132 - PHYSIOLOGICAL DEMANDS ON CLASSIC BALLET CLASS

RENATA FIEDLER LOPES ; JULIANA PERESZLUHA ; RAUL OSIECKI
FEDERAL UNIVERSITY OF PARANA UFPR
CURITIBA PR BRASIL
renatafiedlerlopes@yahoo.com.br

INTRODUCTION

Ballet evolved demanding perfection and beauty to our eyes. In front of these, grand professional companies demand from their ballet dancers performances like elite athletes; that have it all of commons characteristics, except the fact that they don't participate the Olympic Games neither the competitions.

Training occurs not in functions of competitions but in accordance of the shows' year calendar, with presentations on the major's theaters of cities and countries. All of the bases of a ballet dancer are exhausted constitute during infinites and indispensable ballet classes.

Nevertheless, we don't know exactly what occurs during a classical ballet class, or what are the consequences of the regular practice, neither what are the factors could be affected the ballet dancer, damaging or indicating progress in performance; and more, what the variables could contribute with the physiological characterization of this activity "so art how much sport".

What it's perceived, the ballet is an exhausted activity, however without specific knowledge of effort intensity. One alternative to elucidate this subject is the Heart rate monitoring (HR). HR can help with extreme precision the physical conditioning state of ballet dancers and the training intensity (WILLMORE & COSTILL, 2001).

Ballet classes demand the practitioners an excellent physical conditioning with intense efforts developed by fast exercises (20 seconds to 3 or 4 minutes). This kind of effort indicates that energetic demand is received almost exclusive by the high-energy phosphate or ATP-CP, stored on active specific muscles during the exercises. When high intensities are reached, the muscle cells produce piruvic acid (MCARDLE e KATCH, 1999). This acid is instable and converse itself in lactate and, in agreement with Lopes (2005), the lactate accumulated with increased exercise intensity have a muscle incapacitate to extract and oxidize the lactate in the same time, and decrease the blood flux to the esplenic region (liver and kidneys).

Nevertheless, there are lot of studies based on HR like an indicator of effort and physical conditioning (LAMBERT et al, 1998; LUCIA et al, 2000; ACHTEN & JEUKENDRUP, 2003); there are some divergences about the subject. Still more, when the modality is less studied, like Classic Ballet. There's a lack of researches and articles of these theme, which could contribute to better comprehension and enlargement of this modality.

The intent of this research is detecting the physiological aspects of classic ballet dancers, like the metabolic net. Verifying the heart rate behavior during a classic ballet class to determine the exercise intensity in relative and absolute values.

METODOLOGY

Participating this study ten female classical ballet dancers, with a minimum of 9 years of regular participating on ballet classes. After a rest period, we measured individual rest heart rate (POLAR S610), and the HRmax during a maximum test on cycloergometer (Balke Protocol).

Table 1: Balke Protocol

Time	3'	+2'	+2'	+2'	+2'	+2'…
Watts	50	100	125	150	175	200…

The results of the capacity of maximum oxygen consume (VO_2max) from tested sample were from the indirect measure propose by the formula:

$VO_2max = (watts \times 12,2) + 300/weight$

The class is composed by 17 exercises, 9 exercises with ballet shoe realized in a bar support, that it is in the height of the waist, where only one hand is soft supported. Generally, these exercises are alternated with one exercise with predominance of isometric contractions (balances) and exercises where predominated muscle power (jump, for example); 1 exercise with ballet shoe realized in the center of the class (no bar support); 7 exercises realized with ballet pointe shoe also in the center (without bar support), characterized by a higher difficulty and hard intensity.

To data treatment we used the statistical procedures of descriptive statistics.

RESULTS

Table 2 shows the sample characteristics of body composition (weight, height, BMI) and physiological (VO_2máx, rest heart rate and maximum heart rate) (n=10)

TABLE 2 **BODY COMPOISITION AND PHYSIOLOGICAL CHARACTERIZATION OF THE BALLET DANCERS (XSE)**

	AGE (years)	WEIGHT (kg)	HEIGHT (cm)	BMI (kg/m^2)	VO_2max ml/kg/min	Rest HR (bpms)	HRmax (bpms)
MEAN	20,8	51,9	164,3	19,48	49,64	60,6	192,6
SE	0,96	1,28	2,0	0,96	2,77	7,11	8,78

The sample of ballet dancers (20,80,96 years old, 51,91,28 kg, 164,32,0 cm, IMC of 19,480,96 kg/m^2 and they showed an VO_2max equivalent of 49,642,77 ml/kg/min) showed a pattern of characterization related articles from dancers and ballet dancers.

The heart rate behavior was verified during a ballet class in female ballet dancers, and the results were demonstrated in relative values of reserve HR (%) and absolute values (beats per minute) (table 3).

TABLE 3 **HR DURING A CLASSICAL BALLET CLASS (XSE)**

	Exercise with a bar support and without pointed shoe (X ± SE)	**Exercise in the center without pointed shoe** (X ± SE)	**Exercise in the center with pointed shoe** (X ± SE)
HR (BPMs)	158,83± 4,06	174,7± 3,47	172,58± 2,63
HR (%)	74,62± 3,11	86,45 ±1,98	84,97 ± 1,95

Ballet dancers figured out high intensity levels of exercise, like 79,58% of reserve HR and media maximum HR of 192,6 bpms.

After the procedures of datas collected (class and maximum test) were possible to detect that ballet classes intensity are extremely high, because peaks above 60% of reserve heart rate are considerate intense, in accordance with data of American College of Sports Medicine (2005). Loads above 85% are classified like very intense (ACSM, 2005).

If we could separate the class in three different moments, it's perceived that the warm initial, where the exercises with bar support and ballet shoe are done, the intensity have already been high (74,623, 11%), exactly the objective being only to prepare the muscles to the rest of the class (SAMPAIO, F, 1996, pág, 57 e 58). In a second moment, where the exercises in the middle of the class are done with ballet shoes, the peak of intensity is reached (86,45 1,98%), classified equal extreme intense (ACSM, 2005). This higher intensity is because of the spins with great muscles power. The duration of this exercise is about 21 seconds to the right side and more 21 seconds to left side, equal 42 seconds. To finalize the class, the more difficult exercises are executed in the center the class with ballet pointe shoes. The relative intensity of these movements, supported only by the fingertips, are classified equal intense (84,97 1,95%).

CONCLUSIONS

The aim of this study was to check the heart rate behavior during a classical ballet class in female ballet dancers, demonstrating these results in relative values (%) of reserve HR and in beats per minute (bpms). The sample studied (20,83, 08 years old, 51,94,04 kg, 164,36,34 cm, IMC of 19,481,31 kg/m^2 and they showed an VO_2max equivalent of 49,648,74 ml/kg/min) reached high levels of exercise intensity, 79,58% of reserve HR, and HR max of 192,6 bpms.

It's observed that the most difficult and extenuated part of a ballet class is in the center with ballet shoes, when exercises of spins are done.

We hope that the elucidations of this study could take off some doubts of athlete's physiological characterizations in a modality where training isn't only physical but also artistically.

REFERENCES

ACHTEN, J., JEUKENDRUP, A.E. Heart rate monitoring. Applications and limitations. Sports Medicine. Vol. 33 (7), pp.517-538. 2003

ACSM's guidelines for exercise testing and prescription. Seventh edition. Lippincott Williams & Wilkins. www.acsm.org.

LAMBERT, M.J., MBAMBO, Z.H., ST. CLAIR GIBSON, A. Heart rate during training and competition for long-distance running. Journal of Sports Sciences, vol 16, S.85-90. 1998.

LOPES, R.F., THIELE, E., DOURADO, A.C., OSIECKI, R. Comportamento da freqüência cardíaca e concentração de lactato sanguíneo durante teste de esforço progressivo em triatletas. Jornal Brasileiro de Medicina (JBM). Vol.88 (4), p. 54-60. 2005.

LUCIA,A., HOJOS,J., PÉREZ,M., CHICHARRO,J.L. Heart rate and performance parameters in elite cyclists: a longitudinal study. Med. Sci. Sports Exerc., vol 32, n.10, pp.1777-1782, 2000.

MCARDLE, W.D; KATCH, F.T.; KATCH, V.L. Sports & Exercise Nutrition. Philadelphia, PA: Lippincott Williams & Wilkins; 1999.

SAMPAIO, F. Ballet Essencial. Rio de Janeiro: Sprint, 1996.

SHARKEY, B.J. Condicionamento Físico e Saúde. Porto Alegre: ArtMed, 1998.

WILLMORE, J.H; COSTILL, D.L. Fisiologia do Esporte e do Exercício. 2 edição. São Paulo: Editora Manole, 2001.

Contact: Renata Fiedler Lopes
Address: President Affonso Camargo Avenue, 2125. Cristo Rei. Curitiba. PR. Brasil
Email: refiedlerlopes@yahoo.com.br

PHYSIOLOGICAL DEMANDS ON CLASSIC BALLET CLASS

ABSTRACT

Ballet classes demands on the practitioners excellent physical conditioning with intense efforts, nevertheless there isn't a specific determinant of effort intensity. For a better elucidation of this subject, the heart rate monitoring (HR) could indicate the state of physical conditioning of ballet dancers and the physiological intensities of the ballet class. Actually, the HR is considered the simpler, faster, easier and most directed method to indicate the powerful of an athlete during a maximum workout. The aim of this study was investigate the heart rate behavior during a classic ballet class. Participating this study 10 female classic ballet dancers, with minimum of 9 years of regular participating of classical ballet classes. After a rest period, the HR was measured in the entire sample. Then, we realized a maximum test in cycloergometer. The class is composed by 17 exercises, 9 exercises with ballet shoe realized in a bar support, 1 exercise with ballet shoe realized in the center of the class (no bar support); 7 exercises realized with ballet pointe shoe also in the center (without bar support), characterizing of higher difficulty and hard intensity. To data treatment we used the statistical procedures of descriptive statistics. The heart rate behavior was verified during a ballet class in female ballet dancers, and the results were demonstrated in relative values (%) of reserve HR and in beats per minute. The sample (20,83,08 years old, 51,94,04 kg, 164,36,34 cm, IMC of 19,481,31 kg/m^2 and VO_2max equivalent of 49,648,74 ml/kg/min) reached high intensity levels of exercise, like 79,58% of reserve HR and media maximum HR of 192,6 bpms. After the procedures of datas collected (class and maximum test) were possible to detect that ballet classes intensity are extremely high, because peaks above 60% of reserve heart rate are considerate intense, in accordance with datas of American College of Sports Medicine (2005). We hope that the elucidations of this study could take off some doubts of athlete's physiological characterizations in a modality where training isn't only physical but also artistical.

Key words: ballet, Heart rate, physiology

EXIGENCES PHYSIOLOGIQUES VIS-À-VIS DE CLASSE CLASSIQUE DE BALLET

Résumé:

Les cours de Ballet viulent de sis e'lives une exelente forme feseque pourtant sans préciser et spécifier létensité de l'effort. L' objectif de l'étude a été vírifier la fréquence cardiaque pindant un cours de Ballet classique. Il a été evalué 10 danseuses avic 9 ans de cours réguler. Is ant fait mensuration de la fréquence cardiaque de repos et de la fréquence cardiaque maxime (protocoli di Balke). Lis rísultats omt été analisé à travers d'une statistique descripte. La conduite de la fréquence cardiaque pindant un cour de Ballet classique est arrivíe à grands nividix d'itensité. Lis resultats puivent aider a connaêtce un peu dis caratéristiques dis pratiquants du Ballet.

Ballet, fréquence cardiaque, Physiologiques.

DEMANDAS FISIOLOGICAS DE UNA CLASE DE BAILE CALSICO

RESUMEN

Las clases de baile exigen de sus practicantes excelente condición física, con esfuerzos muy intensos, por tal motivo son un determinante específico de la intensidad de ese esfuerzo. Para una mejor interpretación de esto, el uso de la frecuencia cardiaca (FC) puede indicar con más precisión el estado de la condición física de los bailarines y la intensidad fisiológica de la actividad. El objeto de este estudio fue investigar el comportamiento de la frecuencia cardiaca durante una clase de ballet clásico. Participaron 10 bailarinas clásicas de sexo femenino, con poco menos de 9 años de asistencia regular a clases de ballet clásico. Se realizó una medición de frecuencia cardiaca en reposo y la frecuencia cardiaca máxima (protocolo de Balke) en cada una de las bailarinas. La clase se compone de 17 ejercicios, 9 ejercicios sin zapatillas de punta realizadas con apoyo de barra; 1 ejercicio sin zapatillas de punta realizado en el centro y 7 ejercicios realizados con zapatillas de punta también en el centro. Los datos fueron tratados a través de estadística descriptiva. Los resultados del comportamiento de la frecuencia cardiaca durante una clase de ballet, se demostraron en valores relativos (%) de FC de reserva y en bpms. La muestra estudiada (20,83,08 años, 51,94,04 Kg, 164,36,34 cm, IMC de 19,481,31 Kg/m^2 y VO_2máx de 49,648,74 ml/Kg/min) mostró elevados niveles de intensidad con un promedio de 79,58% de FC de reserva y FC máxima media de 192,6 bpm. Después de realizada la recolección de datos (aula y teste máximo), se observa que la intensidad de una clase de ballet es extremadamente alta, porque los picos por sobre el 60% de FC de reserva son considerados intensos, de acuerdo con los datos de 2005 del Colegio Americano de medicina Deportiva. Se acredita que este descubrimiento puede servir para interpretar algunas de las características de atletas de esta modalidad, a la que comprende una forma muy peculiar de tratamiento, que además de físico, es también artístico.

Palabras claves: Ballet, Frecuencia cardiaca, intensidad

DEMANDAS FISIOLÓGICAS DE UMA AULA DE BALLET CLÁSSICO

RESUMO

As aulas de Ballet exigem de seus praticantes excelente condicionamento físico, com esforços muito intensos, contudo sem um determinante especifico da intensidade deste esforço. Para uma melhor elucidação deste assunto, o uso da freqüência cardíaca (FC) pode indicar com mais precisão o estado do condicionamento físico dos bailarinos e a intensidade fisiológica da atividade. O objetivo deste estudo foi investigar o comportamento da freqüência cardíaca durante uma aula de ballet clássico. Participaram 10 bailarinas clássicas do sexo feminino, com pelo menos 9 anos de participação regular em aulas de ballet clássico. Fez-se a mensuração da freqüência cardíaca de repouso e da freqüência cardíaca máxima (protocolo de Balke) em cada uma das bailarinas. A aula é composta por 17 exercícios, 9 exercícios sem sapatilha de ponta realizados com o apoio da barra, 1 exercício sem sapatilha de ponta realizado no centro e 7 exercícios realizados com sapatilha de ponta também no centro. O tratamento dos dados foi feito através da estatística descritiva. O comportamento da freqüência cardíaca durante uma aula de ballet teve seus resultados demonstrados em valores relativos (%) da FC de reserva e em bpms. A amostra estudada (20,83,08 anos, 51,94,04 kg, 164,36,34 cm, IMC de 19,481,31 kg/m^2 e VO_2máx de 49,648,74 ml/kg/min) atingiu elevados níveis de intensidade com média de 79,58% da FC de reserva e FC máxima média de 192,6 bpm. Depois de realizadas as coletas de dados (aula e teste máximo), observou-se que a intensidade da aula de ballet é extremamente alta, pois picos acima de 60% da FC de reserva são considerados intensos, de acordo com dados de 2005 do Colégio Americano de Medicina Esportiva. Acredita-se que estas descobertas possam contribuir para elucidar algumas das características de atletas desta modalidade, a qual compreende uma forma muito peculiar de treinamento, que além de físico, é também artístico.