

SUMMARY

Problem: Running is one of the most widespread physical activities. Incorrect running technique, training quantity but also the runner's equipment can strongly affect health condition of the individual, both positively and negatively. For that reason various trends emerge in the area of running footwear. They include classical sports shoes with different types of impact attenuation as well as the minimalist footwear made to imitate barefoot running, which should be much more natural for humans, as insisted by B. Nigg in his book "Born to Run" – where he says that man was born to walk and run barefooted. Inappropriate shoes can cause various health complications, not only in the foot area.

Objective: To find out how foot strike changes in the area of the foot-shoe interaction in running on flat ground when an amateur runner uses minimalist and sports footwear and to draw conclusions for training practice on the basis of the results.

Methods: The thesis deals with amateur endurance running in different shoe types (minimalist and sports shoes). The study specimen consisted of 14 female runners (mean body weight $63,31 \pm 4,89$ kg, height $169,69 \pm 4,71$ cm, age $31,92 \pm 5,34$ years, speed in minimalist shoes (MO) $3,34 \pm 0,06$ m.s⁻¹, speed in sports shoes (SO) $3,29 \pm 0,06$ m.s⁻¹, weekly mileage $37,54 \pm 9,43$ km, foot size corresponding to 39-40 EU insole). The measurement was performed by the dynamographic examination method aimed at the foot-ground contact analysis. The measurement was based on the Pedar® system (Novel, Munich, Germany). Every trial runner underwent 6 measured runs, of which 3 in minimalist and 3 in sports shoes with passing running speed ($v = 3,33 \pm 0,2$ m.s⁻¹). The measurements were performed on a fifty-meter flat section of artificial lawn of a football ground. Before the measurement the trial runners underwent a warm up and optimisation of their running speed by repeated warm up in the required running speed. The statistical processing was performed by R and Statistica software. The statistical methods used included ANOVA analysis of variance, the Wilcoxon test, the Mann-Whitney U test, the Kruskal-Wallis ANOVA and the Post-hoc analysis.

Results and conclusions:

Our research showed that shoe type (minimalist and sports shoes) does affect foot strike in endurance running on flat ground. Plantar strain shifts towards the toes. The research showed a statistically significant difference ($\alpha = 0,05$) in the force and pressure acting on the foot in first contact with the ground when using minimalist and sports shoes. The force and pressure analysis of the first foot contact with the ground found a statistically significant difference between RFSS (rear foot striking in sports shoes) and RFSM (rear foot striking in minimalist shoes). A further statistically significant difference was found between the force and pressure acting on the insole in the central part of the foot running in flat ground using minimalist and sports shoes. However, no statistically significant difference was found in step frequency of the runner, time of contact with the ground, force and pressure acting on the ground from the front, rear and whole foot of the runner running on flat ground in minimalist and sports shoes. Minimalist shoes are certainly recommended to endurance runners. However, the most important thing is to concentrate on the correct running technique. On the basis of this dissertation research and the studied trials by other researchers, in many respects in agreement with the present study, a conclusion can be drawn that minimalist footwear should become a transitory stage between sports and barefoot shoes. And so runners who want to transfer to minimalism should first begin to use minimalist shoes and then continually transfer to barefoot shoes.

Keywords: run, Pedar, contact time, foot, force, pressure, footwear