

## **Rotator cuff isokinetic strength of young group aged swimmers in a competitive training program**

Sousa JP<sup>1</sup>, Batalha N<sup>1</sup>, Raimundo A<sup>1</sup>, Belfo M<sup>1</sup>, Muñoz D<sup>2</sup>, Tomas-Carus P<sup>1</sup>

<sup>1</sup> Department of Sport and Health. University of Évora, Évora, Portugal

<sup>2</sup> Faculty of Sports Sciences, University of Extremadura, Cáceres, Spain

**Introduction:** In any given sports activity, muscular or movement instability is pointed out as having a high influence for the maintenance of correct joint functionality. In swimming, due to the repetitive use of shoulder muscles, there is a higher tendency to promote injuries at the shoulder joint, especially when instability between the internal (IR) and external (ER) shoulder rotators is present. The aims of this study were to evaluate the rotator cuff isokinetic strength in order to determine any possible muscular over compensation or imbalance, and to assess differences between the dominant and non-dominant side, of young group aged swimmers.

**Methods:** Forty young aged swimmers in a competitive training program were evaluated, and divided in two groups. Only subjects without any previous history of strength training were included. Group 1 (n=19), age 15 to 16 (years); height [mean (SD)] 168.6 (6.5) (centimeters); weight 59.6 (6.0) (kilograms), training/week 113.7 (12.6) (minutes); experience 5.3 (1.6) (years) and Group 2 (n=21); age 13 to 14; height 160.5 (12.2); weight 50.4 (10.8); training/week 88.6 (17.7); experience 4.1 (2.2) (years). The maximal unilateral isokinetic strength was measured (Biodex System 3) on the shoulder IR and ER during concentric action at 60°/second, bilaterally. Data was examined by the application of appropriate statistical tests for the analysis of variance.

**Results:** Statistical differences were found on peak torque (Nm) at the agonist/antagonist ratio measured unilaterally [Group 1: right shoulder 35.8 (7.9) (IR) and 25.8 (4.7) (ER) ( $p=0.001$ ) and left shoulder 32.7 (6.7) (IR) and 23.9 (5.1) (ER) ( $p=0.001$ ) / Group 2: right shoulder 23.4 (6.5) (IR) and 19.0 (5.4) (ER) ( $p=0.048$ ) and left shoulder 22.4 (5.4) (IR) and 16.8 (6.1) (ER) ( $p=0.027$ )]. However, no statistical differences were found between the maximal rotation strength measured bilaterally [Group 1: ER ( $p=0.280$ ) and IR ( $p=0.246$ ) / Group 2: ER ( $p=0.186$ ) and IR ( $p=0.522$ )].

**Conclusion:** Young swimmers involved in a competitive training program can suffer from unilateral over compensation at shoulder IR or ER. This compensation seems to increase with the number of training years. To enable a higher stability between the internal and external shoulder rotators it is recommended that shoulder muscle strengthening should be considered in young aged swimmers training programs.

**Keywords:** isokinetic strength, rotator cuff muscles, young swimmers