

Original article

Perceived exertion threshold: Comparison with ventilatory thresholds and critical power

Seuil de pénibilité perçue à l'effort : comparaison avec les seuils ventilatoires et la puissance critique

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Abstract

Objective

The aim of this study was to provide concurrent validity evidences to perceived exertion threshold (PET) by comparing and establishing relationships with aerobic fitness parameters derived from square-wave and incremental tests.

Methods

Eleven male college students performed one incremental test to determine first and second ventilatory thresholds (VT₁ and VT₂, respectively), maximal oxygen uptake ($V_{O_{2max}}$), and maximal aerobic power (MAP); four predictive trials for the critical power (CP) and PET estimations.

Results

Oxygen consumption (VO_2) at VT₁ and VT₂ were 22.9 ± 4.2 and 35.8 ± 4.7 ml/kg per minute, respectively. The MAP and $V_{O_{2max}}$ were 267 ± 34 W and 40.3 ± 6.3 ml/kg per minute, respectively. The PET (146 ± 31 W) and CP (146 ± 33 W) did not differ from each other, and both estimates were between VT₁ (121 ± 28 W) and VT₂ (228 ± 36 W). The correlations between PET and CP, expressed in relative terms to body mass, were

significant ($P < 0.01$, $r = 0.84$). The correlations between PET and relative V_{O_2} at VT_1 ($r = 0.76$), VT_2 ($r = 0.72$) and $V_{O_{2max}}$ ($r = 0.73$) were significant ($P < 0.05$).

Conclusion

PET did not significantly differ from CP, and presented significant correlations with VT_1 , VT_2 and $V_{O_{2max}}$ derived from incremental test. Thus, it can be considered as a valid measure of aerobic capacity.

Résumé

Objectifs

Le but de cette étude était de démontrer la validité du seuil de pénibilité perçue à l'effort (PET) à partir de relations avec des repères physiologiques caractérisant la capacité aérobie, obtenus lors de tests incrémentés et à intensité constante.

Méthodes

Onze étudiants masculins ont effectué 1) un test incrémenté pour déterminer le premier (VT_1) et second (VT_2) seuil ventilatoire, la consommation maximale d'oxygène ($V_{O_{2max}}$) et la puissance maximale aérobie (MAP) ; 2) quatre exercices rectangulaires pour l'estimation de la puissance critique (CP) et de PET.

Résultats

La consommation d'oxygène (V_{O_2}) à VT_1 et VT_2 était $22,9 \pm 4,2$ et $35,8 \pm 4,7$ ml/kg par minute, respectivement. La MAP et $V_{O_{2max}}$ moyenne était 267 ± 34 W et $40,3 \pm 6,3$ ml/kg par minute, respectivement. PET (146 ± 31 W) et CP (146 ± 33 W) n'étaient pas significativement différents, et étaient tout deux entre VT_1 (121 ± 28 W) et VT_2 (228 ± 36 W). La corrélation entre PET et CP, exprimés de manière relative au poids de corps, était significative ($p < 0,01$, $r = 0,84$). Les corrélations entre PET et la V_{O_2} relative à VT_1 ($r = 0,76$), VT_2 ($r = 0,72$) et $V_{O_{2max}}$ ($r = 0,73$) étaient significatives ($p < 0,05$).

Conclusion

PET n'était pas significativement différent de CP et présentait des corrélations significatives avec VT_1 , VT_2 et $V_{O_{2max}}$ obtenues lors du test incrémental. Cela suggère la validité de PET comme une mesure indirecte des capacités aérobie.

Keywords: Aerobic capacity; Maximal oxygen uptake; Validity

Mots clés: Capacités aérobie; Consommation maximale d'oxygène; Validité

Article Outline

1. [Introduction](#)
2. [Material and methods](#)
 - 2.1. [Subjects](#)

- 2.2. [Experimental design](#)
- 2.3. [Procedures](#)
- 2.3.1. [Ergometer](#)
- 2.3.2. [Familiarization trials](#)
- 2.3.3. [Incremental test](#)
- 2.3.4. [Ventilatory threshold assessment](#)
- 2.3.5. [Predictive trials](#)
- 2.4. [Statistical analyses](#)
- 3. [Results](#)
- 4. [Discussion](#)
- [References](#)

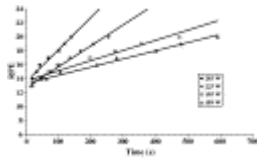


Fig. 1. Increase of the rating of perceived exertion (RPE) as a function of time during predictive tests of a representative subject.

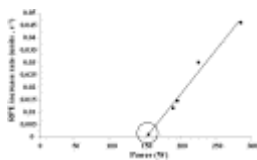


Fig. 2. Determination of PET through linear regression between rating of RPE increase rate and power output of a representative subject.

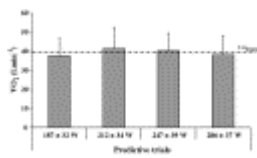


Fig. 3. Oxygen consumption at the end of predictive trials. The horizontal line indicates the group's mean $\dot{V}O_{2\max}$ value.

Table 1.

Mean \pm S.D. of PET, CP, VT₁, VT₂ and MAP ($n = 11$)



- ^a Significantly different from CP and PET ($P < 0.05$).
- ^b Significantly different from VT₁ ($P < 0.05$).
- ^c Significantly different from VT₂ ($P < 0.01$).
- ^d Significantly different from MAP ($P < 0.01$).



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