188 - ANALYSIS AND CORRELATION BETWEEN ALOMETRICS AND PHYSIOLOGICAL VARIABLE AS A FORM TO PREDICTIC THE LOAD IN BICYCLES OF SPINNING

MARINA T. AGUIAR, JANINE MONTEIRO, LUIS CLAUDIO MELO; MARCIA ALBERGARIA
LAFIEX - Laboratório de Fisiologia do Exercício & Medidas e Avaliação -
Universidade Estácio de Sá, Rio de Janeiro, RJ/Brasil
mba@infolink.com.br

Introduction

Melo and Albergaria (2005) pointed the cardiovascular and respiratory capacity consisting in the ability of carrying through physical activities, with dynamic character, that involve great muscular mass with moderate intensity for a long period of time. This ability depends on respitaroty, cardiovascular, muscular systems and your metabolic and physiologic relations, beyond the peripheral sanguineous flow.

The *spinning*® practice appeared in a few years where the academy people were found in the necessity of practicing an exercise that could get a higher energy expense, and a great cardiovascular and respiratory improvement conditioning with a pleasant stimulate for it, safe and under the supervision of a professor. Thus spinning® grew of form in the last years in the academies and continues growing. This was given for a large extend for the increase of the street competitions where the athlete found a form to train under adverse conditions in this modality.

This is a collective activity that comprehends a cardiovascular and respiratory training where the professor submits his pupils to the aerobic or anaerobic stimulations using anaerobic, aerobic interval training, continuous and fartleck methods, in accordance with the objective of the lessons.

The physiological profile of sessions of training of spinning® are used to be assigned in accordance with the lesson plan of the instructor. Many times an air-free activity is simulated including different stretches as plain lands and ascents. The land variations can require different techniques on the bicycle (position on the bicycle - seated or of foot, cadence (rpm) and overload) provoking alterations in the answers to the exercise.

As the lessons of spinning® have two basic positions, making the practitioner able to vary between the seated and stand position (TOSCANO, 1999; JOHNNY G., 2000) simulating respectively, in accordance with the overload used, plain lands and ascents. Literature does not seem to be specific on the existing relation between cadence and overload. According to Mello (2002), significant correlation of systolic BP (blood pressure), VO2, VE, MET and the Scale of Effort Perceived of in agreement Borg variables, exists variation of the load (kg) and/or cadence (rpm) in each phase of the lesson. Normally the studies show this established relation through a specific value for cadence (rpm) and an intensity of work measured in relation to the maximum cardiac frequency or VO2max, not having direct relation with the overload used in the bicycle. The studies do not show a clear relation between the cardiac overload in practical of spinning® and the type of muscular work that is being carried through.

It's understood alometry as being a mathematical expression capable to represent how much a variable (physiological, anatomical or secular it) relates with a corporal measure of the practitioners. (ROWLAND, 2005)

According to Calder, alometric equations are empirical descriptions where they relate a definitive physiological aspect, form or natural history and the corporal mass in the theory lack or causal relation.

Objectives

Being thus this study has as target to analyze the correlation between physiological alometry and variable as form of prediction of the load in bicycles of *spinning*

Methodology

This study a time is guided by a descriptive and correlacional research that wanted to relate variable that could find conclusions on the suggested hypotheses without intervening directly with the parameters. (THOMAS and NELSON, 2002)

The sample used in this study is intentional and non-probabilistic, being the voluntary, apparently healthful citizens and with regular practical of this activity in the very least six (6) months.

The volunteers had been submitted to a anthropometric evaluation in which had been measured cutaneous folds, perimeters, circumferences, corporal mass and stature. Where after collected, these had been submitted to the calculations for prediction of the maximum load for individually.

In order to verify the gotten results based on the mentioned calculations above, the volunteers had been submitted to an ergometric test in the Max Pro bicycle following Jones protocol.

From the data gotten with the Jones test, the loads considered light and weighed of each individual had been stipulated to be used for tests 2 and 3 respectively.

The second test was also made in a Max Pro bicycle having the beginning with a heating period of 5 minutes to a cadence between 75 - 100 RPM without overload followed of up to 6 minutes pedaling with cadence enter 100 - 110 RPM with the overload considered light.

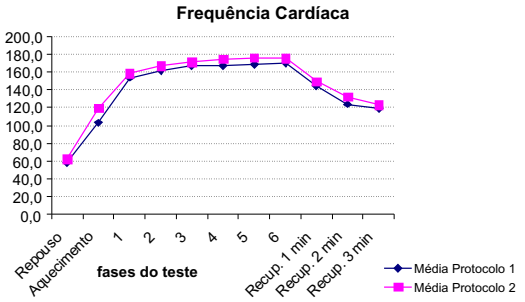
For the third test the procedures had followed the same adopted standards previously. This test also was carried in a bicycle Max Pro beginning with a heating period of 5 minutes to a cadence between 75 - 100 RPM followed of up to 6 minutes pedaling with cadence between 55 - 60 RPM with the overload considered weighed for each person.

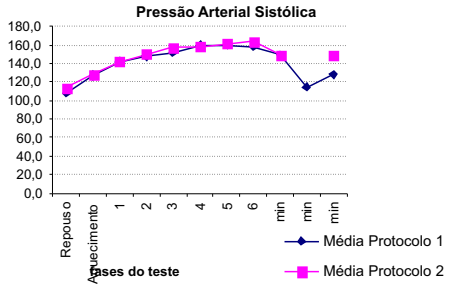
The data had been dealt in a way that comparison could make between the joined physiological effect in the two proposals work situations considering the prediction of the overload from the corporal surface of each person. The data was a base for the verification of the relation between the physiological measured parameters, the accomplishment of work and the Subjective Perception of Effort, bringing more resources to the instructors of the studied modality in way that these can analyze which is the more indicated maneuver for persons of different groups and different physical conditions considering the special groups in order to prevent extreme cardiac overload and to better correspond to the expectations of the pupils as for a safe and efficient lesson as training.

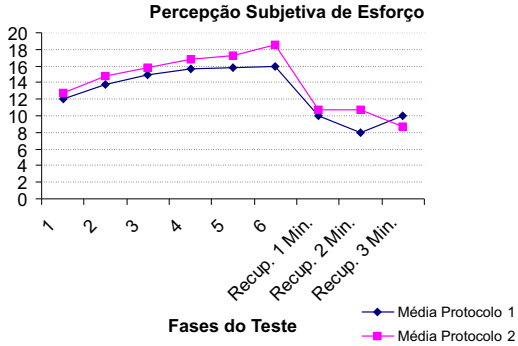
Results

How *spinning* it is a modality where the overload is regulated subjectively, considering the perception of the pupil, it becomes difficult to measurer in a real way the work to be carried through by each practitioner. From there, the study searched in accordance to relate the subjective perception of physical effort classified the scales of Borg, with a prediction of overload that

considered the individuality of each practitioner. For such relation the present study tested a form of prediction of overload based on the corporal surface of each individual in way that the consequent effort was compatible with the individual capacity of the practitioners.







Conclusions

It can be concluded that from 17 averages compared, 16 had not presented significant difference($p<0,05$). The study allowed relating the corporal surface of the individual with the overload used and that the mechanism used for the prediction of overload in bicycles of *spinning* demonstrated adequate to the considered objectives.

The behavior of the surveyed physiological variable during the tests had shown that the used load was adjusted to the proposal, not being nor sub nor overestimated, what could also be observed through the analysis of the Subjective Perception of Effort of the volunteers.

The two load situations x cadence studied had shown similar cardiac overload, thus corroborating the prediction of the overload and showing that different types of work on the bicycle of *spinning* can provoke the same physiological and thermal alterations on the individuals.

The use of an "ideal load" during the tests allowed, that through a comment of the behavior of the body temperature during the tests, also took us to a direct relation between the epidermis surface area, intensity of work and body temperature, becoming one tool of control for the physical activities.

References:

AMERICAN COLLEGE SPORTS MEDICINE (ACSM).**DIRETRIZES do ACSM para os testes de esforço e sua prescrição. 6. ed**. Rio de Janeiro: Guanabara Koogan, 2003.

BARBANTI, V. J.,**Treinamento Físico, bases científicas** (2001).

BORG, G. **Escalas de Borg para a Dor e o Esforço Percebido**. São Paulo: Manole, 2000.

DANTAS, Estélio H. M. **A Prática da Preparação Física**. Rio de Janeiro, Shape, 2003.

FARINATTI, Paulo T.V. *A Prescrição do Exercício para Hipertensos*. **Revista Brasileira de Fisiologia do Exercício.**

FERNANDES, J. F. **A prática da avaliação Física**. 2. ed. Shape, 2003.

FOSS, Merle L., KETEYIAN, Steven J. Fox. **Bases Fisiológicas do Exercício e Esporte**.Guanabara Koogan.2000.

FRANCIS, Peter R.; WITUCKI, Angela stavig; BUONO, Michael J. Physiological Response to a Typical Studio Cycling Session , **American College Sports Medicine Health and Fitness Journal**,v.3, n.1, p. 30-51, jan/fev 1999.

HALL, Susan J. **Biomecânica básica**. 3. ed. Rio de Janeiro: Guanabara Koogan, 2000.

HAMILL, Joseph; KNUTZEN, Kathleen M. **Bases biomecânicas do movimento humano. Tradução Lilia Breternitz Ribeiro**. São Paulo: Manole, 1999.

LEITE, TIAGO COSTA; FARINATTI, Paulo T.V. *Estudo da Freqüência Cardíaca, pressão arterial e duplo-produto em exercícios resistidos diversos para grupamentos musculares semelhantes*. **Revista Brasileira de Fisiologia do Exercício**. Vol 2, nº 1. fev 2003.

MCGINNIS, Peter M. **Biomecânica do esporte e exercício**. Tradução Jacques Vissoky. Porto Alegre: ARTMED, 2002.

MCARDLE, William D; KATCH, Frank I; KATCH, Victor L. **Fisiologia do exercício: energia, nutrição e desempenho humano**. Tradução Giuseppe Taranto. Rio de Janeiro: Guanabara Koogan, 2003.

MELLO, D.M.; CARVALHO, G.E.F.; DANTAS, E.H.M. Alterações Fisiológicas na Aula de Spinning. **8° Congresso de Educação Física e Ciências do Desporto dos Países de Língua Portuguesa,** Portugal, 2000.

MELLO, D.B., **Alterações Fisiológicas do Ciclismo Indoor**. Monografia para Obtensão do título de Mestre em Ciência da Motricidade Humana,**UCB,** 2001

MELO, Luis C., ALBERGARIA, Marcia. **Alterações da Freqüência Cardíaca e Pressão Arterial - Num Teste Maximo de Esteira Rolante, Realizado Por Alunos Universitários**. 10ª Jornada de Educacion Física del Mercosur;Jesus Maria, Córdoba, Argentina; 2005

MELO, Luis C., ALBERGARIA, Marcia. **Comparação Entre as Respostas Cronotrópicas Mensuradas em uma Apresentação Piloto e a Própria Apresentação de Monografia.** XXVIII Simpósio Internacional de Ciências do Esporte; São Paulo; 2005

MELO, Luis C.**Diferenças Cronotrópicas em Saltos Com e Sem Auxílio dos Membros Superiores Para**

Impulsão em um Trampolim Acrobático. 20º Congresso Internacional de Educação Física - FIEP (Federation Internacionale D'education Physique);Foz do Iguaçu;2005
POLLOCK, Michael L; WILMORE, Jack H. **Exercícios na saúde e na doença: avaliação e prescrição para prevenção e reabilitação**. 2. ed. Rio de Janeiro: MEDSI, 1993.
POWERS, Scott K; HOWLEY, Edward T. **Fisiologia do exercício**: teoria e aplicação ao condicionamento e ao desempenho. São Paulo: Manole, 2000.
RYSCHON,T.W.; J.STRAY-GUNDERSEN. The *Effect of body position on the energy cost of cycling*. ***Medicine and Science in Sports and Exercise 23***. 949-953, 1991.
Rowland,Thomas W., **Developmental Exercise Physiology**, 2nd ed.,USA,Human Kinetics, 2005.
WEINECK, Jürgen. **Treinamento ideal**: instruções técnicas sobre o desempenho fisiológico, incluindo considerações específicas de treinamento infantil e juvenil. São Paulo: Manole, 2003.
WILMORE, JACK H.; COSTILL, DAVID L. **Fisiologia do esporte e do exercício**. 2. ed. São Paulo: Editora Manole, 2001.
WILMORE, J. H.; COSTILL, D. L. **Physiology of Sport and Exercise**. Human Kinetics, 2004.
CONGRESSO BRASILEIRO DE BIOMECÃNICA, 5., 1993, santa Maria. **Anais...** Santa Maria: UFSM, 1993.
CONGRESSO BRASILEIRO DE BIOMECÃNICA, 6., 1995, Brasília. **Anais...** Brasília: Sociedade Brasileira de Biomecânica, 1995.

Laboratório de Fisiologia do Exercício & Medidas e Avaliação - Campus Akxe - Universidade Estácio de Sá
Avenida Prefeito Dulcídio Cardoso 2900, Barra da Tijuca, CEP:22631-021, Rio de Janeiro, RJ, Brasil

ANALYSE ET CORRÉLATION ENTRE ALOMETRIES ET VARIABLE PHYSIOLOGIQUE COMME FORME À PREDICTIC LA CHARGE DANS DES BICYCLETTES DE LA SPINNING

Abstrait - Spinning® est une activité principalement aeróbic exécutée dans différentes intensités (Kang et autres, 2005) sur une bicyclette stationnaire. C'est une activité de grand succès dans les académies de nos jours, principalement pour être considéré de grandes dépenses d'énergie - autour 458 kcal (LIMA et autres, 2003), enfermant le public divers. But : Pour vérifier ce qui est la situation d'une plus grande surcharge cardiaque étant comparée le produit de taux de pression pendant les travaux de la cadence lente (65 - 85 t/mn) à beaucoup de surcharge et de la cadence rapide (100 - 120 t/mn) à peu de surcharge pendant le spinning®. **Pertinence** : importance de vérifier quel type de travail doit être empêché et quel manoeuvres peuvent être stimulées pendant les classes de spinning®.

Mots clés : spinning®, cadence, fréquence cardiaque, estimations d'effort perçu, tension artérielle, produit de taux de pression

ANALYSIS AND CORRELATION BETWEEN ALOMETRICS AND PHYSIOLOGICAL VARIABLE AS A FORM TO PREDICTIC THE LOAD FOR SPINNING CYCLES

Abstract - Spinning® is a predominantly aeróbic activity carried through in different intensities (Kang et al, 2005) on a stationary bicycle. It is an activity of great success in the academies nowadays, mainly for being considered of great energy expense - around 458 kcal (LIMA et al, 2003), enclosing diverse public. **Purpose:** To verify which is the situation of bigger cardiac overload being compared the rate-pressure product during the works of slow cadence (65 - 85 RPM) with much overload and fast cadence (100 - 120 RPM) with little overload during the spinning®. **Relevance:** importance of verifying which type of work must be prevented and which maneuvers can be stimulated during spinning® classes.

Key words: *spinning*®, cadence, heart rate, ratings of perceived exertion, blood pressure,rate-pressure product

ANÁLISIS Y CORRELACIÓN ENTRE ALOMETRIAS Y LA VARIABLE FISIOLÓGICA COMO FORMA A PREDICTIC LA CARGA EN BICICLETAS DE SPINNING

Extracto - Spinning® es una actividad predominante aeróbic llevada a través en diversas intensidades (Kang et el al, 2005) en una bicicleta inmóvil. Es una actividad del gran éxito en las academias hoy en día, principalmente para ser considerada del gran costo de la energía - alrededor 458 kcal (LIMA et el al, 2003), incluyendo a público diverso. Propósito: Para verificar cuál es la situación de una sobrecarga cardiaca más grande que es comparada el producto del nivel de presión durante los trabajos de la cadencia lenta (65 - 85 RPM) con mucha sobrecarga y de la cadencia rápida (100 - 120 RPM) con poca sobrecarga durante el spinning®. **Importancia**: importancia de verificar qué tipo de trabajo debe ser prevenido y qué maniobras se pueden estimular durante clases del spinning®.

Palabras claves: spinning®, cadencia, ritmo cardíaco, grados del esfuerzo percibido, presión arterial, producto del nivel de presión

ANÁLISE CORRELACIONAL ENTRE ALOMETRIA E VARIÁVEIS FISIOLÓGICAS COMO FORMA DE PREDIÇÃO DA CARGA EM BICICLETAS DE SPINNING

RESUMO - O *spinning*® é uma atividade predominantemente aeróbica realizada em diferentes intensidades (Kang *et al*, 2005) sobre uma bicicleta estacionária. É uma atividade de grande sucesso nas academias nos dias de hoje, principalmente por ser considerada de grande dispêndio energético - em torno de 458 kcal (Lima *et al*,2003), abrangendo diversos públicos. **Objetivo:** Verificar qual a situação de maior sobrecarga cardíaca comparando o duplo produto durante os trabalhos de cadência lenta (65 - 85 RPM) com muita sobrecarga e cadência rápida (100 - 120 RPM) com pouca sobrecarga durante a prática do *spinning*®.**Justificativa:** importância de se verificar qual tipo de trabalho deve ser evitado e quais manobras podem ser incentivadas dentro da prática do *spinning*®.

Palavras Chaves: *spinning*®, cadência, PSE.