

## Water training effect in shoulder rotators strength in young swimmers

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### INTRODUCTION

The purpose of this study was to evaluate the effect of 18 weeks water training on the rotator cuff strength of young swimmers.

### METHODS

Twenty Portuguese national level male swimmers (age: 14.60±0.67 years old, height: 170.79±6.48 cm, body mass: 61.73±4.68 kg) and 16 sedentary male students (age: 14.88±0.72 years, height: 168.38±6.19 cm, body mass: 60.84±11.69 kg) participated in this study. The peak-torque of shoulder internal (IR) and external rotators (ER) was measured in the beginning of the season and after 18 weeks. Concentric action at 60°/s (3 rep) and 180°/s (20 rep) were measured in a seated position, using an isokinetic dynamometer (Biodex System 3–Biodex Corp., Shirley, USA). Anova with repeated measures was adjusted by baseline data and used to determine significant main effects in shoulder rotators strength and unilateral ratios (concentric ER/IR). The level of significance was set at 0.05.

### RESULTS

Significant differences were found in all variables that measure the IR shoulder strength, at 60°/s in dominant(DT) (P=0.000) and non-dominant(NDT) shoulder (P=0.002), and at 180°/s, both in DT (P=0.000) and NDT shoulder(P=0.001). At 180°/s ER we only found differences in the NDT shoulder (P=0.007). In respect to ER/IR ratio, significant differences were found between baseline and 18 weeks in both shoulders at 60°/s (DT: P=0.000; NDT: P=0.001). At 180°/s only in the DT ER/IR ratio significant differences were found (P=0.002).

### DISCUSSION

The main results are similar with previous studies [1]. After a exclusive water training period, the IR strength gains were significant higher when compared with the ER. These results are attributed to the repetitive shoulder IR and arm adduction motions involved in swimming techniques. As a consequence of the differences in strengths gains, the ER/IR ratio decrease from baseline to 18 weeks water training. The present data show specific adaptations in shoulder strength and identify a relative muscular imbalance between the IR and ER on the DT and NDT arm of young swimmers. Since the ratios describe the quality of muscular balance/imbalance, we can conclude that 18 weeks water training period induces muscular imbalances in both shoulders.

### REFERENCES

1. Ramsi, M., Swanik, K. A., Swanik, C., Straub, S. & Mattacola, C. (2004). Shoulder-Rotator strength of High School swimmers over the course of a competitive season. *Journal of sport rehabilitation*. Human Kinetics Pub. USA. Vol 13: 9-18.