Rearfoot varus is defined as a medial inversion of the rearfoot at the subtalar joint. There are many elite athletes performing at a high level with this condition suggesting that it isn’t an extreme limiting factor in movement. However, because of the lack of research in the area, no concrete conclusion can be made with regards to the effects of rearfoot varus. The purpose of this study was to analyze the kinematics, kinetics, and lower limb strength of collegiate athletes with the condition. This study was designed to add to the knowledge of rearfoot varus, and serve as a resource for future research.

Collegiate athletes were recruited to participate in the study. A goniometer was used to determine the relation of the tibia to the subtalar joint angularly. Athletes’ lower limbs with a calcaneal rotation +5 degrees or more toward the midline were placed in the varus group. The control group consisted of athletes’ lower limbs with -4 to 4 degrees of rotation in relation to the midline. The subjects were studied using motion capture, force plate technology, and Biodex testing.

Biodex testing was conducted on each leg individually of the athletes. Isokinetic testing at maximum effort was conducted for plantar flexion, dorsiflexion, inversion and eversion of the ankle. Each test was run with two trials at 30 degrees per second and 60 degrees per second. Peak torque, peak torque by body weight, average power, angle of peak torque, average peak torque, and range of motion were all measured. All analyses were completed using SPSS and a one-way ANOVA.

Lower limbs with rearfoot varus showed a mean peak distal tibial varum 1.20° higher than the athletes’ limbs without the condition (p<0.05), and showed a total ankle range of motion 1.91° higher than the control limbs (p<0.05). The mean force plate contact time was 0.21 seconds longer for the varus limbs (p<0.05). The mean horizontal and vertical ground reaction force showed no significance; however, it did show a trend that the varus limbs had a lower horizontal and vertical ground reaction force.

Among the Biodex tests performed, the eversion test revealed results that were statistically significant. Particularly for eversion at 30 degrees per second: peak torque, peak torque by body weight, average peak torque, and average power were greater in the varus group (p<0.05).

This data suggests that the athletes with rearfoot varus have stronger eversion of the ankle, increased tibial varum, increased range of motion, increased ground contact time when performing lateral movements, and apparent decreased horizontal and vertical ground reaction force. In the future, a larger study population should be utilized to remove any error due to limited sample size. Furthermore, EMG testing could be implemented to further verify and specify any increased peroneal muscle activity in rearfoot varus athletes.

Reference: