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Ground Reaction Force in Different Footwear during Late Stance Phase of Running

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Abstract

The objectives of the study were compare the differences of force production between dominant and non-dominant legs, and between different types of footwear during the late stance phase of running. Fourteen healthy recreational rearfoot male runners (age 20.14±0.66 years, height 171.79±4.66 cm, and body weight 64.56±5.79 kg.) were recruited in the study. The three dimensional movement analysis and force production were collected by Motion analysis system and AMTI force platform, the data were calculated and analyzed by Visual 3D. The participants in barefoot and 2 types of footwear; the running footwear with and without windlass enhancing feature, started to run along the runway with speed at 3.5 m/s (range between 3.33-3.68 m/s) for 3 trials in each condition. Paired t-test was used to compare the VGRF between dominant and non-dominant legs in each footwear condition. The repeated measures Analysis of variance was used to analyzed. Bonferroni post hoc test was conducted between footwear conditions (p<0.01). The results revealed there were significant differences of ground reaction forces almost throughout late stance between dominant and non-dominant legs in running footwear with windlass enhancing feature. When comparing between each type of footwear, the ground reaction forces produced by barefoot were significantly different from those of running footwear with and without windlass enhancing feature in non-dominant leg but significantly different from those of running footwear without windlass enhancing feature in dominant leg. In summary, the human gait running is symmetry which found in this study, both in barefoot and RNW conditions, but not in RW due to the external factor like the thick outsole. The inclination and surface properties of the RW might change the sensory input to feedback to the unloaded leg. Therefore, the VGRFs between barefoot and RW were not different.

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