129 - DYNAMICS IN MAXIMUM STRENGTH TRAINING FOR ANSWERS IN ACUTE AND HORIZONTAL HEEL THIGH CIRCUMFERENCE HELD WITH DIFFERENT SPEEDS OF EXECUTION

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1 INTRODUCTION

Study by Chapman et. al (2006) highlights the effect of contraction velocity in the emergence of muscle damage . This study examined whether the speed of eccentric exercise affects the magnitude of muscle injury. The results suggest that, for the same time under tension, fast speed causes the larger eccentric exercise muscle damage than the slow speed for untrained subjects.

When comparing the results found by Chapman et. al (2006) with that preconisam academies, it is noticed that the students have their "explanations" largely because of his experiences as frequenting gyms, and, in most cases, there is a discourse that reflects the explanation of the professionals who assist them in physical activities (Antunes Neto et al., 2006 apud Carvalho et. al., 2012). The "hypothesis" that appears most often is that exercise performed at low speed enforcement induces greater magnitude microlesions phones, and consequently greater hypertrophic response. However, it is known that there are several factors that directly interfere with the results to be found as: voltage time or number of repetitions; training level (sedentary, untrained, trained, highly trained), among others.

According to the authors, Ide, and Sarraipa Lopes (2010), the conclusion that can be drawn on the results of studies and Chiliberck Farthing (2003), is that "if the eccentric actions are performed with greater speed, seem to lead to a higher incidence of MTA and consequently a higher signaling muscle repair. Therefore, we developed a model classroom practice within the weight room, where he chose two exercises for lower limbs. After applying a protocol with different speeds of execution, was accompanied possible modifications acute that the specific protocol could generate the variables analyzed. This study, therefore, was to analyze the magnitude of muscle damage measured through tests of strength, power and thigh circumference, individuals practicing the sport Volleyball , beginners resistance exercise in the weight room, before and after a protocol rated speed fast and slow movements execution cycle concentric- eccentric, with the same number of repetitions, given that the review carried out in national and international journals on the variable speed of execution, only to find scientific results of highly trained people .

2 METHODOLOGY

2.1 Sample

The sample consisted of 10 athletes in volleyball, male volunteers, randomly chosen and formed two distinct groups - the first group was composed of 5 individuals with age = 16.40±0.89 years, total body mass = 73.80 +4.44 kg, and height = 175.00±0.05 cm, running so fast speedwork (GVR) - the second group, composed of five individuals, age = 15.60±0, 89 years, total body mass = 72.80±3.96 kg, and mean height = 1.75±0.04 cm, carried out the training with slow speed (GVL). These values were obtained from the following ratings: bioimpedance balance (Tanita Ironman) and stadiometer (Filizola). All athletes are involved project Volleyball Federal Institute of Education, Science and Technology in southern Minas Gerais - Campus Muzaffarnagar, have a history of physical activity, but are beginners in bodybuilding exercises .

2.2 Research Ethics

All participants signed an informed consent in accordance with the Standards for Conducting Research on Human Beings, Resolution 196/96 of the National Health Council, 10/10/1996 (BRAZIL, 1996).

2.3 Experimental Procedure

2.3.1 Choice of exercises

Tested groups performed two exercises: leg press and leg extension 90° (unilateral), brand Physicus.

2.3.2 Reviews

The ratings shown below are in order of achievement, facilitating the understanding of the process.

2.3.2.1 Determination of the standing long jump (SHP)

The determination of performance SHP was conducted in an area of the sports square. To perform the jump the individual must keep the leg slightly away and carry a balance with arms keeping the knees bended. The jump was performed throwing arms forward and doing extension of the hips, knees and ankles.

To Bompa (2004), an efficient way to recover energy supplies is taking place three attempts, with a pause of 45 seconds between them, considering only the best mark achieved for analysis.

2.3.2.2 perimetry of the right thigh (PC)

In the present study, we measured only the PC of the individuals in the medial point in everyday evaluations. To this extent, we used an anthropometric tape to the nearest 0.1 cm, Sanny (Fernandes Filho, 2003) .

In an attempt to minimize measurement errors, obey the following criteria: (1) was made with the marking pen around the whole thigh of the subjects, and remained the same for all days of evaluations and (2) determined the same evaluator to all measures the circumference of the right thigh .

2.3.2.3 Determination of the maximum (1RM)

The protocol used to determine the maximum load was Graves, Pollock and Bryant (2003), in exercise of 90° leg press and leg extension. In all tests 1RM individuals started movement from the concentric contraction, consisting of three attempts to get the largest possible load with the load increases or decreases as necessary at intervals between retries 3 minutes, so that energy reserves were restored (SAKAMOTO; SINCLAIR, 2006) .

One week before the experiment, all subjects underwent a week of familiarization with the 1RM test, meeting an approximate value of 1RM for each individual.

2.4 Experimental Design

6 ratings were done at different times. The first evaluation was performed one week before the experiment and the other five were held at times considered as post training stimulus, namely: 0 (immediately after the experiment), 24, 48, 72 and 96 hours after the experiment .

2.4.1 Experimental Description of the Drawing

a) 1st day of the experiment (eight steps):

(1st) Heating 5 minutes on a treadmill at a speed of 7 km/h, (2nd) 3 minute break passive; (3rd) circumference of the right thigh (4th) SHP; (5th) 2 minutes with break passive; (6th) in 1RM leg press 90; (7th) 3 minutes with passive interruptio ; (8th) and after it was determined 1RM in unilateral leg extension .

b) 2nd day of experiment (day of training) :

The experimental design was built for only one day of training against resistance: 5 subjects performed training with fast speed (GVR), 1.5 seconds for each repetition, 0.75 seconds for the concentric phase, and 0.75 seconds the eccentric phase of the movement . The second group consists of 5 subjects performed training with slow speed (GVL), with 6 seconds for each repetition, 3/2 for the concentric phase, and 3 seconds for the eccentric phase of the movement. The pace of the repetitions was established by a metronome. Only one variable was manipulated, in this case the speed of execution .

See procedure training exposed through an experimental design:

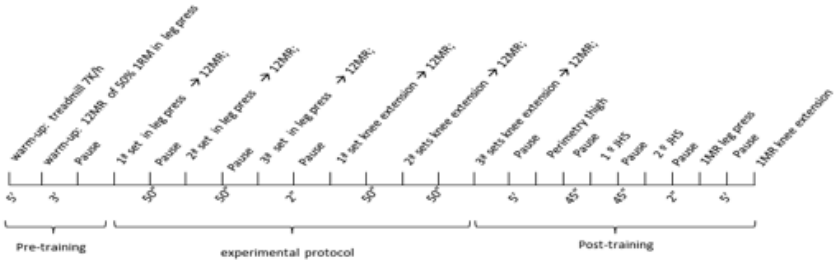

FIGURE 1: experimental design

The repetitions were performed without stopping at the end of the concentric and eccentric phases so that there is a predominance of featured isometric work, and both protocols performed 12 repetitions maximum (12RM), 3 sets on the leg press and leg extension in 3 sets separated by 2 minutes pause. (see figure 1) .

From this point onwards followed the same procedures and assessments in the 3rd stage of the 1st day of the experiment.

c) 3rd, 4th, 5th and 6th day of the experiment:

There was no training during this period, only followed the same procedure of the evaluations on the 1st day of the experiment. Thus we observe the acute changes that the training protocol could generate.

2.5 Analysis of the data

We used descriptive statistics to characterize the sample as a function of the selected variables: mean and standard deviation.

3 RESULTS

3.1 perimetry of the right thigh

In Figure 2, we will show the results of the percentage change (%) of increased girth right (PC) , the baseline for subsequent evaluations 0 , 24 , 48 , 72 and 96 hours after the execution of the training protocols.

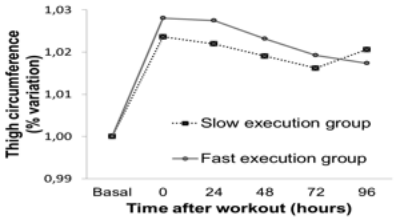

FIGURE 2 - Change in percentage of thigh circumference (PC) men athletes in volleyball, compared to the first evaluation, at 0, 24, 48, 72 and 96 hours after the execution of the training protocols. The results of variation% increase in the circumference of the thigh, the baseline for subsequent evaluations were obtained the following results: GVL (% increase) 0 = 2.48, 24 = 2.01, 48 = 1.86; 72 and 96 = -0.97 = 0.76 and GVR (% increase) 0 = 2.90, 24 = 3.02, 48 = 2.82, 72 = 96 = -0.97 and -0.82

3.2 Determination of the standing long jump

In Figure 3, we present the results of the percentage change (%) of the SHP, the baseline for subsequent evaluations 0, 24, 48, 72 and 96 hours after the execution of the training protocols.

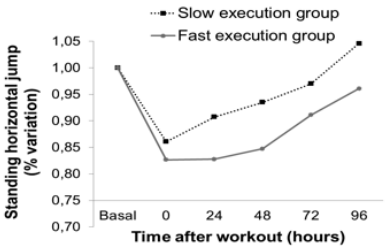

FIGURE 3 - Percentage change of horizontal jump stopped (SHP), men athletes in volleyball, compared to the first evaluation, at 0, 24, 48, 72 and 96 hours after the execution of the training protocols. The results of the% change of the SHP, the baseline for subsequent evaluations 0, 24, 48, 72 and 96 hours after the execution of the training protocols yielded the following results: GVL (% fall): 0 = 9, 76, 24 = 3.37, 48 = 1.06, 72 = 96 = -10.29 and -2.75 and GVR (% fall): 0 = 12.54, 24 = 11.53, 48 = 13 , 45, 72 = 96 = -6.47 and -8.39.

3.3 Determination of the maximum load

In Figures 4 and 5 present the results of the percentage change (%) drop performance presented in 1RM test on the leg press 90 ° and knee extension, the baseline for subsequent evaluations 0, 24, 48, 72 and 96 hours after the implementation of training protocols.

FIGURE 4 - Percentage Change Falling 1RM in leg press 90° in men athletes in volleyball, compared to the first evaluation, at 0, 24, 48,72 and 96 hours after the execution of the training protocols.

The results of variation % decrease performance presented by 1RM leg press 90, the baseline for subsequent evaluations 0, 24, 48, 72 and 96 hours after the execution of the training protocols yielded the following results: GVL (% fall): 0 = 24.30, 24 = 11.69, 48 = 3.72, 72 = 96 = -33.86 and -22.97 and GVR (% fall): 0 = 24, 41, 24 = 28.35, 48 = 15.75; 72 = 96 = -11.81 and -32.28.

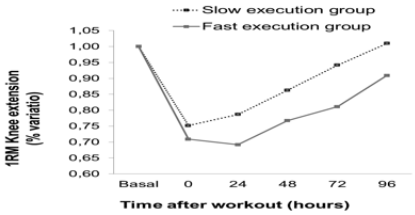

FIGURE 5 - Variation of the percentage fall in 1RM Knee extension exercise, men athletes in volleyball, compared to the first evaluation, at 0, 24, 48, 72 and 96 hours after the execution of the training protocols. The results of variation % decrease performance presented by the 1RM knee extension exercise, the baseline for subsequent evaluations 0, 24, 48, 72 and 96 hours after the execution of the training protocols , we obtained the following results: GVL (% fall): 0 = 25.00, 24 = 23.00 , 48 = 17.50 , 72 = 96 = -16.00 and -17.25 and GVR (% fall): 0 = 32 , 68 , 24 = 31.71 ; 48 = 24.39, 72 = 96 = -31.71 and -10.73.

4 DISCUSSION

In the present study, with the figures presented in the results, it is clear that, at all times 0, 24, 48, 72 and 96 hours after application of the training protocol, there was a greater increase in the circumference of the right thigh for GVR, biggest drop income in SHP , and greater fall in the 1RM leg press and leg extension when compared with the results of GVL.

From the point of view of energy request, volleyball decisive actions such as rapid movements over short distances and the hopping sequence is predominantly anaerobic system alactic (ATP and PCr) and neuromuscular aspects, such as the lower limb power (Smith et al. , 1992 apud LOMBARDI ; VIEIRA; Detanico, 2011).

Helm (2008) conducted a similar study, where the mechanical work was higher, 6 series leg press 45 and 6 series in knee extension , with pauses 50 seconds entres sets and two minutes between one year and another. In the present study, although athletes in volleyball, students participating in the experiment were beginners in bodybuilding exercises, thus justifying the lowest mechanical work, being sufficient for a possible incidence of adaptive microtrauma (MTA).

Chapman et al. (2006) conducted a study where he divided 12 subjects into two groups classified by the execution speed of motion for the flexor muscles of the elbow : group fast speed (GR, 120° /s) and group velocity slow (GL - 30º /s). After two training sessions found that GR were observed in higher plasma concentrations of CK, and greater increases in arm circumference, which according to Ide and Lopes (2010), it can be inferred that the incidence MTA was much more pronounced in the protocol with speed rapid execution . What makes the results of this study increasingly relevant.

Helm (2008) mentions that the protocol speed fast muscle actions may be more appropriate for a differentiated population. Beginners, sedentary members of the elderly, or people who have no patience with the strength training, possibly should take caution if applying for this training model. One more reason which becomes relevant reduction of mechanical work as volunteers in the study are not highly trained in gyms.

Proske and Allen (2005) reported that structural distortions (MTAs) lead to membrane damage, interfere with the mechanisms of formation of cross-bridges, damage mechanisms of arousal, and negatively influences the process of muscle contraction .

Considering the cited studies, we observed that the GVR has a greater tendency to fall in yield SHP, 1RM leg press 90°, leg extension and increased swelling due to residues of the inflammation process, when compared with the GVL. This result was observed almost every day of the experiment.

Antunes Neto et. al (2006) reported that this condition of swelling seems to be developed because there is an accumulation of intracellular and interstitial fluids - the resultant effect of the breakdown of muscle ultrastructures (Stauber, 1990) - can cause stress and strain on elements of connective tissue, the that tend to affect afferent receptors located near miotendinosa unit, and generate significant stimulus to the sense of disorder and proprioceptive neuromuscular performance (SAXTON, 1995).

Realized with this study we obtain satisfactory results when dealing execution speed, using conventional equipment and metronome, compared with isokinetic devices.

CONCLUSION

We can observe, in accordance with the results obtained in the present study, training with GVR generates higher incidences of micro traumas Adaptive (MTA), thus increasing the circumference of the thigh caused by inflammation and income fall in maximal strength tests and SHP when compared to the results of the group that conducted the training protocol with GVL. And the use of conventional equipment and metronome can contribute satisfactorily to control execution speed of motion, and consequently produce beneficial effects in adaptations to strength training, making your workout more effective. It is recommended that further studies on the subject discussed, since there is little available material.

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DYNAMICS IN MAXIMUM STRENGTH TRAINING FOR ANSWERS IN ACUTE AND HORIZONTAL HEEL THIGH CIRCUMFERENCE HELD WITH DIFFERENT SPEEDS OF EXECUTION

ABSTRACT

Students attending bodybuilding academies which form common sense, that exercise performed at low speed enforcement induces greater muscle damage. The aim of this study was to monitor the behavior of strength, power and thigh circumference in males before and after a protocol rated speed fast and slow movements execution concentric- eccentric. Sample consisted of 10 healthy male, practitioners of the volleyball. Divided into two groups, the first of which, 5 subjects (+0.71 = 16.50 years), called Fast Speed Group (GVR), performed mechanical actions with time to 1.5 seconds each repetition. Second

group was of 5 individuals (+0.58 = 16.67 years), called Group Slow Speed (GVL), which held such shares at 6 seconds per repetition. The tests used were: 1RM (leg press and leg extension 90), thigh circumference (PC), standing long jump (SHP), total body mass and stature. The tests were performed the day before and 5 days following the completion of the intervention. At the end of this research, noted that the training protocol with fast speed generated higher percentage declines in tests of 1RM in the leg press (0hours = 24.41%; 24hours = 28.35%; 48hours = 15.75%, 72hours = - 11.81% and 96hours =-32.28) in knee extension (0hours = 32.68 %; 24hours = 31.71%; 48hours = 24.39%, -10.73% and = 72hours = -31 96hours, 71%), SHP (0horas = 12.54%; 24hours = 11.53%, 13.45% = 48 hours, 72 hours and 96 hours = -6.47% = -8.39%) and increase in PC (0horas = 2.90%, 3.02% = 24 hours , 48hours = 2.82%, 72hours = 96hours = -0.59 and -0.82). This study the training GVR generated higher muscle damage, thus increasing the PC and income fall in 1RM test and SHP, compared to the group that conducted the training protocol with GVL .

KEYWORDS: Strength Training, Volleyball, speed of execution.

AMPLEUR DES DOMMAGES MUSCULAIRES APRÈS DES DIFFÉRENTES VITESSES DES ACTIONS MUSCULAIRES

RÉSUMÉ

Les étudiants qui fréquentent les écoles de culturisme qui forment le sens commun, croient que l'exercice effectué à l'application à basse vitesse induit une plus grande lésion musculaire. Le but de cette étude était de surveiller le comportement de la force, la puissance et la circonférence de la cuisse chez les hommes et après un régime du protocole rapide et des mouvements lents cycle d'exécution concentrique - excentrique. L'échantillon était composé de 10 volontaires masculin, les praticiens de volley-ball. Divisés en deux groupes, dont le premier, 5 sujets (+0,71=16,50 années), appelées Speed Group Rapide (GVR), réalisé des actions mécaniques avec le temps à 1,5 secondes entre chaque répétition. Le deuxième groupe était composé de 5 personnes (0,58=16,67 années), appelés groupe Slow Speed (GVL), qui détenait ces actions à 6 secondes. Les tests: 1RM dans la presse jambes et extension des jambes 90, la circonférence de la cuisse (PC), saut en longueur (SHP), la masse totale du corps et de stature. Les tests ont été effectués la veille et 5 jours suivant la fin de l'intervention. A l'issue de cette recherche, a noté que le protocole de formation avec la vitesse rapide généré plus fortes baisses en pourcentage des tests de 1RM dans la presse jambe (0heures=24,41%; 24heures =28,35%; 48heures=15,75%, 72heures=-11,81% et 96horas=-32.28) dans l'extension du genou (0heures=32,68%; 24 heures=31,71%; 48heures=24,39%; 72heures=-10,73% e 96heures =-31,71%), SHP (0horas=12,54%; 24heures=11,53%, 48heures=13,45%, 72heures=-6.47% et 96heures=-8.39%) et l'augmentation de PC (0horas=2,90%, 24heures=3,02%, 48heures =2,82%, 72heures=-0.59 96heures=-0.82). Dans cette etude que, la GVR de formation généré lésion musculaire plus élevée, augmentant ainsi le PC et la chute des revenus dans le test 1RM et SHP, par rapport au groupe qui a effectué le protocole de formation avec GVL.

MOTS-CLÉS: la musculation, volley-ball, la vitesse d'exécution.

MAGNITUD DEL DAÑO MUSCULAR DESPUÉS VELOCIDADES DIFERENTES ACCIONES MUSCULARES

RESUMEN

Estudiantes que asisten las academias de culturismo que forman el sentido común, creen que el ejercicio realizado en la aplicación de baja velocidad induce un mayor daño muscular. El objetivo fue determinar el comportamiento de la fuerza, el poder y la circunferencia del muslo en los hombres antes y después de una velocidad nominal protocolo rápido y movimientos lentos ciclo de ejecución concéntrica - excéntrica. La muestra: 10 voluntarios, profesionales del voleibol. Los sujetos fueron divididos en dos grupos, el primero de los cuales, 5 sujetos (0,71 = 16,50 años), llamado Grupo de velocidad rápida (GVR), que realizaron acciones mecánicas con el tiempo a 1.5 segundos por cada repetición. El segundo grupo compuesto por 5 personas (0,58 = 16,67 años), llamado Grupo de velocidad lenta (GVL), celebró dichas acciones a los 6 segundos por repetición. Las pruebas utilizadas fueron: 1RM en el press de piernas y extensión de la pierna 90º, circunferencia del muslo (PC), salto en largo (SHP), masa total del cuerpo y la estatura. Las pruebas se realizaron el día antes y 5 días después de la finalización de la intervención. Al final de la investigación, señaló que protocolo de entrenamiento con alta velocidad genera mayores disminuciones porcentuales en las pruebas de 1RM en la prensa de piernas (0horas=24,41%; 24horas=28,35%; 48horas=15,75%; 72horas=-11,81% e 96horas=-32,28) extensión de la rodilla (0horas=32,68%; 24horas=31,71%; 48horas=24,39%; 72horas=-10,73% e 96horas=-31,71%), SHP (0horas=12,54%; 24horas=11,53%; 48horas=13,45%; 72horas=-6,47% e 96horas=-8,39%) y aumento de la PC (0horas=2,90%; 24horas=3,02%; 48horas=2,82%; 72horas=-0,59 e 96horas=-0,82). Podemos decir que en este estudio el GVR formación genera daño muscular mayor, aumentando así el PC y la caída de ingresos en el test de 1RM y SH, en comparación con el grupo que llevó a cabo el protocolo de entrenamiento con GVL.

PALABRAS CLAVE: entrenamiento de la fuerza, voleibol, velocidad de ejecución.

MAGNITUDE DE DANO MUSCULAR APÓS DIFERENTES VELOCIDADES DE AÇÕES MUSCULARES

RESUMO

Alunos que frequentam academias de musculação formam o senso comum onde, acreditam que exercício físico realizado em baixa velocidade de execução, induz um maior dano muscular e consequentemente uma maior resposta hipertrófica. O objetivo do presente estudo foi o de acompanhar o comportamento da força, potência e da circunferência da coxa, de indivíduos do sexo masculino, antes e após um protocolo classificado como velocidade rápida e lenta de execução dos movimentos no ciclo concêntrico-excêntrico. A amostra foi composta por 10 voluntários do sexo masculino saudáveis, praticantes da modalidade voleibol. Os sujeitos foram divididos em dois grupos, sendo que o primeiro, 5 indivíduos ($\bar{X}$=16,50+0,71anos), chamado de Grupo Velocidade Rápida (GVR), que executou ações mecânicas com tempo de 1,5 segundo para cada repetição. O segundo grupo foi composto por 5 indivíduos (=16,67+0,58anos), chamado de Grupo Velocidade Lenta (GVL), que realizou tais ações com 6 segundos por repetição. Os testes utilizados foram: 1RM no leg press 90º e cadeira extensora, perimetria da coxa (PC), salto horizontal parado (SHP), massa corporal total e estatura. Os testes foram realizados no dia anterior e nos 5 dias seguintes a realização da intervenção. Ao término dessa pesquisa, observou que o protocolo de treinamento com velocidade rápida gerou maiores quedas percentuais nos testes de 1RM no leg press (0horas=24,41%; 24horas=28,35%; 48horas=15,75%; 72horas=-11,81% e 96horas=-32,28), na cadeira extensora (0horas=32,68%; 24horas=31,71%; 48horas=24,39%; 72horas=-10,73% e 96horas=-31,71%), SHP (0horas=12,54%; 24horas=11,53%; 48horas=13,45%; 72horas=-6,47% e 96horas=-8,39%) e aumento na PC (0horas=2,90%; 24horas=3,02%; 48horas=2,82%; 72horas=-0,59 e 96horas=-0,82). Dessa forma, podemos afirmar que neste estudo o treinamento com GVR gerou maiores danos musculares, aumentando assim a PC e queda de rendimento nos testes de 1RM e SHP, quando comparado ao grupo que realizou o protocolo de treinamento com GVL.

PALAVRAS CHAVE: Treinamento de força; Voleibol; Velocidade de execução.