

TECHNIQUE WITH ECCENTRIC VERSUS CONCENTRIC EXERCISES ON PAIN AND FUNCTION IN PLAYERS WITH TENNIS ELBOW

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ABSTRACT: The other name for tennis elbow is lateral epicondylitis or lateral elbow tendinopathy that causes pain in elbow and reduces functional abilities such as finger extension, wrist extension and forearm eversion. It usually causes inflammation and damage to the tendon of the short radial extensor muscle of the lateral epicondyle.

Objective: The aim of this study is to compare the effects of mulligan technique with eccentric versus concentric exercises on pain and function in players with tennis elbow.

Methods: A randomized controlled trial was performed on thirty-two players. Participants were selected through non-probability convenient sampling. Members who fulfilled the inclusion/exclusion criteria were identified by an assessor and were enrolled for specific study. Informed written consent was taken by the participants and were randomly allocated to two groups. The study was single blinded. The assessor was unaware of the treatment given to both groups. Group 1 received Mulligan technique with Eccentric exercises and Group 2 Mulligan technique with Concentric exercises. All Exercises were performed with 12 reps and 3 sets, 3 times a week for 6 weeks.

Results: The mean age of individuals in Group 1 is 25.82 \pm 2.48 and the individuals in Mulligan Concentric group are 25.38 \pm 2.27. Parametric tests were performed as the data was normally distributed which was proved by Shapiro-wilk test. Within group comparison was made by using Paired t test and it showed significant results with in group (P value <0.001). Between group analysis was done by using independent T test which showed insignificant difference between groups (P value >0.05) for pain and function.

Conclusion: Both interventions are equally effective in reducing pain, improving function in players with tennis elbow which showed that these interventions can be included in the rehabilitation plan of these athletes.

Indexed terms: Elbow pain, Mulligan technique, Eccentric exercises, Concentric Exercises

I. Introduction

The other name for tennis elbow is lateral epicondylitis or lateral elbow tendinopathy that causes pain in elbow and reduces functional abilities such as finger extension, wrist extension and forearm eversion. It usually causes damage and inflammation to the tendon attached to the lateral epicondyle. Major causes of tennis elbow includes overuse, flexibility problem, repetitive movements, wrong training, misalignment, poor circulation, age, muscular imbalance, weakness, and psychological problems (1). Tennis elbow is known as Lateral epicondylitis, is the most popular problem present in dominant arm elbow region which includes the pathology of extensor carpi radialis brevis muscle (2). The symptoms of this syndrome are pain over the lateral epicondyle, with deficit motor control, mechanical hyperalgesia, quite visible functional limitations, and decreased muscle strength changes (3). Lateral epicondylitis affects the inhabitants of active people in men and women. It also limits the functional activities of dominating hand and commonly described as the recurring injury affecting the muscle extensor carpi radialis brevis which is attached to the bony area of lateral epicondyle at humerus. Previously, it is thought that the lateral epicondylitis is may be the reason of tendinitis with acute inflammation but in latest studies it is described that the inflammation is not present which further indicates the chronic pathology of elbow as tennis elbow. The indicators to show the pathology are pain present locally on lateral epicondyle of humerus which increases with force acting against muscles in forearm during extension of wrist or gripping activities of hand (4). This pathology is typically limited to the dominant arm side and if it is present at both arms (bilateral tennis elbow) it is because of the pressure located on the unaffected arm (3). The condition tennis elbow, sometimes is the unhealed response of tendon which is not repaired after injury because high amount of fibroblasts, the incompetent collagen and vascular hyperplasia seen in structures at origin of affected muscle ECRB (5). The sprain of tendon ECRB or minor strain of muscle is the result of speedy rotationary activities with occupation (3). The tennis players and people working while using repeated hand and forearm rotation in activities such as carpenters are mainly affected with tennis elbow. It occurs with frequent, different rapid gripping activities of hands with an episode of time period from 6 months to 2 years (6). Lateral epicondylitis (tennis elbow) is the frequent sort of myotendinitis that limits the functional mobility in affected arm. It affect mainly the muscles origin of extensor carpi radialis brevis which is positioned at

1-2cm below to lateral epicondyle of humerus. Lateral epicondylitis is the syndrome that is related with sudden onset of pain in elbow area associated to the extension on wrist joint along with movement of arm (pronation or supination of forearm). The pain is irritated mostly with gripping activities of hand. This problem is further aggravated because of repetitive resilient synergic and fixator action of extensor muscles of wrist (7). Furthermore, tennis elbow is a term used in place of different disorders of forearm, which encompass radio humeral bursitis, the synovial fringe irritation, radio humeral synovitis, deterioration of ligaments and cartilage and osteoarthritis of the radio capitellar joint, osteochondritis dissecans, and radial nerve entrapment (8). There are different methods used to treat tennis elbow which includes appropriate rest, soft tissue mobilization, analgesics and NSAID and at the end surgery (9). Physiotherapy treatment of tennis elbow includes electrotherapy modalities (therapeutic ultrasound, TENS, hot pack, infrared), exercises, different techniques such as mulligan, taping, dry needling, Cyrix etc. (10). Mobilization with movement is another method of treatment for tennis elbow but provided by experienced physiotherapists only, it may not be possible to provide patients with these practices in every clinic. The exercises such as eccentric and concentric are inexpensive and convenient methods for the treatment of tennis elbow (6, 11). There is a lot of ambiguous data regarding the effects of mulligan technique with eccentric exercises versus concentric exercises. Some researches favoring both treatments for the reduction in pain and function of elbow pain in players, and some researches contraindicating their effects. Some players kept on playing with their muscle impairments. In this study we aim to assess the efficacy of both these techniques in players with tennis elbow to guide some of the treatments so that they can get rid of those elbow pain and can participate in their tournaments with least pain and functional limitation.

II. Materials and methods

It was a single blinded Randomized Clinical trial. Data was collected from Crescent Sports Complex, Faisalabad. The duration of study was 6 months after the approval of synopsis. Convenience sampling technique was used. Sample size was 32 calculated by using a module open-source statistics for public health with 5 % margin of error and 0.80 power of study. **Inclusion criteria** were 16 – 30 years, Badminton, Squash, Table tennis players and both male and female players. **Exclusion criteria** were Elbow fracture, any upper limb deformity and any systemic disease. Purposive sampling technique was used to collect data. Total 32 participants recruited in the study. The subjects were randomly assigned to two groups A & B with each containing 16 subjects according to their number in computer generated table. Data collection tools were Questionnaire (Patient rated tennis elbow evaluation questionnaire)(12) and NPRS for pain (13). **Group A:** The subjects received Mulligan technique with eccentric exercises included conventional treatment. Treatment sessions were 3 times per week for 25 minutes. **Group B:** The subjects received Mulligan technique with concentric exercises included conventional treatment. Treatment session included 3 times per week for 25 minutes. Evaluation was done before treatment and at the end of six week. Outcome was measured by using numeric pain rating scale and Patient rated tennis elbow evaluation questionnaire. A randomized controlled trial was conducted in which participant were randomly assign to two groups, one with Mulligan technique with eccentric exercises and the other mulligan technique with concentric exercises, effects are being measured after application of both techniques before and after. SPSS for windows software, version 25 is used to analyze the data using statistical significance $p=.05$ Shapiro wilk test is used to check the normality of data. If value of the Shapiro wilk test is greater than .05, the data is normal and parametric test of analysis are used. If it is below .05, the data would significantly deviate from a normal distribution and non-parametric tests of analysis are used.

III. Results:

Numeric variables were defined as mean \pm standard deviation. The normality hypothesis was tested using the Shapiro-Wilk test. If value of the Shapiro-Wilk Test was greater than 0.05, the data was normally distributed and parametric tests of analysis was applied. If it was less than 0.05, the data would significantly diverge from a normal dissemination and non- parametric tests of analysis was applied. Normality of data was checked by Shapiro wilk test. All the variables have significant value more than 0.05 which complete the assumption of normal distribution of data. The mean age of individuals in Mulligan eccentric group is 25.82 ± 2.48 and the individuals in Mulligan Concentric group is 25.38 ± 2.27 . Differences between the group was analyzed by independent sample t test. The p value for Numeric pain rating scale (NPRS) was 0.47 and for patient rated tennis elbow questionnaire Score was 0.61.

Figure 1: consort flow diagram

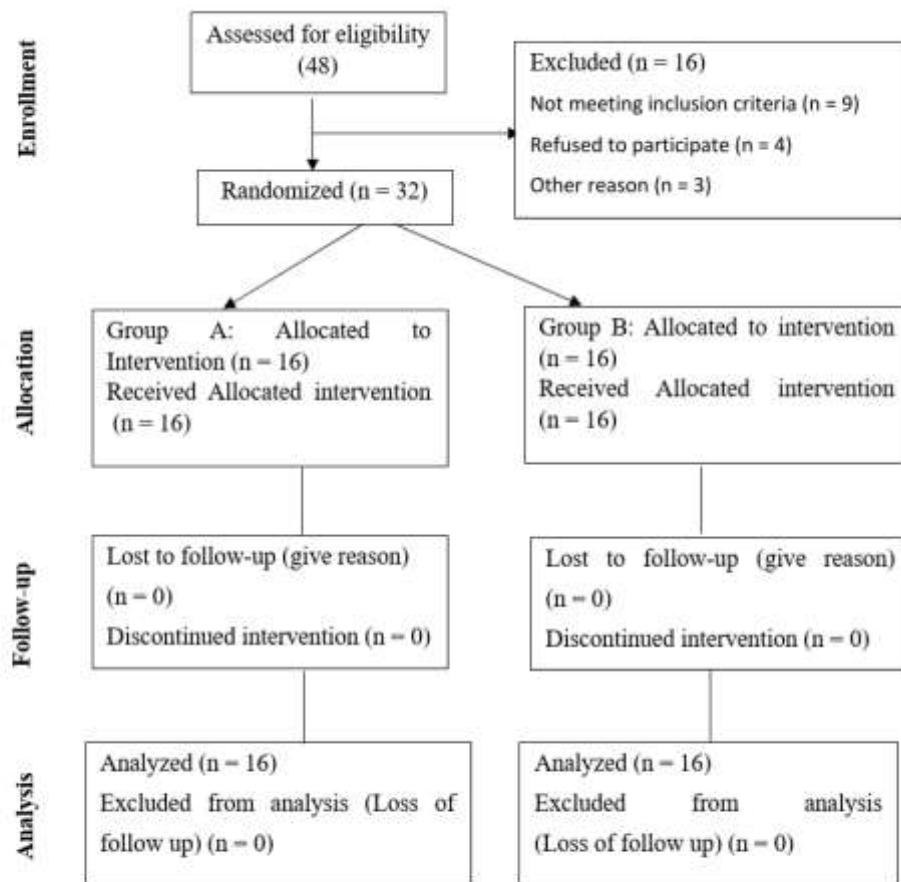


Table 1: Baseline assessment between groups

Sr.no	Variables	Group	Mean	St. Deviation	P value
1	Numeric Pain Rating Scale	Mulligan-Eccentric	5.87	1.45	0.47
		Mulligan Concentric	5.50	1.46	
2	Tennis Elbow Questionnaire Score	Mulligan-Eccentric	83.12	8.33	0.61
		Mulligan Concentric	84.56	7.46	

The significant values were more than 0.05. So, there was insignificant difference between the groups. Upon Comparison of variables with in group for pre & post treatment, the p value for NPRS was <0.001 and for Patient rated tennis elbow Questionnaire Score P value was <0.001. As P value is more than 0.05, it shows that pre and post measurements of all the variables are significant. While analyzing the variables with in group, P-value for all the variables is <0.001 which shows the significance of pre and post measurements as all the values are <0.05 In Mulligan Concentric group NPRS Score and Patient rated Tennis elbow questionnaire Score showed more improvement. The p value for all the variables is more than 0.05. The results showed that no group is superior to another so null hypothesis will be retained which stated that there is no significant difference in both interventions and both interventions are equally effective.

Table 2: End line assessment between groups

Sr.no	Variables	Group	Mean	St. Deviation	P value
1	Numeric Pain Rating Scale	Mulligan-Eccentric	4.00	1.41	0.82
		Mulligan Concentric	3.62	1.20	
2	Tennis Elbow Questionnaire Score	Mulligan-Eccentric	40.68	7.50	0.42
		Mulligan Concentric	40.12	6.67	

IV. DISCUSSION

A lot of studies have been conducted previously to see the effects of mulligan techniques and exercises in tennis elbow but less literature is available in which comparison is done between eccentric and concentric exercises with Mulligan techniques. A study conducted in 2010 by A Amro et al. and concluded that Mulligan Technique along with exercises is beneficial for athletes with tennis elbow (14). A case study is done in 2021 by Nabeela et al. which showed that Triceps eccentric training with mulligan technique is effective for athletes with elbow pain and reduced strength (15). There is another study conducted in 2018 which showed similar results as of previous one and concluded that eccentric control exercises used for treatment of tennis elbow to decrease pain and increase function in athletes (11). The parameters included in this study were Age, Pain and function which found the effects of Mulligan technique with eccentric and concentric exercises on pain and function in athletes with Tennis elbow. The goal of the research was to compare the eccentric and concentric exercises and their effect in improving pain and increasing the function so that athletes could easily return to their sports as soon as possible. In order to prove the effects of mulligan technique with eccentric and concentric exercises of elbow, randomized control trial was conducted based on 6-week time period and 32 athletes were included in this study. Data was analyzed after collecting data of both groups for all outcome measures. Both groups showed significant improvement after treatment in managing pain, improvement in function but if we considered mean values and P values among two groups then it revealed that both the group are equally effective in improving pain and function. There are Insignificant differences in the initial values and at the end of follow up were found in both groups. Within group analysis showed significant difference in pre and post treatment of both groups. There is less evidence available regarding the effect of concentric exercises in patients with lateral epicondylitis or tennis elbow. Researches should be done to find the efficacy of concentric and eccentric exercises along with mulligan technique as a best treatment approach for tennis elbow. A randomized control trial was done in 2020 for a period of 6 months in which total 68 patients were included with tennis elbow. The results concluded that both concentric and eccentric exercises are equal effective in reducing pain and improving function and muscle strength (16). Another research showed that eccentric training is more effective in reducing pain and improving function (17). This study showed that eccentric exercises and concentric exercises with mulligan technique are equally effective in reducing elbow pain in athletes with tennis elbow or lateral epicondylitis. The results helped the trainers and coaches to add best rehabilitation exercises for athlete so that the athlete could return to play early and play his or her sport without pain.

V. CONCLUSION:

According to the data analysis, it is concluded that Mulligan Eccentric and Concentric exercises are equally effective in reducing pain and improving functionality of elbow. Thus, null hypothesis will be retained which stated that There is no difference between the effects of Mulligan technique with eccentric exercises and mulligan technique with concentric exercises on pain and function in player with tennis elbow.

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