

## RELATIONSHIP OF THIGH MUSCLE STRENGTH AND HAMSTRING MUSCLE STIFFNESS WITH KNEE LAXITY

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Thigh muscle strength is important for maintaining proper knee joint stability, particularly during activities that involve running, jumping, and cutting movements. Several studies have demonstrated that individuals with greater thigh muscle strength are less likely to experience knee joint laxity and instability, which can contribute to the development of knee injuries such as anterior cruciate ligament (ACL) tears. Hamstring muscle stiffness, on the other hand, has been shown to be associated with increased knee joint laxity. The hamstrings are a group of muscles that run down the back of the thigh and attach to the bones of the lower leg. When these muscles are too tight, they can pull on the knee joint and cause it to become laxer, increasing the risk of injury.

**The aim of the study:** determine if there is a relationship between knee laxity with thigh muscle strength and hamstring stiffness;

**Objectives:** 1. To assess whether the strength of the thigh muscles affects the laxity of the knee.  
2. To assess whether hamstring stiffness affects the laxity of the knee;

**Participants:** twelve different sports players were involved in the study: 5 basketball players, 3 American football players, 1 football player, 1 kickboxer, 1 cyclist, 1 sprinter. Their age, weight, height, and body fat mean were  $25 \pm 3$ ,  $94 \pm 12$  kg,  $188 \pm 8$  cm,  $16 \pm 3$  %;

**Procedure:** subjects' physiological data were measured using «Tanita MC-780» scales. At the end of the preparation session, the subject performed a 7–9 minute warm-up on a stationary bicycle. After the warm-up, the subject is placed in the «Biodex System 3» dynamometer, in which the operation of the electrodes is revived. During the biceps passive test, the subject individual was placed in a seated position on the isokinetic dynamometer without shoes, with the hip flexed to about 120 degrees and the knee flexed to 60 degrees. The shank at 50 degrees below the horizontal. The maximum knee extension angle from the starting position ( $50^\circ$ ) and the passive-resistance torque at the point of greatest discomfort were used to quantify a range of motion. The next part of the testing takes place at Gijo's clinic, where ACL laxity is measured using the «GNRB Rotab» device. The patient's knee was flexed 20 degrees and not rotated in the decubitus dorsal position on the examination table. Both the left and right knees underwent the test. A pressure load of 134 N and later 200 N were administered using an electronic pressure pad on the upper calf. Data processing and comparison take place using the Microsoft Excel program and BMI SPSS software.

**Results:** the results indicate that ACL stiffness when the force was increased from 89N to 134N was regressed on three predictor variables: range of knee extension, quadriceps muscle strength, and hamstring muscle strength. Also, ACL stiffness when the force was increased from 134N to 200N was regressed on the same three predictor variables. Suddenly, there was no correlation with ACL displacement, hamstring stiffness and thigh muscle strength.

**Conclusion:** thigh muscle strength and hamstring stiffness didn't have any relationship with ACL displacement. Moreover, thigh muscle strength showed a large relationship with ACL stiffness, which could show that bigger strength and smaller imbalance between quadriceps muscle and hamstring muscle could reduce ACL injury percentages. Thigh muscle strength and hamstring stiffness are important factors that can impact knee joint stability and therefore, are especially important for athletes who participate in sports that involve running, jumping, cutting, and other high-impact activities.

**Keywords:** knee laxity, hamstring stiffness, thigh muscle strength, anterior cruciate ligament stiffness.