



AMERICAN COLLEGE
of SPORTS MEDICINE®
LEADING THE WAY

 [Print this Page for Your Records](#)

[Close Window](#)

Control/Tracking Number: 10-SA-2505-ACSM

Activity: Scientific Abstract

Current Date/Time: 10/30/2009 11:38:13 AM

Effect of Carbon Graphite Foot Plate on Loading During Jumping and Landing

Author Block: Robin M. Queen, Alicia N. Abbey, James A. Nunley. *Duke University, Durham, NC.* (Sponsor: Donald Kirkendall, PhD, FACSM)
Email: robin.queen@duke.edu

Abstract:

Fifth metatarsal stress fractures have a high incidence of non-union, delayed union, and re-fracture independent of post-injury treatment. After screw fixation for the treatment of 5th metatarsal stress fractures, many patients are being treated with a rigid carbon graphite foot plate (CFP) to decrease plantar loading.

PURPOSE: To determine if total foot, lateral midfoot (LMF) and lateral forefoot (LFF) loading (peak pressure, contact area, and force-time integral) were decreased with the use of the CFP.

METHODS: Plantar loading in 13 healthy male, collegiate, recreational athletes was evaluated using the Pedar-X in-shoe system collecting at 100Hz (Novel, St. Paul, MN, USA). Exclusion criteria were any history of lower extremity injuries in the past six months, foot or ankle surgery within the past 3 years, and previous metatarsal stress fractures. Prior to data collection all subjects signed informed consent. Subjects completed 7 simulated lay-ups in a standard running shoe with and without a CFP. In order to complete the task properly, subjects needed to jump and land on the same foot, which was the foot used for analysis. A 2x2 repeated measures ANOVA was used to compare the take-off (TO) and landing (LD) both with and without the CFP ($\alpha=0.05$).

RESULTS: The subjects had an average height of 1.76 ± 0.08 m, mass of 73.38 ± 9.87 kg, and age of 21.6 ± 2.75 years. The total foot maximum force was significantly greater during landing when compared with the take-off ($p=0.012$). No other significant differences existed between these two tasks. Independent of the task, the total foot contact area was significantly decreased in the CFP condition ($p<0.001$), while the total foot peak pressure was increased with the CFP ($p<0.001$). LMF Contact area was decreased ($p=0.016$) when wearing the CFP. No differences in the force-time integral were found in the LMF or LFF. Peak pressure was increased in the LMF ($p<0.001$), and LFF ($p=0.002$) when wearing the CFP.

CONCLUSIONS: In this initial study, the results indicate that the CFP is ineffective at reducing plantar loading beneath the 5th metatarsal during jumping and landing in uninjured controls. However, CFP needs to be examined to determine its role in other sporting maneuvers and footwear in patients with a 5th metatarsal fracture history.

:

Author Disclosure Information: R.M. Queen, None.

Category (Complete): 402 sport biomechanics

Keyword (Complete): Plantar Loading ; Carbon Foot Plate ; Metatarsal Stress Fracture

Unlabeled/ Investigational Products (Complete):

: No

Presentation Preference (Complete): Indifferent

Area of Interest (Complete):

Area of Interest: Applied Science

Additional Info (Complete):

***Do you authorize ACSM to record your presentation?:** Yes

***Confirmation:** I understand and agree to the above terms regarding AV equipment

Payment (Complete): Your credit card order has been processed on Friday 30 October 2009 at 11:35 AM.

Status: Complete

[American College of Sports Medicine](#)

401 West Michigan Street

Indianapolis, IN 46202-3233

(317) 637-9200

[OASIS Helpdesk](#)

Powered by [OASIS](#), The Online Abstract Submission and Invitation System SM

© 1996 - 2009 [Coe-Truman Technologies, Inc.](#) All rights reserved.