COMPARISON BETWEEN THE LINEAR AND NOT LINEAR MODELS OF PERIODIZATION IN KUNG FU ATHLETES DURING THE PERIOD BEFORE COMPETITION

Luiz Felipe Machado Pinto¹ l.felipemachado@gmail.com  
Leonardo Bernardes Alves² leobernardes@bol.com.br  
Ignácio Antônio Seixas da Silva² ignacioseixas@gmail.com  
André Luiz Marques Gomes² as.andre.gomes@gmail.com

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ABSTRACT

Introduction: Amongst the models of periodization, which is the distribution of work’s loads to a determined period, two can be cited: the model of linear periodization destines to increasing application of the intensity, while the not linear model mentions its alternation of the intensity throughout the cycles. The aim of this study was to compare the variations of the expiratory volume and muscular power of inferior members, as a consequence of the period before competition training in kung fu athletes divided in two groups: one group with not linear model and the second group with linear model. Materials and Methods: The sample was composed of 14 kung fu athletes, with ages between 18 and 35 years-old. The evaluations occurred for two weeks at three moments. The training occurred in a frequency of two days during the week. One portable spirometry was used to survey the expiratory volume and the horizontal jump test was used to evaluate the inferior members force. Results: No significant differences were observed during the three moments of the spirometry evaluation and the horizontal jump. Discussion: There were not any differences between the periodizations models (p>0.05).

KEYWORDS

Training; Spirometry; Strength; Kung-fu.

¹ Universidade Federal do Rio de Janeiro – UFRJ – Programa Lato Sensu em Treinamento Desportivo – Rio de Janeiro – Brazil  
² Universidade Estácio de Sá – Rio de Janeiro – Brazil
Comparação dos modelos de periodização linear e não linear em atletas de kung fu no período pré-competitivo

RESUMO

Introdução: Dentre os modelos de periodização, que é a distribuição das cargas de trabalho ao longo de um período, podem-se citar dois: o modelo de periodização linear destina-se à aplicação crescente da intensidade, enquanto a periodização ondulatória refere-se à alternância da intensidade ao longo dos ciclos. O objetivo foi comparar as variações do volume expiratório e potência muscular de membros inferiores, como consequência do treinamento pré-competitivo em atletas de kung fu divididos em dois grupos: grupo com periodização ondulatória e aquele com linear. Materiais e Métodos: A amostra foi composta por 14 atletas de kung fu, com idade compreendida entre 18 e 35 anos. As avaliações ocorreram a cada duas semanas em três momentos. O treinamento ocorreu com frequência de dois dias na semana. Foi utilizado um expirômetro portátil para aferir o volume expiratório, e o teste de impulso horizontal para força de membros inferiores. Resultados: Não foi observada discrepância significativa durante os três momentos de aferição da espirometria e no salto horizontal. Discussão: Não houve diferença entre as modelos de periodização (p>0,05).

PALAVRAS-CHAVE

Treinamento; Espirometria; Força; Kung-fu.

Comparación entre los modelos lineales y no lineales del periodización en los atletas de kung fu durante el período antes de la competición

RESUMEN

Introducción: Entre los modelos de periodización, la cual es la distribución de las cantidades de trabajo al período resuelto, dos pueden ser citados: el modelo del periodización linear destina el uso cada vez mayor de la intensidad, mientras que el modelo no lineal menciona la alternación de la intensidad a través de los ciclos. El objetivo de este estudio era comparar el volumen espiratorio y de la energía muscular de miembros inferiores, como consecuencia del período antes de que entrenamiento de la competición en los atletas de kung fu divididos en dos grupos: un grupo con el modelo no lineal y el segundo grupo con el linear. Materiales y Métodos: La muestra fue compuesta por 14 atletas de kung fu con edad entre 18 y 35 años. Las evaluaciones habían ocurrido a cada dos semanas en tres momentos. El entrenamiento ocurrió con frecuencia de dos días durante la semana. Fue utilizado un espirómetro portátil para examinar el volumen espiratorio y la prueba horizontal del salto fue utilizada para evaluar la fuerza inferior de los miembros. Resultados: No fue observada diferencias significativas durante los tres momentos de la evaluación del espirómetro y en el salto horizontal. Discusión: No había diferencia entre los modelos de periodizaciones (p>0,05).

PALABRAS CLAVE

Entrenamiento; Espirometría; Fuerza; Kung-fu.

INTRODUCTION

In the deepening of the athlete’s conditioning process in a determined competition period, the set of factors related to the athletics’ preparation and directed to the performance’s development in the sport chosen for the practice is called physical preparation. In athletes’ physical preparation, there are several factors that confirm the success, or failure, of the training. Among these, the periodization models are included, which, according to Oliveira, Sequeiros and Dantas, are found in literature in several ways, based directed on Matveev ideas, who proposes an emphasis in physical preparation, focusing mainly in the periodization of macrocycles, with a follow-up since the initial phases of training, beginning of the sport. It can be cited among the critics, Verkhoshanski and Bompa, who are more focused on sports calendars, many times emphasizing the technical-tactical training to the physical properly said.

According to Barbanti, Tricoli and Ugrinowitsch and de La Rosa, it is observed that concerning the periodization studies, among the most investigated models are the linear or traditional, and the not linear or undulatory periodization model. The first is determined by a constant increase of the training load and concomitant reduction of the volume, disposed through the training cycles. Concerning the not linear model, Rhea et al. present frequent changes in the training’s volume and intensity, be it weeks, by cycles or even daily.

According to Lima, as to competitions, kung fu is divided, basically, into fights and forms. Fights are confrontations between two athletes with an ample variety of punches, kicks and falls, also called as Sanshou. Forms, however, are combinations of attack and defense techniques, which...
can be individually demonstrated, or in groups, using guns or hands (disarmed). Acrobatics are also used, and many times are similar to rhythmic gymnastics. For Verkhoshanski, in the training that focuses target competition, there is a transition from specific to competitive activities in a determined modality. Therefore, this moment is opportune for increments in the specific workload.

It is in the competition period that the athlete reaches the maximum performance levels (physical, technical and psychological conditioning), in which the specific formation will have a presence almost absolute in training. Provided the exposed, the aim of the present study was to compare the expiratory volume and muscular potency as a consequence of the pre-competitive training in kung fu athletes of the category ‘forms’, in two groups: a group with undulatory periodization and another with linear periodization.

MATERIALS AND METHODS

To follow the physical conditioning process and the answers to the pre-competitive training, the study was carried out in the previous weeks to the target competition. The mentioned event was the international kung fu championship, carried out in São Gonçalo, in the state of Rio de Janeiro.

The horizontal impulse tests (explosive power of lower limbs) and spirometry (expiratory volume) were carried out in three different moments: in the beginning of the training period (pre-competitive period); the second moment happened after four training sessions (corresponding to two weeks); the last evaluation occurred at the end of the pre-competitive period, after more four training sessions.

Subjects were divided into two groups of seven students: not linear training group (or undulatory) and linear training group. The first was submitted to train with undulatory load characteristics. The second one, which was submitted to periodization with crescent intensity loads, was linear. Both with a weekly frequency of two days. The undulatory loads, concerning the variable intensity, were disposed for specific training of the modality, which had punches, kicks, fall techniques and plyometry of the lower limbs, and were characterized with the alteration of interval periods between series and exercises. In order to consolidate the training’s non-linearity, these different intervals were settled in the weeks of training, always respecting the maximum ‘stimulus-recuperation’ between the sessions, in which the most intense loads were followed by reduced ones. The variable volume was maintained as constant, represented by 60 minutes duration of the training session and the total number of series, repetitions and exercises.

In order to verify the expiratory volume and the explosive power of the lower limbs as the evolution or invalu-

tation gauging parameters of training, 14 athletes from 18 to 35 years old (26±8 years old) were evaluated from the advanced category, traditional forms of kung fu modality. A portable spirometer model Personal Best (Respiranics, New Jersey, 2004) was used to gauge the expiratory volume. With regard to the procedure, the assessed did three attempts, expiring until could not persist the effort anymore. The assessed were settled, in a straight posture, as the appraiser’s orientation.

In the lower limbs explosive power evaluation, the distance jump test, stagnant was used. It consists in the projection of the body in distance, the assessed from the standing position and stagnant, with the zero point of the metric ribbon as the start place, which is stuck to the floor, parallel and longitudinally between the evaluated feet. Three attempts and the final result, defined as the biggest distance reached between zero and the heel’s line were carried out. The test’s choice occurred due to less need of the motor ability to carry it out, without the need of its adaptation.

For data analysis, the statistical program SPSS®, version 13.0, was used. The study is characterized as cohort and, to see the results and identify the intra and intergroup differences during the training through three gauging moments, ANOVA 3x2 and Scheffe post hoc were used with a p≤0.05 significance.

The present study attended to the principles for the research realization in human beings, according to resolution n. 196/96 of the National Counsel Health, from October 10, 1996.

RESULTS

In the results analysis, values concerning the three gauging moments were obtained in the spirometry and in the horizontal jump tests, both applied in the group submitted to the undulatory training and in the group submitted to linear training.

Firstly, concerning the spirometry test, both groups did not have statistically significant differences (p>0.05). In the first evaluation moment of the group with undulatory periodization, it started with a mean spirometric rate of 568.5mL. The same group, when exposed to the first four pre-competitive training sessions, did not show any statistically significant changes, detaining spirometric rate mean of 598.5mL. In the third and last moment of gauging, which represents the competition week, the athletes had non-significant answers (p≥0.05), which are equivalent to 638.5mL. The total mean of the three moments was close to 601.9mL, as seen in Graphic 1.

When in an evaluation, the linear periodization and the spirometry had the following results for the first, second and third gauging: 615, 620 and 657mL. The mean...
of the final spirometry rate was close to 630mL, as represented in Graphic 2.

Concerning the undulatory training, the next means were obtained: 228.5, 234 and 235.9cm in the first, second and third evaluation moment, respectively. They were not statistically different (p=0.08).

In the observation of the results in the horizontal jump test, the means, consecutively, in the athletes with linear training loads, were 184.4, 186.4 and 175.8cm, in the first, second and third moment respectively, but the results were not statistically different (p=0.45).

The data analysis demonstrated evolution of the conditioning of the assessed athletes after the proposal period, which precedes the target competition. In the methods comparison, the undulatory presented difference in the impulsion power related to the linear method, in the latter there was a power decrease in the third evaluation moment.

**DISCUSSION**

In the process of training prescription, and, consequently, in its periodization, the evaluation programs detain an important role. It must, firstly, know what to assess, not tending to wrong interpretations of the results. Given its importance, evaluation has as purpose...
the prescription and orientation of activities and physical exercises, as well as the attendance of the evolution of the teaching-learning process.

Among the tests used, spirometry is very common to quantify the pulmonary function relevant to the proposed study. The analysis of the ventilation parameters is used for an objective evaluation of the functional capacity and monitoring of the assessed’s answer to the training. The evaluation of the expiratory volume is constantly used, even as a parameter in intensity’s measurements. Such as the use of gas measurement is a constant in the evaluation of the athletes conditioning levels. However, studies that possess ventilation parameter, in order to verify the conditioning level of a team, retained discrepancies of the results.

In the expiratory process, several are the factors that may contribute to the post-exercise failure, since the respiratory or others muscles, which compose the skeleton, can reduce its functionality by means of effort. Therefore, the insertion of an adjacent test is relevant to evaluate the muscular potency, in order to constitute reliably the attendance to the training answers and its answers about physical capacity.

The distance jump test, horizontal jump, is used to assess components related to muscular potency. Thus, due to the huge use of jumps and postures that need isometric and dynamics strength, the mentioned test is relevant in monitoring the answers to the training.

In the competition, or kati, according to the international competition rules stipulated by the Chinese kung fu confederation, aspects such as velocity, flexibility, explosive power, body expression, clothing, cleanliness and balance are the factors to be evaluated by arbiters. This combination of techniques is emphasized in the execution potency and velocity, suggesting high exercise intensity, characteristics that corroborate for the activity’s characterization about its energetic and anaerobic predominance. The mentioned inquiries as factors to be analyzed in competition are still responsible for the intensity training variation. Between them, the increase of the movement velocity, the amplitude of it and the reduction of the recovery intervals are commonly used in the training of athletes forms. The execution velocity of the specific exercise of competition is the main criterion for the efficacy evaluation in the training process.

Regarding the comparative analysis of the groups, which did linear and undulatory periodization, a singularity in the results can be noticed, and they are also not statistically significant.

The increase of volume in the first moment of periodization aims the rescue of the physiological ballast related to the cardiorespiratory ability and power resistance, helping neuroadaptations and increase of the muscular-skeptical power.

In the present study, although there are no significant differences between the periodization models, numbers show a fast superiority of the linear periodization model in respect to the explosive power, with a decrease of the surrender of this valence in the week of competition in the undulatory periodization group.

The most recent periodization models show the importance in training the strength, which has a fundamental role in the improvement process of the athlete’s physical conditioning. Nevertheless, this valence, as the others, must be stimulated by weekly training with at least five days of frequency and 30 minutes of duration for active individuals. Thus, knowing that the evaluated group in this study is composed of athletes, it can be said that a training frequency of two weekly sessions is below the necessary to focus increments in their abilities in the pre-competitive period.

In Ramalho and Junior study, a comparison of the linear and not linear model was done, having as variable the weightlifting training and the fat percentage of measurement. In it, the not linear training group had a significant improvement, training with a five days frequency in the week for advanced practitioners in weightlifting. Hence, subsequent increments in the movements velocity increase, decrease in the recovery intervals and movements amplitude increase are factors that corroborate for the increase of the training’s progressive intensity. For this, it is necessary to investigate the conditioning level in which a subject is, as well as the needs.

The study reports the important relation between volume and intensity, in which even when preparing the intensity load orderly, or neglecting the frequency, factor related to the training volume, training may not obtain the expected result. The choice of the sample must be taken into consideration, in order to dispose the training loads to an adequate public.

In the present study, all the athletes are in the advanced category, however, for having other occupations that assail the training time, this habitually dedicate only twice in the week to the modality. In the comparison between periodization models of the training, linear and not linear, there were no statistically significant differences. In the athletes’ preparation, there was a gain stabilization and consequent reversibility of these in the power, concerning the undulatory training. In the comparison of the training models, the linear periodization model was more efficient in the kung fu athletes training of the category ‘advanced form’, since it did not shown any statistical difference, as to high surrender training, a minimum increment in the ability can make a difference for a place in the podium.

Further studies using bigger sample groups, different modalities and higher weekly volume are recommended.
aiming at observing the physiological adaptations in the pre-competitive period in respect to the variability of disposition of the training loads.

REFERENCES


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