The Superficial and Deep Fascia System in the Upper and Lower Limbs: Functional and Clinical Implications

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BACKGROUND

The fascia system is a layer of tissue that envelopes different anatomical structures. It consists of a superficial and deep fascia. The superficial fascia is subcutaneous in location. It is made of loose connective tissue with large amounts of fat reinforced by strands of dense connective tissue. The deep fascia is deeper and essentially made of dense connective tissue. In the superficial fascia, the amount and arrangement of dense connective tissue may vary locally, up to significantly increase the density of the superficial fascia. However, the functional role, structural characteristics and differences of the superficial fascia compared to the underlying deep fascia and muscles are not yet established. This study is aimed to investigate the characteristics of the superficial fascia in the upper and lower limbs of human adults and foetuses in relation to the deep fascia.

METHODS

Thirty cryopreserved upper and lower limbs from adult cadavers and two foetuses at the 24 and 30 weeks of development were examined on gross anatomy and ultrasound to identify, isolate and measure the superficial and deep fascia.

RESULTS

Gross anatomy and ultrasound were able to identify the superficial and deep fascia on the extensor and flexor sides of the upper and lower limbs. The superficial fascia appeared to be thicker along the anterior and medial side of the arm and the posterior and medial side of the thigh. On the posterior aspect of the forearm, the superficial fascia was relatively thinner, whereas the deep fascia for thicker. In the leg, we observed the direct opposite. The same features about the superficial fascia were recognized in human foetuses. When the superficial fascia was thinner, the dense connective tissue had a more organized architecture.

CONCLUSIONS

While the superficial fascia is less thick in the extensor sides of the upper and lower limbs, the deep fascia is weaker and thicker in this area. This may be in relation to the greater demand for movement of the flexors side. Adipose tissue may influence the elasticity and resistance of the deep fascia and the action of the muscles.