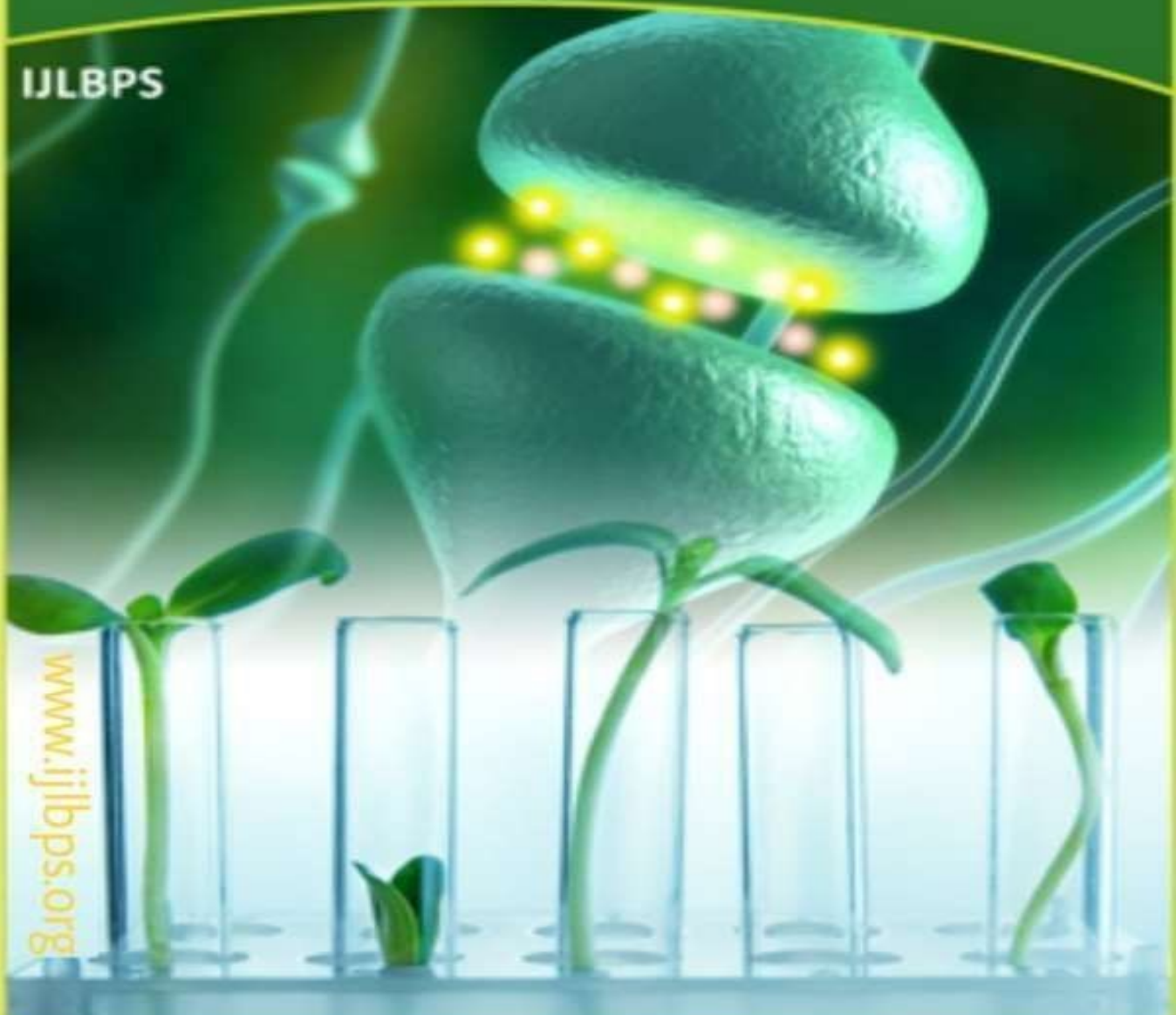




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# Effectiveness of Combined Open and Closed Kinetic Chain Exercises for Treating Shin Splints in Football Players

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## Abstract:

This study investigates the effectiveness of combined open kinetic and closed kinetic chain exercises in treating shin splints (Medial Tibial Stress Syndrome) in football players. A total of 15 football players aged 12-18 years participated in a quasi-experimental study. Pain intensity was measured before and after the intervention using the Numerical Pain Rating Scale (NPRS). The results showed a significant reduction in pain, from an average of 7.07 (Pre-test) to 3.13 (Post-test) ( $p < 0.01$ ). These findings suggest that combining open and closed kinetic exercises is effective for reducing shin splint symptoms and improving function. Further studies with larger sample sizes are recommended to confirm these results.

**Keywords:** Shin Splints, Medial Tibial Stress Syndrome (MTSS), Open Kinetic Chain (OKC) Exercises, Closed Kinetic Chain (CKC) Exercises, Football Players

## Introduction:

**Shin Splints**, medically referred to as **Medial Tibial Stress Syndrome (MTSS)**, are a common overuse injury that affects many athletes, especially those engaged in high-impact, repetitive activities such as running, jumping, and sudden changes in direction. This condition is characterized by pain along the inner edge of the shinbone (tibia), which occurs due to the repetitive stress and strain placed on the muscles, tendons, and bones of the lower leg. In sports such as football, where intense physical demands are placed on the lower limbs, shin splints are particularly prevalent. This condition can significantly affect the performance of athletes and may lead to prolonged periods of rest if not addressed appropriately.

Shin splints generally result from repetitive impact activities that overwork the muscles of the lower leg, particularly those that are responsible for flexing and extending the foot and stabilizing the lower leg. The pain associated with shin splints is usually localized to the lower leg, and can range from mild discomfort to severe pain that impairs an athlete's ability to perform. The condition most often affects athletes who engage in **running, sprinting, or jumping** activities, all of which are integral to sports like football. Because of the sport's explosive nature, involving frequent sprints, sudden stops, and sharp cuts, football players are particularly at risk of developing shin splints.

### **Understanding Shin Splints in Football**

Football players are exposed to repetitive, high-impact forces that place significant stress on their lower legs. These forces are generated during activities such as running, jumping, and pivoting, all of which are integral to the sport. The repetitive nature of these movements leads to micro-trauma in the muscles, tendons, and bone tissue along the tibia. Over time, this repetitive stress causes the muscles and tendons to become inflamed, which results in the pain and discomfort associated with shin splints.

Football, as a sport, also involves sudden changes in direction and high-intensity movements that require the legs to repeatedly absorb shock from jumping, landing, and running. When the muscles and tendons of the lower leg become overstressed or overworked, they may lose their ability to absorb shock and distribute force efficiently, thus leading to injury. Consequently, football players who engage in these demanding movements are at high risk of experiencing shin splints, particularly during periods of intense training or competition.

### **The Role of Rehabilitation in Shin Splint Recovery**

Given the prevalence and impact of shin splints in athletes, effective rehabilitation is essential for preventing further injury and ensuring a swift return to play. Treatment typically focuses on **rest, ice, and anti-inflammatory measures** to alleviate pain and swelling. However, rest alone is often insufficient to address the underlying issues causing the condition. To effectively rehabilitate shin splints, a combination of **strengthening exercises, stretching, and proprioceptive training** is needed. These rehabilitation strategies are designed to improve the strength, flexibility, and

stability of the muscles and tendons around the shin, ultimately reducing the likelihood of recurrence.

Among the various approaches to rehabilitation, **kinetic chain exercises** have emerged as one of the most effective methods for treating shin splints. Kinetic chain exercises involve movement patterns that utilize the coordinated effort of multiple muscle groups, which is essential for improving functional movement patterns and restoring balance. There are two primary types of kinetic chain exercises: **open kinetic chain (OKC)** exercises and **closed kinetic chain (CKC)** exercises.

- **Open Kinetic Chain Exercises (OKC)** involve movements where the distal part of the limb (e.g., hand or foot) is free to move in space and is not fixed to a surface. These exercises often target specific muscles and are used to isolate particular muscle groups. Common OKC exercises include **seated leg extensions**, **hamstring curls**, and **dorsiflexion** (calf pumps), which are aimed at improving the strength and flexibility of the lower leg muscles.
- **Closed Kinetic Chain Exercises (CKC)**, on the other hand, involve movements where the distal part of the limb remains stationary and in contact with a fixed surface. These exercises engage multiple muscle groups simultaneously and are particularly effective for improving joint stability and neuromuscular control. Examples of CKC exercises include **lunges**, **squats**, and **leg presses**, all of which are weight-bearing exercises that target the lower limbs and help in improving the strength and coordination necessary for functional movement in football.

The combined use of OKC and CKC exercises has the potential to address the multifactorial nature of shin splints. While OKC exercises help to isolate and strengthen specific muscles involved in shin splints, CKC exercises provide a more functional approach to rehabilitation by engaging multiple muscle groups and improving the overall stability of the lower limbs. This combination of approaches can potentially lead to more comprehensive rehabilitation, faster recovery, and a reduced risk of reinjury.

### **Need for the Study**

Despite the widespread occurrence of shin splints in football players, research on effective rehabilitation strategies for this condition remains limited. While several studies have explored the efficacy of individual OKC and CKC exercises for treating lower extremity injuries, there is a lack of studies specifically focusing on the combined use of both exercise modalities for the treatment of shin splints in football players. Given the unique physical demands of football and the high incidence of shin splints in this population, there is a need to investigate the combined effect of OKC and CKC exercises for treating this condition.

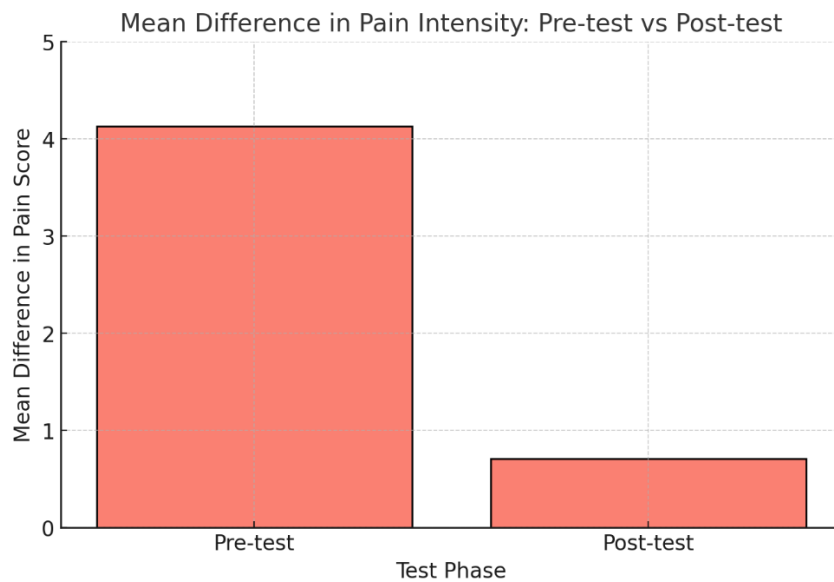
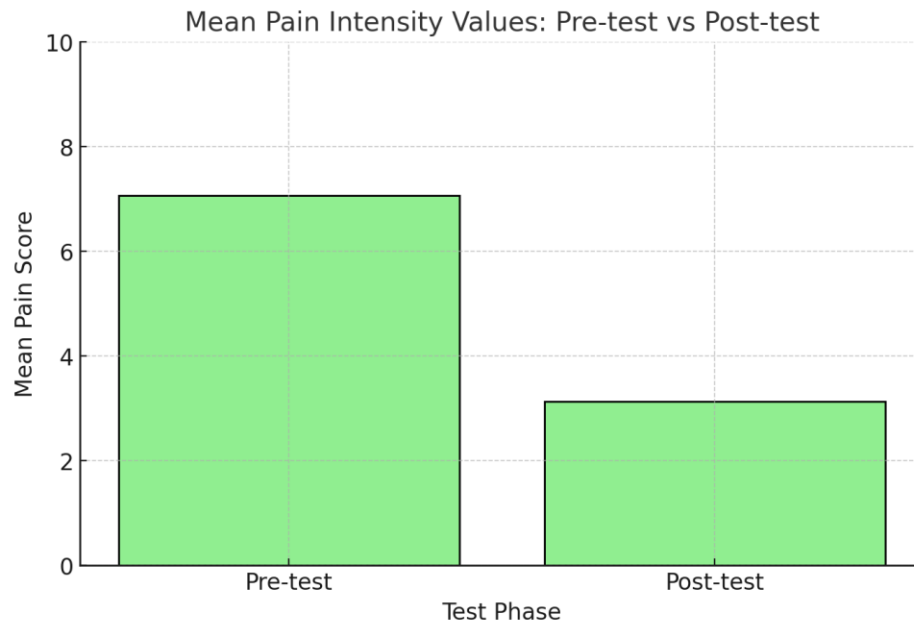
This study aims to fill this gap by evaluating the impact of combining OKC and CKC exercises on reducing pain and improving functional recovery in football players with shin splints. By exploring the effects of both exercise types, the study will provide valuable insights into the rehabilitation process for shin splints and help to develop evidence-based guidelines for treating this common injury. The results of this study could be used to inform rehabilitation practices and assist in the development of effective training programs that prevent and manage shin splints in football players.

### **Results:**

The study results showed a significant decrease in pain intensity after the intervention. The mean pain score for participants in the **Pre-test** was **7.07**, which decreased to **3.13** in the **Post-test**. Statistical analysis using the **paired t-test** confirmed the significance of this change ( $p < 0.01$ ).

- **Pre-test:** 7.07 (mean pain score)
- **Post-test:** 3.13 (mean pain score)
- **Statistical Analysis:** Paired t-test ( $p < 0.01$ )

These results suggest that the combined use of OKC and CKC exercises significantly reduced pain and improved functionality in football players suffering from shin splints.



- **Bar Chart of Mean Pain Intensity Scores:**

This chart compares the mean pain scores before and after the intervention, demonstrating a clear decrease in pain intensity from 7.07 in the Pre-test to 3.13 in the Post-test.

- **Bar Chart of Mean Difference in Pain Intensity:**

This chart highlights the difference in pain scores between the Pre-test and Post-test phases, with a significant decrease of 4.13 points.

## Recommendations and Limitations

This section summarizes the **limitations** of the study and offers **recommendations** for future research or practical applications.

- **Limitations:**

1. Small sample size and short duration limit the generalizability of the results.
2. The lack of a control group also prevents a comparison with other treatment methods.

- **Recommendations:**

1. Future studies should explore the effectiveness of this combined exercise regimen in a larger, more diverse sample.
2. Investigating long-term effects of the exercises could provide insights into the sustainability of pain reduction and recovery.
3. Personalized rehabilitation programs tailored to individual players' needs should be examined.

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