ANALYSIS OF INTENSITY DURING A SESSION OF JUMP TRAINING

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ABSTRACT

Introduction: Jump classes include exercises on an individual mini trampoline, comprehend sequences of rhythmic and choreographed movements and are prescribed to improve the aerobic capacity. The purpose of this study was to determine whether the intensity of a Jump session performed with the musical cadence of 135 beats per minute (bpm) and using a choreography for lower body is in line with the recommendations of the American College of Sports Medicine (ACSM) to improve the aerobic condition. Materials and Methods: Eleven healthy female participants composed the sample (23.2±2.2 years-old, 61.7±8.3 kg, 165.3±6.1 cm). The volunteers were subjected to a maximum test using the Bruce protocol on a treadmill and, subsequently, a second test on a mini trampoline to check the consumption of oxygen (VO2) and heart rate (FC) during the performance of a pre-established choreography at a cadence of 135 bpm for 10 min. Results: Statistical analysis found an average FC of 81% and VO2 of 64%. Discussion: It was concluded that a Jump session at musical cadence of 135 bpm and using a choreography for lower body is in line with the recommendations of ACSM regarding the intensity.

KEYWORDS

Heart Rate, Oxygen Consumption, Motor Activity.

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ANÁLISE DA INTENSIDADE DE UMA SESSÃO DE Jump Training

RESUMO

Introdução: As aulas de Jump compreendem exercícios sobre uma mini cama elástica, compostas por sequências de movimentos ritmados e coreografados, tendo como um dos seus objetivos a melhora da capacidade aeróbica. O objetivo do estudo foi verificar se a intensidade de uma sessão de Jump, realizada com a cadência musical de 135 batidas por minuto (bpm) e com a utilização de uma coreografia somente de membros inferiores, está de acordo com as recomendações do American College of Sports Medicine (ACSM) para aprimoramento da condição aeróbica.

Materiais e Métodos: Foram avaliadas 11 mulheres saudáveis (idade 23±2 anos, peso 61,7±8,3 kg, estatura 165,3±6,1 cm), praticantes da modalidade Jump. As voluntárias foram submetidas a um teste máximo, utilizando o protocolo de Bruce na esteira rolante, e a um teste no mini-trampolim para verificar o consumo de oxigênio (VO2) e a frequência cardíaca (FC) durante a realização de uma coreografia, durante 10 min. Para análise estatística dos dados foi feita estatística descritiva.

Resultados: Encontrou-se um percentual médio para a FC de 81% e para VO2 de 64%.

Discussão: Pode-se concluir que uma sessão de Jump, a uma cadência musical de 135 bpm e com a utilização de uma coreografia somente de membros inferiores, está de acordo com as recomendações do ACSM no que diz respeito à intensidade.

PALAVRAS-CHAVE
Frequência Cardíaca, Consumo de Oxigênio, Atividade Motora.

INTRODUCTION

The American College of Sports Medicine (ACSM) recommends that, to have a proper health, individuals must have ideal levels of cardiorespiratory capacity, strength and flexibility, associated with an adequate body composition. There is a consensus in the literature reporting and confirming the benefits of physical aptitude for health. This can be maintained or promoted by avoiding high risk factors, thus consequently reducing the risk of premature disease and precocious death, as the main component of high risk is the low physical aptitude.

To achieve efficient results for the improvement of cardiorespiratory aptitude, the training must be planned taking into consideration the duration, frequency and intensity of exercises. The ACSM recommends that to develop and maintain cardiorespiratory aptitude, it should have a frequency of training from three to five times a week, a duration of 20 min to 60 min of continuous or intermittent work in an intensity between 50% and 85% of maximum oxygen consumption (VO2max) and between 60% and 90% of maximum heart rate (FCmax).

The methodology commonly used in classes at fitness centers have served as a field of investigation for many scholars. Among the options of offered aerobic activities it is possible to cite the activities in electrical and mechanical treadmills, ergometric bicycle, aerobics, “indoor cycle”, “step training” and “jump training”.
The Jump classes include exercises to on a mini individual elastic bed, consisting of sequences choreographed by movements of jumping and running, with variations and combinations\textsuperscript{11}. This activity provides increased cardiorespiratory endurance, and may be indicated as a modality of class in gyms, and having as one of its goals to improve the aerobic condition and contribute effectively to the maintenance and improvement of physical aptitude and health\textsuperscript{13}. Among the parameters used to modify the intensity of aerobic classes, the literature describes the alternation of musical cadences and the increment of movements of upper limbs\textsuperscript{11,13,16,19,20}.

Some studies\textsuperscript{13,14} analyzed the relation of the intensity of the mini-trampoline classes using varied musical cadences and choreographies with the use of upper limbs, which would characterize a class for advanced individuals, with the recommendations of the ACSM. Regarding the intensity, the classes used in the studies are in agreement with these recommendations. It is unknown whether the responses with respect to the intensity in a choreography with a lesser degree of difficulty, consisted only by movements of inferior limbs and a slower musical cadence (135 bpm), would supply such recommendations.

In this context, the objective of this study was to verify whether the intensity of a Jump session, performed with the musical cadence of 135 bpm and using a choreography only of inferior limbs, is in line with the recommendations of the ACSM to improvement of cardiorespiratory condition.

**MATERIALS AND METHODS**

**Subjects**

The study group was composed by 11 female individuals, practitioners of the “Jump Training” modality, residents in the city of Juiz de Fora - MG - Brazil, aged between 19 and 26 years-old (the characteristics of the group are described in Table 1). The study met the norms to research in humans from the National Health Council from Brazil 196/96 Resolution, of 10/10/1996. The study was approved by the Ethics Committee on Research Involving Human Beings from the Castelo Branco University with the protocol number 0048/2008. The inclusion criteria for the selection of the study group were: the practice of Jump modality for at least three months; the signing of the Term of Free and Informed Consent; and the participation in voluntary way and approval in guided anamnesis questionnaires and PAR-Q. The subjects excluded from the study group were those who were using medications with direct influence on the behavior of heart rate and those with ostheomioarticular problems.

**Procedures**

The data were collected in two visits made to the Motor Assessment Laboratory from the Federal University of Juiz de Fora - Brazil, as will be described below.

In the first visit to the laboratory, the evaluated were submitted to a meeting of clarification about the study and procedures that have been made in data collection; after, they signed the Term of Free and Informed Consent. Then were collected the anthropometric measures weight and height. It was conducted a maximum ergoespirometric test on a treadmill, following the recommendations of the Bruce Protocol, which provides progressive increases in speed and inclination every 3 min\textsuperscript{21}, to determine the maximum oxygen consumption (VO\textsubscript{2max}) and FC\textsubscript{max}. During the test it was used the Aerosport Teen 100 gas analyzer, being the individual connected to the device, using a mouthpiece and nose clip. The FC and subjective perception of effort (PSE) through the Borg scale 6-20\textsuperscript{22}, were verified at the end of each minute of the stages of testing. The test was interrupted by the individual when it reached the maximum fatigue that prevented it, voluntarily, to continue the effort. It was considered the VO\textsubscript{2max} when: the oxygen consumption reached a plateau, even with the increased intensity of the effort; the respiratory exchange ratio was around 1.10 and/or the PSE was reported between 19 and 20. It was considered FC\textsubscript{max} the peak FC achieved during the test.

In the second visit it was performed the spirometric evaluation in the mini-trampoline. The Jump test consisted of a choreography previously rehearsed on the mini trampoline, with the use only of the inferior limbs, at a musical cadence of 135 bpm and the duration of 10 min, enough time for the values of FC to stabilize\textsuperscript{23}. The session of Jump Training was elaborated with the aim of maintaining basic movements of inferior limbs used in classes. The choreography was rehearsed until the study group could assimilate the choreographic movements. During the Jump test, the volunteers followed the sequence of choreography accompanying a person already familiar with it. The FC and PSE were verified at the end of each minute of the test.

On both visits the volunteers used a frequencymeter from the Polar S810i brand. The records of oxygen consumption were made every 20 s. There was an interval of

<table>
<thead>
<tr>
<th>Table 1 - Characterization of the study group</th>
</tr>
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<tbody>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>age (years)</td>
</tr>
<tr>
<td>body mass (kg)</td>
</tr>
<tr>
<td>height (cm)</td>
</tr>
<tr>
<td>BMI (kg·m\textsuperscript{-2})</td>
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at least 24 hours between a test and another for recovery of the evaluated subjects.

Statistical treatment

For the statistical analysis of data it was performed descriptive statistics with average and standard deviation values using Microsoft Office Excel 2003.

RESULTS

The average values found in the Bruce Protocol for FC\textsubscript{max} and VO\textsubscript{2}\textsubscript{max} were 189.0±11.6 bpm and 38.1±6.6 ml•kg\(^{-1}\)•min\(^{-1}\) respectively. The average FC in Jump, the average VO\textsubscript{2} in Jump and the average PSE in Jump are presented in Table 2.

Based on data from Table 2 the average percentages for FC\textsubscript{max} and VO\textsubscript{2}\textsubscript{max} were found, determining, the intensity of the analyzed choreography. The percentage found was 81.0±5.9% for FC and 64.0±12.3% for VO\textsubscript{2}.

DISCUSSION

With respect to the values obtained in the maximum test in treadmill, the evaluated group presented an average VO\textsubscript{2}\textsubscript{max} of 38.1±6.6 ml•kg\(^{-1}\)•min\(^{-1}\) and an average FC\textsubscript{max} of 189.0±11.6 bpm. According to the classification of the ACSM for the level of physical aptitude, the sample of the study provides a good aerobic aptitude. This classification of the level of aerobic aptitude in this study is in accordance with other studies with women physically active\textsuperscript{13,14,16}.

With respect to the results obtained during the Jump choreography, it can be said that the values both for % FC\textsubscript{max} (81%) as for the % VO\textsubscript{2}\textsubscript{max} (64%), are in accordance with the recommendations of the ACSM for maintenance or improvement of cardiorespiratory aptitude, which would be between 50% and 85% of VO\textsubscript{2}\textsubscript{max} and between 60% and 90% of FC\textsubscript{max}. These intensities represented a PSE between light and a little intense. The literature has reported the relation of the PSE with the physiological parameters and the values found in the study, were similar\textsuperscript{24}.

The results of this study confirm what has been found by other similar studies with activities carried out in gyms\textsuperscript{13,14,16,25}.

Furtado et al.\textsuperscript{13} identified the behavior of functional variables such as FC and VO\textsubscript{2} in a class of Jump Fit. The average percentage values of FC (87.1%) and VO\textsubscript{2} (81.2%) were in accordance with the recommendations of the ACSM. These values were higher than the presented in this study. This was possibly due to the difference of maximum aerobic capacity and the methodology presented in class.

Groos\textsuperscript{14} et al. conducted a survey that aimed to determine the intensity of the class of Power Jump (PJ) by the FC. Besides the incremental test, the sample had the FC monitored in two classes (PJ1 and PJ2) of the modality. Based on the results obtained during the tests and relating them to the FC\textsubscript{max}, it was a percentage value of 82.8±6.0% in PJ1 and 80.0±5.0 in PJ2. The results of this survey showed to be similar to the ones from this study, even being conducted in different environments (laboratory and a gym).

The objective of the study by Vianna et al.\textsuperscript{16} was to relate the % of FC\textsubscript{max} with the % of VO\textsubscript{2}\textsubscript{max} in choreographed exercises of Step Training, using a platform of 18 cm, in a musical cadence of 135 bpm, without the use of upper limbs. The results were 90% of FC\textsubscript{max} and 55% of VO\textsubscript{2}\textsubscript{max}. Martinovic et al.\textsuperscript{25} evaluated the cardiovascular and metabolic responses during continuous movements of choreographed exercise of Step Training in the heights of 15 cm and 20 cm of platform with a musical cadence of 132 bpm. The percentage results of this study were 74% (15 cm of height) and 81% (20 cm of height) of FC\textsubscript{max} and 65% (15 cm of height) and 75% (20 cm of height) of VO\textsubscript{2}\textsubscript{max}. Despite being performed in similar musical

<table>
<thead>
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<th>subject</th>
<th>FC\textsubscript{average} (bpm)</th>
<th>PSE</th>
<th>VO\textsubscript{2}\textsubscript{average} (ml•kg(^{-1})•min(^{-1}))</th>
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<tr>
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cadences, the motor characteristics of Step are different from the Jump ones, but the values were similar to the ones from the present study.

The main contribution of this study lies in the fact that a class of Jump Training with a lower level of complexity with regard to musical cadence and a choreography using only the inferior limbs, provides stimulus of intensity compatible with those recommended for maintenance or improvement of cardiorespiratory aptitude.

The major methodological limitation was the inability to control other variables that could also interfere with the intensity of an activity in the mini-trampoline, such as: bigger intensity of movements of legs and arms; greater energy to push the canvas of the mini-trampoline, and amplitude of movement of the inferior limbs in the choreographic sequence. However, these variables are difficultly controlled during a lesson, which makes the study close to reality, despite having been conducted in laboratory environment.

Based on the results of the research, it can be concluded that a session of Jump Training without the use of upper limbs, at a musical cadence of 135 bpm and 10 min duration, is in line with the recommendations of the ACSM on the intensity of a cardiorespiratory activity to improve or maintain aerobic conditioning.

REFERENCES


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