
Treatment Modalities for Tennis Elbow

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Abstract:

Objective: To evaluate the available evidences of the effectiveness of physiotherapy for Tennis Elbow by several physical methods in comparing to results and effects of local steroid injections to the affected elbows as the first choice treatment before using alternative means.

Method: Selected cases identified by a search strategy in one database of two independent groups of totally 63 patients who confirmed to be had tennis elbow according to a report of Delphi consensus workshop at university of Birmingham in 1997, and these patients are totally regarded as the backbone for fulfillment of this study in a totally 7567 patients attended to the rheumatology and medical rehabilitation department at Rizgari teaching hospital in Hawler province during the second half of 2006. At least one clinically relevant outcome measure is regarded as a reviewer in a selected group of patients who submit physical therapy methods in comparing versus to local injection treatment in another group. Methodological quality was independently assessed by the results review. A best evidence synthesis, including a quantitative and qualitative analysis, was conducted, weighing the studies with respect to their statistical significance, clinical relevance, and statistical power.

Results: Among selected patients with tennis elbow who included in this study, evaluating the effects of physical therapy by electrotherapy, ultrasound and deep friction massage in 48 patients (67%) of group (A) are done in compare to 15 patients (24%) in the another group (B) whom treated by local corticosteroid injections. Despite irrelevant data and insufficient studies, the clinical and statistical results were regard to be significant and making relevant differences in favor of physical therapies. There is quiet evidence demonstrate benefit of effect of physical therapy methods by 48% for long term period (more than three months) as an effective strategy, in comparing treatment by local steroid injection in short term (less than 6 weeks) duration which regarded as the swift choice for relief or diminish the pain for the affected elbow in the rate of 20 to 66% respectively.

Conclusion: Physical therapies are regard to be the solely preferable choice versus to local steroid injection in a long term management for tennis elbow patients.

Key words: Tennis Elbow (TE), Treatment Modalities

Introduction

The elbow joint is a hinge formed by articulations of the distal end of the humerus with the radius, ulna, and the radius with the ulna. Soft tissues, tendons, muscles and ligaments stabilize the bony articulations. The joint serves to move the distal extremity to position the hand for fine motor activities^[1].

The epicondyles are bony prominences easily palpated on the medial and lateral sides of the distal humerus, and the tendinous origins of the muscles that flex and extend the wrist are located at the medial and lateral epicondyles, respectively^[2].

By definition; Tennis Elbow (TE), or lateral epicondylitis, is defined as soreness or pain around lateral epicondyle prominence on the outside and lateral part of the elbow. Mostly the extensor muscles of the wrist are involved in which attached^[3], where the pain is arise near the site of attachment and may radiate into the forearm and dorsum of the wrist in which combined motions of the elbow and wrist are employed. Mostly the pain is thought to be caused by repeated forceful contractions by stress conditions & putting extensor muscles in action

A plethora of terms that have been used to describe TE, and make references to an

appropriate anatomical, pathophysiological analogue terms in which describe the problem in different approaches as lateral humeral epicondylitis, Lateral elbow tendinopathy^[4], and the occupation bases of the term like computer elbow, rowing elbow^[5].

Tennis elbow's history is return back to 19th century since the creation of modern tennis in 1873 where the first documented medical reference to the condition by tennis elbow is done by Runge^[6], and the term is derived from "Lawn Tennis Arm" later described by Morris in 1882^[7].

Several studies about TE showed a prevalence of 1–3% in the general population^[8], but this may increases to 19% in 30–60 year olds and appears to be more longstanding and severe specially in women^[9], in which the Incidence rate sometime increases to 10% with a peak incidence of 42–46 years of age^[10].

In West European countries the incidence of lateral elbow pain in general practice is 4–7/1000 people a year^[11, 12], where half of these patients with tennis elbow had been seeking medical attention^[13]. Recent researches show that 95% of cases occur in patients other than tennis players^[14] by occupational stress^[15] and this fact lead to misnomer the name of the condition, other studies in sport medicine reveals that only 5% of tennis players develop the disorder are attending clinics

for treatments. TE occurs more commonly in loose jointed tennis players^[16] as a result of using wrong techniques or equipments^[17].

The most common site of TE is at the lateral epicondyle and this is three times as frequent as at the medial epicondyle^[18], and mostly occur in the dominant arm in 75%^[19] of patients and is usually unilateral^[20], but it is possible to occur in the non dominant or even both arms.

Tennis elbow has numerous etiologies including repetitive wrist turning or hand gripping, tool usages, shaking hands, and twisting movements that may exceed tissue capacities and leading to micro-trauma and over usage of the wrist extensor musculature are leads to injury and enthesopathy usually around the lateral epicondyle that commonly cause the condition.

Recent researches in athletes describes the tennis elbow risks among younger age group of players^[21] however the injury risk in tennis has been shown to gradually increase with age in those over 75 years of age^[22].

Many individuals with tennis elbow are involved in works or recreational activities^[23] as a part related to occupational tasks due to stresses rather than movements, which requires repetitive and vigorous grasping of the forearm muscles^[24], and most patients are unable to recall or to identify a precipitating event although there is relative evidence of physical load factors like repeated use, and obesity as a strong determinants of the condition^[25].

The average duration of an episode of lateral epicondylitis is 6 to 24 months, and 10% to 30% of cases result in work absenteeism^[26] leading to a high loss of productivity. Some patients develop tennis elbow without any specific recognizable activities like in violinist, aviators^[27] and laboratory workers^[28]. The risk of upper limb disorders in work place is shown to be the top ten of the non specific work-related diseases and for the dwindling band of physicians who work in manufacturing, the work related upper limb disorders (WRULD) will feature in their top three, and may be number one in some industries^[29] like printing associated industries^[30,31].

Several case reports have notes an association between the ingestion of specific drugs and the development of lateral epicondylitis, as an example TE developed after the first dose of a Fluoroquinolone antibiotic^[32], in which mechanistically related to the development of Achilles' tendinitis that is more often seen with its usage.

The pathophysiological changes of TE are in the form of tendonitis^[33], in which degenerative changes are often the case occurrences of the extensor tendons, with extensor carpi radialis brevis *ECRB*, extensor carpi radialis longus

ECRL, and extensor digitorum *ED* tendons are more commonly implicated as the primary locations of tendinitis, however other muscles and bones of the elbow joint are also involved and been held responsible for the symptoms, then the condition is best to be called epicondylitis, but the exact pathology remains obscure^[33].

This inflammatory and vascular pathogenesis is supported by isotopic bone scanning and computerized infrared thermography findings. The inflammatory response ultimately results in degeneration of the involved tissues, including fibrous tendons degenerations or micro ruptures of the collagenous fibers^[34].

The presentations of TE can be in the form of acute, intermittent, sub acute, or chronic pains and accompanied possibly with weakness in the forearm, and on physical examination, there is tenderness without swelling along the extensor tendons at or just below the lateral epicondyle. Elbow range of motion (ROM) is normal. Grip strength on the affected side is diminished^[3].

The diagnostic criteria for TE as an upper limb disorders is according to the report of Delphi Consensus Workshop at University of Birmingham^[36], confirmed that the condition of tennis elbow or lateral epicondylitis will be diagnosed by three criteria together; epicondylar pain, epicondylar tenderness and pain on resisted extension of the wrist^[37].

Patients & Methods:

All patients treated for tennis elbow by the physical and medical procedures at rheumatology and medical rehabilitation department at Rizgari hospital in Hawler province from July 2006 to January 2007 were considered and included for this prospective review.

Amongst 98 patients attended the department suffering from elbow pain, totally 63 patients (68 elbows) met the inclusive criteria of *Delphi consensus workshop at University of Birmingham* were selected. Patient's had pain on the lateral side of the elbow, tenderness over the forearm extensor origin, and pain on the lateral epicondyle during resisted dorsiflexion of their wrists with the elbows in full extension.

Precise history and proper clinical examination performed for all patients. Any previous operation of the elbow joint, arthritis, and allied neurological disorders of the painful extremity are all excluded.

A total of 14 men with 49 women, aged from 24 to 66 years, underwent treatment on all 42 right elbows (36 dominant side) and 21 left elbows (18 dominant side) respectively, and In those with bilateral symptoms only the most painful arm was included.

The patients inclusion in this study based on a protocol consisting of collected details about each patient's separately including information about gender, occupation, durations of the pain, usage of

any previous treatment or medications, beside records of the exact descriptive nature of the pain by the patients.

Statistic data is arranged for each patients depending on the positive and negative findings on physical examinations which depends on several signs ,tests ,and normal radiographic studies (of elbow ,cervical and sacroiliac joints) done for patients to exclude other causes of referred pain from sere-negative inflammatory arthropathies.

Physical examinations consisted of inspection, measurement elbow's ranges of motions (ROM), and assessment of the pain provocation by resisted movements and palpations.

All patients who registered have had pain that was severe enough to interfere with daily activities and work requirements for a period more than one month (4 weeks) duration , Long-term follow-up evaluations of the patients was performed by:

1. Prospectively using a pain questionnaire on Visual Analogue Scale *VAS* and pain drawings classified into 5 categories, and
2. Retrospectively with a postal questionnaire (which was taken from the patients) to fill in. Sick-leave days, medical and physiotherapy visits, elbow supports, and being injected by any local steroid injection before were in great help sides .The patients are categorized into two groups depending on the methods that have been used into group **(A)** by using three selected physical methods (Trans cutaneous electric nerve stimulation *TENS* , Ultrasound over the tender points ,and deep friction massage) as a trial in totally 48 patients (76%) while group **(B)** of patients are whom undergo treatment by local injection of corticosteroid in 15 patients (24%) as a prior medical treatment ,and both groups got precise medical follow up.

Three courses of physiotherapy has been done entirely for group **(A)**, and each course lasted for 2 weeks duration with interval of three weeks as a rest in between each two courses and Re-assessment of severity with occurrence of elbow pain, subjective loss of grip strength, resumption of work are taken as compare indicators to find out the difference

outcomes versus with group **(B)** had been received local injections of corticosteroid in 15 patients, on the base that they had chronic pain for more than one month and not respond to analgesic drugs like non steroid anti inflammatory drugs *NSAIDs*.

They had been injected by 1 ml of methyl prednisolone suspension (Depomedrol), contain of 40 mg per one ml diluted with 1 ml of lidocaine 2% into the tendinous origin of ED and ECRB muscles. The patients had been followed by six or twelve weeks after getting the first injection and patients are advised not to use the affected arm for any activity which provoked pain during the mentioned period.

A second injection had been given (in 5 patients) who showed persistent pain and tenderness over lateral epicondyle

Statistical analysis is done for the sake of differentiation in between both treatment groups. methods at 0, 6 and 12 weeks which used are tested by the Chi-Square test for linear trend and differences in the increase of grip strength by T-tests and results were analyzed and assessed by mean value and significant p.value(< 0.05) depending on the protocol data which revealed through Excel sheet analysis .

Qualitative and quantitative regression values were used in comparing the results after 6, and 12 weeks respectively.

Results:

Out of 7567 patients had been seen in rheumatology and medical rehabilitation department (RRD) at Rizgari hospital in Hawler province during the last six months of 2006, totally 98 patients (1.3 % of total attendees) who complain of elbow pain and tenderness are examined by several methods in order to confirm conditions with tennis elbow and exclude other medical statuses. The schedule of the monthly variation of attended tennis elbow patient's during whole 2006 which shown in (Figure 1.) had met criteria of diagnosis which made by University of Birmingham in 1997.Relying on criteria bases 63 patients with tennis elbow were managed through groups (A, and B) by using separate modalities for each group had been used for more than three months duration per each patients Results for both groups were reviewed after six and twelve weeks respectively

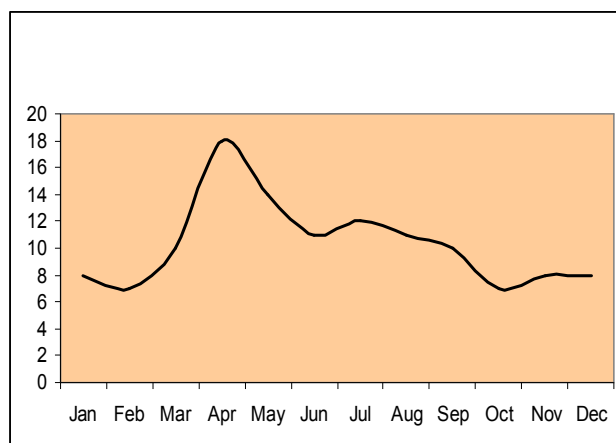


Figure 1. Monthly Tennis Elbow attendees to the RRD at Rizgari hospital during 2006

The gender variation in patients in both groups (Figure 2.) and their ages, occupation, and duration of symptoms were worth mentioning in comparing to the randomized selection of patients.

Totally 49 females (78 %) with 14 males (12 %) with mean age 41.42 years ($SD \pm 10$) had undergo both medical and physical treatment where 42 female and 6 males (female: male ratio 7:1) in group (A), and 5 females and 10 males in group (B) with F/M ratio is (1: 2) had been studied..

Symptom duration of all patients varied from 1 month to 10 months (mean, 3.3 months

with $SD \pm 2.1$) patients occupations inclined from three major categories, 14 describes their occupations involving strenuous manual labor (eight working with heavy machines, four carpenters, and two blacksmiths) ,21 as involving moderately strenuous work(nine using computer, five teachers, two tailors, four weavers and one orthotic technician), and finally 28 as involving light labor (five shop keepers , twenty three house wives as two third of them regularly and repetitively made and bake traditional bread with special baking sticks (Terok) as they blamed these tools for development, exacerbation and symptom progressions.

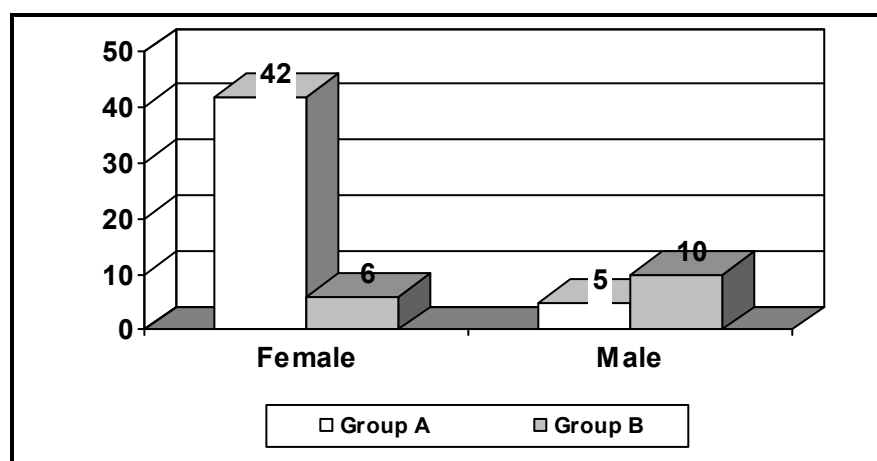


Figure 2.Gender variation in both physiotherapy group (A) and injection group (B).

48 patients in group (A) have being submit to intensive physical treatment for three successive courses each one lasting for two weeks duration (7 sessions) with interval of three weeks in between each two courses as majority of

patients 45 of them (94 %) had regularly complete the courses while 3 patients intermittently .

The physical modalities which had been used were TENS, Ultrasound in continues mode applied to the affected elbow for 5 minutes, in a

dose of 0.5W/cm² & 3MHz per session and deep friction massages.

Results obtained after 6 weeks treatment were considerable slightly more in patients from group (B) than patients in group (A), while after 12 weeks the results were much more energetic

especially among patients in group (A) as the continuity of pain decline (p value = <0.005), the pain become less severe (p.value = 0.005), and improvement of patients as shown in (Figure 3) were continues by usage of physical methods which lead to resumption of their works (Table 1).

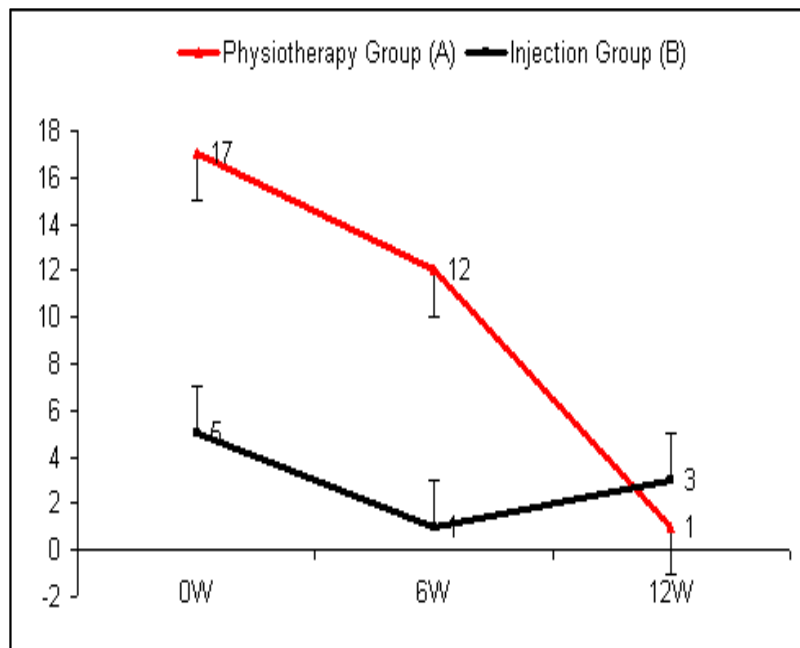


Figure 3. Improvement variation of tennis elbow with severe Pain after 6 and 12 weeks durations

Table 1. Subjective variables after treatment of both group (A) and group (B)

	0		at 6 weeks			at 12 weeks		
	A	B	A	B	P value*	A	B	P value*
Severity of pain								
Absent	0	0	8	3		23	2	
Slight	8	1	10	5		18	3	
Moderate	23	9	18	6		6	7	
Severe	17	5	12	1	<0.254	1	3	<0.05
Occurrence of pain								
Never	0	0	6	2		19	3	
Seldom	5	2	11	4		16	3	
Regularly	25	8	22	6		11	5	
Continuously	18	5	9	3	<0.827	2	4	<0.005
Subjective loss of grip strength								
Absent	10	5	14	6		18	7	
Slight	9	5	13	4		18	5	
Moderate	22	3	17	4		11	2	
Severe	7	2	4	1	<0.92	1	1	<0.42
Resumption of labour								
Resumed			6	2		12	1	
still working			24	8		32	9	
unable to work			12	4	<0.05	2	5	<0.035
not applicable			6	1		2	0	
Grand total:	48	15	48	15		48	15	
*Differences between 0 , 6 weeks and 12 weeks								

There is no specific complications or side effects were seen as observed in using all modalities with both treatment group methods except in three patients whom had been injected by the first steroid injection develop increasing pain threshold of the injected elbow and lasts approximately less than three days duration and the pain is subsided after they got the second injections especially amongst two of them. There were no infections after injections and no skin hypo pigmentation has been observed.

Statistical analysis of outcomes of treatment at 6 and 12 weeks:

After the assessment of the results at six weeks, several patients needed additional treatment.

Multiple linear and logistic regression showed that treatment was the most important factor determining outcome at six weeks especially in group(B), had a better result ,where the pain is diminished in severity to slight and moderate degree in five (33%) and six (40%) patients respectively. Pain is absent in three patients (20%) of total patients of the corticosteroid group after receiving the first injection in comparing with eight patients (16%)

in group (A), after receiving nearly two courses of physiotherapy (14 sessions).

Additional treatments at 12 weeks reveals that the poor results in group (A) has been altered as 23 patients (48%) became pain free follow three courses of physiotherapy in contrast to regression in effect of injection in group (B) as the pain and tenderness increased with a recurrence of symptoms in 10 patients (67%) to moderate and sever degree and require further treatment by additional injections or alternative modalities.

Resumption of work was significant after three months treatment where 12 patients in group (A) 25% are perform their works with complete facilities, in addition to other 32 patients in the same group were there is no clear figures about regains of their lost capacities despite of their continuance on the daily activities mostly inside their homes as there was no exact forbidding of their works.

Discussion:

Tennis elbow is one of the most common lesions of the arm and is an overuse syndrome most prevalent in the fourth decade of life and mostly severe and long lasting in female patients^[9] , in

which it is regarded a major challenge, as it is difficult to treat, prone to recurrence, and may last for several weeks or months till complete recovery, with the average duration of a typical episode reported to be between six months and two years^[39]. Predominant symptoms of lateral elbow pain on gripping result in many consultations in primary care and days lost from work. It is generally a work related as well as tennis like sports in which the name is derived from.

In our study the mean age of patients was 41.42 years (SD $\pm$ 10) as it is parallel to same age group average of patients in several other studies [10, 40]. The female to male ratio was quiet significant in ratio of 7:1 where shortage studies don't reveals this similar inference as obvious here. Average of the pain duration was 3.3 months with (SD $\pm$ 2.1), but was difficult to measure due to influencing by many factors, thus we therefore used grip strength measured with qualitative values as an objective indication of the outcome of treatment. Gripping is mainly carried out by the forearm flexors and action of the forearm extensors which generates a painful condition which reflects the severity of the condition and responds to treatment. Goldie^[41].

Most patients supposed to be recovered within a year time, and this should be remembered when considering the results of this clinical review identified in consecutive attended patients were grouped to two selective treatment modalities as randomized trials.

Our results showed that after six weeks of treatment there was a significant improvement in the both groups of patients but those with corticosteroid injections were better than the physical therapies; on one hand the success rate in the injection group (20 %) was somewhat lower than previously reported results. Valtonen^[42] reported a success rate of 86%, and Day et al^[43] showed 92% of their patients improved or were cured with the injection with in the period. These differences may be explained by different factors as small number of patients (fifteen patients in group (B) and patient's doubts about the curative role of the injection, lead to their hesitation in getting the local steroid injections and influence the results. On the other hand results in the physiotherapy group (16%) are also somewhat lower than the to 53% success rate as obtained by Devereaux et al^[44]. Therefore steroid injections may alleviate the pain in tennis elbow very well, but may not inhibit the recurrence and prolongation of pain rate which is remained in 80% versus to 83% in physiotherapy group A.

After twelve weeks most of involved patients in both groups A, and B undergo the second assessments when they receive adequate course of physiotherapy inform of receiving 20

sessions during the period, in comparing to just 5 patients in group B had received the second injection to the affected arm. Severity and continuity of pain declined sharply in physiotherapy group with p-values < 0.05 and < 0.005 respectively in comparing to injection group were they show increase their incapacitation to work by 33% and remain with severe pain of intermittent nature.

Despite the noticeable percentage of patients with symptoms which persist more than three months with economic consequences in most patients is disappointing, but the severity of symptoms was significantly reduced, lead to improvement of patient's abilities (as they said) in performing the daily activities especially in half of patients 15% who are house wives among the total TE attendees.

The important lesson learnt from this prospective study is to reveal that on short term treatment the steroid injection may be the choice, but the physical methods have several advantages over injection by; 1) It's noninvasive technology without any severe complications as associated with injections. 2) Relatively limited recovery time during which the patient may return to employment and normal activities the week following treatment, and 3) favorable success rates compared (to local injection and to other conservative therapies).

Certain recommendations for clinical practice can be made. In the early phase of the disease, undergoing physiotherapy as long term management and avoiding provoking activities is likely to be beneficial. Corticosteroid injections may be helpful in breaking the pain cycle, but patients should be warned against inflicting further pain episodes^[9].

According to results we advise patients with tennis elbow to attend for the physical therapy as soon as possible with performance of rehabilitation and strengthen exercises at home and modification of labor type is crucial in prevention of recurrences especially in our Kurdish society that urban and rural house wives with (TE) must be keeping off baking, raking, weaving and other occupations which depends on repetitive movements of forearm and wrist joints.

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