

## Identification of Knee Dynamic Profiles in High Performance Athletes with the Use of Motion Tracking

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**Abstract :** One of the injuries with a higher incidence among university-level athletes in the North of Mexico is presented in the knee. This injury generates absenteeism in training and competitions for at least 8 weeks. There is no active quantitative methodology, or protocol, that directly contributes to the clinical evaluation performed by the medical personnel at the prevalence of knee injuries. The main objective is to contribute with a quantitative tool that allows further development of preventive and corrective measures to these injuries. The study analyzed 55 athletes for 6 weeks, belonging to the disciplines of basketball, volleyball, soccer and swimming. Using a motion capture system (Nexus®, Vicon®), a three-dimensional analysis was developed that allows the measurement of the range of movement of the joint. To focus on the performance of the lower limb, eleven different movements were chosen from the Functional Performance Test, Functional Movement Screen, and the Cincinnati Jump Test. The research identifies the profile of the natural movement of a healthy knee, with the use of medical guidance, and its differences between each sport. The data recovered by the single-leg crossover hop managed to differentiate the type of knee movement among athletes. A maximum difference of 60° of offset was found in the adduction movement between male and female athletes of the same discipline. The research also seeks to serve as a guideline for the implementation of protocols that help identify the recovery level of such injuries.

**Keywords :** Cincinnati jump test, functional movement screen, functional performance test, knee, motion capture system

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