

EFFECTS OF FOOT EXERCISES IN LONG DISTANCE RUNNERS: A PILOT CONTROLLED TRIAL

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BACKGROUND

On account of the easy accessibility, distance running is practiced worldwide and its popularity continues to expand with the growing interest in disease prevention. Over recent years, strengthening the foot-ankle muscles have been the focus of some studies for the prevention of running-related injuries and we proposed a randomized, prospective controlled and parallel trial (ClinicalTrials.gov NCT02306148) with blind assessment following a "ground-up" approach (Baltich, 2014) with the main aim to establish prophylactic measures for recreational runners while improving foot-ankle functionality and biomechanics. The objectives of this quasi-experimental pre-test, post-test pilot study were (1) to evaluate the feasibility of the proposed "ground-up" exercise protocol, and (2) to evaluate the effectiveness of the protocol on foot health and functionality, foot muscle trophism, and forces while running. In the present study, feasibility is defined as the participant's rate of satisfaction and completion of the protocol.

METHODS/DESIGN

A quasi-experimental pre-test, post-test pilot study was conducted on a single subject, healthy female long-distance runner (31 yrs, 1.68 m, 57 kg), 5 years of running practice, weekly volume of 25 km. The runner practiced the whole protocol of 12 exercises focused on the foot-ankle complex, 3 times/week at home and once/week supervised by a physiotherapist, for 4 weeks. After each session, the subject had to score in an online software her difficulty in performing the exercises on a scale from 0 to 10. The runner was assessed at baseline and after 4 weeks regarding running kinetics and kinematics, intrinsic foot muscles strength (Mickle, 2008), foot muscle area and volume (Miller, 2014), foot health and functionality - FHSQ-BR (Ferreira, 2008), and weekly inquired about the training volume and injuries through an online software.

RESULTS

After 4 weeks intervention, an increase in cross-sectional area of the abductor allucis (ABH),

flexor digitorum brevis (FDB) and abductor digiti minimi (ADM), respectively of 37.3%, 21.0% and 87.5% and muscle volume of 38,6% 30,7% 108.3%, respectively were observed. Toes strength increased 6.8% under the hallux and 44.1% under the lesser toes. Reduction of 4% was found on ground reaction peak force (GRF) during running. No differences were found on health and functionality scores of the FHSQ-BR.

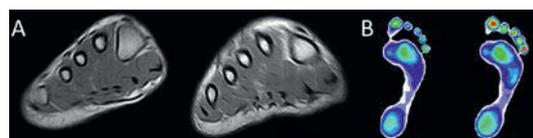


Figure 1: (A) Right foot MRI at baseline (left) and after 4 weeks of training (right) and (B) plantar pressure at baseline (left) and after 4 weeks of training (right).

CONCLUSION

Subject's rate of satisfaction and completeness of the protocol was 100%, and her median difficulty in performing the whole protocol was 3, and she never scored above 5 in any exercise, suggesting that exercises were easy and provided comfortable feeling. Exercises proposed for the foot and ankle have the potential to be an effective intervention for the enhancement of the intrinsic foot muscles, even in a healthy and active runner. Increased force and contact area over the hallux and toes and alterations in GRF may suggest changes in running dynamics. The protocol applied showed promising results and is currently being tested in a larger sample. If the hypothesis that it can reduce the incidence of running related injuries in one year of follow-up is confirmed, could be easily incorporated in their training routine.

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