



## Effectiveness Of Mulligan Taping Versus Kinesio Taping With Common Use Of Ultrasound Therapy In Tennis Elbow Of Cricket Players: A Randomized Clinical Study

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### Abstract:

**Background:** The purpose of this study was to compare the effectiveness of Mulligan taping versus kinesio taping with common use of ultrasound therapy in managing tennis elbow.

**Methods:** Thirty cricketers aged between 25 to 35 years, presenting with tennis elbow with symptom duration within one month, were randomized into two groups. The Group-A received Mulligan taping with ultrasound therapy and Group-B received kinesio taping with ultrasound therapy. Treatment duration was 3 times a weekly four weeks.

**Outcome Measures:** Data was obtained on pain intensity levels via Visual Analog Scale (VAS) grip strength via measuring Pain Free Grip Strength (PFGS) and functional status measured by the Patient-Rated Tennis Elbow Evaluation (PRTEE).

**Results:** Result shows that significant improvement in VAS ( $p=.04$ ), PFGS ( $p=.02$ ) and PRTEE ( $p=.01$ ).

**Conclusion:** The results of this study demonstrate that kinesio taping with ultrasound therapy is a superior treatment approach compared to Mulligan taping with ultrasound therapy in managing tennis elbow.

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**KEY WORDS:** Tennis elbow, Mulligan taping, Kinesio taping, Ultrasound therapy.

## INTRODUCTION

The career of many cricketers including great player like Sachin Tendulkar have been jeopardized by tennis elbow. Sachin Tendulkar could not play ICC Champions trophy in 2004 as his tennis elbow failed to respond

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in time to treatment. Tennis elbow is a nightmare for any cricketer for its slow prognosis, recurring nature and affect on the performance. Sourav Ganguly's inability to attend 2005 Challenger Trophy due to tennis elbow costed him his captaincy and birth in Indian cricket team<sup>1</sup>.

Tennis elbow has a prevalence rate of 15% in high-risk groups. It accounts for approximately 7 per 1000 patient visiting general medical practitioners. The commonly affected arm is the dominant arm, with a prevalence of 1–3% in the general population, but the incidence rapidly increases to 19% between 30–60 years of age and seems to be more severe and long standing in women.

Tennis elbow is a painful condition affecting the lateral epicondyle, traditionally considered as lateral epicondylitis but whether there is inflammation or not is doubtful. The tendinous origin of the Extensor Carpi Radialis Brevis (ECRB) is the area of most pathologic change. Changes can also be found in the musculotendinous structures of the extensor carpi radialis longus, extensor carpi ulnaris and extensor digitorum communis. Overuse or repetitive trauma in these areas cause fibrosis and microtears and the vascular ingrowth of the involved tissues as angiofibroblastic hyperplasia<sup>2</sup>.

The most common cause of the tennis elbow in cricketers are chronic repetitive stress and strain to the muscles and tendons of extensor compartment. In cricket the players often require repetitive and strenuous forearm and wrist movements (like hook or pull shot or throwing the ball from deep) that predisposes them towards tennis elbow<sup>3,4</sup>. Some other causes are sudden changes in activity level or intensity, poor physical conditioning (strength and flexibility), inadequate warm up before practice or play, resumption of activity before healing, rehabilitation and conditioning is complete. The choice of cricket bat also has an important role to play. Much like tennis the incorrect grip, incorrect grip size of handle of the bat (often too large) or using a heavy bat along with incorrect hitting posture increases the risk of tennis elbow of a cricketer. Former Indian cricket captain and batting legend Dilip Vengsarkar attributes Tendulkar's tennis elbow (and his own) for overuse of top hand<sup>1</sup>. Common sign and symptoms of tennis elbow are pain and tenderness on the outer side of the elbow, pain or weakness with gripping activities, pain with twisting motions of the wrist (playing cricket, using a screwdriver, opening a door or a jar), pain with lifting objects, sometimes as light as a coffee cup<sup>5</sup>.

The purpose of this study was to compare the effectiveness of Mulligan taping versus kinesiio taping with common use of ultrasound therapy in managing tennis elbow.

## METHODOLOGY

30 patients randomly selected from the population, who were fulfilling the selection criteria (inclusion & exclusion criteria) for the study and were assessed and divided into two equal groups namely Group-A and Group-B, each containing 15 patients.

**Table 1 Inclusion & Exclusion criteria**

Inclusion	Exclusion
Clinically diagnosed tennis elbow	Tennis elbow patient treated with steroid injection previously.
Age 25 to 35 years	Recent fracture around elbow.
Male patients	Metal implant around elbow.
Cricketer players only	Patient who has allergic reaction to therapeutic taping.
Positive Cozens test	Patient who has dermatological problems around lateral epicondyle that may affect the treatment.
Dominant hand with unilateral involvement	Patient with any other condition which may affect the proposed interventions.

## OUTCOME MEASURES

**Visual Analogue Scale (VAS):** Visual Analog Scale is the best 'pencil & paper' method for assessing the intensity of clinical pain. Patients were explained first about the scale and then they were asked to express the intensity of pain by marking or indicating over the line. The length of the scale was 10 cm. There were no numerical marks over the scale, only one end denoted no pain where other end having worst pain. The patient is requested to put a mark on scale at the point, which approximates to the relative intensity of his or her pain experienced in past few days. VAS is also valid and reliable measurement tool for assessing pain in Tennis elbow. The data was collected at baseline, (1<sup>st</sup> day) and after last treatment session (end of 4 week).

**Pain Free Grip Strength (PFGS) Scale:** Pain free grip strength is another measurement tool for assessing outcome measure in Tennis elbow. PFGS was measured in Kgs with a hand-held dynamometer. PFGS has

been found to be a valid measure for assessing clinical change over time in patients with Tennis elbow. PFGS and functional status were captured at baseline, immediately following the first treatment session (1<sup>st</sup> day) and after last treatment session (end of 4 week).

**Patient-Rated Tennis Elbow Evaluation (PRTEE):** Patient-Rated Tennis Elbow Evaluation (PRTEE) is important measurement tool for assessing outcome measure in Tennis elbow. It measures pain, function with the affected arm and usual activities. The PRTEE consists of 15 items. All responses are rated on a Visual Numeric Scale (VNS). This differs from the VAS in that it is an ordinal scale as opposed to a continuous one. Respondents are asked to circle the number that best describes the situation or condition stated in the question. The numbers on the VNS are placed 1 cm apart from one another. The range of possible values is from 0 to 10, where 0 represents 'no pain' or 'no difficulty' and 10 represents 'worst pain imaginable' or 'unable to do', depending on the subscale (pain function/activities). The measurement tool is scored as the mean of all the items. Sub scores for each dimension are scored as the mean of all the items in each particular dimension. Higher scores indicate higher pain and/or higher dysfunction. Its high/worst score is 100 and the lower/best score is 0.

**Hand Held Dynamometer:** PFGS was measured in Kg with a hand-held dynamometer. Patients were instructed to squeeze the dynamometer to the point where they first experienced pain and then release. Patients were blinded to the reading. A total of three measures were recorded with 30-sec rest intervals between each. The mean value of the repetitions was calculated and represented the patient's PFGS. PFGS has been found to be a valid measure for assessing clinical change over time in patients with tennis elbow. The method described by Robert HC<sup>8</sup> was followed.

## INTERVENTION

**Common use of Ultrasound:** Subjects in both the groups received ultrasound therapy for 10 minutes followed by respective tapings (Mulligan or KT). The parameters were 100% duty cycle at a frequency of 1 MHz, delivered at an intensity of 1.5 W/cm<sup>2</sup> over the area of the lateral epicondyle. The patients were positioned supine lying with affected arm resting of the side (over the couch), elbow fully extended, forearm slight pronated and wrist in flexed or extended position. Therapist positioned on the side of the affected elbow.

**Group-A:** For the application of Mulligan taping, tape starts medially on the proximal forearm and tracking laterally across the joint line to anchor off on the distal humerus above the joint line, thus attempting to replicate the force applied during the Sustained Lateral Glide with Pain Free Grip (SLGWPFPG). Non-elastic tape with adhesive backing was used. All patients were seen 3 times a week for 4 weeks for a total of 12 treatment sessions.

**Group-B:** For the application of Kinesio taping, technique was described by Schneider M. et al<sup>7</sup> was followed. The KT group received the application for lateral epicondylitis of the elbow using black 5 cm KT. The subject's forearm was prepared for KT application using alcohol pads. The Kinesio Y strip was applied from insertion to origin, to inhibit muscle function in acutely over-used muscles, with paper-off tension, which refers to application of the tape directly to the skin from the paper backing. The Kinesio Y strip is made from a single strip of tape with a cut down the middle to produce 2 equal size strips. This application decreases the strain placed on the over-used muscle by assisting with muscle contraction. The base of the Y strip was placed near the region of the radial styloid process with no added tension and rubbed in place to initiate glue adhesion. The elbow was placed in a position of slight flexion with the wrist in neutral. The first strip was applied using paper-off tension along the inferior aspect of the common wrist extensor muscle group to the lateral epicondyle of the humerus with paper-off tension. The second strip was applied using paper-off tension along the superior aspect of the common wrist extensor muscle group to meet the first strip at the lateral epicondyle where it was laid down with no tension. The strips were applied with the subject's arm in elbow and wrist extension and wrist ulnar deviation. The KT was applied 30 minutes prior to testing to allow the glue to become fully activated. All patients were seen 3 times a week for 4 weeks for a total of 12 treatment sessions.

## RESULTS

Thirty cricketers with tennis elbow participated in this study, none were lost during the course of the study. The outcomes were measured by VAS, PFGS and PRTEE. Both the groups were considered homogenous with regards to outcome measures values taken at the first day of assessment. Intragroup comparison was analyzed by paired t' test, whereas the intergroups comparison were assessed by independent Fischer's t' test.

The mean score of VAS score reduced from a mean of 5.67 to 2.64 in group-A (Mulligan taping with ultrasound therapy group) where as in group-B (kinesio taping with ultrasound therapy) the mean improves from 5.16 to

1.26. The pain score analysis for intergroup comparison shows significant improvement in group-B subjects as compared to group-A ( $p=7.51053 \times 10^{-05}$ ), thus indicating KT with ultrasound therapy to be more effective towards pain reduction. Although, intragroup analysis clearly depicts both interventions to be effective in pain relief.

PFGS improved from a mean of 44 to 68.7 in group-A (Mulligan taping with ultrasound therapy group) where as in group-B (kinesio taping with ultrasound therapy group) the mean improved from 50.8 to 78.33. Intra group analysis clearly depicts both interventions to be effective in grip strength improvement. The grip strength score analysis for intergroup comparison showed the strength significantly improved in group-B subjects as compared to group-A subjects ( $p=0.02$ ). Thus, indicating KT with ultrasound therapy to be more effective towards grip strength improvement.

The mean score of PRTEE reduced from 68.98 to 44.31 in group-A (Mulligan taping with ultrasound therapy group) where as in group-B (kinesio taping with ultrasound therapy group) the mean reduced from 69.83 to 33.82. Yet intra group analysis clearly depicts both interventions to be effective in grip strength improvement. The pain score analysis for intergroup comparison showed significantly more improvement in group-B subjects as compared to group-A subjects ( $p=4.36936 \times 10^{-05}$ ). Thus, indicating KT with ultrasound therapy to be more effective in attaining functional ability.

## Discussion

Purpose of this study was to compare the effectiveness of Mulligan taping versus kinesio taping with common use of ultrasound therapy in tennis elbow of cricket players. For the KT protocol the study of Melissa Schneider et al<sup>7</sup> using a “Y” strip of kinesio tape was followed. The Mulligan taping followed study of Akram Amro et al<sup>6</sup>. Measurement of the grip strength value before intervention showed that the average PFGS score for the patient population of this study is 44 for group A and 50.8 for group B whereas the normal pain free grip strength value for the normal population is 47. It may appear that the participants had a normal PFGS before treatment but the fact that they are cricketers and they have improved their PFGS scores after treatment shows their grip strength was in fact reduced due to tennis elbow.

In our study population all were cricket players, mainly batsmen. They were affected with tennis elbow in their dominant hand. During the treatment regime players from both the groups were advised against playing vigorously. They were permitted to go for light knocking in the nets but restrained from batting on the pitch. No restrictions, however, were placed on the fielding or bowling.

Out of 15 players in the group A 14 players responded to lateral glide with Mulligan taping & remaining 1 player responded to medial glide. They were taped accordingly.

We also found kinesio tape was better tolerated by the players while the patients with mobilization with movement (Mulligan) tape developed skin irritation in some players. For this reason, we asked those patients (3 in no) to remove the tape after 24 hrs. The KT group did not face this problem. For the skin irritation problem, we treated them with lactocalamine lotion. Only one player developed mild rashes on the treatment area and he was treated with antihistaminic group of drugs by a physician for last one week of the treatment session.

30 subjects who met the inclusion criteria were assigned into two groups, group-A and group-B. The result of this study supports that kinesio taping with ultrasound therapy has much better improvement compared to Mulligan taping with ultrasound therapy. Statistical analysis showed that the mean of VAS score in Group-A (Mulligan taping with ultrasound therapy group) is 5.67 before treatment and 2.64 after 4 weeks of treatment and for Group-B (kinesio taping with ultrasound therapy group) it is 5.16 before treatment and 1.26 after treatment. Both groups showed significant reduction in VAS score, but group-B showed better improvement than group-A.

The other outcome measure was Pain Free Grip Strength (PFGS). Statistical analysis showed that PFGS scores better improvement in favor of group-B than group-A. In group-A, average mean of PFGS (Pain Free Grip Strength) scores are 44 before treatment and 68.7 at the end of 4<sup>th</sup> week of treatment. In group-B it is 50.8 before treatment and 78.33 at the end of 4<sup>th</sup> week of treatment. This indicates that group-B is significantly better than group-A.

The statistical analysis also showed that there was significant reduction PRTEE score within both group i.e. group-A and group-B. There was significant difference between group-A and group-B but group-B showed better reduction in PRTEE scores than group-A. Result showed that reduction of the mean value of PRTEE score from 1<sup>st</sup> day of treatment to end of 4 weeks of treatment in both groups (group-A and group-B). The result showed that group-A PRTEE scores are 68.98 before treatment and 44.3133 at the end of 4<sup>th</sup> week of treatment. In group-B it is 69.82667 before treatment and 33.82 at the end of 4<sup>th</sup> week of treatment. This indicates that better improvement in group-B and group-B is significant than group-A.

In our study we had used UST as a common treatment, for practical as well as ethical considerations. So, it will be difficult to judge the exact effect of the two different taping techniques. However, as the difference between Kinesio tape and Mulligan tape is significant it clearly shows KT is better.

Based on the results of our study we can definitely recommend use of KT for tennis elbow in cricket players.

#### **Limitation of the study**

The primary limitation of this was only male cricketer were recruited with acute symptom. The duration of the study was only four weeks with less sample size. We had not considered body mass index of the players for assessing PFGS.

#### **Future Recommendation**

Further studies could be done on chronic symptoms with proper follow up, in order to observe the long-term effect of treatment protocol.

#### **CONCLUSION**

The results of this randomized clinical trial demonstrate that kinesio taping with ultrasound therapy was found to provide a superior benefit in terms of pain, PFGS and PRTEE when compared to a treatment regimen consisting of Mulligan taping with ultrasound therapy over a period of four weeks in athletes with tennis elbow. However, both interventions appear to have a positive effect in pain, PFGS and PRTEE as a short term of treatment for tennis elbow. As differences of all outcome measures were greater for kinesio taping with ultrasound therapy, it seems to be the more effective treatment choice for the athletes whose are suffering from tennis elbow.

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