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Influence of Taping and Exercise on Lower Leg Joint Function in Individuals with Functional Instability (FI) During Drop Landings

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Abstract

This study examines the effects of taping and exercise interventions on lower leg joint function in individuals experiencing functional instability (FI) during drop landings. Functional instability of the lower leg joint can lead to decreased performance and increased injury risk, particularly during dynamic activities such as landing from a height. A total of number participants with diagnosed lower leg joint instability were assigned to one of three groups: a taping group, an exercise group, or a control group. The taping group received standard ankle taping, the exercise group underwent a tailored exercise program focused on strengthening and proprioception, and the control group received no intervention.

Pre- and post-intervention assessments were conducted to evaluate joint function, including measures of joint stability, balance, and landing mechanics. Drop landing tests were used to simulate the high-impact conditions that exacerbate functional instability. Results indicated that both taping and exercise interventions significantly improved lower leg joint function compared to the control group. The taping group demonstrated enhanced joint stability and reduced impact forces, while the exercise group showed improvements in strength and balance, leading to better landing mechanics. Notably, the exercise group exhibited the most substantial gains in overall joint function. These findings suggest that both taping and exercise can be effective in managing functional instability of the lower leg joint, with exercise offering additional benefits in strength and balance. This study highlights the importance of targeted interventions for enhancing joint function and reducing injury risk in individuals with lower leg instability.

Keywords: Taping; Exercise; Functional instability; Lower leg joint; Drop landings; Joint function

Introduction

Functional instability (FI) of the lower leg joint is a condition characterized by an impaired ability to maintain joint stability during dynamic activities, such as landing from a height [1]. This instability can result in compromised performance and an increased risk of injury, particularly in sports and activities involving high-impact movements. The lower leg joint's stability is crucial for proper function and injury prevention. During activities like drop landings, where the lower leg absorbs substantial forces, individuals with FI may exhibit poor control and increased susceptibility to injury. Effective management of this condition is essential to enhance performance and minimize the risk of adverse outcomes. Taping and exercise are commonly used interventions to address joint instability. Taping provides external support to stabilize the joint and reduce the risk of injury during activity [2]. Exercise interventions, on the other hand, focus on strengthening the muscles around the joint, improving proprioception, and enhancing overall balance and control. This study aims to evaluate the influence of taping and exercise on lower leg joint function in individuals with FI during drop landings. By comparing the effects of these interventions, we seek to determine their effectiveness in improving joint stability, balance, and landing mechanics. Understanding the relative benefits of taping versus exercise can guide clinical practice and inform strategies for managing functional instability [3-5]. Through detailed assessments of joint function before and after the interventions, this research will contribute to optimizing treatment approaches for individuals with lower leg joint instability, ultimately enhancing their performance and reducing the risk of injury.

Results and Discussion

The taping intervention group showed significant improvements in lower leg joint function compared to the control group [6]. Specifically, participants in the taping group demonstrated enhanced joint stability, with a notable reduction in joint displacement during drop landings. Additionally, impact forces were significantly decreased, with a mean reduction. Balance measures, assessed through specific balance test improved indicating better proprioceptive control. The exercise intervention group also exhibited significant gains in joint function. Strength tests showed increase in lower leg muscle strength, and balance performance improved by as measured. Landing mechanics improved, with a reduction in joint stress and impact forces comparable to those observed in the taping group. The exercise group had a reduction in joint displacement during drop landings, similar to the taping group. Both taping and exercise led to significant improvements in lower leg joint function, but the exercise group demonstrated superior overall gains. The exercise intervention yielded greater improvements in strength and balance, which are crucial for managing functional instability over the long term [7]. The taping group provided effective immediate support and reduced joint displacement, but did not show the same level of improvement in strength and balance as the exercise group.

Taping effectively stabilizes the lower leg joint during high-impact activities, providing immediate benefits in terms of reduced joint

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displacement and impact forces. This intervention is particularly useful for managing acute symptoms and providing external support [8]. However, while taping improves joint stability in the short term, it does not address underlying muscle weakness or proprioceptive deficits that contribute to functional instability. Exercise interventions not only improve joint stability and balance but also enhance muscle strength and proprioception. The observed improvements in strength and balance suggest that exercise addresses the root causes of functional instability, offering long-term benefits beyond the immediate impact reduction provided by taping. Strengthening the muscles around the joint and improving proprioceptive feedback can lead to more sustained improvements in joint function and a reduced risk of future injuries. The findings highlight the importance of incorporating both taping and exercise into rehabilitation programs for individuals with functional instability [9]. Taping can provide immediate support and alleviate symptoms, while exercise should be emphasized for long-term management and prevention. Combining these approaches may offer a comprehensive strategy for enhancing lower leg joint function and reducing injury risk. This study's limitations include the short duration of the intervention and the specific population studied. Future research should explore long-term effects of taping and exercise, evaluate different exercise protocols, and include a broader range of participants. Additionally, studying the combined effects of taping and exercise over extended periods could provide further insights into optimal treatment strategies for functional instability. Both taping and exercise are effective interventions for improving lower leg joint function in individuals with functional instability during drop landings. While taping provides immediate stabilization, exercise offers substantial long-term benefits by addressing underlying issues such as muscle weakness and balance deficits [10]. A combined approach may be the most effective strategy for managing functional instability and enhancing overall joint performance.

Conclusion

This study demonstrates that both taping and exercise interventions significantly improve lower leg joint function in individuals with functional instability (FI) during drop landings. Taping effectively enhances joint stability and reduces impact forces in the short term, making it a valuable option for immediate symptom relief and support. However, exercise interventions provide more comprehensive benefits by addressing underlying issues such as muscle weakness and proprioceptive deficits. Participants in the exercise group showed substantial improvements in strength, balance, and overall joint mechanics. Combining taping with exercise may offer a synergistic approach, providing both immediate stabilization and long-term functional improvements. For optimal management of functional instability, incorporating exercise into rehabilitation programs is crucial for addressing the root causes of instability and enhancing joint performance. Future research should focus on evaluating the long-term effects of these interventions, exploring different exercise regimens, and assessing the combined effects of taping and exercise over extended periods. Such studies will help refine treatment strategies and improve outcomes for individuals with lower leg joint instability.

Acknowledgement

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Conflict of Interest

None

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