

Changes in tibiofemoral contact forces during running in response to in-field gait retraining.

Willy RW¹, Meardon SA¹, Schmidt A², Blaylock NR¹, Hadding SA¹, Willson JD¹.

⊕ Author information

Abstract

We evaluated the efficacy of an in-field gait retraining programme using mobile biofeedback to reduce cumulative and peak tibiofemoral loads during running. Thirty runners were randomised to either a retraining group or control group. Retrainers were asked to increase their step rate by 7.5% over preferred in response to real-time feedback provided by a wrist mounted running computer for 8 routine in-field runs. An inverse dynamics driven musculoskeletal model estimated total and medial tibiofemoral joint compartment contact forces. Peak and impulse per step total tibiofemoral contact forces were immediately reduced by 7.6% and 10.6%, respectively ($P < 0.001$). Similarly, medial tibiofemoral compartment peak and impulse per step tibiofemoral contact forces were reduced by 8.2% and 10.6%, respectively ($P < 0.001$). Interestingly, no changes were found in knee adduction moment measures. Post gait retraining, reductions in medial tibiofemoral compartment peak and impulse per step tibiofemoral contact force were still present ($P < 0.01$). At the 1-month post-retraining follow-up, these reductions remained ($P < 0.05$). With these per stance reductions in tibiofemoral contact forces in mind, cumulative tibiofemoral contact forces did not change due to the estimated increase in number of steps to run 1 km.

KEYWORDS: Knee; biofeedback; biomechanics; gait retraining; osteoarthritis; running

PMID: 26679058 DOI: 10.1080/02640414.2015.1125517