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Efficacy of Phonophoresis, flexibility and endurance training along with wrist manipulation in Lateral epicondylitis: A Randomized Control Trial

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Abstract

Aim: The aim of the study was to find out the efficacy of wrist manipulation and phonophoresis, flexibility and endurance training on pain and grip strength in lateral epicondylitis patients. *Methods:* A total of 30 patients having lateral epicondylitis, included both male and female, age ranges from 25 to 50 years were selected as subjects and they were further divided into 2 groups. Each group comprising of 15 subjects (male=7; female=8). Group A (Control) received phonophoresis, flexibility and endurance training and Group B (Experimental) received wrist manipulation along with phonophoresis, flexibility and endurance training for 3 days per week. For both groups total duration of treatment was for 4 weeks. Numeric Pain Rating Scale and Grip Strength were used as pre and post outcome measures. *Results:* Result of the study suggests that there was improvement in the mean value of Numeric Pain Rating Scale and Grip Strength after treatment in both groups. But the treatment was statically more significant in Experimental group than Control group. *Conclusion:* It was concluded that the patients of lateral epicondylitis show more improvement when receiving wrist manipulation along with phonophoresis flexibility and endurance training.

Keywords: Lateral Epicondylitis; Wrist Manipulation; Phonophoresis; Flexibility; Endurance Training.

Introduction

Lateral epicondylitis, more commonly known as “tennis elbow”, is an overuse injury of the wrist extensor tendon that attach along the outer side of the elbow which leads to inflammation and ultimately degenerative changes such as tendinosis and micro-teared fibrous tissue at these points. Lateral epicondylitis occurs 7 to 20 times more frequently than medial epicondylitis [1].

Lateral epicondylitis is one of the most common lesions of arm. This is an injury that is difficult to treat, is prone to recurrent bouts and may lasts for several weeks or months. The average duration of a typical episode of tennis elbow is between 6 months to 2 years [2].

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It is a work related or sport related pain disorder with microscopic and macroscopic tears in Extensor Carpi Radialis Brevis (ECRB), usually caused by excessive quick, monotonous repetitive eccentric contraction and gripping exercises of wrist [3, 4]. The dominant arm is commonly affected with the prevalence of 1-3% in general population, but this increases to 19% at 30-60 years of age [5]. The condition is not differing between men and women [6]. There has been a well defined clinical presentation, the main complaints being pain and decreased grip strength. Diagnosis is simple and can be confirmed by the tests that reproduce pain such as palpation overuse lateral epicondylitis, resisted wrist extension, resisted middle finger tension and passive wrist flexion [7].

According to Shirley Kushner (1999), repeated wrist extension and rotation may produce “repeated minor trauma” and strains in the common wrist extensor origin at its attachment into the lateral epicondyle. The tissue attempts repair, but continued muscle contraction pulls the surfaces apart leading to multiple, repetitive tear. It has been suggested that a periostitis may occur at the tenoperiosteal junction. Excessive granulation tissue, with free nerve ending, has been identified in the subtendinous space. The

pathological changes in the tendons have been termed "fibroadenomatous hyperplasia" which describes a tissue of poor quality, slow to heal and painful [8].

Nirschl (1973) referred to dull greyish oedematous tissue replacing the normal glistening tendon. These tissues often encompassed the entire origin of the ECRB tendon to the level of the radial head. He found pathological changes on the inner side of the extensor aponeurosis in approximately 35% of cases. In 20% calcific exostosis of the lateral epicondyle was present [9].

Leonardo Viola (1998) described histopathologic examination of samples obtained from patients with chronic refractory lateral epicondylitis showed vascular proliferation and focal hyaline degeneration which is consistent with a degenerative rather than an inflammatory process. Histological examination of the bone- tendon junction in patient with tennis elbow has shown evidence of a repair response of variable degree, the most frequent feature being mucopolysaccharide infiltration and bone formation [10].

Traditional treatment program for people with lateral epicondylitis have focused primarily on the pain control by ultrasound, anti-inflammatory medication, iontophoresis or phonophoresis followed by rehabilitation program which ranges from flexibility to strengthening and endurance training. Numerous treatments have been, tried for lateral epicondylitis including drug therapies, corticosteroid injection, electrical stimulation, laser, accupuncture, counterforce bracing, ergonomics. Surgical treatment is needed in 5- 10% of patients who do not respond after many months of conservative treatment [11].

Struijis et al conducted a study on manipulation of wrist for management of lateral epicondylitis. They concluded that manipulation of wrist is capable of relieving symptoms in lateral epicondylitis patients [12]. Manipulation has been frequently used for the management of back and neck complaints and is thought to be free motion segment that have undergone disproportionate displacement or are felt to be hypo-mobile and causes muscle relaxation. These mechanisms are thought to be associated with distribution of abnormal stresses within the joint, resulting in pain, restriction of motion and potential inflammation [13-19]. The purpose of the present study was to evaluate the efficacy of wrist manipulation technique along with phonophoresis and graduated exercise therapy regimen in patients of lateral epicondylitis.

Methods

The sample consisted of 30 patients, both male and female. Their ages ranged from 25 to 50 years. All the patients received a written explanation of the trial before entry into the study and they were given informed consent to be signed for participation. Then the subjects were randomly allocated equally into Group A and Group B respectively. All 30 subjects met the following inclusion criteria -Patient's with age of 25-50 years, tennis elbow patients with positive Cozen's test, signs and symptoms of tennis elbow more than 6 weeks, pain over the lateral side of the elbow that provoked the lateral epicondyle region and gripping tasks. Pain had to be experienced over the lateral epicondyle during at least one of the following: resisted static contraction of the wrist extensors or ECRB muscle or stretching of the forearm extensor muscles.

The subjects with the following criteria were excluded from the study -Definite decrease in pain for last two weeks, severe neck and shoulder problem which can affect the diagnosis and results, patient received any steroid injection within the last 30 days in elbow, patient with patho neurodynamics around elbow, bilateral conditions, any history of rheumatoid arthiritis, systemic or neurological disease.

Procedure

30 subjects of lateral epicondylitis were selected according to inclusion criteria and allocated 15 each into Group A and Group B. All the patients in both the groups were pre-tested by Numeric pain rating scale and hand held dynamometer.

Group A: The subjects of Group A received phonophoresis during which pulsed ultrasonic therapy was given at the tenoperiosteal junction of the extensor carpi radialis brevis at 20% duty cycle, frequency 3MHz and an intensity of 1.2 W / cm^2 for 5 min. Diclofenac Sodium based gel was used as coupling medium. The protocol was followed 3 times a week for 4 weeks.

Group B: The subjects of Group B received Wrist manipulation technique in addition to phonophoresis. During manipulation of wrist each subject rested the forearm of his or her affected side on a table with the palmer side of head facing down. The therapist sat at right angle to the subject's affected side and gripped the subjects's scaphoid bone between his thumb and index finger reinforced by

placing the thumb and index finger of the other hand. The therapist then extended the subject's wrist dorsally at the same time the scaphoid bone was manipulated ventrally. This part of the maneuver was repeated approximately 15 times. This procedure was repeated about 2 times, alternated by either forced passive extension of the wrist or extension against resistance. The duration of intervention session was 15 to 20 minutes No restrictions in use of the arm were imposed. Both the groups also received flexibility and endurance training. The protocol was followed 3 times a week for 4 weeks.

Results

The statistical analysis for two groups were performed to find out the mean, standard deviation, p value, t value and the statistical significance between NPRS, grip strength in both groups having lateral epicondylitis. There was no significant difference between the groups in terms of age, BM and baseline measurements (NPRS, Grip Strength).

Table 1: Comparison of pre and post NPRS within Group A and Group B

Group		Mean	S.D.	t value	p<0.05
Group A	Pre NPRS	8.20	0.775	20.579	Significant
	Post NPRS	6.00	0.845		
Group B	Pre NPRS	7.93	0.961	31.588	Significant
	Post NPRS	4.20	0.826		

Table 2: Comparison of pre and post grip strength within Group A and Group B

Groups		Mean	S.D.	t value	p<0.05
Group A	Pre Grip Strength	15.13	0.990	14.491	Significant
	Post Grip Strength	17.13	1.125		
Group B	Pre Grip Strength	15.00	1.195	27.495	Significant
	Post Grip Strength	19.80	1.082		

Paired sample t-test has been used to compare pre and post NPRS within group A and group B. The table value (2.14) is less than the calculated t- value. Therefore, the results revealed significant difference between pre NPRS and post NPRS measurements at p<0.05.

Table 3: Comparison of Post NPRS between Group A and Group B

Post NRPS	Mean	S.D.	t value	p<0.05
Group A	6.00	0.845	5.775	Significant
Group B	4.20	0.862		

Paired sample t-test has been used to compare the mean for strength in Group A and group B. The table value (2.14) is less than the calculated t- value. Therefore, the results revealed significant difference between pre strength and post strength measurements at p<0.05.

Table 4: Comparison of Post Grip Strength between Group A and Group B

Post Grip Strength	Mean	S.D.	t value	p<0.05
Group A	17.13	1.125	6.614	Significant
Group B	19.80	1.082		

Unpaired sample t-test has been used to compare the mean of post NPRS between group A and group B. The mean and standard deviation for NPRS scores for Group A after 3 weeks was 6.00 ± 0.845 and for Group B was 4.20 ± 0.862. The table value (2.14) is less than the calculated t- value (5.775). Therefore, the results revealed significant difference between post NPRS measurements in both groups at p<0.05

Unpaired sample t-test has been used to compare the mean of post grip strength between group A and group B. The mean and standard deviation for grip strength scores for Group A after 3 weeks was 17.13 ± 1.125 and for Group B was 19.80 ± 1.082. The table value (2.14) is less than the calculated t value (6.614). Therefore, the results revealed significant difference between post NPRS measurements in both groups at p<0.05.

Discussion

The findings of this study indicated that subjects in both the groups had significant decrease in pain & increase in grip strength. However, out of the two groups, the group receiving manipulation of wrist had more improvement in both pain intensity & grip strength.

The reported success of manipulation of wrist in the present study is bolstered by the previously published trials. Struiji's et al compared the effectiveness of manipulation of wrist, ultrasound, friction massage and muscle stretching & strengthening exercises in managing lateral epicondylitis. They concluded that manipulation of the wrist produced the more effective results in improving outcomes [12]. Manchanda & Grover compared the effectiveness of movement with mobilization and manipulation of wrist in the lateral epicondylitis management. They concluded both are equally effective in its management.

The clinical efficacy of manipulation therapy has been demonstrated in randomized clinical trials which report benefits in term of pain relief and rapid restoration of function. This may be due to direct effects on articular structures, modulation of nociceptive afferent transmission within the CNS and psychological influences [20].

Recent evidence has indicated that the central nervous system may play a role in pain inhibition following joint manipulation. Vicenzino et al investigated the effects of a non-thrust cervical lateral glide in patients with chronic lateral epicondylalgia. This technique was shown to result in increased pain-free grip, pressure pain threshold, as well as a sympathetic nervous system response as indicated with measures of skin conductance and blood flux [21]. More recently, Paungmali et al found similar results with improved pain-free grip, pressure pain threshold, and sympatho-excitation following mobilization with movement directed at the elbow 22.

Clinical Implication

The result of this study may help the physiotherapists to use more effective intervention, in the form of manipulation of wrist along with conventional physiotherapy for reducing pain and improving grip strength in the clinical settings for lateral epicondyiltis patients.

Future Research

Whether the effectiveness of the interventions sustains for longer periods or not, is not known yet. Future randomized trials are required to determine the long term effects of the interventions.

Conclusion

Therefore the study concluded that wrist manipulation technique and conventional physiotherapy program including phonophoresis, flexibility and endurance training were effective in reducing pain and improving grip strength in lateral epicondylitis patients after the treatment sessions. But benefits of Manipulation of Wrist along with conventional physiotherapy program as compared to conventional physiotherapy alone in 4 week periods were substantial.

Conflict of interest: Nil

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