

## DIFFERENCES IN SWIMMING FORCE METRICS INDUCED BY GENDER

Amaro, N.1.2, Marinho, D.A.2.3, Batalha, N.2.4, Morouço, P.1.2

1: CIMH-IPL (Leiria, Portugal), 2: CIDESD (Portugal), 3: UBI (Covilhã, Portugal), 4: EU (Évora, Portugal).

### Introduction

Swimming performance differences are notorious among male and female post-puberty swimmers. Previous studies point that, in adolescence, boys are taller and heavier than girls; taking advantage in swimming performance with that anthropometric difference (Morouço et al., 2012). Therefore, the aim of this study was to identify possible differences between performance (personal best at 50m freestyle) and parameters obtained in tethered swimming tests (force and impulse), between genders.

### Methods

One group of 14 male adolescent swimmers (age:  $14.6 \pm 1.2$  years of age, body mass:  $53.1 \pm 9.0$  kg, height:  $1.66 \pm 0.1$  m, arm span:  $1.69 \pm 0.1$  m) and other of 8 female adolescent swimmers (age:  $13.9 \pm 2.1$  years of age, body mass:  $46.3 \pm 9.2$  kg, height:  $1.57 \pm 0.1$  m, arm span:  $1.59 \pm 0.1$  m) took part in the study. Each participant performed a 30 s maximal front crawl tethered swimming test (described in detail by Morouço et. al, 2011) and a 50m in-water maximal bout. After normality assumption checked, speed in 50m in-water maximal bout ( $s_{50}$ ) and force metrics (average force –  $F_{avg}$ ; maximum force –  $F_{max}$ ; and impulse of force –  $F_{imp}$ ) were assessed for each group.

### Results

50m swimming speed was significantly higher for the males group comparing with females cohort ( $1.69 \pm 0.11$  vs.  $1.52 \pm 0.13$  m/s,  $p=0.004$ ; respectively). The same superiority was observed in tethered swimming metrics ( $F_{avg}$ :  $78.1 \pm 17.1$  vs.  $56.0 \pm 14.5$  N,  $p=0.006$ ;  $F_{max}$ :  $200.8 \pm 51.4$  vs.  $141.4 \pm 35.48$  N,  $p=0.009$ ;  $F_{imp}$ :  $74.7 \pm 15.6$  vs.  $52.8 \pm 16.3$  N.s,  $p=0.006$ ; respectively). No differences were found in body mass, height and arm span ( $p>0.05$ ).

### Discussion

It is assumed that body mass and height differences among males and females intensively increase after puberty (Kraemer et al., 1989). Thus, it is pointed that at these ages males are capable to produce more strength (Schneider & Meyer, 2005). However, in the present study no anthropometrical differences were noticed, and still performance and force exertion in-water were higher for the males group. These results suggest that other variables, rather than body constitution, should be considered when evaluating adolescent swimmers. The higher values in tethered swimming metrics may imply that male swimmers had higher muscle strength levels and/or a greater capacity to apply propulsive force to water.

### References

Bencke J, Damsgaard R, Saekmose A, Jorgensen P, Jorgensen K, & Klausen K, (2002). Scand J Med Sci Sport. ; 12:171-178.

Kraemer WJ, Fry AC, Frykman PN, Conroy B, Hoffman J, (1989) *Pediatr Exerc Sci*, v.1, p.336-350.

Morouço P, Vilas-Boas JP, Fernandes R, (2012). *Pediatr Exerc Sci*,v 24, 312-321

Schneider P, Meyer F,(2005). *Rev Bras Med Esporte*,v.11, p.209-13.