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Original Article

The Role of Therapeutic Taping Techniques in Enhancing Motor Function and Reducing Pain in Patients with Rotator Cuff Tendinopathy: A Randomized Controlled Trial

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ABSTRACT

Background: Rotator cuff tendinopathy is a prevalent condition that impairs shoulder function and quality of life. While conventional treatments exist, they often have limitations in terms of invasiveness and effectiveness. Therapeutic taping has emerged as a non-invasive alternative that may enhance motor function and alleviate pain through mechanisms such as increased proprioceptive feedback and pain modulation.

Objective: This randomized controlled trial aimed to evaluate the effectiveness of therapeutic taping in enhancing motor function and reducing pain in patients with rotator cuff tendinopathy compared to standard physical therapy alone.

Methods: Fifty-six participants diagnosed with rotator cuff tendinopathy were recruited from Johar Poly Clinic, Lahore, and randomly assigned to two groups: an intervention group receiving therapeutic taping along with standard physical therapy, and a control group receiving standard physical therapy alone. Inclusion criteria were adults aged 18-60 years with a clinical diagnosis of rotator cuff tendinopathy confirmed by ultrasound. Exclusion criteria included previous shoulder surgery, systemic diseases affecting the musculoskeletal system, and any contraindication to taping. Outcome measures included the Shoulder Pain and Disability Index (SPADI) and range of motion (ROM), assessed at baseline, 4 weeks, and 8 weeks. Data were analyzed using repeated measures ANOVA in SPSS version 25.

Results: The intervention group showed significant improvements in both SPADI scores, and ROM compared to the control group. SPADI scores in the intervention group decreased from 68.4 (SD 12.3) at baseline to 50.2 (SD 10.6) at 4 weeks and 38.9 (SD 8.4) at 8 weeks ($p < 0.01$). ROM increased from 110.5 degrees (SD 15.2) at baseline to 125.4 degrees (SD 13.5) at 4 weeks and 135.3 degrees (SD 12.9) at 8 weeks ($p < 0.01$). The control group showed minimal changes in SPADI scores and ROM over the same periods.

Conclusion: Therapeutic taping proves to be a valuable adjunct to physical therapy, offering significant benefits in pain reduction and enhanced motor function for patients with rotator cuff tendinopathy. These findings advocate for the integration of therapeutic taping into standard treatment protocols, though further research is needed to standardize taping techniques and understand patient-specific responses for broader clinical application.

Keywords: rotator cuff tendinopathy, therapeutic taping, pain reduction, motor function, randomized controlled trial, SPADI, shoulder mobility.

INTRODUCTION

Rotator cuff tendinopathy is a prevalent musculoskeletal disorder characterized by pain and functional disability in the shoulder, leading to a significant impairment of quality of life. The rotator cuff, comprising a group of four muscles and their tendons, plays a critical role in shoulder movement and stability. Overuse, aging, or injury can lead to inflammation or degenerative changes in these tendons, resulting in tendinopathy. Conventional treatment options for rotator cuff tendinopathy include physical therapy, medication, and in severe cases, surgery. While these treatments can be effective, they are often associated with high costs, invasiveness, and variable success rates (1, 2). Recently, therapeutic taping has emerged as an innovative, non-invasive intervention aimed at providing pain relief and functional improvement by stabilizing the shoulder joint, altering muscle function, and reducing the load on tendons.

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Therapeutic taping, particularly Kinesio taping, is a relatively novel modality that has gained popularity in clinical settings. Its novelty lies in providing immediate support to the joint while allowing full motion, which is crucial for rehabilitation and the performance of daily activities. The hypothesized mechanisms through which therapeutic taping exerts its benefits include enhancement of proprioceptive feedback, modulation of the pain gate mechanism, and mechanical support to the affected tissues. Proprioceptive feedback refers to the body's ability to sense the position and movement of joints and muscles. Therapeutic taping is believed to facilitate skin receptors, thereby increasing afferent feedback to the brain, leading to enhanced muscle activity and coordination (3, 4). This mechanism is particularly beneficial in rotator cuff tendinopathy, where pain and disability often occur alongside disrupted shoulder mechanics.

Another significant mechanism is the potential influence of taping on pain modulation, based on the gate control theory. The mechanical lift produced by taping across the skin is postulated to reduce pressure on subdermal and subcutaneous regions, thereby impeding pain signals to the brain and reducing the patient's perception of pain (5, 6). Additionally, therapeutic taping provides mechanical support directly to the shoulder tissues without limiting the range of movement. Unlike standard athletic taping, which can restrict motion, Kinesio taping supports the affected tendons and muscles, reducing the load and strain associated with movement or activity. This support not only alleviates pain but also allows the tendons to heal, thereby preventing further injuries (7, 8).

Despite its widespread use and anecdotal success, the scientific evidence supporting the efficacy and mechanisms of therapeutic taping in rotator cuff tendinopathy remains limited and somewhat mixed. While some studies have demonstrated significant improvements in pain and function with therapeutic taping, others have reported minimal or no benefits compared to control treatments. These inconsistencies may be due to variations in taping techniques, study designs, or patient populations (9, 10). There is a clear need for well-designed randomized controlled trials that not only assess clinical outcomes but also investigate the physiological responses to taping. Such studies are essential for developing evidence-based protocols and potentially integrating therapeutic taping into standard treatment regimens for rotator cuff tendinopathy, thereby reducing dependence on more invasive treatments and the risk of chronic pain and disability.

In summary, therapeutic taping offers several theoretical advantages over other conservative therapies for rotator cuff tendinopathy. By increasing proprioceptive feedback, modulating pain, and providing mechanical support, therapeutic taping has the potential to significantly improve pain and function in affected patients. However, further research is needed to standardize taping techniques and understand the specific patient characteristics that influence treatment outcomes. This study aims to fill this gap by providing empirical evidence for the benefits of therapeutic taping and exploring its role as a simple, cost-effective adjunct to conventional treatments for rotator cuff tendinopathy (11, 12).

MATERIAL AND METHODS

The This randomized controlled trial was designed to evaluate the effectiveness of therapeutic taping techniques in enhancing motor function and reducing pain in patients with rotator cuff tendinopathy. The study included a total of 56 participants who were recruited from Johar Poly Clinic, Lahore. Participants were adults aged 18-60 years with a clinical diagnosis of rotator cuff tendinopathy confirmed by ultrasound. Exclusion criteria included a history of previous shoulder surgery, systemic diseases affecting the musculoskeletal system, and any contraindications to taping (13).

Participants were randomly assigned to one of two groups: the intervention group, which received therapeutic taping along with standard physical therapy, and the control group, which received standard physical therapy alone. Randomization was performed using a computer-generated random sequence to ensure allocation concealment. The intervention involved the application of Kinesio tape directly over the affected rotator cuff tendons in specific patterns designed to reduce strain and facilitate muscle function. The tape was applied by a trained physical therapist who ensured consistency in the application technique

Data collection involved baseline assessments followed by follow-up assessments at 4 weeks and 8 weeks. Outcome measures included the Shoulder Pain and Disability Index (SPADI) for evaluating pain and functional limitations, and the Range of Motion (ROM) measured using a standard goniometer. The SPADI is a validated questionnaire that consists of two subscales: one for pain and one for functional activities. ROM measurements were taken for shoulder flexion, abduction, and external rotation. All assessments were performed by a blinded assessor to minimize bias.

Ethical approval for the study was obtained from the ethics committee of Johar Poly Clinic. The study adhered to the principles outlined in the Declaration of Helsinki. All participants provided written informed consent prior to participation. They were informed about the study’s purpose, procedures, potential risks, and benefits.

Statistical analysis was performed using SPSS version 25. Repeated measures ANOVA was used to compare changes over time between the two groups. The primary outcomes were changes in SPADI scores and ROM from baseline to 4 weeks and 8 weeks.

Secondary analyses included within-group comparisons over the same time periods. Statistical significance was set at $p < 0.05$. Data were checked for normality and homogeneity of variance to ensure the assumptions of the ANOVA were met. In cases where data violated these assumptions, appropriate non-parametric tests were used.

In summary, this study employed rigorous methods to assess the impact of therapeutic taping on pain and motor function in patients with rotator cuff tendinopathy. By using standardized protocols for taping and outcome assessments, the study aimed to provide reliable and generalizable results to inform clinical practice (14, 15).

RESULTS

In this randomized controlled trial, 56 patients diagnosed with rotator cuff tendinopathy were recruited and randomly assigned to either the intervention group (n=28) receiving therapeutic taping plus standard physical therapy or the control group (n=28) receiving standard physical therapy alone. The demographic and baseline characteristics of the participants are presented in Table 1. Both groups were comparable in terms of age, gender distribution, duration of symptoms, baseline SPADI scores, and ROM.

Table 1: Demographic and Baseline Characteristics of Participants

Characteristic	Intervention Group (n=28)	Control Group (n=28)
Age (years), mean (SD)	42.5 (8.2)	43.1 (7.9)
Gender, n (%)		
Male	16 (57.1%)	15 (53.6%)
Female	12 (42.9%)	13 (46.4%)
Duration of Symptoms (months), mean (SD)	6.3 (2.1)	6.1 (2.3)
Baseline SPADI Score, mean (SD)	68.4 (12.3)	67.8 (11.9)
Baseline ROM (degrees), mean (SD)	110.5 (15.2)	111.2 (14.8)

Table 2: Comparison of SPADI Scores and ROM at Baseline, 4 Weeks, and 8 Weeks

Time Point	Group	SPADI Score, mean (SD)	ROM (degrees), mean (SD)
Baseline	Intervention	68.4 (12.3)	110.5 (15.2)
	Control	67.8 (11.9)	111.2 (14.8)
4 Weeks	Intervention	50.2 (10.6)	125.4 (13.5)
	Control	65.1 (11.5)	113.8 (14.2)
8 Weeks	Intervention	38.9 (8.4)	135.3 (12.9)
	Control	63.4 (11.8)	115.2 (13.9)

The intervention group exhibited significant improvements in both SPADI scores, and ROM compared to the control group at 4 weeks and 8 weeks. The SPADI scores in the intervention group decreased from a mean of 68.4 (SD 12.3) at baseline to 50.2 (SD 10.6) at 4 weeks, and further to 38.9 (SD 8.4) at 8 weeks. In contrast, the control group showed minimal changes in SPADI scores, decreasing from 67.8 (SD 11.9) at baseline to 65.1 (SD 11.5) at 4 weeks, and to 63.4 (SD 11.8) at 8 weeks.

Similarly, the ROM in the intervention group increased significantly from a mean of 110.5 degrees (SD 15.2) at baseline to 125.4 degrees (SD 13.5) at 4 weeks, and to 135.3 degrees (SD 12.9) at 8 weeks. The control group showed less pronounced changes, with ROM increasing from 111.2 degrees (SD 14.8) at baseline to 113.8 degrees (SD 14.2) at 4 weeks, and to 115.2 degrees (SD 13.9) at 8 weeks.

Statistical analysis using repeated measures ANOVA indicated that the improvements in SPADI scores and ROM were significantly greater in the intervention group compared to the control group at both follow-up intervals ($p < 0.01$). These findings suggest that therapeutic taping, when used as an adjunct to standard physical therapy, significantly enhances pain reduction and motor function in patients with rotator cuff tendinopathy.

Overall, the results of this study provide strong evidence supporting the effectiveness of therapeutic taping in improving clinical outcomes for patients with rotator cuff tendinopathy. The intervention group experienced substantial improvements in both pain and shoulder mobility, highlighting the potential of therapeutic taping as a valuable addition to conventional physical therapy protocols.

DISCUSSION

The results of this randomized controlled trial highlight the significant benefits of therapeutic taping as an adjunct to standard physical therapy for patients with rotator cuff tendinopathy. The intervention group exhibited substantial improvements in pain reduction and shoulder mobility, as evidenced by significant decreases in SPADI scores and increases in ROM over the 8-week period.

These findings are consistent with previous studies that have demonstrated the positive effects of therapeutic taping on musculoskeletal disorders(16-18).

Several studies have reported similar outcomes regarding the efficacy of kinesiology taping. For instance, Kaya et al. (2011) found that kinesiology taping significantly reduced pain and improved daily functioning in patients with shoulder disorders, aligning with the marked decrease in SPADI scores observed in this study (19). Additionally, Thelen et al. (2008) demonstrated enhanced shoulder joint positioning and movement following the application of kinesiology tape, which parallels the improvements in ROM seen in our intervention group (20).

However, the literature also contains studies with mixed results regarding the effectiveness of therapeutic taping. Montalvo et al. (2014) conducted a systematic review and highlighted the variability in outcomes, noting that while some patients experienced significant benefits, others showed minimal or no improvement (21). These discrepancies may be attributed to differences in taping techniques, study designs, and patient characteristics (22,23). The standardized application technique and consistent follow-up assessments in our study likely contributed to the significant findings.

The theoretical mechanisms through which therapeutic taping exerts its effects are multifaceted. Proprioceptive feedback is enhanced by facilitating skin receptors, increasing afferent feedback to the brain, and thereby improving muscle activity and coordination. This is particularly relevant for patients with rotator cuff tendinopathy, where pain and disability often disrupt shoulder mechanics(24). Furthermore, the gate control theory posits that the mechanical lift produced by taping reduces pressure on subdermal and subcutaneous regions, thereby impeding pain signals to the brain and reducing the perception of pain (25,26).

Despite these promising results, the study had several limitations. The sample size, although adequate for detecting significant differences, was relatively small and drawn from a single clinic, which may limit the generalizability of the findings. Additionally, the study duration was limited to 8 weeks, and longer-term follow-up is necessary to determine the sustained effects of therapeutic taping. Future studies should consider larger, multicentre trials with extended follow-up periods to confirm and extend these findings.

The strengths of this study include its randomized controlled design, which minimizes bias and allows for robust comparisons between groups. The use of validated outcome measures, such as the SPADI and standardized ROM assessments, ensured the reliability and validity of the findings. Moreover, the consistent application of taping techniques by a trained physical therapist enhanced the intervention's fidelity.

In conclusion, this study provides compelling evidence for the effectiveness of therapeutic taping in reducing pain and enhancing motor function in patients with rotator cuff tendinopathy. The significant improvements in SPADI scores and ROM in the intervention group suggest that therapeutic taping is a valuable adjunct to standard physical therapy. These findings support the integration of therapeutic taping into clinical practice, offering a non-invasive, cost-effective option for managing rotator cuff tendinopathy. However, further research is needed to standardize taping techniques and explore the long-term benefits and potential patient-specific responses to therapeutic taping. By addressing these areas, future studies can contribute to the development of evidence-based protocols that maximize the clinical utility of therapeutic taping for musculoskeletal disorders.

CONCLUSION

Therapeutic taping proves to be a valuable adjunct to physical therapy, offering significant benefits in pain reduction and enhanced motor function for patients with rotator cuff tendinopathy. These findings advocate for the integration of therapeutic taping into standard treatment protocols, though further research is needed to standardize taping techniques and understand patient-specific responses for broader clinical application.

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