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The influence of compression apparel on soft tissue vibrations during running

Zoller E, Friesenbichler B, Nigg BM

Abstract

The impact at heel-strike during running initiates soft tissue vibrations in the leg, which were suggested to negatively affect muscle fatigue[1] and performance[2]. Tight fitting compression apparel has previously been shown to influence soft tissue vibration[2,3], however, very little is known about the influence of running speed and the level of compression on muscle vibrations. Therefore, the aim of this study was to investigate the influence of different levels of compression and 7 running speeds on muscle vibrations. 14 trained, male athletes participated in the study. The conditions tested included 3 compression suits with different levels of compression as well as two non-compressive (control) suits in randomized order. Vertical muscle vibrations of the gastrocnemius medialis and the vastus lateralis muscles were measured using a skin-mounted accelerometer during treadmill running at speeds ranging from 2.68 to 5.36 m*s^{-1}. Peak power and damping coefficient of the measured vibration data were calculated using a wavelet-based method and compared between the suits. Correlation between speed and peak power as well as between speed and damping coefficient was analyzed for all compression conditions normalized to the control conditions. Peak power decreased significantly for the gastrocnemius medialis at speeds equal or higher than 3.58 m*s^{-1} ($p < 0.05$) but not for the vastus lateralis when wearing compressive apparel. No significant changes were found in the damping coefficient of either of the muscles. Peak power and damping were significantly affected by running speed when wearing compression apparel versus control. This study showed that higher levels of compression do not systematically reduce muscle vibrations more effectively but that running speed and the investigated muscles are more critical factors. Vibrations in all three planes of motion and more muscles need to be further investigated.

References

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