

# Mechanical properties of foot tendons – In vitro study

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## ABSTRACT

The aim of the present study was to determine the mechanical properties of main intrinsic and extrinsic human foot tendons in vitro. Within foot soft tissue, tendon is the tissue with less information available. Recent foot computational studies incorporate approximate representations of tendons [1,2], thus, deeper study of foot tendons properties has become necessary. Mechanical properties of foot tendons have been studied previously, especially the Achilles tendon properties, which is one of the most important tendons in the human body. However, information reported about other foot tendons is scarce and incomplete [3,4].

Seventy eight uniaxial tensile tests were performed to obtain the stress-strain curve of different foot tendons. The specimens were harvested from four frozen cadaver feet and included: Extensor and Flexor tendons of all toes, Tibialis Anterior and Posterior, Peroneus Brevis and Longus tendons. Ultimate tensile stress, stiffness and Young modulus were calculated for each sample. Load and strain failure were also recorded. Furthermore, the characteristics of the stress-strain curve, initial strain and linear range, were quantified.

All tests showed the characteristic tendon stress-strain curve with an initial strain without load followed by a linear region until macroscopic failure. The mean strain failure was  $13 \pm 6.2\%$ . The Young Modulus of all samples ranged from 0.1 to 0.8GPa with a mean value of  $0.34 \pm 0.18$ GPa. Two different tendon behaviors could be differentiated. Tibialis and Peroneus tendons exhibited higher values of strain and load failure if compared to Flexor and Extensor tendons which had higher Young Modulus.

Information on the mechanical properties of these lesser-studied tendons is very useful both for computational simulation and clinical applications, such as tendon repairs.

## REFERENCES

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