

Concurrent and predictive validity of isokinetic dynamometry and tensiomyography in differently trained women and men

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Abstract.

BACKGROUND: Information regarding the relationship between methods for assessment of voluntary and involuntary muscle contractile properties is of importance in sport science and medicine.

OBJECTIVE: To appraise the concurrent and predictive validity of isokinetic dynamometry and tensiomyography (TMG) in differently trained men and women.

METHODS: Fifty men and 45 women were divided into three groups: physically inactive, physically active and athletes. Isokinetic testing was performed on knee muscles in concentric mode at 60 and 180°s while tensiomyographic measurements were obtained from the rectus and the biceps femoris muscles.

RESULTS: A small, statistically significant correlation was detected between the peak moment and tensiomyography parameters relating to contraction time and maximal displacement ($\text{Adj. } R^2 = 0.086, p = 0.028$).

CONCLUSION: In general, isokinetic dynamometry and tensiomyography are not related and represent different technologies that measure different contractile properties of muscles. A hierarchical structure of predictive validity at the level of individual variables was detected as a function of gender and training level.

Keywords: Voluntary contraction, involuntary contraction, peak moment, contraction time, maximal displacement

1. Introduction

One of the basic properties of muscle tissue is the ability to contract, that is, react to stimuli by increasing tension and changing its length [1]. Muscle contraction can be voluntary or involuntary.

Voluntary muscle contractions are characteristic of skeletal muscles, are generated by cerebral cortex in

response to perceived need, and play a central role in human movement [2,3]. On the other hand, involuntary muscle contractions are controlled by the autonomic nervous system, are exerted by smooth muscles, but may also occur in skeletal muscles due to various factors (reflexes, neuromuscular conditions, electrical stimulation) [4–6]. Involuntary muscular contractions of skeletal muscles evoked by electrical stimulation have a particular role both in sports and clinical practice and are extensively investigated. In addition to being used in rehabilitation and training process, electrically-induced contractions enables the acquisition of meaningful information about the contrac-

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