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# Biomechanical Factors of the Lower Limb Related to Running Injuries: A Systematic Review

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**Date:** Sept. 1, 2017

**From:** Journal of Athletic Training (Vol. 52, Issue 9.)

**Publisher:** Allen Press

**Document Type:** Abstract; Report

**Length:** 430 words

**DOI:** <http://dx.doi.org.colorado.idm.oclc.org/10.4082/1062-6050-52.9.01>

## Full Text:

**Context:** In the last decades running has become the sport of choice for many, because of its convenience, health benefits, and economical nature. The incidence of running injuries is high, result from a combination of extrinsic factors (training errors, shoe issues, running surface) and intrinsic factors (poor flexibility, muscle weakness, anthropometry ...), the individual biomechanics is considered one of the intrinsic factors to explain the origin of running related injuries.

**Objective:** To analyse the biomechanical factors which are involved in running related myofascial injuries in regular runners compared to non-injured runners

**Data Sources:** An electronic database search was carried out using four different databases: Medline, Dialnet, ScienceDirect and Emerald.

**Study Selection:** The following search terms were used: running, injury, kinematics and biomechanics.

**Data Extraction:** All of the studies had to meet inclusion criteria: 1) only research papers (case reports, reviews, editorials, letters to the editor were excluded) published between January first 2005 and July first 2015, 2) texts in English or Spanish, 3) only papers that had recreational or competitive runners but not elite in the study population, 4) comparing subjects with a running related injury diagnosed by a healthcare professional and asymptomatic controls without orthopedic issues, 5) all subjects were between the ages of 18 and 45 years, 6) all studies used photogrammetry as instrument to analyse the 3D biomechanics while running, and 7) all of the studies had to include one of the following kinematic variables: hip adduction, hip internal rotation, knee internal rotation and rearfoot eversion. 16 studies were finally considered for the systematic review.

**Data Synthesis:** Results showed a significant increase of hip adduction during stance phase in runners with patellofemoral pain syndrome, a significant increase in hip adduction and in knee internal rotation in runners with iliotibial band syndrome, a significant increase in rearfoot eversion in runners with achilles tendinopathy and a significant increase in hip adduction and in rearfoot eversion angles in runners with tibial stress fracture or medial shin pain.

**Conclusions:** There is an acceptable evidence that runners with patellofemoral pain syndrome or medial shin pain have a significantly greater hip adduction during running stance phase. Also, runners with achilles tendinopathy or medial shin pain syndrome have a significantly greater rearfoot eversion during running. This systematic review would allow us to identify a biomechanical relation between the running related myofascial injuries of the lower limb in regular runners, this opens door to another way for myofascial injury examination in sports considering running biomechanics analysis systems, which can identify easily movement disorder patterns that could cause injuries or could help prevent them.

doi: 10.4082/1062-6050-52.9.01

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<http://www.nata.org/journal-of-athletic-training>

**Source Citation** (MLA 8<sup>th</sup> Edition)

Fernandez-Lopez, I., and D. Rojano-Ortega. "Biomechanical Factors of the Lower Limb Related to Running Injuries: A Systematic Review." *Journal of Athletic Training*, vol. 52, no. 9, 2017, p. 864. *Gale OneFile: Health and Medicine*, <https://link.gale.com/apps/doc/A513926521/HRCA?u=coloboulder&sid=HRCA&xid=9f312746>. Accessed 17 Aug. 2019.

**Gale Document Number:** GALE|A513926521