Apr 25th, 6:00 PM - 7:00 PM

The Relationship of Lower Extremity Range of Motion and Incidence of Shin Splints in Collegiate Runners: A Pilot Study

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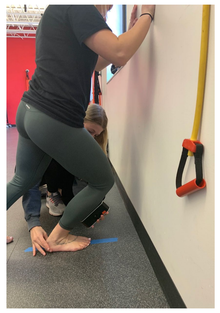
INTRODUCTION & PURPOSE

- Medial tibial stress syndrome (MTSS), more commonly known as shin splints, is a routine diagnosis handed out by medical professionals as a way of generalizing pain symptoms and initiating a treatment plan. It's characterized by pain along the distal end of the medial tibia that can occur at any point during or after a workout. Although it's simple, this generalization allows for other potential causes of lower leg pain to be overlooked, such as tibial stress fractures. The misdiagnosis could lead to long-term, or recurring, health effects. Along with the ambiguity of the injury, there are numerous risk factors said to increase a runner's risk of developing MTSS, yet there is inconclusive research regarding exactly what they are.
- Shin pain accounts for 10-20% of all injuries in runners and 60% of all overuse injuries in the leg (Couture & Karlson, 2002). Depending on the severity of the injury, affected athletes could miss entire track and cross country seasons while undergoing potentially misguided rehabilitation programs. Preventing the onset of MTSS could protect an athlete from further injury.
- The purpose of this study was to investigate relationships between hip internal and external rotation and ankle dorsiflexion range of motion (ROM) with the incidence of MTSS. We tested the hypothesis that deficits in ankle dorsiflexion range of motion and imbalances between hip internal and external ranges of motion would be predictive of the onset of shin splints. We also hypothesized that various running related injuries would be accountable for deficits in ranges of motion.

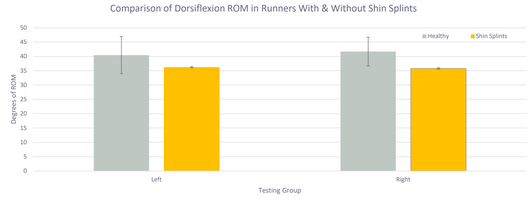
METHODS

- Participants filled out an injury and athletic history questionnaire in order to determine their lower extremity health status before testing was initiated.
- Testing for each individual was completed on the same day to reduce the risk of external variables affecting ROM measurements.
- Hip internal ROM was assessed passively with the athletes lying prone on the examination table with their leg at 90°. Maximum internal rotation was determined by pulling the athlete's leg towards the ground until the hip began to rise off the table. Three measurements were taken at the point right before the hip came off the table and then averaged.
- Hip external rotation ROM was assessed through the same means as hip internal rotation ROM.
- The hip rotation measurements were repeated on both legs.
- Ankle dorsiflexion ROM was assessed passively, but without manipulation from the examiner. Athletes stood a variable distance away from the wall in a lunge position with the leg being measured closer to the wall. Participants were instructed to drive their knee towards the wall and bend at their ankle until their heel came off the ground. Two measurements were taken from the point right before the heel came off the ground.
- This process was repeated for both legs.

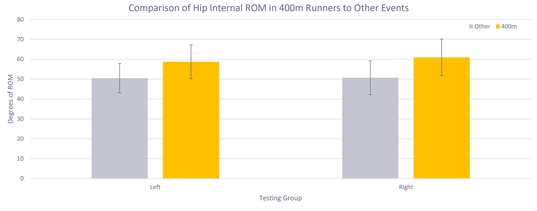
TESTING

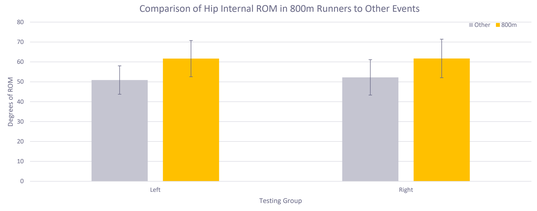

RESULTS



Right dorsiflexion ROM was nearly significantly less for runners with shin splints compared to healthy runners (p=0.06).



Hip internal ROM for 400m runners was significantly higher than in other events (L: p=0.038, R: p=0.016).



Hip internal ROM for 800m runners was significantly higher than in other events (L: p=0.030, R: p=0.042).

SUBJECTS

- Twenty-three Division III track and field athletes were recruited to participate in this study.
- Five of the runners had previously been diagnosed with shin splints and were still participating in the sport.
- Each participant received an injury assessment survey prior to completion of the experiment to determine their lower extremity health status.
- This study was approved by a university institutional review board, and all participants provided informed consent prior to testing.

CONCLUSIONS

This study found no significant results between hip internal and external ROM and dorsiflexion ROM with the incidence of shin splints. Right leg dorsiflexion ROM was nearly significant for those previously diagnosed with shin splints (p=0.06), which could be an important variable to assess with a larger sample. Previous injury was also not significantly related to deficiencies in lower extremity ROM. Hip internal ROM was found to significantly increase as the event distance increased, which was an interesting conclusion that could lead to questions concerning hip injuries in distance runners. The sample of twenty-three athletes was not large enough to make any sound decisions as to which anatomical factors increase the likelihood of developing shin splints; however, the trend in ankle dorsiflexion ROM shows potential significance. It would be beneficial to do larger scale studies with an emphasis on dorsiflexion ROM because the larger sample sizes would produce more accurate results.

PRACTICAL APPLICATIONS

- Shin splints are one of the most common injuries sustained by runners with varying severity. In some cases, the intensity of the pain can cause runners to miss practices and even full seasons of their sport. If the symptoms are allowed to persist, they could develop into more serious conditions, such as tibial stress fractures. Knowing what anatomical ROM deficits to look for in athletes can help coaches and athletic trainers prevent the onset of shin splints through proper 'pre-habilitation.' If medial tibial pain is already present, suitable rehabilitation measures can be implemented to help slow the progression of the injury. Knowledge of which ROM deficits are related to incidences of shin splints can also be useful knowledge for the runner themselves so they are able to take responsibility and discuss potential modifications with their coaches.
- Knowing the average ROM in different joints of the lower extremity can aid a coach or athletic trainer in assessing their athletes' ranges of motion. If a runner is found to have inadequate joint ROM in their lower extremity, an athletic trainer can attempt to improve that ROM through various means. Focusing on improving ROM might be more useful for long-term lower extremity health rather than attempting to prevent the injury through various strengthening exercises.
- This topic requires further investigation with larger sample sizes in order to obtain more accurate results. Future research should place an emphasis on dorsiflexion ROM and hip internal rotation.