

Minimalist Footwear Reduces Muscle Activity in the Lower Leg During a Jump Landing Task

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Previous research has shown minimalist footwear (MF) to have a positive effect on ankle injury risk factors such as balance, strength, and kinematics. Little research has been reported on the effect of MF on muscle activity. Preliminary investigations in novice users of MF has shown lower muscle activity during a jump landing (JL) task, which may indicate faster reactions and less overall muscle activity in response to a perturbation. It is unknown if similar effects can be detected as a result of long-term MF use. **PURPOSE:** To examine the effects of MF use on muscle activity patterns in lower leg musculature. **METHODS:** Two groups of healthy, physically-active individuals ($n = 50$) who participate in regular high intensity interval training, participated in this study. The MF group (27.8 ± 5.5 yrs, 168.5 ± 11.0 cm, 73.1 ± 13.8 kg) consisted of 10 males and 15 females who regularly train in MF. The non-minimalist (NM) group (22.9 ± 4.9 yrs, 170.0 ± 9.9 cm, 67.7 ± 12.1 kg) consisted of 11 males and 14 females with no previous exposure to MF during training. Analysis of the tibialis anterior (TA), peroneus longus (PL), peroneus brevis (PB), and the medial gastrocnemius (MG) was conducted during JL with surface electromyography (EMG) on the dominant leg. EMG data was normalized using a 5-second MVIC for each muscle prior to JL. Subjects jumped with both feet over a 30-centimeter hurdle from a distance of 40% of their height and landed with only their dominant leg on a force plate. The primary outcome variable was normalized EMG activity of the four muscles, during the five seconds post-initial contact with the force plate. Independent sample t-tests were used to compare average EMG activity between the groups for hypothesis testing at $p < 0.05$. Mann-Whitney U was used for data that was not normally distributed. **RESULTS:** EMG activity was significantly lower for PL ($p = 0.031$) and PB ($p = 0.012$) in the MF group. No significant differences were seen for TA or MG. **CONCLUSION:** Lower EMG activity in MF shows that muscle activity during a JL varies across footwear and could be an indicator that long-term MF use results in quicker stability. Intervention studies should be conducted to better determine whether the results were caused by habitual training in MF or rather an effect of the footwear during JL.

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