

COMPARISON OF CYRIAX PHYSIOTHERAPY AND TAPING technique IN SUBJECTS WITH TENNIS ELBOW: A RANDOMIZED CLINICAL TRIAL

STUDIUL COMPARATIV PRIVIND TERAPIA CYRIAX ȘI TEHNICA TAPING LA SUBIECȚII CU COTUL TENISMENULUI: STUDIUL CLINIC RANDOMIZAT

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Key words: tennis elbow, grip strength, cyriax physiotherapy, taping, DTFM, VAS

Cuvinte cheie: cotul tenismenului, forța prehensiunii, terapia Cyriax, taping, DTFM, scala analogă vizuală

Abstract. Tennis elbow or lateral epicondylitis is a commonly encountered musculoskeletal complaint, which is characterized by lateral elbow pain often associated with gripping task. For management of this problem, elbow tape and Cyriax physiotherapy have been incorporated into the treatment. **Objective.** To study the comparative effectiveness of Cyriax physiotherapy and Taping in cases of tennis elbow in terms of pain, grip strength and functional activities. **Methods.** 40 subjects with tennis elbow over the duration of 3 months, between the age 20 to 50 years were taken up for the study. Baseline pain, grip strength and functional evaluation were recorded pre treatment (1st day) and post treatment (7th day). Hand dynamometer was used to measure the grip strength, VAS to assess pain and patient rated forearm evaluation questionnaire for lateral epicondylitis was used for functional evaluation. Comparison of the pre and post values was done following the treatment. **Results.** Within group analysis showed that there was statistically significant improvement in both the groups in the pain, grip strength and functional performance. ($p < 0.0001$) whereas between group analysis revealed that Group A showed significant improvement compared to Group B in terms of pain and functional performance. **Conclusion.** This clinical trial provided evidence to support the use of cyriax physiotherapy and taping techniques in relieving pain, improving grip strength and improve functional performance in subjects with tennis elbow. Results supported that Cyriax physiotherapy was more effective than taping technique in reducing pain and functional performance.

Rezumat. Cotul tenismenului sau epicondilita laterală este o afecțiune musculoscheletală des întâlnită, caracterizată prin durere în porțiunea laterală a cotului, asociată cu reducerea forței prehensiunii. În tratamentul kinetic s-au adăugat terapia Cyriax și kinesioteiparea. **Obiectiv.** Scopul lucrării este de a studia comparativ eficiența terapiei Cyriax și a teipingului, în cazul cotului tenismenului, referitor la durere, forța prehensiunii și a activităților funcționale. **Metode.** 40 subiecți cu cotul tenismenului de mai bine de 3 luni, cu vârste între 20 și 50 ani au participat la studiu. Durerea inițială, forța prehensiunii și evaluarea funcțională s-au efectuat înainte (ziua 1) și după tratament (ziua 7). S-a folosit dinamometrul pentru evaluarea forței prehensiunii, SAV pentru durere și un chestionar de evaluare funcțională pentru funcția cotului. Compararea rezultatelor pre și post intervenție s-a realizat la sfârșitul studiului. **Rezultate.** Analiza intragrup demonstrează îmbunătățiri semnificative statistic la ambele grupe de subiecți, privind durerea, forța prehensiunii și performanța funcțională ($p < 0.0001$), pe când analiza intergrup demonstrează că grupul A a prezentat îmbunătățiri semnificative față de grupul B în ceea ce privește durerea și performanța funcțională. **Concluzii.** Acest studiu oferă informații care sprijină ideea folosirii terapiei Cyriax și a teipingului în reducerea durerii, creșterea forței prehensiunii și a performanței funcționale, la pacienții cu epicondilită laterală. Rezultatele demonstrează că terapia Cyriax a fost mai eficientă decât teipingul în reducerea durerii și a performanței funcționale.

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Introduction

Pain over the lateral epicondyle, which is exacerbated by work or recreational activities that involves gripping action of the hand, such as holding tools, shaking hands, and lifting a kettle, usually signals that the individual has a condition termed lateral epicondylalgia, epicondylitis, or what is more commonly known as tennis elbow. [1] This condition was first named by Morris (1882) who called it lawn tennis arm. [2]

Tennis elbow is a syndrome characterized by an insidious onset of elbow pain brought on by wrist extension with pronation or supination and aggravated by gripping. [3]

Tennis elbow affects 1-3% of the population, only 5% of all patients seen are recreational tennis players. [4] Although the syndrome has been identified in patients ranging from 20 to 60 years old, it predominantly occurs in the fourth and fifth decades. Male and female prevalence rates are reportedly equal. Seventy-five percent of patients are symptomatic in their dominant arms. [5,6,7]

The specific muscle most often implicated clinically and surgically is the extensor carpi radialis brevis with occasional involvement of the extensor digitorum communis, extensor carpi radialis longus, and extensor carpi ulnaris. The possible reason for this more frequent involvement of the extensor carpi radialis brevis is its location as one of the most laterally situated muscles on the lateral epicondyle with slips taking origin from the radial collateral ligament. The extensor carpi radialis brevis is intimately attached to the joint capsule, which is continuous with the radial collateral ligament and because of this proximity adhesions are more likely. [4] Cyriax advocated the use of deep transverse friction massage in combination with Mill's manipulation in treating tennis elbow. [8,5]

Deep transverse friction (DTF) is also known as deep friction massage is a specific type of connective tissue massage applied precisely to the soft tissue structures such as tendons. It was developed in an empirical way by Cyriax and is currently used extensively in rehabilitation practice. [5]

Mill's manipulation is the most common manipulative technique used by physiotherapists. Cyriax states that it should be performed immediately after the DTF is provided that the patient has a full range of passive elbow extension. If passive elbow extension is limited, the manipulative thrust will affect the elbow joint, rather than the common extensor tendon, possibly causing traumatic arthritis. It is defined as a passive movement performed at the end of range—that is, once all the slack has been taken up—and is a minimal amplitude, high velocity thrust. The aim of this technique, again without properly designed controlled studies to prove this, is to elongate the scar tissue by rupturing adhesions within the teno-osseous junction, making the area mobile and pain free. [5]

The application of tape to injured soft tissue and joints provides support and protection for these structures and minimizes pain and swelling in the acute stage. Tape should reinforce the normal supportive structures in their relaxed position and protect the injured tissue from further damage. McConnell has proposed the application of tape as a means of alleviating pain, improving muscle function, and restoring functional movement patterns. [1]

Cyriax physiotherapy is the technique where DTF and Mill's is used, this technique has been compared with Ultrasound, phonophoresis, Laser, but very few studies have compared between the technique i.e. Cyriax and taping. However, the present study has been undertaken in order to compare the effectiveness of Cyriax and taping to improve pain, grip strength and to see functional activities following treatment in cases of tennis elbow.

Method

A randomized clinical trial was conducted at the physiotherapy OPD of KLE Dr Prabhakar Kore Hospital & MRC, Belgaum Karnataka

Participants were referred by public and private medical practitioners for treatment of chronic tennis elbow. 40 subjects were randomly allocated into two groups i.e. Group A and Group B, where Group A had 20 participants and Group B with 20, Group A received Cyriax

physiotherapy, ultrasound and exercisers, group B received taping, ultrasound and exercises. The intervention was provided at 7 visits occurring over 1 week. Measurements was recorded once pre treatment i.e 1st day and once post treatment i.e 7th day.

Participants

People entering the trial had to meet the following inclusion criteria, both male and female between 20 to 50 years of age, pain on the lateral side of the elbow, tenderness over the forearm extensor origin, pain with 1 of the following tests: Mill's test, Cozens test, all subjects with symptoms for duration of more than 3 months. Exclusion criteria were if they had a previous operation on the elbow, elbow fractures, if full extension is not obtained at elbow, hypermobile joints, sensitive skin, allergies to adhesive tape and a recent steroid injection (3 months).

Intervention

The purpose of this study was explained and a written informed consent was obtained from all the participants. The subjects were screened based on the inclusion and exclusion criteria. Demographic data was collected along with initial assessment of VAS, grip strength, Patient rated forearm evaluation questionnaire for lateral epicondylitis. After initial assessment they were allocated into 2 groups i.e. Group A and Group B.

Both groups received the selected treatment for 7 sessions at 1 session per day.

Ultrasound: Subject in both the group received ultrasound and exercises before performing deep friction massage and manipulation and applying tape. Subject were seated on the chair with shoulder in neutral position, elbow in right angle and fully supported. The ultrasound was administered for 7 minutes in pulsed mode with ultrasound gel¹⁷, over the later epicondyle or area of tenderness.

Exercises: Each exercises were repeated 10 times in 3 series,

Clenching fist strongly, resisted wrist extension, resisted wrist flexion, wrist rotation with a stick, and end range stretching at least 30 sec to flexion and extension.

Following this, subjects in group A received Cyriax and subject in group B received Taping.

Cyriax , physiotherapy: Position of the patient – the patient sits with elbow bent to right angle and full supination. The physiotherapist places one hand at the patient's wrist and holds the forearm in supination.

The pad of the index finger, middle finger or thumb is placed directly over the involved site, the remaining fingers should be used to provide further stabilization of the therapists hand, no lubrication is used, the patient's skin must move along with the therapists fingers.

Beginning with light pressure, the therapist moves the skin over the site of the lesion back and forth in a direction perpendicular to the normal orientation of the fibers of the involved part.

The massage is given for 2 minutes then stopped for 1 to 2 minutes then repeated of 2 minutes, working up to 12 to 15 minutes, followed by the manipulation.

Manipulation

Position of patient- patient sits upright with the arm abducted to the horizontal and so far medially rotated that the olecranon faces upward. The physiotherapist stand behind the patient, the patients forearm must be fully pronated and the wrist flexed.

The physiotherapist now places his left hand on the olecranon, thus extending the elbow, while the tension is strongly maintained; he suddenly forces full extension at the elbow with his left hand with a smart jerk.

This is carried out once each visit, immediately after friction.

Taping- The patient is in supine lying with the elbow in a slightly flexed position.

The diamond Taping technique consisted of 4 pieces of non-elastic, adhesive tape.

These will be applied on the skin distally to proximally in a diamond shape, while simultaneously applying a tractional force on the soft tissues towards the lateral epicondyle and perpendicular to the line of the tape. The strips overlapped at their ends and were secured with an additional 4 tape strips.

Outcome measures

Pain intensity:

By Visual analogue scale – A scale of 10 cm to evaluate intensity of pain where 0 represents no pain and 10 represent unbearable pain.

Grip strength:

Grip strength will be measured by hand held dynamometer.

Physical Function outcome:

Patient rated forearm evaluation questionnaire for lateral epicondylitis.²¹

Table.1 Comparison of Groups in terms of Age, Gender, Height, Weight and BMI

Group	Age (years)	Gender		Height (cm)	Weight (kg)	BMI
	Mean±SD	male	female	Mean±SD	Mean±SD	Mean±SD
A	41.15±7.73	11	9	166.45±8.13	62.6±7.708	22.56±2.60
B	43.3±11.57	10	10	168.45±7.52	60.1±9.101	21.02±2.11
t value	0.691			0.808	0.937	2.050
P value	0.494			0.424	0.355	0.080

Table. 2 Comparison of VAS, Grip strength and PRFEQ within group A and group B

	GROUPS	PRE TREATMENT		POST TREATMENT		W VALUE	P VALUE
		MEAN	SD	MEAN	SD		
VAS	A	6.1	1.3	2.0	1.1	210	<0.001
	B	6.0	1.3	2.8	1.2	210	<0.001
Grip strength	A	15.3	2.3	18.3	2.3	-210	<0.001
	B	14.6	3.1	17.4	3.3	-210	<0.001
PRFEQ	A	55.4	14.0	21.0	6.2	210	<0.001
	B	56.6	11.1	26.5	5.3	210	<0.001

Statistical analysis

Statistical analysis for the present study was done using statistical package of social sciences (SPSS) version 14 so as to verify the results obtained. For this purpose data was entered into an excel spread sheet, tabulated and subjected to statistical analysis. Various statistical measures such as mean, standard deviation, and test of significance such as, paired and unpaired t –test were used. Nominal data from patient’s demographic data i.e. age, sex, BMI, Ht, Wt distribution were analyzed using Unpaired t-test. Comparison of the pre and post intervention outcome measures within the group was done by using Wilcoxon paired test was applied, whereas Unpaired ‘t’ test was utilized to measure the difference between two groups (Intergroup comparison) in terms of decrease in Visual Analogue Scale (VAS), Grip strength and PRFEQ score. Probability values less than 0.05 were considered statistically significant and probability values less than 0.0001 were considered highly significant.

Results

There was no significant difference between the demographic and anthropometric measurement among all the subjects. VAS- in group A and group B, the mean VAS score pre session on 1st day and post session on 7th day was 6.1 ±1.3, 6.0±1.3 and 2.0 ± 1.1, 2.8±1.2 respectively. On comparing these values there was significant difference between group A & group B.

Grip strength- in group A and group B, the mean grip strength score pre session on 1st day and post session on 7th day was 15.3 ±2.3 , 14.6 ± 3.1 which increased to 18.3±2.3, 17.4±3.3

respectively. On comparing these values there was no significant difference between group A & group B.

Finally on comparing the pre and post treatment values of PRTEEQ i:e pre 55.4 ± 14.0 , 56.6 ± 11.1 which post treatment decreased to 21.0 ± 6.2 , 26.5 ± 5.3 respectively in group A and group B, significant difference was noted in the pre and post values.

Discussion

The present clinical trial was conducted to compare the effectiveness of cyriax physiotherapy and taping technique with a common treatment of therapeutic ultrasound and supervised exercise in subjects with Tennis elbow. Results of this study were focused on pain relief where Pain assessment was done by visual analogue scale (VAS), [9] improvement of grip strength, grip strength was measured with the help of hand held dynamometer, [10] and reduction in function activity impairment scores based on Patient rated forearm evaluation questionnaire for lateral epicondylitis. It was noticed that there was improvement in all the above parameters in both groups.

In this study the age group of the participants was between 20 to 50 years, the mean difference between the age of both the groups is statistically not significant. According to a study by Halpren BC (1994) it was stated that, peak age at which tennis elbow occurs is 40 to 50 years. [11] There is a decrease in the occurrence of tennis elbow cases after 50 years of age, this may be due to diminished intensity of play or activity at these older ages as suggested in a study by. [12]

Subjects of present study consisted of 21 males and 19 females. According to a study by Alireza Shamsoddini et al [8] and few others, tennis elbow is equally distributed between men and women. But according to Gruchow H.W et al 1979, [12] there was a fourfold increase in prevalence among men and nearly two fold increase among women. In this study men had a marginally higher prevalence rate than women, but there was no statistically significant difference between men and women prevalence.

The mean values of data from present study indicates that group A and group B treated with cyriax physiotherapy and taping respectively with common treatment of ultrasound and supervised exercise showed reduction in pain score on VAS, improved grip strength on hand held dynamometer and functional improvement graded on PRFEQ.

When the intra group mean values of VAS were analyzed it was found statistically significant in both groups pre to post intervention, but when comparison was done inter group, statistically group A showed more significance as compared to group B in revealing pain. In the present study reduction in pain level, as quantified by the VAS with the application of both Cyriax and taping is consistent with the findings of previous studies including, Cyriax and taping reducing in patients with tennis elbow.

It is a common clinical observation that application of DTF leads to immediate pain relief. The patient experiences numbing effect during the session and reassessment immediately after the application of DTF shows reduction in pain and increase in strength and mobility.¹³ several theories have been put forth to explain the pain relieving effect of DTF. According to Cyriax and Cyriax, DTF also leads to increased destruction of pain provoking metabolites such as Lewis's substances [5]. Another mechanism by which reduction in pain may be achieved is through diffused noxious inhibitory controls, a pain suppression mechanism that releases endogenous opiates. The latter are inhibitory neurotransmitters which diminish the intensity of pain transmitted by higher centre. [5]

Mill's manipulation is performed immediately after DTF, where it is done to elongate the scared tissue by rupturing adhesions within the teno-osseous junction making the area mobile and pain free. [8, 5]

Amit V Nagrale et al, in his study between cyriax and phonophoresis found cyriax physiotherapy to be superior treatment approach compared to phonophoresis in terms of pain, pain-free grip, and functional status. [14]

Mc Connell¹ proposed that application of tape helps to reduce pain, improve muscle function and restore function movement patterns. In this study, patients in the taping group reported reduction in pain level following the treatment. The pre and the post treatment mean of VAS showed statistical significance in the taping group (table 2).

The possible reasoning for action of taping in reducing pain could be related to neurophysiologic effects on the nervous system. In this taping may cause alteration in pain perception, either locally at the elbow by inhibiting nociceptors, facilitating large afferent fiber input into the spinal cord and by stimulating endogenous processes of pain inhibition. [1] In a study by Alireza Shamsoddini et al [8] where they checked initial effect of taping technique on wrist extension and grip strength and pain of individuals with tennis elbow, and an impressive effect on wrist extension and grip strength and pain. Thus taping was recommended in the management of tennis elbow.

It is important to note that all participants were given ultrasound and supervised exercises as a common conventional method. Ultrasound refers to mechanical vibrations which are essentially the same as sound waves but of a higher frequency. Such waves are beyond the range of human hearing and can therefore also be called ultrasonic. [15]

A study by A.P.D'Vaz et al [16] studied the effect of pulsed low-intensity ultrasound therapy for chronic tennis elbow. They concluded that low-intensity ultrasound (LIUS) was no more effective for a large treatment effect than placebo for recalcitrant LE. This is in keeping with other interventional studies for the condition

Ultrasound has been used over a period of time to control acute and chronic pain over a localized area. Several studies have demonstrated the effectiveness of ultrasound in reducing pain, In Study by A. Binder et al [17], where they checked for the effectiveness of Ultrasound in treating soft tissue lesions, where they conclude that Ultrasound enhances recovery in most patients with tennis elbow.

Tim Noteboom et al [18], in his study mentioned that chronic symptoms are commonly associated with inadequate muscle power and endurance. In this study Jamar Hand Dynamometer is used to measure grip strength. Reduction in grip strength was note in these subjects, for strengthening of these muscles supervised exercises were prescribed.

Strengthening and stretching exercises were given in both the groups. Strengthening the damaged attachment of wrist extensors resulted in better repetitive wrist movements performed by the subjects with tennis elbow. [19]

It was claimed that the eccentric training results in tendon strengthening by stimulating mechanoreceptors in tenocytes to produce collagen, which is the key cellular mechanism that determines recovery from tendon injuries. Strengthening may improve collagen alignment of the tendon and stimulate cross linkage formation both of which improve the tensile strength of tendon. [19]

Literatures suggest that strengthening and stretching both are main components of exercise program, because tendons must be flexible along with strong. Positive effects of exercise program for tendon injuries may be attributable to lengthening of muscle tendon unit by stretching and strengthening exercise which could achieve loading effect within muscle tendon unit along with hypertrophy and increased tensile strength of the tendon.[20]

The results of this study showed significant increase in grip strength within groups A and B. But on comparison between groups, there was no significant difference between group A and group B. therefore this showed that group A and Group B are equally effective.

PRTEE Formerly known as the Patient-Rated Forearm Evaluation Questionnaire (PRFEQ), seems to be a reliable tool for assessing pain and function in patients with chronic tennis elbow. The PRTEE has shown greater reliability and has sufficient width scale to reliably detect improvement or worsening in most subjects. For these reasons, the PRTEE appears to be the one of most commonly reported measure of health status in patients with Tennis elbow.²¹

the present study the means of PRTEE were analyzed, where intra group analyses showed significant improvement in both the groups. When inter group analyses were done

results have shown significant difference between Group A and group B, with group A showing better improvement in PRTEE scores. This showed that Cyriax physiotherapy is more effective in improving functional outcome in patients with tennis elbow.(Table 2)

From the present study it can be concluded both the groups showed significant improvement in terms of pain, grip strength and functional performance in patients with tennis elbow. But group A showed better results as compared to group B.

Limitations

Subjects could not be followed up for longer period of time, to see long term benefit, Occupation relevance was not compared.

Future Scope of the Study

Studies with longer duration are recommended with longer follow-up period to assess long term benefits, Conduct the study with larger sample size, Range of Motion could be taken in to consideration

Conclusion

The present randomized clinical trial provided evidence to support the use of Cyriax physiotherapy and taping techniques in relieving pain, improving grip strength and improve functional performance in subject with tennis elbow. In addition, results supported that Cyriax physiotherapy was more effective than taping technique in reducing pain and functional performance.

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