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BRIEF NOTE

Anaerobic threshold and critical velocity parameters determined by specific tests of canoe slalom: Effects of monitored training



Seuil anaérobie et de la vitesse critique à l'aide de tests spécifiques pour le slalom en canoë-kayak : effets de l'entraînement

F.B. Manchado-Gobatto^{a,*}, N. Arnosti Vieira^b,
L.H. Dalcheco Messias^a, H.G. Ferrari^b, J.P. Borin^b,
V. de Carvalho Andrade^c, D.R. Terezani^c

^a *Laboratory of applied sport physiology - LAFAE, school of applied sciences, university of Campinas, UNICAMP, Pedro Zaccaria street 1300, Santa Luíza, 13484-350 Limeira, SP, Brazil*

^b *Faculty of physical education, university of Campinas, UNICAMP, university City Zeferino Vaz, Barão Geraldo, 13083-970 Campinas, SP, Brazil*

^c *Faculty of health sciences, Methodist university of Piracicaba, UNIMEP, Rodovia do Açúcar, km 156 (SP-308), 13423-170 Piracicaba, SP, Brazil*

Received 15 July 2013; accepted 13 April 2014

Available online 14 July 2014

KEYWORDS

Invasive and non-invasive aerobic evaluation;
Progressive test;
Blood lactate;
Canoe slalom;
Training

Summary

Objectives. – The aims of study were to determine the anaerobic threshold (AT) and critical velocity (CV) parameters using specific test for canoe slalom and verify the effects of 7-weeks of monitored training on these parameters.

Methods. – Well-trained kayakers were submitted to specific tests on a lake before and after training. The AT was determined by a progressive kayak “shuttle” exercise (50-m course, 3 min/stage, 5.0–9.5 km.h⁻¹). The blood lactate (BLC) was determined after each stage and AT was obtained using visual inspection and the intersection of the bi-segmental linear regressions. The CV protocol consisted of four maximal paddling exercises (150–600 m). The slope and y-intercept of the ‘distance vs. time’ model were CV and anaerobic paddling capacity (APC). The training intensity sessions were obtained by the rating of perceived exertion (RPE) and the product of daily volume and RPE was the load training.

* Corresponding author.

E-mail addresses: fmanchado@yahoo.com.br, fulvia.gobatto@fca.unicamp.br (F.B. Manchado-Gobatto).

MOTS CLÉS

Évaluations aérobie
invasive et non
invasive ;
Test progressif ;
Lactate sanguin ;
Slalom en
canoë-kayak ;
Entraînement suivi

Results. – The AT and CV were not different in initial tests (6.7 ± 0.2 and $6.8 \pm 0.1 \text{ km}\cdot\text{h}^{-1}$). After program, the AT increased ($7.3 \pm 0.2 \text{ km}\cdot\text{h}^{-1}$) without modified CV ($6.7 \pm 0.0 \text{ km}\cdot\text{h}^{-1}$).

Conclusion. – The AT protocol detected aerobic capacity increase after 7-weeks of training with small changes in load. Thus, the progressive test seems more appropriate to evaluate the effects of training on slalom kayakers.

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Résumé

Objectifs. – Les objectifs de l'étude ont été de déterminer les paramètres du seuil anaérobie (AT) et de la vitesse critique (VC) à l'aide de tests spécifiques pour le slalom en canoë-kayak et vérifier les effets de 7 semaines d'entraînement suivi sur ces paramètres.

Méthodes. – Des kayakistes bien entraînés ont été soumis à des tests spécifiques avant et après l'entraînement. L'AT a été déterminé par des exercices progressifs de « navette » en kayak (50 m de course, 3 min/intervalle, $5,0\text{--}9,5 \text{ km}\cdot\text{h}^{-1}$). Le lactate sanguin (Lac) été déterminé après chaque étape et l'AT a été obtenu en utilisant l'inspection visuelle et l'intersection des régressions linéaires bivariées. Le protocole de VC se composait de quatre exercices de pagayage maximum (150–600 m). Le modèle de pente et l'ordonnée à l'origine de « la distance par rapport au temps » ont été la VC et la capacité de pagayage anaérobie (CPA). Les sessions d'intensité d'entraînement ont été obtenues par l'évaluation de l'effort perçu (RPE) et le produit du volume quotidien et du RPE était la charge d'entraînement.

Résultats. – L'AT et la VC n'ont pas présentés de différences lors des tests initiaux ($6,7 \pm 0,2$ et $6,8 \pm 0,1 \text{ km}\cdot\text{h}^{-1}$). Après le programme, l'AT a augmenté ($7,3 \pm 0,2 \text{ km}\cdot\text{h}^{-1}$) sans modification de la VC ($6,7 \pm 0,0 \text{ km}\cdot\text{h}^{-1}$).

Conclusion. – Le protocole de l'AT a détecté un accroissement de la capacité aérobie après 7 semaines d'entraînement avec de petits changements dans la charge. Par conséquent, le test semble plus approprié pour évaluer les effets de l'entraînement sur des kayakistes pratiquant le slalom.

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1. Introduction

The canoe slalom is an Olympic sport held in rivers and depends of aerobic and anaerobic metabolism during training and competition [1]. However, there are a significant lack information about exercise intensity due to a deficiency of specific physical tests applied to kayakers.

The blood lactate concentration (BLC) is an important physiological variable for measuring aerobic and anaerobic conditioning. Thus, the anaerobic threshold (AT) obtained from BLC on specific tests has been used in many sports, but it has few applied to canoe slalom. Alternatively, non-invasive procedures have been proposed to estimate the aerobic and anaerobic parameters, for example, the critical power model suggested initially in 1960. Lloyd [2] applied a mathematical model using world records of runners, plotting the distance covered (d) as a function of the record time (t) ('d-t' model) to determine the critical velocity (CV) and anaerobic capacity. Currently, studies in humans indeed suggests CP as an aerobic index denoting the transition between high and severe exercise intensity domains.

Accordingly, this study aimed to determine the anaerobic threshold and critical velocity parameters using specific test for slalom kayakers and verify the effects of 7-weeks of monitored training on these parameters.

2. Methods

2.1. Participants

Six well-trained slalom kayakers (K1 category) were evaluated (age 17 ± 2 yrs; 67.5 ± 4.9 kg; 174.5 ± 5.9 cm). All athletes were competing in National and International Championships during the study period (80% of the sample ranked among the top 8 national rankings of Brazilian Canoe Confederation).

2.2. Experimental design

This study was approved by the University's local ethics committee. The experimental design was comprised of two field protocols both designed to determine the aerobic/anaerobic parameters, before and after 7-week specific training program. The tests were conducted in a lake and it completed in a maximum period of one week.

2.3. AT determination of slalom kayakers using BLC

The AT was obtained by progressive kayak "shuttle" exercise, with a 50-m course and stages lasting 3 min. The velocities used were 5, 6, 7, 8, 9 and $9.5 \text{ km}\cdot\text{h}^{-1}$, with blood samples collected from participants' ear lobes after each stage

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