



Application of Tests for Measuring Maximal Isometric Force

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Editorial

The assessment of muscle characteristics in the isometric working regime is a widely applicable method for testing athletes. In this mode of operation, the examinees act with muscle force against an immovable support which is connected to a measuring probe, tensiometer, force measuring platform or other similar measuring device that measures manifested force. The device for measuring maximal isometric force is applicable for different age categories, in top-level athletes, trained and non-trained population and amateurs, and they have significant role in the process of rehabilitation [1].

Maximal isometric force measuring plays an important role in sport as a widespread tool for collecting and obtaining feedback on the state of an athlete's fitness level. In addition, it plays an important role in setting standards for certain sports branches, as well as in defining differences in function of gender and different competitive levels, training effects monitoring, etc. [2] which results can indicate training deficiencies.

Reliability plays an extremely important role in measurement in the isometric regime of muscle exertion. It is considered that measuring of isometric force is a method with high test-retest reliability. In the papers of numerous researchers that have dealt with measuring maximal isometric force (F_{max}), the results showed high reliability in the range from 0.85-0.99 [3]. However, there are some differences in the results due to different methodological principles, measuring devices and measuring different muscle groups. The results showed lower correlation values (Wilson et al. 1995) in RFD ($r = 0.84$) than in F_{max} ($r = 0.96$), while in Mirkov's research [3], the results showed higher correlation in RFD_{max} in the range from 0.83-0.94 than in F_{max} (0.64-0.91).

In the research of Marković and associates [4], it was determined that the hand contractile characteristics can be measured

reliably, whereby the interclass correlation coefficient (ICC) is in the range from 0.938 to 0.977 for the maximal force (Fmax), from 0.903 to 0.971 for the rate of force development (RFDmax), and from 0.747 to 0.943 for the impulse of force (ImpF50%max). The representative value for variables Fmax and RFDmax, regardless of dominant hand or age category, should be the second or third attempt, because a better result was assessed. For variable ImpF50%max in the age category 35.0 to 49.9 and 50.0 to 69.9, the representative value for both hands should be the first attempt, in the group from 14.0 to 19.9 the second attempt, and in the group from 20.0 to 34.9, the better result for the non-dominant hand is the first attempt, and in the dominant hand is the second one.

In the research of Ivanović and associates [5] the obtained data showed that the application of the standard procedure for measuring muscle force and leg extensors explosiveness, the seated leg press has a high reliability as a specialized and sophisticated measuring device among top-level athletes and non-athletes. In non-athletes it is necessary to conduct three attempts in order to access maximal force (Fmax) ($\chi^2 = 0.995$), i.e. four attempts to access the rate of force development (RFD) ($\chi^2 = 0.965$), in order to achieve their maximal value. Regarding the top-level athletes competing in different sports (water polo, basketball and football), maximal values for Fmax and RFD were mainly obtained during the second attempt.

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