47 - PRELIMINARY ANALYSIS OF ANAEROBIC INFLUENCY IN PERFORMANCE OF ORIENTEERING ATHLETES

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INTRODUCTION

Orienteering is basically a sport of race in natural atmosphere where the athlete should accomplish in the smallest possible time a course demarcated in a map that receives in the moment of the departure with the aid of a compass. The different courses of Orientation in official measures vary between 12 min and 80 min of independent duration of the distance, in other words, the official rules extol the time of duration of the races and not the distance.

To notice that Orienteering as a sport mostly aerobic is not a difficult task, it is enough to consider the characteristics of a proof, as for instance the duration and the different types of the athlete's muscular recruitment during the different proofs. In spite of the orientation athlete (orienteerer) to be demanded in several physical qualities and to pass for several situations along an orientation course and the aerobic potency (VO2máx) to be the primordial and decisive factor in the athlete's acting, this information is not enough and it is not also enough parameter for the systematized planning of a competitive athlete's training. The nature of the sport suggests the study and the determination of specific parameters for the athletes of that modality, what had already been placed by Zürcher, Clénin and Marti, mentioning Jensen ET AL. (1999) in 2005.

One of the factors to be analyzed is the athlete's anaerobic potency. In spite of the orientation races they don't demand a predominance in anaerobic metabolism, the participation of lactic pathway can be a decisive factor in some races, especially the sprint races. The analyses of the few previous studies that had with study object the sport Orientation they were based on the heart frequency (FC) and in the measure of the lactate (LARSON, 2002). Now, in spite of few, some researchers already use the analysis of gases for referring analyses to the metabolic demands in the Orientation.

The interaction among the metabolic roads during a lingering period of physical exercise is a study object that lacks of myths studies in the sport Orienteering. The several interaction possibilities among the roads if considered the ineditism of each competition opens a great scientific gap in this area.

METHODS

Subjects

This study counted with an athlete's of the masculine sex of elite of the Navy of Brazil participation. The age, height and the athlete's corporal mass was 21 years, 1,76 cm and 71 kg. The athlete met me good conditions of health and you/he/she didn't present any discomfort to make to interrupt him/it the exercise. The athlete signed a consent term after receiving all the explanations of the procedures of the study, as well as your objective, risks, possibility of identification of the appraised and potentials benefits. All the procedures of this study are in agreement with the Declaration of Helsinki 1996 and in agreement with the resolution CNS 196/96.

Experimental design

The athlete was monitored during a competition of Orienteering sprint he had your data registered by an apparel of GPS (global positioning system) with memory for storage of data. The collected dice were rolled in a specific software for analysis of routes of Orienteering.

Measurements

The data obtained in the study they are referring to a sprint proof. The obtained measures were medium speed (vm, Km/h), altimetria (alt, meters) and accomplished course. Starting from these primary data it is possible to extract secondary information as direction change and sense and other information that won't be presented at this time.

Measure instruments

For collections of data analysis was used a GPS, model Garmin Forerunner 305 of pulse and the Swedish software Quick Route, specific for use in events of Orienteering. Besides, the map used it also went to visualization of the caracteristics of each place where the athlete passed during the accomplished course.

RESULTS

The first analysis given was with base in the course accomplished by the athlete. The illustration 1 display the whole initiate in the extremity S (departure) until the end of the race in the extremity F (arrival). through the used software three colors can be observed along the course: Green (3min30seg/Km, speed limits inferior esteemed, or less), red (5min/Km, speed limits superior esteemed, or more) and I yellow (speed between the limits inferior and superior). the more close of the speed it limits inferior the yellow color if it approximates of the green and the more close of the superior limit the yellow color if it approximates of red.

Fig. 1 – Elite athlete's course on a sprint race. As diferentes cores

As the athlete could be observed you/he/she changed of direction and sense several times and you/he/she varied the

displacement speed in 27,1 Km/h, of 5,1 Km/h to 32,2 Km/h, being excluded the short periods in that didn't move in the course. It is noticed that the variation of speed is an important factor to be considered, consequently the metabolic demand suffers great variations in a short period of time. Considering that in this course the athlete accomplished a race with unevenness between the departure and the arrival, they are had then one more aggravating factor in anaerobic participation.

A second analysis was accomplished below through the observation of the graph. The time of permanence in the different displacement speeds can be observed. It is noticed that the largest time of permanence was in the speed among 3min50seg and 4min10seg of displacement. It would not be an enough intensity to determine the fatigue in a race proof, however the reasoning variables and fast change of direction they provoke a behavior that commits the athlete's acting during the proof.

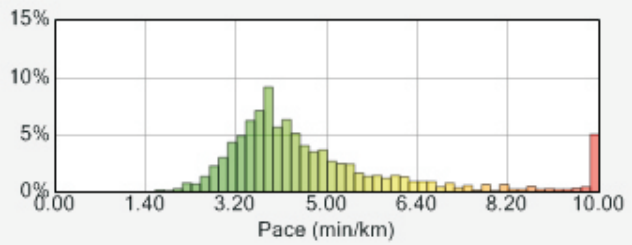

Fig. 2 – graph of accumulated time in the different speeds of run of accumulated time in the different displacement speeds.

The next graph shows the profile of the displacement speed to every second of the proof during all her. It is noticed that there were periods in that the athlete had to reduce your speed abruptly and even stopping your displacement to decide which broken to travel. Moments of for complete in the displacement are realy few, that is due the some mistake made by the athlete. That behavior is not expected, even in the most difficult route choices. Other moments of fast reduction and also retaking of speed with great acceleration characterizes the largest action of anaerobic metabolism during the competition

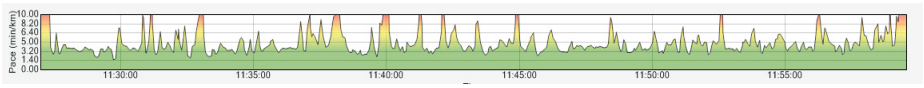

Fig. 3 – Graph of variation of the speed of the athlete's displacement during the race of Orienteering sprint.

DISCUSSION

In a first analysis, considering the time of duration of the proofs according to the official rules, it is evident the aerobic predominance in the supply of energy for the activity. However, as they are quite common, the different courses and the different characteristics of each proof atmosphere suggest a great anaerobic participation during an orientation course for all the athletes of Orientation that seek the acting. An abbreviation analogy can be made with proofs of long distance in the athletics that has every day demanded more from the athlete's anaerobic capacity.

Previous studies measured the energy demand of the organism during an orientation course that is essentially aerobic and that most of the athletes avoids periods of high intensity and long duration (SMERKAL, 2003). Other study indicated a great aerobic activity, however with varied intensity and phases with intense anaerobic participation (BIRD, 1993).

In the athletic studies a larger consideration of the anaerobic qualities can be observed in the current days. The resistance and the anaerobic potency won great importance in proofs of larger duration because of the athlete's largest metabolic efficiency when this has a high anaerobic threshold. Theanaerobic resistance is the capacity to be prolonged an effort of high intensity. The development of that physical qualities happens due to larger adaptation of the proteic filaments responsible for the muscular contraction and mainly for the metabolic adaptation of the muscles, fact that happens obviously through the training of high intensity.

The comparison with athletics proofs becomes inevitable given to the characteristics of physical demand of the Orientation. Creagh (1998) he/she made a study comparing the profile of FC between athletes of Orientation and cross-country corridors and. THE study showed a larger average of FC for corridors and a value about 5% more low for athletes of Orientation, however with a larger variability. Bird (1993) showed a variation between 140 and 180 bpm in HR in athletes from 15 to 62 years in different course as the distance and level of difficulty.

During a sprint race, for instance, he/she is considered that the perfect balance among the intensity of the race in the displacement between control points and the duration of the incentive is responsible for the athlete's best physical acting in the end of the proof.

The largest variation of HR in athletes of Orientation probably feels in the flaw of the planning before arriving to the control points, combined with the reduction of the speed in reorienting when it is lost, it results in a great deviation pattern of FC. Besides, in the Orientation the acclivities and slopes are constant, the direction change and sense and of race speed it constantly varies.

In spite of the orientation proofs they demand not a predominance metabolic anaeróbia under a global vision of the proofs, the participation of the road lactic glicolítica can be decisive factor in some proofs, especially the sprint proofs or even in proofs of larger duration where the choice of broken or attack and exit of control points can affect directly in the heart frequency, lung ventilation and consequently in the athlete's reasoning power, factor as important as any physical requirement.

As said in the popular language, a " reasoning " frequency exists for the athlete of Orientation. In fact it is noticed a smaller capacity of choice of routes when the athlete meets in a state of physiologic discomfort, in other words, in an intensity of superior effort your capacity of reading of the map in displacement and consequently possibility to choose efficient actions for the displacement among control points. The literature places that in general a value is verified of [lactate] sanguine of 1mmol/L in rest, and he/she is considered that after 4mmol/L the point that we knew of threshold of the lactate, happens in other words, the body produces more Lactic acid of what it is capable to eliminate.

The permanence capacity in unfavorable conditions in the exercise is an ability that can be trainning, however when he/she is considered simultaneously the need of fast reasoning and different possibilities of muscular actions, an athlete's of Orientation trainability is shown extremely complex.

CONCLUSION

The different proof types in the Orienteering are they depend predominantly on the aerobic metabolism. The anaerobic demands for this sport is a significant variable in the athletes' of high revenue case. The anaerobic resistance can be decisive factor in the athletes' of high revenue acting, mainly in sprint races and in races with great variation in altimetria. Subsequent studies can clear the interaction of the metabolic roads better in the athletes of Orientation, however it is clear the need of the good aptitude for continuous exercises with great anaerobic anaeróbia in specific phases of the exercise.

RECOMENDATIONS

It is suggested to subsequent studies to accomplish analysis of sanguine lactate during the Orienteering races and analysis of gases to clear better to real participation of the glicolitic pathway during the Orienteeriog competitions.

REFERENCES

1.BIRD, SR; R BAILEY AND J LEWIS. Heart rates during competitive orienteering. *British Journal of Sports Medicine*, Vol 27, Issue 1, p. 53-57, 1993.

2.BIRD, S; GEORGE, M; BALMER, J; DAVISON, RCR. Heart rate responses of women aged 23–67 years during competitive orienteering. *British Journal of Sports Medicine* vol 37, p.254-257, 2003.

3.CREAGH, U; REILLY, T; NEVILL, AM; REILLY, UT; NEVILL, AM. Heart rate response to "off-road" running events in female athletes. *British Journal of Sports Medicine,* Vol 32, p. 34-38, 1998.

4.KUJALA, UM; OJ HEINONEN, M KVIST, OP KARKKAINEN, J MARNIEMI, K NIITTYMAKI AND E HAVAS. Orienteering performance and ingestion of glucose and glucose polymer. *British Journal of Sports Medicine*, Vol 23, Issue 2, p. 105-108, 1989.

5.LARSSON, P; BURLIN, L; JAKOBSSON, E; HENRIKSSON-LARSEN, K. Analysis of performance in orienteering with treadmill tests and physiological field tests using a differential global positioning system. *Journal of Sports Sciences*, Vol 20, Issue 7, p. 529-535, 2002.

6.SMEKAL, G; VON DUVILLARD, SP; POKAN, R; LANG, K; BARON, R; TSCHAN, H; HOFMANN, P; BACHL, N. Respiratory gas exchange and lactate measures during competitive orienteering. *Medicine and Science in sports and exercise*. Vol 35, Issue 4, p. 682-689, 2003.

7.ZÜRCHER S, CLÉNIN G AND MARTI B. Uphill running capacity in Swiss elite orienteers. *Scientific Journal of Orienteering*. Vol 16, p. 04-11, 2005.

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PRELIMINARY ANALYSIS OF ANAEROBIC INFLUENCY IN PERFORMANCE OF ORIENTEERING ATHLETES

ABSTRACT

The different courses of Orientation in official measures vary between 12 min and 80 min of independent duration of the distance, in other words, the official rules extol the time of duration of the proofs and not the distance. An elite athlete, masculine, was monitored during a Orienteering sprint race. The data were analyzed through the software Quick Route. The results showed that the need of a good anaerobic shape of the athlete of high revenue exists and that the interaction of the anaerobic capacity and the different possibilities of muscular recruitment are factors that have influency in the athlete's performance.

KEY WORDS: Orienteering, energetic metabolism, anaerobiosis.

ANALYSE DES MÉTHODES JETABLES DE MESURE DE TEMPÉRATURE CORPORELLE : UNE APPLICATION EN PHYSIOLOGIE D'EXERCICE

RÉSUMÉ

Les différentes voies d'orientation sur les mesures officielles varient entre 12 min et 80 min dans la durée indépendamment de la distance, c'est à dire les règles officielles appel à la durée des tests et non sur la distance. Un athlète d'élite, hommes, a été suivie au cours d'un sprint d'orientation. Les données ont été analysées à l'aide rapide de l'itinéraire. Les résultats ont montré qu'il existe un besoin pour un conditionnement physique Bos anaérobie de l'athlète avec un rendement élevé et que l'interaction de la capacité anaérobie et le recrutement musculaire possible sont des facteurs influents dans le crash de l'athlète.

MOTS DE LA CLEF : Termorregulação corporel, température corporelle centrale, physiologie de l'exercice.

EL ANÁLISIS PRELIMINAR DE INFLUENCIA ANAEROBIO EN LA ACTUACIÓN DE ATLETAS DE ORIENTACION

RESUMEN

Los cursos diferentes de Orientación en las medidas oficiales varían entre 12 min y 80 min de duración independiente de la distancia, en otros términos, las reglas oficiales exaltan el tiempo de duración de las pruebas y no la distancia. Atleta de la élite, masculino, se supervisó durante una Orientacion carrera corta raza. Los datos se analizaron a través del software la Ruta Rápida. Los resultados mostraron que la necesidad de una forma anaerobia buena del atleta de rédito alto existe y que la interacción de la capacidad anaerobia y las posibilidades diferentes de contratación muscular es factores que tienen el influencia en la actuación del atleta.

PALAVRAS CLAVE: Orientacion, el metabolismo enérgico, el anaerobiosis.

ANÁLISE PRELIMINAR DA INFLUÊNCIA ANAERÓBIA NO DESEMPENHO DE ATLETAS DE ORIENTAÇÃO

RESUMO

Os diferentes percursos de Orientação em medidas oficiais variam entre 12 min e 80 min de duração independente da distância, ou seja, as regras oficiais preconizam o tempo de duração das provas e não à distância. Um atleta de elite, masculino, foi monitorado durante uma prova de sprint de Orientação. Os dados foram analisados através do software Quick Route. Os resultados mostraram que existe a necessidade de uma boa aptidão anaeróbia do atleta de alto rendimento e que a interação da capacidade anaeróbia e as diferentes possibilidades de recrutamento muscular são fatores influenciadores no despenho do atleta.

PALAVRAS CHAVE: Orientação, metabolismo energético, anaerobiose.

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