Splayfooted runners: their preferred running shoes and their influence on kinetics and kinematics of the gait cycle

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Introduction:

The aim of the study was to investigate the shoe preferences of splayfooted runners, identified with clinical examination and dynamic stress distribution, compared to runners with normal feet. The shoe-foot-interaction was quantified by kinetics and kinematics.

Methods:

35 male runners (age 16 to 64 years) with a minimum running distance of 20 miles a week were included in this study. 21 runners had a normal foot, 14 runners had a splayfoot. The categorization was done after clinical examination and a dynamic investigation of the stress distribution. The runners were analyzed running barefoot, running in their favorite running shoe and running two different pairs of standardized test shoes. The favorite running shoe was analyzed for cushioning, energy loss and flexion stability. Kinetics (Kistler-plate) and kinematics (highspeed video) of the gait cycle were quantified. Running speed was standardized at 3.5 m/s.

Results and Discussion:

Figure 1. Passiv peak and calcaneus angle at touchdown (ο value outside 2s range)

Runners with a splayfoot had a less high passive peak (p=0.02) and a less inverted calcaneus while touching ground (p=0.04) compared to the control group (see figure 1 and 2). Splayfooted runners had a less extended range of motion of the calcaneus (p=0.04) and a lower angle speed of pronation (p=0.04) compared to the normal footed control group (see figure 3 and 4).

There was no significant difference in the maximal pronation angle and there was no difference of the active peak. The differences between splayfooted runners and normal footed runners were highest running the standardized test shoes and significant lower running the preferred running shoe. No significant differences could be identified investigating the materials of the favorite shoes. There were no significant differences in kinetics and kinematics while running barefoot.
Splayfooted runners seem to avoid high, uncontrolled ground reaction forces in running shoes. This thesis is supported by the fact, that the differences between splayfooted and normal footed runners were significant higher running the “unknown” test shoe than running the “well known” preferred running shoe. However, the differences in kinetics and kinematics could not be correlated to complains about metatarsalgia. Controlled load, as it is seen with the active peak seems not to be a problem for the splayfoot. Material tests of the preferred running shoe could not identify a preference for good cushioned running shoes in the group of splayfooted runners.

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