Comparison of kinematic variables in healthy individuals with those with reconstructed cruciate ligaments in military personnels

Mohammad Aziminia[1], Mojtaba Yousefi Zoshk[2], Simin Riahy[1*]

1. *Clinical Biomechanics and Ergonomics Research Center, AJA University of Medical Sciences, Tehran, Iran*
2. *Trauma Research center, AJA University of Medical Sciences, Tehran, Iran*

*Corresponding author: Simin Riyahi, Email: riahy_simin@yahoo.com

Abstract

Background and aim: Due to the long-term recovery of anterior cruciate ligament (ACL) injury and postoperative problems as well as the nonadherence to postoperative rehabilitation programs, the risk of re- injury of this ligament will increase. To ignore kinematic variables in Anterior cruciate ligament reconstructed (ACLR) individuals can be one of the main causes of injury in these people. The purpose of this study was to investigate kinematic parameters and variables of lower extremity during walking in healthy military personnel with the reconstructed anterior cruciate ligament.

Method: The subjects were 34 volunteer male military personnel who were reported to have anterior cruciate ligament rupture previously. The kinematic and kinetic data of the subjects' movements was recorded by the Vicon motion analysis system and the Kistler force plate with sampling frequencies of 200 and 1000 Hz, respectively. Finally, data analysis was performed using Nexus and Visual 3D software. The kinematic variables of the lower extremity from the moment of initial heel contact to the moment of foot separation with the force plate were calculated and compared between the two groups.

Results: The results of the study showed that the range of flexion-extension motion of the hip and ankle in the stance phase in the group with anterior cruciate ligament reconstruction (ACLR) was lower than the healthy group; however, there was no significant relationship between them (P=0.12, P=0.62). Moreover, the range of flexion-extension motion of the knee in the stance phase and the maximum flexion angle of the knee at the moment of heel contact with the ground in the ACLR group was significantly reduced compared to the healthy group (P= 0.03, P=0.005). The findings of the study revealed that Maximum knee joint valgus and tibiofemoral rotation ratio (T/F) in the stance phase showed a significant difference between the two groups and was associated with an increase in the mean of the ACLR group (P=0.032, P=0.038). Also, there was a significant difference between the two groups regarding the parameters of

duration in the stance phase, Step speed, and step length evaluated during walking. It was also associated with a decrease in the mean of these parameters in the ACLR group (P=0.01, P=0.02, P=0.03).

Conclusion: The results of this study suggest that rehabilitation exercises aimed at improving the range of motion of the lower extremity joints and also the modified Gait pattern in rehabilitation exercises can contribute to reducing the risk of injury and re-injury.

Keywords: Military personnel, Anterior cruciate ligament, Anterior cruciate ligament reconstruction, Kinematic variables, Walking