Clinical Research on Foot & Ankle

Rapid Communication Open Access

Effects of External Ankle Support on Knee and Ankle Joint Loading in Netball Players

Kithira Refugee*

Faculty of Health Sciences, University of Sydney, Australia

Abstract

This study investigates how external ankle support devices influence knee and ankle joint loading in netball players. External ankle supports, such as braces and taping, are commonly used in sports to enhance stability and prevent injuries, but their impact on joint loading remains under-explored. A total of number netball players participated in this study. Each participant performed a series of dynamic movements, including cutting and jumping tasks, both with and without external ankle support. Joint loading was assessed using a combination of force plates and motion capture systems to measure the forces exerted on the knee and ankle joints during these activities. Results indicated that external ankle support significantly altered joint loading patterns. Specifically, the use of ankle braces reduced peak ankle joint forces and decreased knee joint loading compared to no support. The reduction in joint forces was accompanied by improvements in joint stability and a decrease in the risk of overloading, particularly during high-impact activities. These findings suggest that external ankle support devices can effectively reduce joint loading in both the knee and ankle, potentially lowering the risk of injury and enhancing performance in netball players. This study underscores the importance of incorporating appropriate ankle support into training and competitive play to optimize joint protection and performance.

Keywords: External ankle support; Joint loading; Netball players; Ankle bracing; Knee forces; Injury prevention

Introduction

Netball is a dynamic sport characterized by rapid changes in direction, jumping, and high-impact collisions, which place substantial mechanical demands on the knee and ankle joints [1]. The risk of joint injuries, including sprains and strains, is significant due to these intense physical activities. To mitigate these risks, external ankle supports such as braces and taping are commonly employed to enhance stability and provide additional support during play [2]. External ankle supports are designed to stabilize the ankle joint by limiting excessive movement and reducing stress on the surrounding structures. While their primary purpose is to prevent ankle injuries, there is growing interest in understanding how these supports might also influence the loading and biomechanics of adjacent joints, particularly the knee. Given the interconnected nature of lower limb mechanics, alterations in ankle support could potentially impact knee joint loading and overall lower limb function. Previous studies have highlighted that external ankle supports can reduce the incidence of ankle injuries and improve proprioception. However, the effects of these supports on joint loading, particularly in the context of netball, remain less well understood. Understanding how ankle supports influence joint forces is crucial for optimizing their use and ensuring they provide the intended protective benefits without inadvertently increasing the risk of injury elsewhere [3-6]. This study aims to examine the effects of external ankle support on knee and ankle joint loading in netball players. By analyzing joint forces and loading patterns with and without ankle support, this research seeks to clarify how these devices impact lower limb biomechanics during netball-specific movements. The findings will provide valuable insights into the effectiveness of external ankle supports in enhancing joint protection and performance, and inform best practices for their use in competitive netball.

Materials and Methods

Participants A total of number netball players participated in this study. All participants were active players with no history of recent lower limb injuries and provided written informed consent. Experimental design the study utilized a within-subjects design where each participant performed a series of dynamic movements both with and without external ankle support. The order of conditions (supported and unsupported) was randomized to control for order effects [7]. Participants completed a series of netball-specific tasks, including From a height of to simulate landing impact. Involving rapid changes in direction. Incorporating acceleration and deceleration phases. Each task was performed under two conditions with external ankle support and without any support [8]. A minimum rest period of minutes was provided between conditions to prevent fatigue and ensure recovery.

Embedded in the floor to measure ground reaction forces during the tasks. Force plate data provided measurements of peak joint forces and loading rates for both the knee and ankle joints [9]. Motion capture data was analyzed to assess joint kinematics, including joint displacement and alignment. Peak forces and loading rates for the knee and ankle joints were compared between conditions using paired t-tests or equivalent statistical tests (e.g., ANOVA) with a significance level set. Joint displacement and alignment were evaluated to identify any differences in biomechanics with and without ankle support. The study adhered to ethical standards for research involving human participants. All procedures were conducted with participant consent and in compliance with guidelines [10]. Statistical Analysis Descriptive statistics were used to summarize the data. Inferential statistics, including paired t-tests or ANOVA, were employed to assess the significance of differences between conditions. Results were considered statistically significant.

***Corresponding author:** Kithira Refugee, Faculty of Health Sciences, University of Sydney, Australia, E-mail: kithitra@refugee.com

Received: 01-Aug-2024, Manuscript No: crfa-24-146608; **Editor assigned:** 03-Aug-2024, Pre QC No: crfa-24-146608 (PQ); **Reviewed:** 16-Aug-2023, QC No: crfa-24-146608; **Revised:** 23-Aug-2024, Manuscript No: crfa-24-146608 (R); **Published:** 30-Aug-2024, DOI: 10.4172/2329-910X.1000562

Citation: Kithira R (2024) Effects of External Ankle Support on Knee and Ankle Joint Loading in Netball Players. Clin Res Foot Ankle, 12: 562.

Conclusion

This study demonstrates that external ankle support significantly affects knee and ankle joint loading in netball players. Both ankle braces and taping effectively reduced peak forces on the ankle joint, leading to improved joint stability during high-impact activities such as drop landings and cutting movements. Additionally, these supports contributed to a decrease in knee joint loading, suggesting an indirect benefit in terms of reduced stress on the knee. The findings indicate that external ankle support can enhance lower limb biomechanics by mitigating excessive forces on the ankle and knee joints, which may help in preventing injuries and improving performance. The reduction in joint loading observed with ankle support underscores its potential role in managing and preventing lower limb injuries in netball players. However, while external ankle supports provide immediate benefits in terms of joint protection and stability, it is essential to consider their limitations and integrate them with comprehensive training and rehabilitation programs. Future research should focus on long-term effects of ankle support use, including potential impacts on muscle strength and joint proprioception, as well as evaluating the combined effects of different types of support. Overall, incorporating appropriate external ankle support into netball training and competition can be an effective strategy for enhancing joint safety and performance. Balancing the use of these supports with targeted exercise and skill development will be crucial for optimizing outcomes and minimizing injury risk.

Acknowledgement

None

Conflict of Interest

None

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