

REFERENCES

1. Dopsaj M, Matkovic I (1994). Motoric activity of water polo players during the game. *Physical Culture*, 48 (4):339-346 (in Serbian).
2. Gastin P B (2001). Energy system interaction and relative contribution during maximal exercise. *Sports Medicine*, 31 (10), 725-741.
3. Smith HK (1998). Applied physiology of water polo. *Sports Medicine*, 26(5):317-334.

ASSESSMENT OF TIME LIMIT AT LOWEST SPEED CORRESPONDING TO MAXIMAL OXYGEN CONSUMPTION IN THE FOUR COMPETITIVE SWIMMING STROKES.

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INTRODUCTION

Time limit at the minimum velocity that elicits maximal oxygen consumption (TLim- $\dot{V}O_{2max}$) was studied both in flume (Billat et al., 1996) and in normal swimming conditions (Fernandes et al., 2003). While no studies have been carried out based on other swimming techniques than freestyle, the purpose of this experiment was to characterize, and compare, TLim- $\dot{V}O_{2max}$ in the four competitive strokes, as well as to observe its relationships with two major performance determinants: $\dot{V}O_{2max}$ and anaerobic threshold (AnT).

METHODS

Twenty-three elite swimmers (15 males of 19.4 ± 2.1 y, 178.1 ± 6.2 cm and 71.8 ± 7.4 kg, and 8 females of 17.2 ± 1.4 y, 166.0 ± 3.7 cm and 59.7 ± 4.3 kg) performed, in their best technique, an intermittent incremental protocol for $\dot{V}O_{2max}$ assessment (Fernandes et al., 2003). Forty-eight hours later, subjects swam until exhaustion at their pre-determined velocity, to assess TLim- $\dot{V}O_{2max}$. $\dot{V}O_2$ was measured breath by breath by a portable gas analyzer (K4 b², Cosmed, Italy) connected to the swimmers by a respiratory snorkel. AnT was assessed individually (YSI 1500L Sport, USA) from the $[La^-]/\dot{V}O_2$ curve (Machado et al., this vol.).

RESULTS

Mean \pm SD values for TLim- $\dot{V}O_{2max}$ were 238.8 ± 39.0 , 246.1 ± 51.9 , 277.6 ± 85.6 and 331.4 ± 82.7 sec in crawl, backstroke, butterfly, and breaststroke, respectively. While no significant differences were observed between strokes in TLim- $\dot{V}O_{2max}$ (One-way Anova, $p < 0.05$), pooled data were correlated with AnT. Non-significant interrelationships were found between TLim- $\dot{V}O_{2max}$ and $\dot{V}O_{2max}$ (ml/kg/min) and AnT (mmol/l). However, moderate inverse interrelationships were observed between TLim- $\dot{V}O_{2max}$ and $\dot{V}O_{2max}$ ($r = -0.63$, $p = 0.001$) and $v@AnT$ ($r = -0.52$, $p = 0.012$, Figure 1).

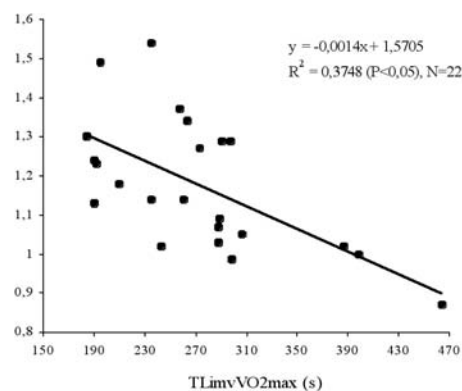


Figure 1. Relationship between TLim- $\dot{V}O_{2max}$ and $v@AnT$.

DISCUSSION

The inverse interrelationship between the parameters confirms previous findings obtained in national level freestyle swimmers (Fernandes et al., 2003), and point out that the higher the swimming velocities commonly related to aerobic proficiency, the lower the TLim- $\dot{V}O_{2max}$. Moreover, this latter variable did not differ between swimming strokes, pointing out that the phenomenon is similar in all four strokes.

REFERENCES

- Billat V., Faina M., Sardella F., Marini C., Fanton F., Lupo S., Faccini P., de Angelis M., Koralsztein J.P., Dalmonte A. (1996). A comparison of time to exhaustion at VO_{2max} in elite cyclists, kayak paddlers, swimmers and runners. *Ergonomics*, 39 (2), 267-277.
- Fernandes R.J., Cardoso C.S., Soares S.M., Ascensão A.A., Colaço P.J., Vilas-Boas J.P. (2003). Time limit and VO_2 slow component at intensities corresponding to VO_{2max} in swimmers. *Int. J. Sports Med.*, 24: 576-581.

LACTATE AND HEART RATE RESPONSES DURING SWIMMING AT 95% AND 100% OF THE CRITICAL VELOCITY IN CHILDREN AND YOUNG SWIMMERS.

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INTRODUCTION

Metabolic responses during swimming at critical velocity (CV) have been previously reported (2). However, CV may represent a different exercise domain for children and young swimmers compared to adults (1). The purpose of the present study was to compare the metabolic responses of children and young swimmers when swimming at 95% and 100% of the CV.

METHODS

Seven young swimmers and eight children ($x \pm SD$, age: 16.0 ± 1.7 vs. 11.5 ± 0.6 years, height: 177 ± 6 vs. 149 ± 5 cm,