Effect of Kinesiology Taping Combined with Closed Chain Exercises for Upper Limb in Shoulder Impingement Syndrome on Pain and Function Among Athletes: An Experimental Study

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Abstract— Background: Shoulder impingement syndrome (SIS) is a common musculoskeletal disorder among athletes, significantly impacting pain and function. Kinesiology taping (KT) and closed-chain exercises (CCE) have been individually used for shoulder rehabilitation, but their combined effect remains underexplored.
Objective: To evaluate the effect of kinesiology taping combined with closed-chain exercises on pain and function in athletes with SIS.
Methods: This experimental study included 40 athletes diagnosed with SIS, randomly allocated into two groups: Group A (KT + CCE) and Group B (CCE only). Pain intensity was assessed using the Numeric Pain Rating Scale (NPRS), and shoulder function was evaluated using the Shoulder Pain and Disability Index (SPADI). The intervention lasted for four weeks, with three sessions per week. Pre- and post-intervention scores for NPRS and SPADI were analyzed using paired and independent t-tests.
Results: Group A demonstrated a significant reduction in NPRS scores (mean difference: 3.5, $p<0.001$) and SPADI scores (mean difference: 20.8, $p<0.001$) compared to Group B (mean NPRS difference: 2.1, $p<0.01$; mean SPADI difference: 12.5, $p<0.01$). Intergroup analysis revealed statistically significant improvements in Group A for both outcomes ($p<0.05$).
Conclusion: The combination of kinesiology taping and closed-chain exercises was more effective in reducing pain and improving function in athletes with SIS compared to closed-chain exercises alone. This intervention offers a promising approach for athletic rehabilitation.

Index Terms- Kinesio taping, closed chain exercises, shoulder impingement syndrome, athlete.

I. INTRODUCTION

Shoulder impingement syndrome (SIS) is one of the most prevalent causes of shoulder pain in athletes, particularly those involved in overhead sports such as swimming, tennis, and volleyball. SIS is characterized by the compression of soft tissues, such as the rotator cuff tendons, beneath the acromion during shoulder movement. This condition leads to pain, reduced range of motion, and functional impairment.

Current rehabilitation strategies for SIS include physical therapy interventions such as exercise therapy, manual therapy, and adjunctive modalities like kinesiology taping (KT). KT is known for its ability to provide proprioceptive input, reduce pain, and improve muscle activation. Closed-chain exercises (CCE), on the other hand, enhance stability and strength by engaging multiple muscle groups simultaneously. While both interventions are effective individually, their combined effect on SIS has not been adequately studied.

This study aimed to evaluate the efficacy of combining KT with CCE in improving pain and function among athletes with SIS.

II. MATERIALS AND METHODOLOGY

Study Design: A randomized controlled trial conducted over eight weeks.
Participants: Forty athletes aged 18-35 years, diagnosed with SIS based on clinical tests (Neer's and Hawkins-Kennedy tests) and confirmed by imaging. Inclusion criteria included moderate pain (NPRS ≥ 5) and functional limitation (SPADI $\geq 50\%$). Athletes with previous shoulder surgeries or systemic conditions were excluded.
Intervention:

- Group A (KT + CCE): KT was applied to the affected shoulder using a tension of 25-50%, targeting the deltoid and supraspinatus muscles.

CCE included wall push-ups, weight-bearing activities, and scapular stability exercises.

- Group B (CCE only): Participants performed the same CCE protocol as Group A without KT.

Both groups attended three sessions per week for four weeks. Each session lasted 45 minutes, supervised by a physiotherapist.

Outcome Measures:

- Pain: Numeric Pain Rating Scale (NPRS).
- Function: Shoulder Pain and Disability Index (SPADI).

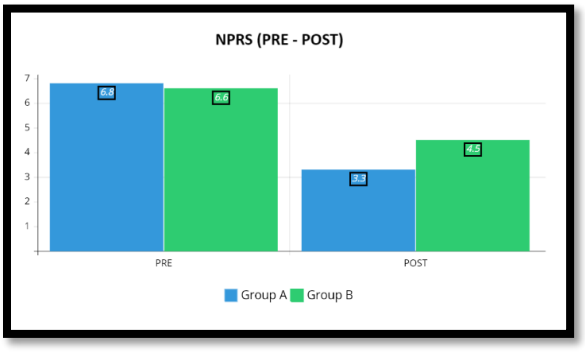
III. DATA ANALYSIS

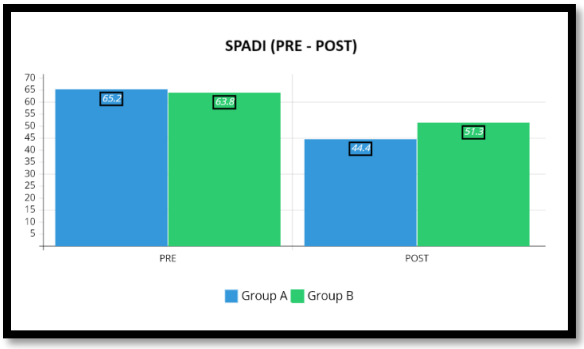
Data were analyzed using SPSS (version 25). Paired t-tests assessed within-group differences, and independent t-tests compared between-group differences. A p-value <0.05 was considered statistically significant.

IV. RESULTS

Participant Characteristics: All 40 participants completed the study. The mean age was 25.3 ± 4.2 years, with no significant baseline differences between groups.

Group	NPRS (Pre)	NPRS (Post)	SPADI (Pre)	SPADI (Post)
Group A	6.8 ± 1.2	3.3 ± 0.9	65.2 ± 8.7	44.4 ± 6.5
Group B	6.6 ± 1.1	4.5 ± 1.2	63.8 ± 9.1	51.3 ± 7.8





V. DISCUSSION

The findings of this study indicate that combining kinesiology taping with closed-chain exercises significantly improves pain and function in athletes with SIS compared to closed-chain exercises alone. The proprioceptive input from KT may enhance neuromuscular control, while CCE strengthens stabilizing muscles and improves shoulder kinematics. These results align with previous studies demonstrating the effectiveness of KT and CCE individually. The synergistic effect observed in this study highlights the potential benefits of an integrated approach to rehabilitation.

VI. LIMITATIONS

- Small sample size limits generalizability.
- Short intervention duration may not reflect long-term outcomes.
- Absence of a follow-up period to assess sustained effects.

VII. FURTHER RECOMMENDATIONS

- Conduct studies with larger sample sizes and diverse populations.
- Investigate the long-term effects of the combined intervention.
- Explore the impact of different taping techniques and exercise protocols.

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