

## Documents

Wodhillah, N.A.<sup>a</sup>, Azhar, N.I.<sup>a</sup>, Manaf, H.<sup>a b</sup>, Justine, M.<sup>a b</sup>, Alfawaz, S.S.<sup>c</sup>, Munajat, M.<sup>d</sup>, Bukry, S.A.<sup>a b</sup>

**FATIGUE EFFECT ON LANDING BIOMECHANICS AMONG INDIVIDUALS WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A SYSTEMATIC REVIEW**

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<sup>a</sup> Center for Physiotherapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, Selangor, Puncak Alam 42300, Malaysia

<sup>b</sup> Clinical and Rehabilitation Exercise Research Group, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, Selangor, Puncak Alam 42300, Malaysia

<sup>c</sup> Department of Physical Therapy, Faculty of Medical Rehabilitation Sciences, King Abdulaziz University, Jeddah, 21589, Saudi Arabia

<sup>d</sup> Department of Physical Rehabilitation Sciences, Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, Pahang, Kuantan, 25200, Malaysia

**Abstract**

It is well established that knee stability can be altered during fatigue, which may increase the risk of anterior cruciate ligament (ACL) injury. This is due to a reduction in neuromuscular control that leads to abnormal movement patterns. This study aims to review the impact of fatigue on landing biomechanics among individuals who have undergone anterior cruciate ligament reconstruction. Four databases (Scopus, EBSCO, Web of Science, and Google Scholar) were searched for relevant articles, with a focus on full-text English-language research articles published between 2012 and 2022. The quality of the included studies was evaluated using the McMaster Critical Review Form for Quantitative Studies, and two independent reviewers were involved in the study evaluation, with a third reviewer resolving any discrepancies. Data on study demographics, fatigue simulation methods, landing tasks, outcome measures, and results were extracted from included studies. Eight studies met the inclusion criteria and were included in the analysis. The results of these studies showed that fatigue simulation reduced knee flexion only in two studies and increased hip flexion moment only in two studies during landing among individuals with ACLR. These inconclusive results show that fatigue may negatively impact landing biomechanics in people who have had an ACLR, potentially increasing their risk of re-injury. Fatigue did not affect the landing strategies adopted by individuals who have undergone ACLR. Some of these changes, such as reduced knee flexion and reduced hip flexion moment, could potentially increase the risk of re-injury. However, other changes, such as an increased hip flexion angle, may protect the joint from further injury. More research is needed to better understand the impact of fatigue on landing strategies in this population and to identify strategies that can minimize the risk of re-injury. © 2023, Faculty of Medicine, University of Malaya. All rights reserved.

**Author Keywords**

Anterior Cruciate Ligament Reconstruction; Fatigue; Injury; Landing

**Index Keywords**

adult, ankle dorsiflexion angle, anterior cruciate ligament reconstruction, Article, biomechanics, fatigue, female, gait, ground reaction force, hamstring muscle, hip flexion angle, human, injury, kinematics, knee function, knee instability, ligament surgery, lower limb, male, muscle strength, normal human, outcome assessment, physical activity, quantitative analysis, range of motion, scoring system, simulation, systematic review

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A kinetic measurement found a greater hip flexion moment in the post-ACLR group compared to the healthy group. Competing interests during a fatigued state: The hip flexion moment can be defined as the torque produced by the hip extensors. The authors would like to declare that there is no conflict during landing by slowing the hip flexion to control and of interest in conducting and publishing the present paper: stabilizing the femoral adduction and internal rotation? Hip extensors? specifically the gluteus maximus? will financial support contract eccentrically to control the femur? According to the authors received no financial support for the research? to Leppänen et al: an increase in the peak external hip flexion moment was not associated with ACL injury by

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**Correspondence Address**

Bukry S.A.; Center for Physiotherapy Studies, Puncak Alam Campus, Selangor, Puncak Alam, Malaysia; email: saiful\_adli@uitm.edu.my

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