35 - EFFECTS OF DIFFERENT RESISTIVE TRAINING PROTOCOLS ON STRENGTH

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INTRODUCTION

Studies and surveys related to health have provided important information about the programs and strategies to encourage and educate the public about the benefits of physical activity (ACSM 1998, ACSM 2002). Today, weight training is one of the most practiced exercises in different age groups, both sexes and varying levels of fitness. This type of exercise promotes important morphological, physiological and neuromuscular changes as well as psychological and social benefits.

The main feature associated with the practice of weight training is the increasing of the levels of muscular strength, due to adaptations related to neural and muscular factors (ACSM 2002). Muscle strength can be defined as the ability to develop muscle tension against a resistance, involving mechanic and physiological factors, that determine the strength of any particular movement (BARBANTI 1979). It is known that most of the gains in muscle strength during the initial stages of a program of resistance training are due to the increase in total muscle activation in the discharge frequency and synchronization of motor units, or even by reducing the co- activation of antagonistic muscles during exercise. Although there is a tendency to associate the levels of muscular strength with the size of the cross-sectional area of muscle, this relation seems to be true only when the neural adaptations have been largely manifested (DIAS et al. 2005).

In the weight training process there are, specifically, methods and programs with scientific basis, as well as programs based on the practical experience of the physical education teacher. Therefore, when initiating a physical exercise program the student must sets his goals with enough clarity , so that, along with his teacher, he can define a good work to satisfy his needs.

The strength training performed with weights, also called weight training, is used for several objectives: to improve performance in sports, fitness, aesthetics and health promotion (MCCARTNEY et al 1988). Different variables can be manipulated in the prescription of strength training to dimension the volume and of the intensity of the training, such as: number of sets, reps, exercises, rest intervals, time of tension, load, among others. The control of these variables has been considered a primary aspect in the elaboration of the programs of strength training. Recommendations on the level of intensity of the weight training are based on percentages of maximum force (FLECK & JÚNIOR 1997). There are contradictory results in the literature regarding the intensity and type of exercises ideals to promote good effects on the health (ACSM 2000).

Different institutions, such as “American College of Sports Medicine”, underscore the importance of weight training as a form of physical activity for health promotion. The number of surveys related to strength training and hypertrophy increased sharply in the last two decades. Moreover, the application of strength training in special needs populations also increased. However, in relation to the prescription of weight training, many different behaviors have been adopted based on scientific research, varying considerably in the gyms reality.

Therefore, the aim of this study is to compare the effect of two weight training methods: 1) protocol proposed by (ACSM 2002); 2) protocol designed by Physical Education Teacher of the gym.

METHOD

SAMPLE

Thirty (30) individuals were related, (25,6±5,5 years), healthy, and registered in a gym in the city of Muriaé-MG. The inclusion criteria in this study were: aged between 20 and 45 years, registered in the gym in the period from 08/10/2007 to 02/29/2008 and inexperienced in weight training. Exclusion criteria were: substance use that affected the psychological and physiological responses to exercise; be participating in any regular physical activity during the research and commitment of any kind that might forbid the execution of the proposed exercises.

Volunteers signed a consent form, free and clarified, according to resolution 196/96 for experiments on human beings, which contained all the information related to the study.

PROTOCOL

Initially, all the individuals underwent anthropometric assessment. The following measures were collected: body weight (balance brand Welmy, 42792-2000), body fat (skinfold Cescorf professional), circumference (tape-measure Sanny-Sn4010). Then, the sample was divided randomly into two groups: 1) Experimental Group (EG) consisted of 15 individuals (13 men and 2 women) who underwent the training protocol proposed by (ACSM 2002); 2) Control Group (CG) composed of 15 individuals (12 men and 3 women) who underwent a personal exercise protocol, developed by the Physical Education Teacher, considering the volunteer's goal and information about his physical assessment.

The muscle strength was evaluated by a prediction test of 1 RM (one maximum repetition) of ((BAECHLE & GROVES 1992), in Leg Press exercises (Vitally brand) and Articulated Inclined Supine (Flex brand). Both groups were tested. For the test, a relatively high load was selected, in a way that volunteers could make up to 8 RM. At the end of the third try, the 1 RM load was estimated, considering the lifted load.

The EG was tested for peak load of reps in all the exercises for training, as attached. The training proposed for this group was characterized by a standard work for all volunteers, regardless of their goals, starting with training intensity at 60% load due to 1RM. Every four weeks, a new load test was performed by changing the intensity to 70%, 80% by the end of twelve weeks witch the volunteer would conclude the work proposed at the thirteenth week for completion of final tests. Before each training session the individuals performed a general warming of five minutes on the stationary bike and exercise with about 30% by weight of the load of running training.

The CG underwent an initial load test, in which the Teacher regulated, based on his experience, the workload in the exercises. It was used the same number of sets and repetitions of the EG. The training lasted three months (12 weeks).

STATISTIC TREATMENT

Data are presented as mean ± deviation - standard. To compare the groups for muscle strength, it was used the Student t test for independent measures, using a significance level of $p < 0.05$.

RESULTS

The results are presented in Table 1. There were no statistically significant differences between the groups for the anthropometrics variables, nor for the strength increase, evaluated by the load test of 1 RM prediction, based on the type of training performed.

Table 1: Effect of different protocols of resistance training on anthropometrics variables and strength levels.

Variables	Control Group Pre	Experimental Group Pré	p	Control Group Post	Experimental Group Post	p
Weigth	72,4 ± 13,1	70,2 ± 17,3	0,70	72,3 ± 12,7	71,9 ± 13,5	0,94
Height	170,3 ± 6,8	170,7 ± 7,8	0,88	170,6 ± 6,8	172,7 ± 6,8	0,42
Chest Circumference	98,3 ± 6,8	93,9 ± 10,6	0,18	99,5 ± 7,4	94,6 ± 8,4	0,12
Tight Circumference	59,5 ± 5,2	59,9 ± 8,5	0,87	59,8 ± 4,6	61,1 ± 5,8	0,54
Chest Skinfold	22,3 ± 24,1	16,1 ± 9,3	0,36	13,7 ± 5,2	14,1 ± 9,1	0,91
Tight Skinfold	21,3 ± 13,1	22,8 ± 10,6	0,73	18,4 ± 10,2	20,6 ± 7,4	0,54
Load 1RM Leg Press	60,4 ± 29,4	81,6 ± 52,4	0,19	95,9 ± 43,7	130,2 ± 89,3	0,21
Load 1RM Chest Press	33,7 ± 16,6	39,9 ± 14,7	0,30	47,8 ± 19,9	56,8 ± 15,8	0,24

(Experimental Group: training protocol according to ACSM orientation; Control Group: training protocol elaborated by the Teacher; $p > 0.05$).

DISCUSSION

The aim of this study was to compare two methods of weight training to gain muscle strength, one being drawn from the recommendations of (ACSM 2002) and the other based on practical experience of the Physical Education Teacher of the gym. The results suggest that both types of training were effective to cause significant gains in muscle strength in men and in women, confirming results from previous studies ((DIAS et al. 2005). It was not observed superiority of one program over another as to gain muscle strength. Although no significant differences were found in the variables, it was noticed that both groups had good results with the proposed program, the reason for so could be either by the groups being beginners in resistant training practices, or by the merits of the proposed work.

The changes in muscular strength during short periods of resistance training appear to be the result of improved intra and intermuscular neural adjustment during movement execution. It is believed that these adaptations are associated with the increased number of motor units recruited, the improvement of timing and frequency of discharges of motor units and lower co-activation of antagonistic muscles, causing greater force production during the early stages of training (DIAS et al. 2005).

In this sense (HAKKINEN et al 1998) it was verified the muscular activation and co-activation of the antagonistic muscles of men and women followed during six months of resistance training. The partial results indicated that after two months of resistance training there was a significant increase in total muscle activation, along with the reduction in co-activation of antagonistic muscles in both groups, resulting in sharp increases in the levels of muscular strength. Although the initial increases in muscular strength are associated, mainly the neural adaptations, as described before, some studies have reported significant changes in muscle morphology in only two weeks of resistive training ((DIAS et al. 2005), such as the increased amount of myosin of heavy chain type II a, demonstrating that these morphological changes may occur in the first few weeks of resistive training. However, it is not yet well established whether these adjustments in the short term may or may not affect the development of muscular strength.

What could be observed in this work though, is that there are many factors concerning volunteers who cannot be controlled, such as frequency, food, sleep, among others, beyond the simple elaboration of the exercise program at the gym, being these factors directly related to the growth and development of the volunteer. However, it seems that the initial differences in levels of training can influence strongly the results. Although these variables hasn't been controlled during this study, it's believed that, usually, the level of the physical activity of most part of the beginners of physical activities of resistance exercises, would obtain increases in the muscle strength, due to training programs (DIAS et al. 2005), what was actually confirmed in this study.

One thing very interesting found in this study is that the gain of muscle strength followed a similar order, so it seems, that exercises that involve a greater number of muscle groups require a longer period of time for a plateau to be established in neural adjustment and in the learning of the motor movement task (CHILIBECK et al. 1998).

CONCLUSION

The results of this study indicates that twelve weeks of resistance training were enough to improve significant increases in the muscle strength, not having, however, significant difference between the method proposed by ACSM and the one proposed by the Physical Education Teacher of the gym. Despite oh the method, the weight training is effective in the increase of muscle strength of the beginners in weight training, and its practice should be encouraged to the promotion of health.

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EFFECTS OF DIFFERENT RESISTIVE TRAINING PROTOCOLS ON STRENGTH

ABSTRACT

Summary: In virtue of diverse inconclusive results in relation to the intensity and the type of beneficial exercises for the profit of muscular hypertrophy, the present work considered to compare the method prescribed of exercises for the ACMS (2002), with a fiche personalized mounted for the pupil through the theoretical and practical knowledge of the professional of physical education in the attainment of results. The work was carried out with a group of 30 pupils of an Academy of Muriaé-MG, divided in Control Group (CG) and Experimental Group (GE). The work with each integrant one lasted around 3 the 4 months of duration, and the collected data had been analyzed through Test t, using a level of significance of p<0,05 for comparison of the same ones. The results had not most presented significant differences, being that for controlled that were the work, other factors as frequency, feeding, hours of sleep can have intervened with the reply of the results. We conclude that other studies will have to be carried through in order to continue in the evidences or little conclusive search of reply in the more correct form or forms of lapsing.

WORD-KEYS: Resistive training; Muscular Hypertrophy.

EFFETS DE LA FORMATION DE DIFFERENTS PROTOCOLES POIDS SUR LA FORCE MUSCULAIRE

RÉSUMÉ:

Compte tenu de plusieurs résultats controversés en ce qui concerne l'intensité et le type d'exercices bénéfiques pour gagner l'hypertrophie musculaire, cette étude visait à comparer la méthode prescrite exercice par ACMS (2002) avec une fiche personnalisée monté à l'étudiant à travers la connaissances théoriques et pratiques des enseignants d'éducation physique. L'étude a été menée avec un groupe de 30 étudiants de l'Académie des Muriaé-MG, divisés en groupe de contrôle (CG) et le groupe expérimental (EG). La formation a dure trois mois, et les données recueilleis ont été analyées en utilisant le test t, avec un niveau de signification de p <0,05 puor la comparaison entre les groupes. Les deux groupes ont montré une augmentation de la force musculaire, indépendamment du protocole effectué. Des études complémentaires sont nécessaires comparant différents protocoles et le contrôle de variables de confusion possibles.

MOTS-CLÉS: Poids et haltères, l'hypertrophie musculaire

EFECTOS DE PROTOCOLOS DE FORMACIÓN SOBRE DIFERENTES PESO FUERZA MUSCULAR

RESUMEN:

En la virtud de los resultados diversos de los inconclusitos en la relación a la intensidad y el tipo de ejercicios beneficiosos para el beneficio del hipertrofia muscular, el actual trabajo considerado comparar el método prescrito de los ejercicios para el ACMS (2002) y siguió hasta los días actuales, con una ficha personalizada montada para la pupila con el conocimiento teórico y práctico del profesional de la educación física en el logro de resultados. El trabajo fue llevado a través con un grupo de 30 pupilas de una academia de Muriaé-MG, donde Grupo Controle (GC) y grupo experimental había sido dividido adentro (GE). La información y los materiales usados habían sido iguales para ambos los grupos, en la búsqueda de una imparcialidad del logro de los resultados. El trabajo con cada uno el integran duró alrededor 3 los 4 meses de la duración, y los datos recogidos habían sido analizados a través de una prueba t, con un nivel de la significación de p< 0.05 para la comparación las mismas. Los resultados no tenían la mayoría de actuales diferencias significativas, siendo ése para controlados que eran el trabajo, otros factores como frecuencia, alimentando, horas del sueño no pueden haber intervenido con la contestación de los resultados. Concluimos que otros estudios tendrán ser llevados a través para continuar en los evidentes o poco búsqueda concluyente de la contestación en la forma o las formas más correcta de caducar.

PALABRA-LLAVES: Entrenamiento de Resistivos; Hipertrofia muscular.

EFEITO DE DIFERENTES PROTOCOLOS DE TREINAMENTO COM PESOS SOBRE A FORÇA MUSCULAR

RESUMO:

Em virtude de diversos resultados controversos em relação à intensidade e ao tipo de exercícios benéficos para o ganho de hipertrofia muscular, o presente trabalho propôs comparar o método prescrito de exercícios pela ACMS (2002) com uma ficha personalizada montada para o aluno através do conhecimento teórico e prático do profissional de educação física. O trabalho foi realizado com um grupo de 30 alunos de uma Academia de Muriaé-MG, divididos em Grupo Controle (GC) e Grupo Experimental (GE). O treinamento durou três meses, e os dados coletados foram analisados através do Teste t, utilizando um nível de significância de p<0,05 para comparação dos grupos. Ambos os grupos apresentaram aumento da força muscular, independente do tipo de protocolo realizado. Novos estudos são necessários comparando diferentes protocolos e controlando possíveis variáveis intervenientes.

PALAVRAS-CHAVE: Treinamento com pesos; Hipertrofia muscular.