M.S. Candidate: Fadumo Mohamud, B.S.
Advisor: Gerald F. Harris, Ph.D., P.E.

ABSTRACT

“DETERMINING THE CORRELATION BETWEEN PLANTAR PRESSURE AND JOINT KINEMATICS WHILE RUNNING”

Running provides many health benefits, but there is a risk for lower extremity injuries. Previous studies have performed simultaneous assessments of plantar pressure and joint kinematics; however, they have not investigated correlations between these parameters. The goal of this study was to assess correlations between joint kinematics and plantar pressure metrics during the stance phase. Fifteen female and eleven male recreational runners ran ten trials in this study. The joint kinematics were measured using the Vicon MX system and plantar pressure metrics were measured with the Quasar pressure treadmill. Spearman rho correlation tests were performed to determine correlations between joint kinematics and plantar pressure metrics. Mann-Whitney U tests were conducted to examine statistical differences between participant groups.

Females had positive correlations between peak plantar pressure and ankle dorsiflexion (DF), knee flexion, and ankle inversion and between speed and peak ground reaction force (GRF) for the entire foot. Male runners had correlations between peak knee flexion and plantar pressure, and between peak midfoot GRF and hip flexion. The males also had correlations between peak first metatarsal GRF and hip adduction, peak third metatarsal GRF and ankle DF, peak fourth metatarsal GRF and ankle DF, and peak fifth metatarsal GRF and knee flexion. Statistically significant differences were found in joint kinematics and plantar pressure metrics. These correlations gave insight into risk factors for injury based on the relationship between plantar pressure metrics and joint kinematics. This information is helpful in determining proper treatment and preventive measures for running injuries.