Abstract

Title: Comparative analyses of muscle activation lower extremities during running at different surface.

Objectives: The aim of this bachelor's thesis is to compare the level of activation of selected muscles of the lower extremities and the relative timing of these activations. Realize measurements on three types of surface: tartan, grass, sand and find out the differences in activations of selected muscles according to the surface.

Methods: In this thesis, I used the method of analysis and the method of comparison. I applied the analysis method in the analysis of the measured signals for the running step and the comparison method in the section comparing average running step cycles from different surface types.

Results: I found out that running on the tartan, acitvates all the monitored muscles in more than 75% of the average cycles within 10% of the running step time period. For softer surfaces - grass and sand, my research did not support the hypothesis, that the softer the surface is, the greater are the differences in the activation of individual muscles versus tartan. Further I found out that on sandy and grassy surfaces, the average activation time of the muscles which are more involved in stabilizing the ankle and foot, i.e. tibialis anterior and peroneus longus, increases. On a sandy surface, the anterior tibialis muscle doubled it's activation during one average cycle.

Conclusion: By a healthy man, the muscles are activated during free running with almost the same activation time on average and with the timing of the activation of individual muscles relative to each other. Another important finding is that, based on research, it can approved that the tibialis anterior and peroneus longus muscles are more involved in stabilization. No recommendations for running training can be drawn from this study.

Keywords: electromyography, running, tibialis anterior muscle, peroneus longus muscle, gastrocnemius, lateral head, medial head, correlation, envelope analysis, thresholding