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Effectiveness of Fascial Manipulation on Pain, Grip Strength, and Functional Performance in Chronic Lateral Epicondylitis Patients

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Abstract

Fascial manipulation is an effective tool in the management of the musculoskeletal disorders. This can be used to address pain, grip strength, functional performance in tennis elbow (lateral epicondylitis patients) patients. The specific objective of the study was to evaluate the efficacy of fascial manipulation in tennis elbow its role in decreasing pain , improving the grip strength and overall functional performance is also evaluated. A total of twenty samples participated in the study. Reduction in pain intensity was significant, gaining the fascial connection of the neuromusculoskeletal system may also assist patients in accepting why movement of body parts distant from the site of symptoms may be used as a treatment approach to manipulate fascial tissues. Fascial manipulation techniques are passive manipulations on selected points that focus on restoring the ability of the fascial system to tolerate the normal compressive, friction, and tensile forces associated with daily and sport activities.

Question: Role of fascial manipulation in management of chronic lateral epicondylitis.

Design: Pre –post experimental study design.

Participants: Chronic lateral epicondylitis (tennis elbow) who have pain, decreased grip strength and disturbed functional performance in the Age group 25-40 include both sexes (male and female).

Intervention: Fascial manipulation technique on two centers of coordination and one center of fusion, stretching and ultrasound therapy.

Outcome measures: Pain and functional performance using Patient Rated Tennis Elbow Evaluation (PRTEE) questionnaire, grip strength was measured using hand dynamometer.

Results and conclusion: The result concluded that fascial manipulation is more effective than ultrasound therapy with stretching in the management of lateral epicondylitis subjects and hence it can be effectively used to reduce pain, increase grip strength and functional performance in lateral epicondylitis (tennis elbow) patients.

Keywords: Lateral epicondylitis; Fascial manipulation; Ultrasound therapy; Stretching

Introduction

Lateral epicondylitis or tennis elbow is the common cause for the pain and dysfunction of elbow joint. It is a chronic overuse injury, characterized by pain and tenderness over the lateral epicondyle of humerus [1]. The term tennis elbow is misnamed, because it also occurs in non-tennis players and workers who require repeated movement of wrist flexion with the forearm pronation [2]. It is also called as carpenters elbow, computer operator's elbow, lateral epicondylalgia, and lateral stress syndrome. It was first distinguished from writer's cramp and described in 1873 by Hillman Runge. It was then named as "lawn tennis arm" by Morris.

The annual incidence of tennis elbow is 4 to 7 new cases for 1000 patients [3]. It occurs predominantly in patients aged 35 to 55 years with a mean age of 45 years [4]. The incidence and recurrence rate decreases with increasing age [5]. This is most evident in the over 40's where the prevalence increases fourfold in men and twofold in women [6]. The dominant arm is usually affected, but the condition is occasionally bilateral. Men are more likely to suffer than women.

The actual cause of the tennis elbow is unknown. Studies shows that trauma such as direct blows to the epicondyle, a sudden forceful pull or forceful extension cause more than half of these injuries, inadequate forearm extensors power and endurance, bad playing techniques. Tennis elbow is one of many examples of overuse syndromes caused throughout the body by chronic cyclic activity. 'Overuse is encountered when the body's physiological ability to heal lags behind the micro-trauma occurring with the repetitive action' [7]. The forceful repeated contractions of the muscle lead to irritation and partial tear of the involved musculature [8,9]. It may occur with the following factors; overload combined with the disadvantaged leverage system caused by sloping lateral epicondyle, creates a fulcrum effect around the prominent radial head and thus increased tension of the soft tissues in that area, particularly when the forearm working in the hyper-pronated position; For instance back hand stroke in tennis and volley.

Extreme movements of force or repetition, despite reasonable muscle power, endurance and flexibility can also results in tennis elbow [10]. The muscle tears are most easily at its attachment to the bone, rather than the musculotendinous junction or the muscle belly and the site of maximal tenderness is the site of the injury [9]. However, the muscle damage will always occurs at the musculotendinous junction [11]. The disorder is characterized by pain and tenderness over the lateral epicondyle of the humerus exacerbated by gripping [12].

When compared with the normal tendon, which is glistening white and has a firm fibroelastic texture, tendinopathy induces specific modifications: the tendon appears grey or Yellow-brown and is soft, friable, fragile and thin or oedematous [10,13].

Under light microscopy, tendinopathy shows: studies by [10], showed mainly fibroblastic tissue and vascular invasion that led him to describe the condition in 1999 as "angiofibroblastic tendinosis". Disrupted collagen with fibres thinner than normal and loss of the classical hierarchical structure [10,14]. Tenocytes located at the site of tendinopathy produce abnormal amounts of collagen III, commonly associated with wound healing [15]. Increased ground substance with high concentrations of glycosaminoglycans and proteoglycans [14,16]. This increased proteoglycan turnover is likely required to maintain normal tendon homeostasis, with perturbations in proteoglycan metabolism contributing to tissue dysfunction, resulting in chondrogenic differentiation [14,17]. Changes in cellularity with more prominent and numerous tenocytes with more rounded nuclei, and without a fine spindle shape [10,14,15]. An increase in apoptosis or programmed cell death possibly explained by oxidative stress and loss of cellular homeostatic tension [15,18]. In a recent study, Neovascularization, a process which could be associated with tendon repair or chronic pain which was confirmed on color and power Doppler Ultrasound [14,19-21]. Electron microscopy has demonstrated that some vascular buds do not possess a lumen; this granulation-like tissue has been termed angiofibroblastic hyperplasia [10].

Assessment tools

The assessment tools those are used in this study for lateral epicondylitis are patient rated tennis elbow evaluation questionnaire (pain score) to assess pain, hand dynamometer to measure grip strength and patient rated tennis elbow evaluation questionnaire (function score) for functional performance. Visual Analogue Scale (VAS), Goniometer, Disabilities of the Arm Shoulder and Hand (DASH), Liverpool Elbow Score (LES), Mayo Elbow Performance Score (MEPS), Roles and Maudsley Score, GRIPPIT are some other evaluating tools used for the pain, range of motion, disabilities and grip strength in chronic lateral epicondylitis patients.

Management

Conventional treatment for tennis elbow has focused primarily on the pain management by anti-inflammatory medication, ultrasound, phonophoresis, or iontophoresis. Various treatments have been attempted for tennis elbow including corticosteroid injection, drug therapies, laser, electrical stimulation, ergonomics, counterforce bracing, acupuncture, and splintage.

The conventional treatment intervention of tennis elbow is most often accompanied by exercise program which may include strengthening, flexibility, or endurance training exercises.

Stasinopoulos recommended the use of static stretching of the Extensor Carpi Radialis Brevis (ECRB) and eccentric strengthening exercises for the wrist extensors in treating lateral epicondylitis.

Surgical treatment is indicated in 5–10% of patients who did not improve from their symptoms with conservative treatment approach. There are several surgical procedures for the treatment of lateral epicondylitis. Fasciotomy of the extensor origin (Spencer and Herndon), Z-lengthening of its tendon at the wrist, excision of the tender area, ablation of the common extensor origin (Garden), and Hohmann's operation in which the extensor aponeurosis is surgically released from the lateral epicondyle.

Ultrasound therapy

Therapeutic ultrasound is one of the most widely and frequently used electrophysical agents. Ultrasound therapy is a modality that physiotherapists use daily in their clinical practice. Despite over 60 years of clinical use, the ultrasound is more effective in treating people with pain, musculoskeletal injuries, and soft tissue lesions. Ultrasound therapy (US) has been shown to be beneficial in accelerating fracture healing and has produced positive results in tendon repair [15,22,23]. There is also evidence to support the use of ultrasound therapy in the treatment of lateral epicondylitis [24-26].

The effectiveness of ultrasound is based on its parameters i.e., frequency, mode, intensity, duration of treatment, movement or not of the transducer head, coupling medium, treatment intervals and effective radiated area [27].

Fascial manipulation

Fascial manipulation was first known as 'neuro-connective manipulation of segmentary treatment'. The fascial manipulation is a manual therapy that requires a good working knowledge of anatomy and physiology.

In fascial manipulation the body is divided into 14 segments: head, neck, thorax, lumbar, pelvis, scapula, humerus, elbow, carpus, digits, hip, knee, ankle, and foot. Each body segment is served by six myofascial units consisting of monoarticular and biarticular uniarticular muscle fibers, their deep fascia and the articulation that they move in one direction on one plane.

Myofascial (mf) unit is after the motor unit, the structural basis of the locomotor system, which is composed of a group of motor units that move a body segment in a specific direction, with the fascia that connects these forces or vectors. In every myofascial unit there is a center of co-ordination (cc) that directs the muscular forces and a center of perception (cp) that perceives movement occurring at the joint. In upper limb there are six mf units for each major articulation; a total of thirty mf units in all. According with the new functional classification, the names of each myofascial unit is formed by the initials of the movement that it performs and from the initials of the body part it moves.

The minor but constant pressure during the manipulation creates heat by friction, modifying the consistency of the ground substance of fascia. After restoration of the fluidity to the ground substance of the fascia then the healing process is activated. During the manipulation the therapist "tunes in" to the patient's problem in such a way that the therapists hand is guided by the needs of the patient's body [28].

Tennis Elbow Strap/ band is a simple strap like tennis elbow aid which is wrapped around the forearm just below. It compresses the forearm and absorbs the force transmitted through the injured tendon and allows time to the tendon to recover by changing the angle of pull of the muscle.

Statement of the study

A study on the effect of fascial manipulation and conventional physiotherapy in the management of pain, grip strength and functional performance among chronic lateral epicondylitis patients.

Need of the study: The reason of the study is to introduce fascial manipulation as a useful intervention method to the chronic lateral epicondylitis and to find the effectiveness of the fascial manipulation in the management pain, grip strength and to improve the functional performance in subjects with chronic lateral epicondylitis.

Objectives of the study:

1. To find out the effectiveness of fascial manipulation in the management of pain, grip strength and functional performance among lateral epicondylitis subjects.
2. To find out the effectiveness of conventional physiotherapy in the management of pain, grip strength and functional performance among lateral epicondylitis subjects.
3. To compare the effectiveness of fascial manipulation and conventional physiotherapy in the management of pain, grip strength and functional performance among lateral epicondylitis subjects.

Operational definitions

Lateral Epicondylitis is a condition characterized by pain and tenderness at the lateral epicondyle of the humerus due to non-specific inflammation at the origin of the extensor muscles of the forearm [1].

Pain is defined as 'an unpleasant, sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage' [29].

Grip Strength is a measure of muscle strength evaluated with a dynamometer.

Functional Capacities is the ability to execute performance components of essential activities, including cognitive and social interactions, activities of daily living, mobility skills, and life roles.

Therapeutic ultrasound is a form of acoustic vibration propagated in the form of longitudinal compression waves at the frequency to high to be heard by the human ear (i.e., greater than 20 KHz). The waves generated by a piezo-elctical effect caused by the vibration of the crystal within the head of the probe [26].

Stretching is a general term used to describe any therapeutic maneuver designed to increase the extensibility of soft tissues, thereby improving flexibility and ROM by elongating structures that have adaptively shortened and have become hypo-mobile over time [30].

Tennis Elbow Strap is a simple strap like tennis elbow aid which is wrapped around the forearm just below the elbow.

Fascial Manipulation The fascial manipulation is a manual therapy that requires a good working knowledge of anatomy and physiology [28].

Materials and Methodology

Study setting

The study was conducted in R.V.S. College of Physiotherapy outpatient department.

Selection of subjects

20 subjects with lateral epicondylitis were selected randomly who fulfilled the inclusion and exclusion criteria and were divided into two groups:

Group A - Conventional physiotherapy.

Group B – Fascial manipulation.

Selection of variables

Dependent variables:

1. Pain.
2. Grip strength.
3. Functional performance/ability.

Independent variables:

1. Conventional physiotherapy – ultrasound therapy, stretching, forearm/tennis elbow band.
2. Fascial manipulation.

Measurement tools

Variables tools:

Pain: PRTEE (Pain score)

Grip strength: Hand dynamometer

Functional performance: PRTEE (Function score)

Study design

The study design was a comparative study.

Inclusion criteria:

1. Patient with lateral epicondylitis for more than 3 weeks.
2. Both sexes were included.
3. Age ranges between 20 and 40 years.
4. Unilateral tennis elbow patients were included.
5. Positive Cozen's and Mill's tests.

Exclusion criteria:

1. Patients undergone any other treatment such as steroid injections, surgery in the past 3 months.
2. Referred pain from cervical spine.
3. Recent fracture in the upper limb.
4. Recent dislocation in the upper limb.
5. Metal implants in the upper limb.
6. Osteoarthritis of the elbow joints.
7. Myositis ossificans.

8. Lateral ligament sprain.
9. Bursitis.
10. Any bone diseases such as osteoporosis, osteomyelitis etc.
11. Patients with any upper limb neurovascular diseases.

Orientation to the subjects: Before collection of data, all the subjects were explained about the study. The investigator had given a detailed orientation about the various test procedures such as hand dynamometer to measure grip strength and PRTEE questionnaire to measure pain and functional performance. The concern and full corporation of each participant was sought after complete explanation of the condition and demonstration of the procedure involved in the study.

Materials used

1. Treatment table.
2. Chair.
3. Pillows.
4. Ultrasound therapy equipment.
5. Aqua-sonic gel

Test administration

Pain and functional performance is assessed by patient rated tennis elbow evaluation (PRTEE) questionnaire: The PRTEE is a 15-item questionnaire designed to measure forearm pain and disability in patients with lateral epicondylitis. The patient was allowed to rate their levels of tennis elbow pain and disability from 0 to 10 in the questionnaire. The questionnaire consists of 2 subscales:

1) PAIN subscale (0=no pain, 10=worst imaginable)

Pain - 5 items

2) FUNCTION subscale (0=no difficulty, 10=unable to do)

Specific activities - 6 items

Usual activities - 4 items

Grip strength is assessed by hand dynamometer: A dynamometer can be used to quantitatively measure an individual's grip strength. These results can then be used to objectively measure bilateral strength deficits, identify, and document progress through the rehabilitation program

Position of the subject: Holding the dynamometer with the elbow flexed to 90° and the radio-ulnar joint in its neutral position.

Position of examiner: Standing in front of the athlete, viewing the dynamometer's gauge.

Evaluative procedure: The patient squeezes the dynamometer's handle with maximum force. The values are recorded and the test is repeated on the opposite hand. The average score of the three trials can be compared to the normative data with adequate recovery time allowed between bouts.

Positive test result: Injured non-dominant hand: More than 10% bilateral strength deficit when compared with the dominant hand. Injured dominant hand: More than 5% bilateral strength deficit when compared with the non-dominant hand.

Implications: Decreased grip strength.

Comment: Because of the wide range of variation in grip strength, the outcome of each of these tests is most meaningful when compared against a baseline measure [2].

Special test

Cozen's test: The patient's elbow is stabilized by the examiner's thumb, which rests on the patients' lateral epicondyle. The patient is then asked to make a fist, pronate the forearm, and radially deviate and extend the wrist while the examiner resists the motion. A positive sign is indicated by a sudden severe pain in the area epicondyle of the humerus. The epicondyle may be palpated to indicate the origin of the pain [31].

Mill's test: While palpating the lateral epicondyle, the examiner passively pronates the patients forearm, flexes the wrist fully, and extends the elbow. A positive test is indicated by pain over the lateral epicondyle of the humerus. This maneuver also puts stress on the radial nerve and in the presence of compression of the radial nerve, cause symptoms very similar to those of tennis elbow. Electrodiagnostic studies help differentiate the two condition [31].

Fascial manipulation

Assessment chart: The initial step to the fascial manipulation is data collection, which includes the patient's site of pain (SiPa) and any relative painful movement (PaMo).

Treatment procedure

Ultrasound therapy:

Patient position: Sitting in chair with the elbow flexed and forearm pronated and rest on the pillow placed over the patient's lap.

Therapist position: Sitting in front of the patient.

Parameters: A continuous ultrasound with 3 MHz frequency and 1.5 W/cm² intensity is given for 8 minutes. 1 session per day is given daily for 3 weeks.

Procedure: The ultrasound machine is turned on and all the parameters were selected. The coupling medium is then placed on the transducer head and the machine is started. The ultrasound is given to the treatment area by moving the transducer head in the circular motion.

Stretching

Patient position: Sitting with the elbow slightly flexed and forearm supinated and rest on the table.

Therapist position: The therapist sits on the treatment side to the patient.

Parameters: 10 stretches with 30 seconds hold and 5 seconds rest in between. One session per day is given daily after the application of ultrasound for 3 weeks.

Procedure: Patients forearm is stabilized by the therapist against the table with one hand and hand is clasped on its dorsal aspect with another hand. The forearm extensors were stretched gently by flexing the wrist and fingers and holds it in position for 30 seconds. Then 5 second rest is given by releasing the stretch to its starting position. This is repeated for 10 times.

Fascial manipulation

Procedure: First the treatment points i.e., centers of co-ordination and center of fusion were identified by movement verification and palpation verification respectively. The patient is positioned on the table and each myofascial units are manipulated with 2 sets of 20 quick back and forth movement is given with the knuckles. A minor but constant pressure is required during treatment of the cc(s) of fusion. The patients are questioned throughout the manipulation with regards to sensations of benefit, or relief of symptoms.

Myofascial unit of extra-cubitus

Site of pain or CP (center of perception): Pain is localized around radial head or near the lateral epicondyle.

Origin of dysfunction of CC (center of co-ordination): This form of "epicondylitis" is accentuated above all by rotation of the arm (supinator and brachioradialis) rather than by lifting a weight.

Movement verification: Ask patient to supinate forearm from the pronated position, against a manual resistance. At times, other movement verifications can be used but it is always important to highlight to identify the mf unit requiring treatment and to compare results afterwards.

Treatment: Patient prone with extended arm alongside; the therapist uses their knuckle placed laterally to the tendon of triceps, palpating in the fascia and lateral septum (origin of supinator and brachioradialis muscle) for the more densified point.

Myofascial unit of latero-cubitus

Site of pain or CP: Epicondylitis (tennis elbow) is the most frequent dysfunction of this mf unit.

Origin of dysfunction of CC: Excessive use of extensor carpi radialis leads to the formation of connective tissue adherences between the fasciae.

Movement verification: The patient may complain of pain when attempting to raise a bottle from the table; even though this movement is indicative, verification prior to treatment is necessary to quantify immediate post-treatment results.

Treatment: Patient prone, arm above head; the therapist manipulates the fascia with knuckle until local pain disappears. This point is particularly painful; therefore, pressure should be dosed according to the patient's tolerance.

Centre of fusion of retro-latero cubitus

Site of pain: Pain in forearm, pain in elbow, especially where the two lines of force converge.

Origin of dysfunction of CF (center of fusion): The dysfunction of any one cf can cause pain in numerous sites because they are related to several mf units and to retinacula that connect different areas.

Palpation verification: In the sulcus behind extensor carpi radialis brevis and longus muscles, and over the retinaculum formed by the transverse and oblique fibers of the posterior antebrachial fascia (Figure 1).

Treatment: Patient prone with extended arm alongside; in cases of epicondylitis, this cf is often manipulated in association with the cc(s) of latero-cubitus and retro-cubitus.

Figure 1: Centre of fusion of retro-latero cubitus.

The 20 chronic lateral epicondylitis subjects were divided into 2 groups:

1. Group –A received conventional physiotherapy
2. Group – B received fascial manipulation

Both the experimental groups were given treatment for continuously 3 weeks. Before and after the completion of 3 weeks treatment intervention, grip strength, pain and disability was evaluated by grip dynamometer and patient rated tennis elbow questionnire and recorded.

Statistical techniques

The collected data were analyzed by paired 't' test to find out significance difference between pre and post-test values of experimental groups and further unpaired 't' test was applied to find out the differences between groups.

Data Analysis and Results

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	4.9	0.65	0.41	5.0*
Post-test	5.55			

Table 1: The table shows mean value, mean difference, standard deviation and paired 't' value between pre and post test scores of grip strength among Group A. *0.005 level of significance.

In Group A for grip strength the calculated paired 't' value is 5.0 and the table 't' value is 3.25 at 0.005 level of significance (Table 1). Since the calculated 't' value is greater than the table 't' value there is significant difference in grip strength following Conventional Physiotherapy (Figure 2).

Figure 2: Shows pre-test, post-test and mean difference of grip strength among Group A.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	5.6	3	0.78	12.15*
Post-test	8.6			

Table 2: The table shows mean value, mean difference, standard deviation and paired 't' value between pre and post test scores of grip strength among Group B.*0.005 level of significance.

In Group B for grip strength the calculated paired 't' value is 12.15 and the table 't' value is 3.25 at 0.005 level of significance. Since the calculated 't' value is greater than the table 't' value there is significant difference in grip strength following Fascial Manipulation (Figure 3).

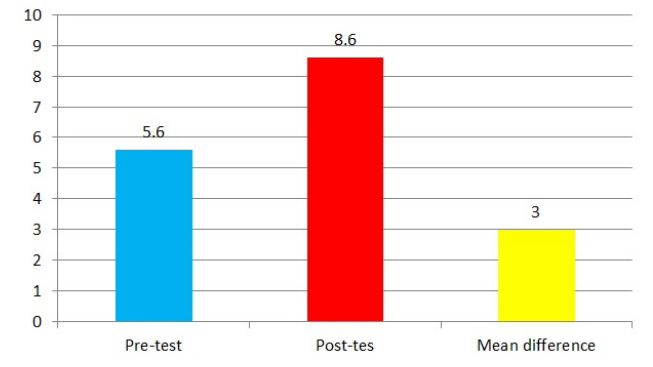

Figure 3: Shows pre-test, post-test and mean difference in grip strength among Group B.

S.No	Groups	Improvement (Mean)	Improvement (Mean Difference)	Standard deviation	Unpaired 't' test
1	Group A	0.65	2.35	0.62	3.44*
2	Group B	3			

Table 3: The table shows mean value, mean difference, standard deviation, and unpaired 't' value of grip strength between Group A and Group B. *0.005 level of significance.

In Group A and B for grip strength the calculated unpaired 't' value is 3.44 and the table 't' value is 2.878 at 0.005 level of significance. Since the calculated 't' value is greater than the table 't' value there is significant difference between Conventional Physiotherapy and Fascial Manipulation in improving grip strength among chronic lateral epicondylitis subjects (Figure 4).

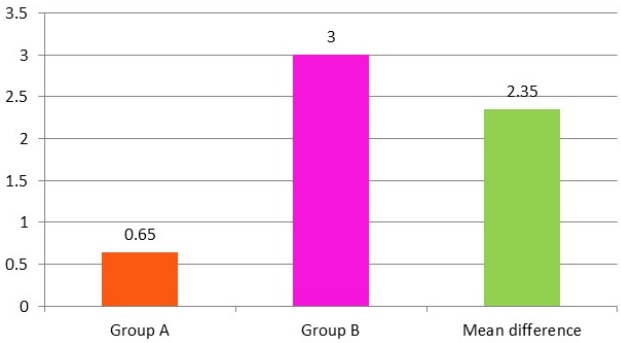

Figure 4: Shows mean values and mean difference in grip strength between group A and group B.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	33.3	5	3.1	5.1*
Post-test	28.3			

Table 4: The table shows mean value, mean difference, standard deviation and paired 't' value between pre and post test scores of pain among Group A. *0.005 level of significance.

In group A for pain the calculated paired 't' value is 5.1 and the table 't' value is 3.25 at 0.005 level of significance. Since the calculated 't' value is greater than the table 't' value there is significant difference in pain following Conventional Physiotherapy (Figure 5).

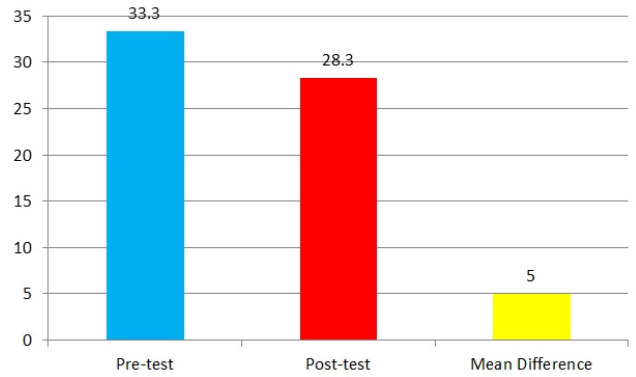

Figure 5: Shows pre-test, post-test and mean difference of pain score among group A.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	36.8	8.3	1.34	19.55*
Post-test	28.5			

Table 5: The above table shows mean value, mean difference, standard deviation and paired 't' value between pre and post test scores of pain among Group B. *0.005 level of significance.

In Group B for pain the calculated paired 't' value is 19.55 and the table 't' value is 3.25 at 0.005 level of significance. Since the calculated 't' value is greater than the table 't' value there is significant difference in pain following Fascial Manipulation (Figure 6).

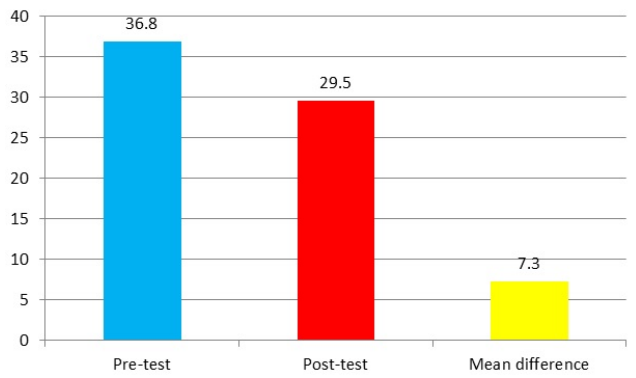

Figure 6: Shows pre-test, post-test and mean difference of pain score among group B.

In Group A and B for pain the calculated unpaired 't' value is 2.7 and the table value is 2.878 at 0.005 level of significance. Since the calculated 't' value is greater than the table 't' value there is significant difference between Conventional Physiotherapy and Fascial Manipulation in reducing pain in chronic lateral epicondylitis subjects (Figure 7).

S.No	Groups	Improvement (Mean)	Improvement (Mean Difference)	Standard deviation	Unpaired 't' test
1	Group A	5	3.3	1.67	2.7*
2	Group B	8.3			

Table 6: The table shows mean value, mean difference, standard deviation, and unpaired 't' value of pain between group A and group B. *0.005 level of significance.

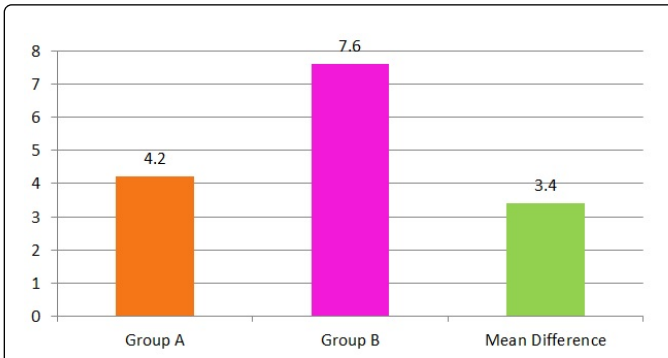

Figure 7: Shows mean values and mean difference in pain score between group A and group B.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	63.9	4.2	1.95	6.8*
Post-test	59.7			

Table 7: The table shows mean value, mean difference, standard deviation and paired 't' value between pre and post test scores of disability among group A. *0.005 level of significance.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	65	7.6	1.38	17.39*
Post-test	57.4			

Table 8: The table shows mean value, mean difference, standard deviation and paired 't' value between pre and post test scores of disability among group B. *0.005 level of significance.

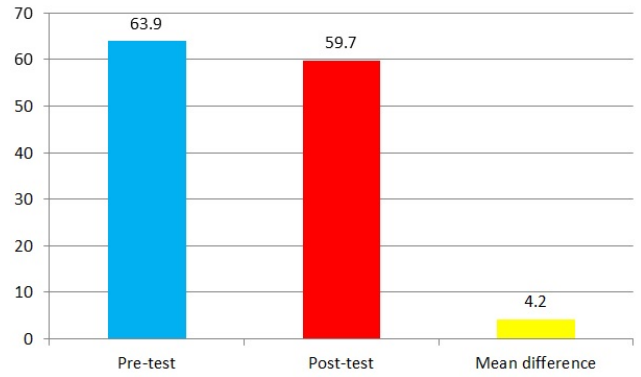

Figure 8: Shows pre-test, post-test and mean difference in function score among group A.

In Group A for disability the calculated paired 't' value is 6.8 at 0.005 level of significance and the table 't' value is 3.25 at 0.005 level of significance. Since the calculated 't' value is more than 't' table value above study shows that there is significant difference in pain following conventional physiotherapy (Figure 8).

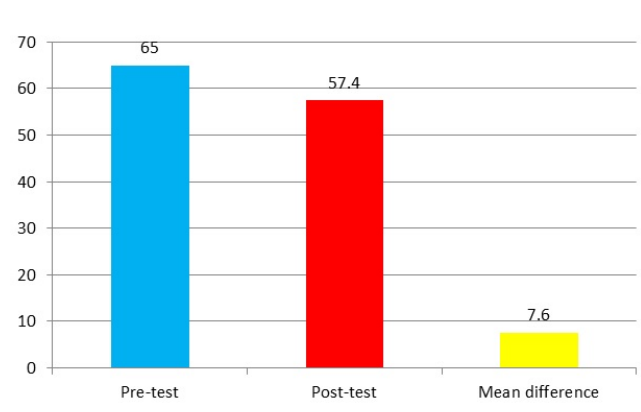

Figure 9: Shows pre-test, post-test and mean difference of function score among group B.

S.No	Groups	Improvement (Mean)	Improvement (Mean Difference)	Standard deviation	Unpaired 't' test
1	Group A	4.2	3.4	2.23	2.47*
2	Group B	7.6			

Table 9: The table shows mean value, mean difference, standard deviation, and unpaired 't' value of disability between group A and group B. *0.005 level of significance.

In Group B for disability the calculated paired 't' value is 17.39 at 0.005 level of significance and the table 't' value is 3.25 at 0.005 level of significance. Since the calculated 't' value is more than 't' table value above study shows that there is significant difference in pain following Fascial manipulation (Figure 9).

In Group A and B for disability the calculated unpaired 't' value is 2.47 at 0.005 level of significance and the unpaired table 't' value is 2.878 at 0.005 level of significance. Since the calculated 't' value is more than 't' table value above study shows that there is significant difference between Conventional physiotherapy and Fascial manipulation among chronic lateral epicondylitis subjects (Figure 10).

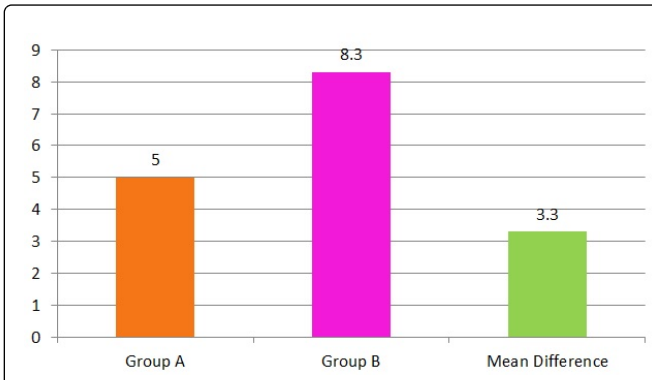

Figure 10: Shows mean values and mean difference of function score between group A and group B.

Results

20 clinically diagnosed chronic lateral epicondylitis subjects were divided into two groups.

Group A was treated with Conventional Physiotherapy.

Group B was treated with Fascial Manipulation.

Analysis of dependent variable grip strength in group A

The calculated paired 't' value is 5.0 and the table 't' value is 3.25 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference in grip strength following Conventional Physiotherapy (Table 1).

Analysis of dependent variable grip strength in group B

The calculated paired 't' value is 12.15 and the table 't' value is 3.25 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference in grip strength following Fascial Manipulation (Table 2).

Analysis of grip strength between group A and group B

The calculated unpaired 't' value is 3.44 and the table 't' value is 2.878 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference between Conventional Physiotherapy and Fascial Manipulation in improving grip strength among lateral epicondylitis subjects (Table 3).

Analysis of dependent variable pain in group A

The calculated paired 't' value is 5.1 and the table 't' value is 3.25 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference in pain following Conventional Physiotherapy (Table 4).

Analysis of dependent variable pain in group B

The calculated paired 't' value is 19.55 and the table 't' value is 3.25 at 0.005 level of significance. Hence the calculated 't' value is greater

than the table 't' value there is significant difference in pain following Fascial Manipulation (Table 5).

Dependent variable pain between group A and group B

The calculated unpaired 't' value is 2.7 and the table value 't' is 2.878 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference between Conventional Physiotherapy and Fascial Manipulation in reducing pain among lateral epicondylitis subjects (Table 6).

Analysis of dependent disability in group A

The calculated paired 't' value is 6.8 at 0.005 level of significance and the table 't' value is 3.25 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference in disability following Conventional physiotherapy (Table 7).

Analysis of dependent disability in group B

The calculated paired 't' value is 17.39 at 0.005 level of significance and the table 't' value is 3.25 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference in disability following Fascial manipulation (Table 8).

Analysis of disability between group A and group B

The calculated unpaired 't' value is 2.47 at 0.005 level of significance and the unpaired table 't' value is 2.878 at 0.005 level of significance. Hence the calculated 't' value is greater than the table 't' value there is significant difference between Conventional physiotherapy and Fascial manipulation among chronic lateral epicondylitis subjects (Table 9).

When comparing the mean values of Group A and B, Group B subjects treated with Fascial manipulation shows more difference than Group A. Hence it is concluded that Fascial manipulation is more effective in the management of grip strength, pain and disability among chronic lateral epicondylitis subjects.

Discussion

Lateral epicondylitis is a chronic overuse injury, characterized by pain and tenderness over the lateral epicondyle of humerus. Overuse is encountered when the body's physiological ability to heal lags behind the micro-trauma occurring with the repetitive action. The main clinical presentation and the chief complaints in tennis elbow are decreased grip strength, decreased functional activities, and increased pain, which may have significant impact on activities of daily living.

This study is to find out the effectiveness of Conventional Physiotherapy and Fascial Manipulation in improvement of grip strength and reduction of pain and disability on patients with chronic lateral epicondylitis.

Group A receives Conventional Physiotherapy daily for 3 weeks. The post treatment values of group A shows improvement of grip strength and reduction of pain and disability on patients with chronic lateral epicondylitis.

Effectiveness of therapeutic ultrasound in soft tissue lesion and they found that the ultrasound enhances recovery in most of the lateral epicondylitis subjects [24,32].

stretching is more effective in the management of chronic lateral epicondylitis in his randomized control trial [33].

a study on "functional treatment of tennis elbow: a comparative study between an elbow support and physical therapy". In their study they found that the orthotic devices such as tennis elbow straps and sleeves are effective in the treatment of the tennis elbow [34].

This is attributed to the effect of Conventional Physiotherapy in reducing pain and improving functional performance and grip strength.

Group B received Fascial Manipulation once in a weak for 3 weeks. Post treatment values of group B shows reduction in improvement of grip strength and reduction of pain and disability.

musculoskeletal dysfunction is considered to occur when muscular fascia no longer slides, stretches, and adapts correctly and fibrosis localises in these intersecting points of tension, known as center of co-ordination and center of fusion [35].

Manipulation on the densified center of co-ordination for a sufficient amount of time for the friction against fascia produces heat, which modifies the consistency of the ground substance from thick form to fluid form and allows fascial layers to glide freely. This in-turn relieves the stretching of the free nerve endings within the fascia and thus relieves the pain [28].

When comparing two groups, there is significant difference in improvement of grip strength and reduction of pain and disability. Group B shows more improvement in grip strength and reduction of pain and disability than Group A.

Fascial Manipulation are claimed to bring about improvement in grip strength, pain and disability immediately following the treatment. Fascial Manipulation treatment technique for chronic lateral epicondylitis has been described in reviews and non-peer-reviewed literatures.

Conclusion

The study was conducted to found the effectiveness of Conventional Physiotherapy and Fascial Manipulation among chronic lateral epicondylitis subjects.

20 patients with tennis elbow was included in this study and divided into two groups, Group A and Group B. Each consist of 10 subjects.

Group A was treated with Conventional Physiotherapy, Group B was treated with Fascial Manipulation. Grip Strength, pain and disability was assessed before and after the treatment by hand dynamometer and patient rated tennis elbow evaluation questionnaire.

From the statistical results it can be concluded that there is increase in grip strength and reduction of pain and disability in both the groups. When comparing the groups, it was found that Fascial Manipulation is more effective than the Conventional Physiotherapy.

Limitations

1. The study was conducted with limited number of subjects.
2. The study did not include a follow up programme.
3. This was a time bound study.
4. The fascial manipulation concept is a system that relies on the fascial manipulation assessment, but here the fixed protocol is used, better results are anticipated in tailor made fascial manipulation treatment sequence rather than fixed protocol.

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