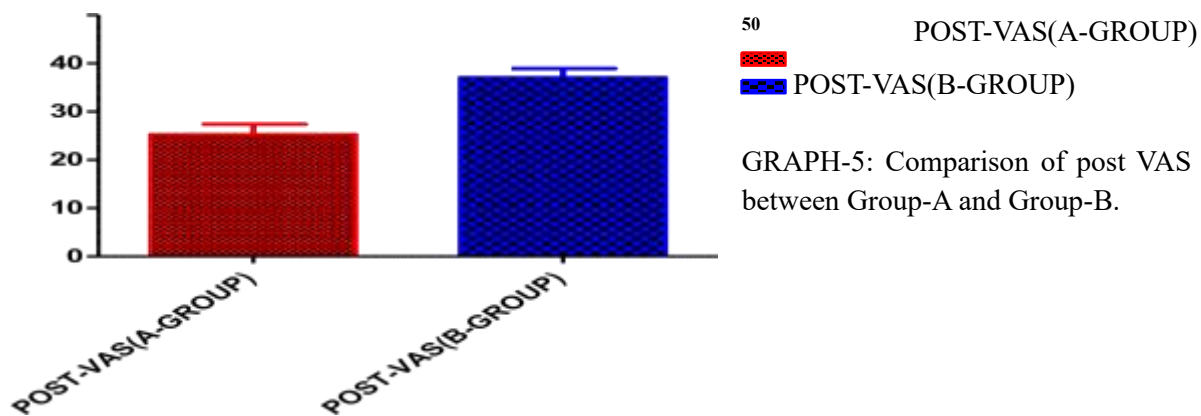


GRAPH-6. 4: Comparison of pre and post VAS of subjects in group-B.

TABLE-5: COMPARISON OF POST VAS OF SUBJECTS IN BETWEEN GROUP-A AND GROUP-B.

SUBJECTS	POST VAS(mean±SD)(A)	POST VAS(mean±SD)(B)	P	t
	25.47±8.008	37.83±17.007	<0.0002	4.998

Here, comparison of Post-VAS done in between the subjects of Group-A and Group-B by using paired t-test at 95% confidence interval. It was showed that there was statistically significant difference found in Post-VAS in between Group-A and Group-B ($p < 0.0002$, $t = 4.998$, $df = 14$), as shown in table and Graph.



GRAPH-5: Comparison of post VAS of subjects in between Group-A and Group-B.

DISCUSSION

The present study was conducted to see the effect of eccentric muscle strengthening on pain component of lateral epicondylitis of elbow. All the participants divided in two group A and B. In A group participants have given both conservative treatment and eccentric muscle exercise by twisting a rubber bar (Thera-Band ® FlexBar, The Hygenic Corporation, Akron

OH) and in B group participants have given only conservative treatment. After all the protocol, VAS scale have taken for pain measurement to see effect of eccentric muscle strengthening on pain component of lateral epicondylitis of elbow. The main findings of this present study are there was statistically significant difference found between Pre-VAS and Post-VAS in Group A and Group B. Also, there was statistically significant difference found in Post-VAS between Group A and Group B.

Croisier et al. conducted study to compare the outcome of patients performing an isokinetic eccentric training with that of age-, gender-, activity-matched patients receiving a nonstrengthening classical rehabilitation. Ninety-two patients with unilateral chronic lateral epicondylar tendinopathy (mean duration of symptoms 8+/-3 months) were assigned either to a control group (n = 46) or to an eccentrically trained group (n = 46). The control group underwent a passive standardized rehabilitation programmed that excluded strengthening exercises. In addition to this programmed, the trained group also performed eccentric exercises based on the repetitive lengthening of the active musculo-tendinous unit. The latter exercises started with submaximal contraction intensity and slow speed movement. Modalities were progressively intensified (increase in intensity contraction and speed movement) over a long period of treatment. Programme effectiveness was assessed through pain score evaluation, a disability questionnaire, muscle strength measurement and ultrasonographic examination.

Compared to the non-strengthening control group, the following observations were made in the eccentrically trained group: (1) a significantly more marked reduction of pain intensity, mainly after one month of treatment; (2) an absence of strength deficit on the involved side through bilateral comparison for the forearm supinator and wrist extensor muscles; (3) an improvement of the tendon image as demonstrated by decreasing thickness and a recovered homogenous tendon structure; and (4) a more marked improvement in disability status during occupational, spare time and sports activities⁶².

Martinez-Silvestrini JA¹, Newcomer KL et al conducted a study to evaluate the effectiveness of eccentric strengthening. Ninety-four subjects (50 men) with chronic lateral epicondylitis were allocated randomly into three groups: stretching, concentric strengthening with stretching, and eccentric strengthening with stretching. Subjects performed an exercise program for six weeks. All three groups received instruction on icing, stretching, and avoidance of aggravating activities. The strengthening groups received instruction on isolated concentric and eccentric wrist extensor strengthening, respectively. At six weeks, significant gains were made in all three groups as assessed with pain-free grip strength, Patient-rated Forearm

Evaluation Questionnaire, Disabilities of the Arm, Shoulder, and Hand questionnaire, Short Form 36, and visual analog pain scale. No significant differences in outcome measures were noted among the three groups. Although there were no significant differences in outcome among the groups, eccentric strengthening did not cause subjects to worsen. Further studies are needed to assess the unique effects of a more intense or longer eccentric strengthening program for patients with lateral epicondylitis⁶³.

Woodley BL¹, Newsham-West RJ conducted a study to determine the effectiveness of eccentric exercise (EE) programme in the treatment of common tendinopathies. The PEDro and van Tulder scales were employed to assess methodological quality. Levels of evidence were then obtained according to predefined thresholds: Strong--consistent findings among multiple high-quality RCTs. Moderate--consistent findings among multiple low-quality RCTs and/or clinically controlled trials (CCTs) and/or one high-quality RCT. Limited--one lowquality RCT and/or CCT. Conflicting--inconsistent findings among multiple trials (RCTs and/or CCTs). No evidence-no RCTs or CCTs. Twenty relevant studies were sourced, 11 of which met the inclusion criteria. These included studies of Achilles tendinopathy (AT), patella tendinopathy (PT) and tendinopathy of the common wrist extensor tendon of the lateral elbow (LET). Limited levels of evidence exist to suggest that EE has a positive effect on clinical outcomes such as pain, function and patient satisfaction/return to work when compared to various control interventions such as concentric exercise (CE), stretching, splinting, frictions and ultrasound⁶⁴.

Wasielewski NJ¹, Kotsko KM at el.T conducted a study to review evidence for the effectiveness of eccentric exercise to treat lower extremity tendinoses. Specific data were abstracted from the RCTs, including eccentric exercise protocol, adjunctive treatments, concurrent physical activity, and treatment outcome. The calculated post hoc statistical power of the selected studies ($n = 11$) was low, and the average methodological score was 5.3/10 based on Pedro criteria. Eccentric exercise was compared with no treatment ($n = 1$), concentric exercise ($n = 5$), an alternative eccentric exercise protocol ($n = 1$), stretching ($n = 2$), night splinting ($n = 1$), and physical agents ($n = 1$). In most trials, tendinosis-related pain was reduced with eccentric exercise over time, but only in 3 studies did eccentric exercise decrease pain relative to the control treatment. Similarly, the RCTs demonstrated that strength-related measures improved over time, but none revealed significant differences relative to the control treatment. Based on the best evidence available, it appears that eccentric exercise may reduce pain and improve strength in lower extremity tendinosis, but whether eccentric exercise is more effective than other forms of therapeutic exercise for the resolution of tendinosis symptoms remains questionable⁶⁵.

Kingma JJ¹, de Knikker R at el conducted a study to see efficacy of eccentric overload training on the outcome measures of pain and physical functioning. Electronic databases were searched for randomized clinical trials concerning eccentric overload training in patients with chronic Achilles tendinopathy. The Delphi list was used to assess the methodological quality of the studies. Nine clinical trials were included. Only one study had sufficient methodological quality. The included trials showed an improvement in pain after eccentric overload training. Because of the methodological shortcomings of the trials, no definite conclusion can be drawn concerning the effects of eccentric overload training in patients with chronic Achilles tendinopathy⁶⁶.

Jonsson P¹, Wahlström P et al conducted a pilot study in which nine patients (five females and four males, mean age 54 years) with a long duration of shoulder pain (mean 41 months), diagnosed as having shoulder impingement syndrome and on the waiting list for surgical treatment (mean 13 months), were included. Patients with arthrosis in the acromioclavicular joint or with large calcifications causing mechanical impingement during horizontal shoulder abduction were not included. We prospectively studied the effects of a specially designed painful eccentric training programme for the supraspinatus and deltoids muscles (3 x 15 reps, 2 times/day, 7 days/week, for 12 weeks). The patients evaluated the amount of shoulder pain during horizontal shoulder activity on a visual analogue scale (VAS), and satisfaction with treatment. Constant score was assessed. After 12 weeks of treatment, five patients were satisfied with treatment, their mean VAS had decreased (62-18, $P < 0.05$), and their mean Constant score had increased (65-80, $P < 0.05$). At 52-week follow-up, the same five patients were still satisfied (had withdrawn from the waiting list for surgery), and their mean VAS and Constant score were 31 and 81, respectively⁶⁷.

Timothy F. Tyler PT conducted a study. The objective of this study was to assess the efficacy of a novel eccentric wrist extensor exercise added to standard treatment for chronic lateral epicondylitis. Twenty-one patients with chronic unilateral lateral epicondylitis were randomized into an eccentric training group ($n=11$, 6 men, 5 women; age 47 ± 2 yr) and a standard treatment group ($n=10$, 4 men, 6 women; age 51 ± 4 yr). Both treatment groups received wrist extensor stretching, ultrasound, cross-friction massage, heat and ice. Additionally the Standard Treatment Group performed isotonic wrist extensor strengthening and the Eccentric Group performed isolated eccentric wrist extensor strengthening. Groups did not differ in terms of duration of symptoms (Eccentric 6 ± 2 mo vs. Standard 8 ± 3 mo, $P=0.7$), number of physical therapy visits (9 ± 2 vs.

10 ± 2 , $P=0.81$) or duration of treatment (7.2 ± 0.8 wk vs. 7.0 ± 0.6 wk, $P=0.69$).

Improvements in all dependent variables were greater for the Eccentric Group versus the

Standard Treatment Group (percent improvement reported): DASH

76% vs. 12%, $P=0.01$; VAS 81% vs. 22%, $P=0.002$, tenderness 70% vs. 4%, $P=0.003$; strength (wrist and middle finger extension combined) 72% vs. 11%, $P=0.032^{68}$.

Ohberg et al. Believe that ,during eccentric training , the blood flow is stopped in the area of damage and this leads to neovascularization , the formation of new blood vessels, which improves blood flow and healing in the long term.

LIMITATIONS AND RECOMMENDATIONS

1. No follow up data was collected, therefore the long term effects of the interventions in the present study remain unknown.
2. Study includes only 60 subjects which is a small sample size. Larger study involving on increased number of participants should be employed.
3. Patients should be of same gender. Men generally have stronger grip strength as compared to women and this should affect the grip strength results.
4. As there is wider distribution of age group selected in the study, the result might be biased. Hence similar studies can be done in different age groups with sub group analysis.
5. There exist various etiologies of lateral epicondylitis, only patients with similar etiologies should be used, as various etiologies may affect the outcome.

CONCLUSION

Tennis elbow is a condition that results in pain around the outside of the elbow. It often occurs after strenuous overuse of the muscles and tendons of the forearm, near the elbow joint. One method of treatment for lateral epicondylitis and other tendinopathies that has gained recent attention is eccentric strengthening. Because lateral epicondylitis and other tendinopathies are degenerative conditions of the tendon with few inflammatory cells, the theoretical effectiveness of anti-inflammatory treatments is doubtful. In this regard, the purpose of this study to see the effect of Eccentric Muscle Strengthening on pain of Lateral epicondylitis of elbow.

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REFERENCES

1. Moken T, Mehlu IS. Work related musculoskeletal disorders in Norway's offshore petroleum industry. *Occup med (lond)*,2007.57(2):112-117.
2. Shiri R, Viikari-Juntura E. Prevalence and determinations of lateral and medial epicondylitis: a population study. *Am J Epidemiol*,2006.164 (11):1065-74.
3. Ekberg K, Karlson m. Case control study of risk factors for disease in the neck and shoulder area. *Occup Environ Med*.1994.51(4):262-6.
4. Cyriax Jh. The pathology and treatment of tennis elbow. *The journal of bone and joint surgery*,1936,18:921-940.
5. Kaplan EB. Treatment of tennis elbow (epicondylitis) by denervation. *The journal of bone and joint surgery*. 1959;41(1) 147-151.
6. Mills GP. The treatment of tennis elbow. *The journal of bone and joint surgery*.1928;1:12-13.
7. Kraushal B, Nirschl R. Current concept review: Tendinosis of elbow (tennis elbow) Clinical features and findings of histological and immunohistochemical and electron microscopy studies. *J bone joint surgery*.1999;81.259-285.
8. Aust N Z J surg. The early history of tennis elbow. 1873 to the 1950s. Thurston AJ . department of surgery, willington school of medicine, New Zealand.1998.Mar ;68(3)219-24.
9. Waugh EJ. Lateral epicondylalgia or epicondylitis. What is in name?. *sport Phys ther*.2005,35;200-202.
10. Abbot JH, Patla CE. The initial effect of elbow mobilization with movement technique on grip strength in subjects with lateral epicondylalgia. *Manual Therapy*.2001;6(3):163-169.
11. Vesseljen O. Low level laser treatment versus traditional physiotherapy in the treatment of tennis elbow. *Physiotherapy* 1992;78:329-334.
12. Vicenzino B, wright A. Effect of novel manipulative physiotherapy technique on tennis elbow; a single study. *Manual therapy*.1995;1:30-35
13. Lennart Dimberg. The prevalence and causation of tennis elbow in a population of engineering industry. *ergonomics* 1987.march;30 (3):573-.579.
14. Manchanda G, Grower D. Effectiveness of movement with mobilization compared with manipulation or wrist in case of lateral epicondylitis. *Indian journal of physiotherapy and occupational therapy* 2008:291.
15. Vicenzino B. Lateral epicondylalgia: a musculoskeletal physiotherapy perspective. *Manual therapy* 2003;8(2):66-79.
16. Oron Z, schwarzkork R. tennis elbow- Assessment and treatment .2008.april 147(4);340-3,379.
17. Boyer ,Hasting .Lateral tennis Elbow. Is there any science out there? *Journal of shoulder elbow surgery* 1999;8:481-91.
18. Allander E. Prevalence, incidence and remission rates of some common rheumatic disease syndrome. *Scandinavian journal of rheumatology*.1974;3(3):145-153.
19. Vicenzino A, Wright B. Lateral epicondylgia; a review of epidemiology, pathophysiology, etiology and natural history. *Physical therapy reviews*.1996;1:23-34.
20. Gabel Gt. Epicondylitis after treatment with fluroquinolone antibiotics . *J bone joint surgery Br*.1995.77;293-5.
21. Leach RE, Miller JK. Medial and lateral Epicondylitis of elbow. *clin sport med*.1987;6:259-72.
22. Nirschl RP. Soft tissue injury about the elbow. *clin sport med*.1986;5:637-52.
23. Nirschl RP. Tennis elbow. *Orthopedic clinics of north America*.1973;4;787800.
24. Verhar J. tennis elbow: anatomical, epidemiological and therapeutics aspects. *International orthopedics* 1994;8;263-7.
25. Binder AI, Hazelman BL. Lateral humeral epicondylitis- a study of natural history and effect of manual therapy. *British journal of rheumatology*.1983;22:73-76.



26. Haker E. Lateral epicondylgia:Diagnosis, treatment and evaluation.Critical reviwis in physical rehabilitation medicine.1993;5:29-154.
27. B D Chaurasia .Human anatomy of upper limb and thorax.Vol 1.fourth edition,2006.
28. Bernard F Morrey.The elboe and its disorder.second edition,1993.
29. Vicenzino A,Wright B.Lateral epicondylgia; a review of epidemiology,pathophysiology , etiology and natural history.Physical therapy reviwis.1996;1:23-34.
30. Kapandjii A.The physiology of joints.5th edition.11998.