International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY

Acute effects of trail running on neuromuscular fatigue in lower limbs

INPLASY202380099
doi: 10.37766/inplasy2023.8.0099
Received: 22 August 2023
Published: 22 August 2023

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ADMINISTRATIVE INFORMATION

Support - Without financial support.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202380099

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 August 2023 and was last updated on 22 August 2023.

INTRODUCTION

Review question / Objective What are the effects of neuromuscular fatigue induced by Trail Running on the lower limbs? To determine the effects of neuromuscular fatigue on the different muscle groups of the lower limbs induced by trail running.

Condition being studied In trail running athletes, injuries are high, particularly in the lower limbs. One main factor is the impact on the hips, knees, and ankles (Viljoen et al., 2022). The high variability of the terrain used in trail running requires a high cognitive processing of the environment and, thus, a quick adaptation to the demands of the race. Because of the long distances, this sport is associated with high fatigue levels. Due to the inability to control the movements by the high fatigue and muscle damage, failures in running technique and asymmetries are generated, increasing the risk of injuries and accidents (Heather et al., 2022).

METHODS

Search strategy Web of Science; Pubmed; Scopus; Sport discus ("trail running" OR "downhill running" OR "ultra-marathon" OR "ultramarathon" OR "trail" OR "ultra-trail-running" OR "trail runners" OR "ultratrail running" OR "mountain trail races" OR "ultra-trail-runners" OR "downhill trail run" OR "hilly running" OR "hilly run") AND ("fatigue" OR "neuromuscular fatigue" OR "peripheral fatigue" OR "central fatigue" OR "local fatigue" OR "neuromuscular function") AND ("knee extensors" OR "cuadriceps" OR "vastus lateralis" OR "vastus medialis" OR "intermedius vastus" OR "rectus femoralis" OR "plantar flexors" OR "gastrocnemius" OR "soleus" OR "plantaris").

Participant or population Female and/or male trail runners over 18 years old, healthy without injuries. The subjects had at least one participation in the Trail Running competition.

Intervention Articles that studied short (80km) Uphill and/or downhill sections running were

considered.Studies that investigated trail running races were chosen according to the International Trail Running Association (ITRA) definition, which considers those races developed in natural environments with variable terrain and a maximum of 20% of asphalted terrain. The ITRA defines short races as those with 80 km for ultra-trail races. The last modification of article 252 of the rules of ITRA defines that the organization, before the race, must announce the distance, ascent, and descent of the route that must have been measured beforehand to consider the distance and the positive slope to categorize the races according to the level of difficulty and not only by the distance.

Comparator Running over flat surfaces if available.

Study designs to be included Cross-sectional and longitudinal studies.

Eligibility criteria We considered study protocols in English that measured before, during (if available), and/or after the intervention. The measurements included were central and/or peripheral lower limb fatigue (this includes plantar flexors, knee extensors, or another muscle group) expressed as strength differences, using different forms and instruments.

Information sources All studies considered "grey literature," such as conference papers or theses, will be excluded. The reviews will not be included too. We will also exclude all studies that applied fatigue assessments after running on treadmills and not on trails, did not assess fatigue in the lower body musculature, did not comparative studies, and did not accomplish ITRA characteristics.
We considered developing the search in the next database: Web of Science, SCOPUS, PubMed, and Sport Discus.
In case a full text is not available, we will contact with authors.

Main outcome(s) We expect to clarify which muscle group presents greater fatigue after trail running races, the percentage of loss in each of them, and the categorization according to the characteristics of the race, whether due to ascents, descents, slopes, or temperature.
We expect that the outcomes are expressed as strength differences percentage ((post-test) - (pre-test) * 100%) in the next variables:
-Jump height, force rate development, and derivated measurements.
-Maximum peak torque, maximum voluntary isometric contraction, maximum contraction time on knee extensors and plantar flexors.
-Electrical stimulation with the percentage of maximal voluntary activation, high-frequency potentiated doublets on knee extensors and plantar flexors.
-Electromyography with contractile properties, M-wave amplitude (peak-to-peak amplitude and duration).
-Transcranial magnetic electro-stimulation: Maximum and submaximal corticospinal excitability, peak-to-peak amplitude, corticospinal excitability index.
The measures will be expressed as mean and standard deviation. As effect size will use Cohen's d index.

Data management Data will be tabulated and sorted in Excel for analysis.

Quality assessment / Risk of bias analysis As this research is framed within the sports sciences, it will be use the specific 15-item tool called Tool for the assEssment of Study qualiTy and reporting in EXercise (TESTEX) scale (Smart et al., 2015).

Strategy of data synthesis This Systematic Review will present the data tabulated in tables according to the characteristics of Trail Running, such as distance, slope, and surfaces.

Subgroup analysis This analysis will not be developed.

Sensitivity analysis This analysis will not be developed.

Language restriction English.

Country(ies) involved Chile.

Keywords Trail running; neuromuscular fatigue; lower limbs; knee extensors; plantar flexors; ultra-trail; ultra-trail running.

Contributions of each author

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