Effects of talocruralis joint immobilization in rats tibialis anterior muscle. a morphological and histochemical study

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Immobilizations by orthosis or plaster cast are routinely used in orthopedics procedures. This intervention is commonly used in some cases of bone fracture, ligament injury, tendonitis, among others disorders of musculoskeletal system. The aim of this study was to evaluate the characteristics of tibialis anterior muscle submitted to a functional position immobilization of talocruralis joint. An orthosis model has been made by Wood's metal (a fusible alloy containing 50% bismuth, 25% lead, 12.5% tin, and 12.5% cadmium). The orthosis was fixed on the left hind limb of male wistar rats during four weeks. This device immobilized the talocruralis joint in an angle of 100° and the right hind limbs served as control group. After the trial period, the animals were euthanased with excessive dose of anesthetic, and the tibialis anterior muscles were collected and frozen in liquid nitrogen to analysis. The specimens were placed in a cryostat maintained at -25 °C and sectioned in 10 µm thick for histological and histochemical analysis. The muscle fibers morphology was obtained by the routine Hematoxylin-Eosin stain, and the fiber-type composition from histochemical reaction of NADH-TR enzyme. In the immobilized muscles some cells showed centralized nuclei suggesting changes in cellular structure. With this reaction the control muscles revealed Fast Glycolytic (FG), Fast Oxidative Glycolytic (FOG) and Slow Oxidative (SO) fibers with heterogeneous distribution on muscular bundles. The immobilized specimens showed an intense histochemical reaction suggesting an increased of SO and FOG fibers. This experimental model of talocruralis joint immobilization produced changes in nuclei position of some muscle fibers. The results also indicate an interconversion of muscle fiber types between FG and SO after four weeks of immobilization.

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