EFFICACY OF KINESIO TAPING ALONG WITH DROP SQUAT EXERCISES VERSUS KINESIO TAPING ALONG WITH LEG EXTENSION EXERCISES ON PAIN AND MUSCLE STRENGTH AMONG VOLLEYBALL PLAYERS -- A COMPARATIVE STUDY

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ABSTRACT

Background: Jumper's knee is a clinically diagnosed condition of activity related to the anterior knee pain associated with tenderness at the inferior pole of the patella where the patellar tendon attaches. The prevalence of this condition in elite volleyball players and basketball players has been found to be over 40 percent. Most common symptoms of Jumper's knee are pain, tenderness, and stiffness around the joint and pain is occurring with varying intensities. The study's primary objective was to find out the Efficacy of Kinesio taping along with Drop squat exercises and Kinesio taping along with Leg extension exercises on pain and muscle strength among volleyball players. **Methodology**: A comparative study design was used. A criterion-based random sampling method was used to recruit players (N=20) diagnosed with Jumper's knee, and they were randomized into two treatment groups. The experimental Group-A received Kinesio taping along with Drop squat exercises whereas those assigned to experimental Group-B received Kinesio taping along with Leg extension exercises for a period of 12 weeks with one session for 5 days in a week. The efficacy of the treatment was measured through the Numerical pain rating scale and Handheld dynamometer. Both paired and unpaired 't' tests were employed to study the treatment effectiveness **.Result**: Pretest and post-test values were calculated by paired t-test used for within-group analysis. The calculated t-value was greater than the table t-value. The table value was 2.048 at 5% level of significance. In between group analysis calculated by unpaired t-test shown pre-pre comparison values were less than table value. There was no significant difference.However, post-post comparison value was greater than table t value 2.145 at 5% level of significance.There is an improvement in both groups eventually. Group A have more significant improvement than group B at 5% level of significant with degrees of freedom (df=9 and df=18).There is an improvement in both groups eventually. Group A have more significant improvement than Group B at 5% level of significance with degrees of freedom (df= 9 and df =18**).Conclusion**: There is a significant reduction in pain intensity, improvement in muscle strength, and overall function of the leg following the application of Kinesio taping along with the Drop squat exercises for a period of 3 months in Jumper's knee players.

Key words: Jumper's knee, Kinesio taping, NPRS Scale, Hand-held dynamometer, Drop squat exercises, Leg-extension exercises.

INTRODUCTION

Jumper's knee, also known as patellar tendinitis or patellar tendinopathy, is a degenerative overuse injury affecting the patellar tendon due to repetitive stress, commonly seen in athletes aged 15-30 who participate in high-impact sports like basketball, volleyball, and high jump. The condition arises from repetitive microtrauma to the tendon-bone interface, leading to pain, tenderness, and stiffness at the inferior pole of the patella, which worsens with activity but remains absent at rest. The most significant risk factor is excessive training load, with prevalence rates highest in elite volleyball players (45%) and basketball players (32%), and male athletes experiencing twice the prevalence as females. The biomechanics of knee extension involve the quadriceps muscle exerting force through the patella, which acts as a pulley to transmit force to the tibia**,** but repeated high forces (up to 14 times body weight**)** during jumping and landing cause microtears, inflammation, and tendon degeneration. The condition progresses through four clinical stages**,** from mild post-activity pain (Stage 1) to persistent pain limiting performance (Stage 3) and complete patellar tendon rupture requiring surgery (Stage 4). Diagnosis involves clinical examination along with X-rays to rule out bone injuries, ultrasound to detect tendon tears, and MRI to assess structural damage**.** Conservative treatment focuses on eccentric strengthening exercises**,** physiotherapy**,** soft tissue mobilization**,** Kinesio taping**,** and shock wave therapy to promote healing. Medical management includes NSAIDs for pain relief and corticosteroid injections, although these may impair tendon healing. Surgical options such as tenotomy, inferior pole resection, and fat pad detachment are considered in severe cases when conservative methods fail. Rehabilitation aims to reduce inflammation, restore quadriceps strength, and enhance knee stability through progressive strengthening exercises, proprioceptive training, and plyometrics to prevent recurrence. Outcome measures like the Numerical Pain Rating Scale (NPRS) and Hand-Held Dynamometer **assess** pain intensity and muscle function, helping to monitor recovery and guide treatment. Early diagnosis and proper rehabilitation are crucial to prevent long-term complications and optimize athletic performance

METHODOLOGY

STUDY DESIGN:The study was a comparative pre-test and post-test evaluation conducted at the Outpatient Department of PPG College of Physiotherapy, Coimbatore, over a period of six months. The study population consisted of collegiate male volleyball players aged 19-25 years diagnosed with Stage 2 Jumper's knee in the sub-acute stage, selected using a simple randomized sampling technique via the slot method. SUBJECTS: A total of 30 subjects were included, with 10 participants in Group A and 10 in Group B. Inclusion criteria included a positive Tap test and Basset sign, with no prior medical or physiotherapy treatment, while exclusion criteria encompassed unstable knees, lower limb fractures, allergic reactions to taping material, recent knee or ligament injuries, and the use of orthotics. Ethical approval was obtained, and subjects were informed about the study objectives, procedures, and

treatment techniques before signing an informed consent form. A patch test was conducted to check for allergic reactions to Kinesio taping before participants were assigned into two groups: Group A received Kinesio tape along with drop squat exercises, while Group B received Kinesio tape along with leg-extension exercises. Pain intensity and muscle strength were measured using the Numeric Pain Rating Scale (NPRS) and a Hand-held dynamometer, with pre-test values recorded before intervention and post-test values documented after 4 and 12 weeks. Treatment was administered for 12 weeks, five days per week, with one session per day. The study utilized essential materials including an informed consent form, couch, towel, pen, paper, Kinesio tape, writing pad, timer, and ice. The objective was to assess pain reduction and muscle strength improvement through different exercise interventions combined with Kinesio taping.

DESCRIPTION OF INTERVENTION

Treatment Technique	**Details**
Patch Test	A small adhesive/tape piece was placed on sensitive skin, covered with a band-aid, and left overnight. The next day, the area was checked for redness or irritation. If any reaction occurred, the subject was excluded.
Taping Procedure for Group A & B	The U-strip technique was used. Tape length was measured from the medial to the lateral portion of the patella. It was applied with 50% paper-off tension, pressing down on the lower patella. The tape was adjusted until a wave pattern appeared. The knee was flexed to 90 degrees while applying the remaining tape with slight tension. The tape was changed every 3 days.
Group A – Kinesio Taping with Drop Squat Exercises	**Patient Position:** Standing. **Therapist Position:** Standing in front of the patient. **Exercise Routine:** Ice and rest for the first 2 weeks. Kinesio tape applied, then subjects performed drop squats by standing with feet hip to shoulder-width apart, keeping the upper body neutral, bending knees into a squat, and using their heels to return to the starting position.
Group B – Kinesio Taping with Leg	**Patient Position:** Sitting on a chair/couch while holding onto the chair. **Therapist Position:** Standing beside or in front of the patient.

Treatment Technique	Details
Extension Exercises	**Exercise Routine:** Ice and rest for the first 2 weeks. Kinesio tape applied, then subjects were seated and instructed to raise the leg to a 180-degree angle with toes pointed upward before returning to the starting position.
Exercise Routine for Both Groups	**Duration:** 5 days/week for 12 weeks. **Repetitions:** Group A: 60 repetitions (3 sets of 20 reps).

STATISTICAL ANALYSIS:

The result was analysed for pre and post test values using paired 't' test favored for alternate hypothesis. The statistical tool used in this study are paired t-test. The paired t-test was used for within group analysis. Pre -test and post-tet values were calculated using paired t test at significant level $p<0.05$ with t-value.

RESULTS

Group Analysis of the Numeric Pain Rating Scale (NPRS):

Group	Pre-Test Mean ± SD	Post-Test Mean ± SD	Calculated t-Value	Table t-Value	Significance Level ($p < 0.05$)	Inference
Group A (Drop Squat Exercises)	5 ± 0.48	2.2 ± 0.36	21.56	2.262	Significant	Significant reduction in pain after intervention.
Group B (Leg Extension Exercises)	5 ± 0.48	3.4 ± 0.1	7.31	2.262	Significant	Significant reduction in pain after intervention.

The obtained t-values for both Group A and Group B were greater than the table t-value at the $p < 0.05$ level of significance for 9 degrees of freedom. Hence, the statistical report states that there were statistically significant improvements in reducing pain after the application of the intervention in both groups.

Within Group and Between Group Analysis of the Numeric Pain Rating Scale (NPRS):

Analysis	Group	Pre-Test Mean ± SD	Post-Test Mean ± SD	Calculated t-Value	Table t-Value	Significance Level	Inference
Within Group Analysis	**Group A (Drop Squat Exercises)**	5 ± 0.48	2.2 ± 0.36	21.56	2.262	$p < 0.05$ (Significant)	Significant reduction in pain after intervention.
	Group B (Leg Extension Exercises)	5 ± 0.48	3.4 ± 0.1	7.31	2.262	$p < 0.05$ (Significant)	Significant reduction in pain after intervention.
Between Group Analysis	**Pre-Test (Group A vs. Group B)**	5 ± 0.48	5 ± 0.48	0	2.101	$p > 0.05$ (Not Significant)	No significant difference in pre-test comparison.
	Post-Test (Group A vs. Group B)	2.2 ± 0.36	3.4 ± 0.1	4.68	2.101	$p < 0.05$ (Significant)	Significant difference in post-test comparison.

The obtained t-value is greater than the table t-value at the significant level of $p < 0.05$.

Hence, the statistical report states that there were significant differences in post-test comparisons.

DISCUSSION

Jumper's knee, also known as patellar tendinopathy, is an injury characterized by inflammation of the patellar tendon, commonly caused by repetitive jumping or running. This study evaluated the effectiveness of Kinesio taping combined with Drop squat exercises versus Kinesio taping with Leg extension exercises on pain reduction and muscle strength improvement in athletes with Jumper's knee. A total of 20 participants were selected based on specific criteria and underwent interventions for 12 weeks. Pain levels and muscle strength were assessed using the NPRS scale and Hand-held dynamometer. Brumitt et al. (2019) investigated the prevalence of Jumper's knee in 95 male collegiate basketball players, reporting that 33.79% showed ultrasonographic evidence of patellar tendon abnormality, with 21.1% experiencing both pain and tendon abnormalities. The study highlighted that Jumper's knee is highly prevalent among elite athletes, particularly in basketball and volleyball.Kumar et al. (2020) conducted a randomized clinical trial comparing the effects of decline squat exercises and forward lunges in 30 basketball players with patellar tendinopathy. Their findings indicated that both exercises effectively reduced pain and improved function over four weeks, with the decline squat exercise showing superior clinical benefits.Massei et al. (2015) examined the effects of therapeutic taping on pain, range of motion, strength, balance, and power in athletes and non-athletes with acute Jumper's knee, further supporting the role of taping as a beneficial intervention.Overall, the present study reinforces the effectiveness of Kinesio taping in combination with specific exercise interventions for managing Jumper's knee by significantly improving pain levels and muscle strength in athletes.

LIMITATIONS

The participants selected for this study were only male athletes.

This study was limited to a particular age group.

The study has been conducted with small sample size.

SUGGESTIONS

This study was limited to particular players.

Further studies can be done in different age groups and different Players.

Further studies can be done with female players.

Further study can be done with larger sample size.

Further studies can be done with lesser duration.

Further studies can be done based on different outcome measures and measurement-Scale

Conclusion

This study demonstrated that both Kinesio taping with Drop squat exercises and Kinesio taping with Leg extension exercises effectively reduced pain and improved muscle strength in athletes with Jumper's knee. However, statistical analysis revealed that Group A (Kinesio taping with Drop squat exercises) showed significantly greater improvements compared to Group B. The findings support the effectiveness of Kinesio taping in combination with targeted exercises for enhancing muscle strength, reducing pain, and improving overall knee function.

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