

Abstract

Thesis title: Comparative analysis of lateral symmetry of selected lower extremity muscle activity during a sprint on an athletic track

Objectives: The aim of the thesis was to measure the activity of selected muscles during a sprint on an athletic track and subsequently compare the activity in terms of lateral symmetry during a sprint on an athletic curve and on a straight athletic path.

Methodology: The experimental measurements were conducted using surface electromyography (sEMG) on a group of ten athletes (4 men and 6 women) specializing in longer sprints and middle-distance events. Based on a literature research and a pilot study, three muscles were selected for measurement: *m. gluteus maximus*, *m. gluteus medius* and *m. tensor fasciae latae*. The main measurement of muscle activity during sprints on straight and curved part of the track was preceded by preparation and normalization of MVC values. Data were analyzed using MATLAB and MEGAWIN software, where EMG signal values, after artifact removal, were adjusted and segmented into individual movement cycles.

Results: The findings indicate that during curve sprinting, a significant lateral difference only occur in the activation of the *m. tensor fasciae latae*. A significant lateral difference in the activation of *m. tensor fasciae latae* was also demonstrated during a sprint on a straight track. In both cases, higher activity was observed on the right lower limb. The results concerning the *m. gluteus maximus* and *m. gluteus medius* were not statistically significant, suggesting that there are no significant lateral differences in the activity of these muscles.

Conclusions: The identified differences in the activity of *m. tensor fasciae latae* suggests that this muscle may play a key role in the asymmetry of lower limb loading during curve running. The results support the need for further research focused on a comprehensive evaluation of biomechanical and kinesiological factors of running in curves to optimize training methods and prevent injuries.

Keywords: running, sprint, athletic track, curve sprinting, surface electromyography, sEMG, *m. gluteus medius*, *m. tensor fasciae latae*, *m. gluteus maximus*