

Plantar Pressure Assessments of Athletes from Different Sports Branches

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Abstract

The aim of this study was to evaluate static posture and dynamic plantar pressure analyses during walking in athletes from different sports branches. A total of 89 participants voluntarily took part in the study, including 9 American football players (22.5±5.2 years; 176.7±6.0 cm; BMI = 26.1±6.1 kg/m²; experience = 5.2 ± 3.4 years), 15 badminton players (19.0±3.0 years; 169.4±0.9 cm; BMI = 22.0±1.6 kg/m²), 25 soccer players (20.66±1.3 years; 178.4±4.64 cm; BMI = 23.5±1.8 kg/m²), 15 folk dancers (20.6±1.7 years; 164.9±5.8 cm; BMI = 20.6±1.7 kg/m²), and 25 sedentary individuals (21.0±2.3 years; 177.5±4.8 cm; BMI = 23.3±2.1 kg/m²).

Static standing and dynamic walking plantar pressure measurements were performed using the EMED-XL plantar pressure measurement system (Novel GmbH, Germany). In the dynamic foot assessments, groups were compared using one-way analysis of variance (ANOVA) for normally distributed variables and the Kruskal-Wallis test for non-normally distributed variables. Values of $p < 0.05$ were considered statistically significant. Independent samples t tests were used for right-left foot static pressure evaluations.

The findings related to dynamic walking demonstrated statistically significant differences among the groups in the right-left total foot, forefoot, midfoot, and heel regions in terms of Force-Time Integral (FTI), Maximum Force (MF, N), Contact Area (CA, cm²), and Contact Time (CT, ms). The highest values were observed in the American football group, followed respectively by soccer, badminton, and folk dance groups. These findings reflect the adaptation and specialization of foot posture to the technical movements specific to each sport due to their unique dynamics.

As a result, it may be recommended to perform sport-specific, and even position-specific within each sport, evaluations of plantar pressure distributions during static posture and dynamic walking. Such approaches may help reduce injury risk through preventive treatment strategies and improve athletic performance by using athlete-specific insoles and sports shoe designs.

Keywords

Foot posture index, range of motion, flexibility, strength, plantar pressure, sport.