41 - ACUTE EFFECTS IN FULL FORCE, STANDING HORIZONTAL JUMP AND THIGH CIRCUMFERENCE, FRONT OF A STRENGTH TRAINING PERFORMED WITH DIFFERENT EXECUTION SPEEDS

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INTRODUCTION

We developed a model of classroom practice, which uses the weight room and some assessment features. To illustrate to students of Physical Education, one of the themes that a scarcity of published work, and provides discussion - and controversy - with the discipline of bodybuilding is about manipulating the speed of execution and the magnitude of micro cell damage and adaptations that may generate.

We realize that students have their "explanations" largely because of his experiences at the gym, and in most cases, there is a discourse that reflects the explanation of the professionals who come in physical activities (ANTUNES NETO et al., 2006). The "hypothesis" that appears most frequently is that exercise performed at low speed of execution, induces cellular micro damage in greater magnitude, and consequently greater hypertrophic response.

However, some studies were published as Chapman et al. (2006), demonstrating that the fast execution protocol was observed has higher plasma concentrations of creatine kinase, which can be inferred that the incidence of adaptive micro trauma (MTA) was higher in the protocol with fast execution speed. In the work of Farthing and Chiliberck (2003) points out that the hypertrophic response was higher, compared to the higher execution speed in the eccentric phase.

According to Ide and Lopes (2010), the conclusion can draw on the results from Chiliberck and Farthing (2003) studies, is that "if the eccentric actions are performed with greater speed, seem to lead to a higher incidence MTA and therefore a higher signal muscle repair".

Considering this problem, we developed a model of classroom practice that uses two protocols with different speeds of implementation, to monitor the possible changes that the acute specific protocol could generate at the variables analyzed. The objective of this study therefore was to monitor the behavior of strength, power and right thigh circumference on individuals beginners to resistance exercise in the weight room before and after a protocol classified as fast and slow execution speed of movements in concentric-eccentric cycle, 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.

3 METHODOLOGY

3.1 Sample

Participated in the proposed experiment, four female student volunteers, who were randomly selected and formed two distinct groups as follows: - a group of two individuals, mean age 19±0.00 years old, mean total body mass of 57.05±2.62 kg and mean height of 165±1.77 cm, which carried out the training with fast speed (FEG) - and another group also comprised of two individuals with a mean age of 23.50±0.71 years old, average body mass 61.70±4.53 kg and average height 165.25±1.77 cm, which carried out the training with slow execution speed (SEG), using the weight scale (Tanita Ironman) and height scale (Filizola). Everyone involved was students of Physical Education at the South Minas Gerais Federal Institute of Education, Science and Technology - Campus Muzambinho (IFSULDEMINAS), with a positive history of physical activity, but are beginners to strength training. Do not have a history of heart disease and osteoarticulars.

Prior to the study, all participants were informed about the procedures used in the experiment, their risks and benefits, and its shares gave their written consent. This study met the Standards for Conducting Research on Human Beings, Resolution 196/96 of the National Health Council, 10/10/1996 (Brazil, 1996).

3.2 Experimental procedure

3.2.1 Choice of exercises

The groups tested performed two exercises: leg press and leg extension 90° (only right side), with Physicus brand machines. It is noteworthy that these exercises were chosen because they are very popular among practitioners of exercises with weights and cover large muscle groups.

3.2.2 Assessments

Assessments are presented below in the sequence they were performed.

3.2.2.1 Standing Horizontal Jump (SHJ) determination

To determine the performance of the standing horizontal jump (SHJ) with the help of arms, we used a Western brand tape, following the Fernandes Filho (2003) protocol. Three trials were performed, with intervals of 45 sec. between them, considering only the best mark achieved for analysis (BOMPA, 2004).

3.2.2.2 Right Thigh Circumference

In the present study, we measured only the right thigh circumference of individuals, in the medial point, every day of assessments. To this extent, we used an anthropometric Sanny Medical brand tape measure to the nearest 0.1 cm (FERNANDES FILHO, 2003).

The measurement performed with such equipment can provide very precise information about the body structure (LEME, 2008).

In this location, the marking was done with pen around the whole thigh circumference, and remained the same for all

days of assessments, to avoid the standardization measurement error site on other days of analysis (QUEIROGA, 2005).

According to Leme (2008), with measurement standardization site, for all days of data collection, this problem would not be relevant, being able to "assess whether there were changes in circumference (muscle hypertrophy) of the thigh, as the "edema" or "swelling" would represent a hypertrophic response as an effect of this training (LEME, 2008, p. 21).

3.2.2.3 Maximum load determination

We chose to perform the one maximum repetition test (1RM), since according to Reynolds et al, (2006), despite its limitations, this is a direct method for accurate and reliable assessment of the maximum force that can be applied to healthy individual strained and untrained, which the latter group of individuals who fit our study.

To determine the maximum load, we used the protocol described by Graves, Pollock and Bryant (2003), with leg press exercises in 90°. In all 1RM tests the subjects started the movement from the concentric contraction, consisting of three attempts to lift the heaviest load possible increases or decrease the load when necessary, at intervals between the attempts of 3 min. So that energy reserves were restored (SAKAMOTO; SINCLAIR, 2006).

The 1RM tests were performed on several different days. A week before the experiment, all subjects underwent weeks of familiarization with the 1RM test, where he met for each individual an approximate value of 1RM.

3.3 Experimental design

The first assessment was conducted one week before the experiment and the other 4 were performed at times considered as post training stimulus, as follows: 0 (immediately after the experiment), 24 and 48 hours after the experiment.

3.3.1 Experimental design description

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

(1st) Heating of 5 min. on a treadmill at a speed of 7 km/h (2nd) followed by 5 minutes passive pause, (3rd) held the circumference of the right thigh, (4th) was held 3 standing horizontal jumps (HJ) with the help of arms, with intervals of 45 sec. between them, considering only the best mark achieved for analysis (5th) 3 min rest with passive interruption, (6th) determining the maximum force on the leg press 90°, allowing only three attempts to determine 1RM, increases or decreases the load when necessary, at intervals between the attempts of 3 min., (7th) new 3 min rest with passive interruption, (8th) and last, it was determined the subject's 1RM in one side leg extension, following the same procedures used in determining the maximum force on the leg press 90°. The result of 1RM in the leg extension was found only to determine the training load.

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

Our experimental design was built for only one day of training, in which subjects were randomly divided into two distinct groups: one group of two individuals to perform the training with fast execution speed (FEG), with 1.5 sec. for each repetition, 0.75 sec. for the concentric phase, and 0.75 sec. for the eccentric phase of movement. The rate of the repetitions was established by a metronome. The beeps of 0.75 to 0.75 seconds, totaling 80 signals per minute. And another group also comprised of two individuals to perform the training with a slow (SEG), with 6 sec. for each repetition, 3 sec. for the concentric phase, and 3 sec. for the eccentric phase of movement, a total of 20 signals per minute on the metronome.

To avoid unwanted responses in our study, subjects were asked to perform repetitions without stopping at the end of the concentric and eccentric phases, avoiding interruptions between contractions.

Prior to the practice followed by the routine: - general heating 5 min. on a treadmill at a speed of 7 km/h - passive interruption of 5 min., - specific warm-up on the leg press 90° to 12 maximal repetitions at 50% load of 1RM found on the 1st day of experiment, - 3 min. with passive interruption, - the training of three sets of 12 repetitions for both groups FEG and SEG, and 50 sec. interval between sets and 2 min. between 90° leg press and one side leg extension, respectively.

From this point forward followed the same procedures and assessments conducted in Phase 3 of the 1st day of the experiment.

Importantly, the only variable that changed was the execution.

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

In the 3rd and 4th day of the experiment, there was no training, just repeating the assessments on the 1st day of the experiment, to monitor possible changes that the acute specific protocol could generate the variables analyzed. "This makes it possible to observe the physiological responses in a short period of time for the two groups analyzed, and their differences, if it occurred" (LEME, 2008).

3.4 Data analysis

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

4 RESULTS

4.1 Right Thigh circumference

Figure 1 and Table 1 presents the results of the percentage change (%) increase in TC, from the baseline to subsequent assessments 0, 24 and 48 hours after the execution of training protocols in SEG and FEG groups.

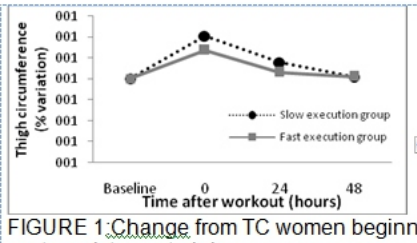

FIGURE 1:Change from TC women beginners to resistance training.

TABLE 1: Results of the percentage change increase in TC, from the baseline assessments to subsequent 0, 24 and 48 hours after training protocol for SEG and FEG.

Group	Hours after workout		
	0	24	48
SEG (increase %)	2,03	0,78	0,10
FEG (increase %)	1,36	0,31	0,10

4.2 Standing horizontal jump determination

Figure 2 and Table 2 presents the results of the percentage change (%) of SHJ, from thebaseline to subsequent assessments 0, 24 and 48 hours after the implementation of training protocols in groups SEG and FEG.

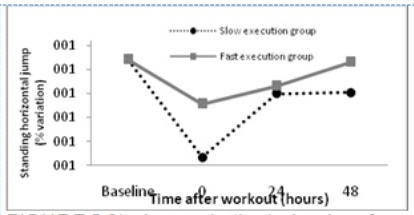

FIGURE 2:% change in the behavior of women SHJ beginners in resistance training.

TABLE 2: Results of percentage change in SHJ, from the baseline to subsequent assessments 0, 24 and 48 hours after the training execution protocol in SEG and FEG groups.

Group	Hours after workout		
	0	24	48
SEG - increase %	20,29	7,07	6,78
FEG - increase %	9,24	5,45	0,55

4.3 Maximum load determination

Figure 3 and Table 3 presents the results of the percentage change (%) of drop in performance shown by the test of 1RM in the leg press exercise 90, from the baseline to subsequent assessments 0, 24 and 48 hours after the execution of training protocols in groups and GVL GVR.

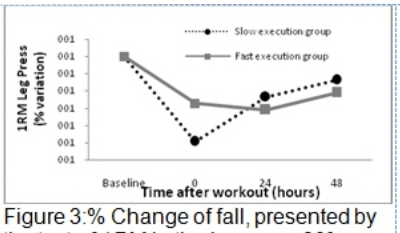

Figure 3:% Change of fall, presented by the test of 1RM in the leg press 90° exercise, for women beginners to resistance training.

TABLE 3: Results of the variation of% drop in performance shown by the test of 1RM in the leg press exercise 90°, from the baseline to subsequent assessments 0, 24 and 48hours after training protocols in LEG and FEG groups.

Group	Hours after workout		
	0	24	48
LEG (decrease %)	24,53	11,70	6,79
FEG (decrease %)	13,53	15,41	10,53

5 DISCUSSION

To illustrate to students of Physical Education, one of the themes that a scarcity of published work, and provides discussion, and controversy, with the discipline of bodybuilding, we developed a model of classroom practice that uses the weight room and some assessment resources to verify the effect of manipulating the execution speed of the movements on the variables TC, SHJ and 1RM in the leg press 90° exercise, and literature for the relationship made with the emergence of the MTAs, with this type of protocol.

We realize that students have their "explanations" largely because of his experiences at gyms. The "hypothesis" that appears most often among them, is that exercise performed at low speed of execution, induces greater MTAs, and consequently greater hypertrophic response.

In our study, with the figures and tables presented, we can analyze that, at all times 0, 24 and 48 hours after application of the training protocol, there was a greater increase of the TC for the group that ran the protocol with slow speed, followed by the biggest drop in performance assessment of SHJ, and greater fall in the leg press 90° 1RM, compared with the group that ran the protocol with fast execution speed of movement.

However, these results do not corroborate with the findings of Leme (2008), who found in his research, higher values of TC and the largest decreases in FEG and SHJ 1RM, but the individuals were highly trained and training protocol characterized by a greater than the mechanical work performed in our study. The Leme (2008) protocol was the leg press 45° with 5 series and 5 series in the leg extension, with intervals of 50 seconds between series and 2 minutes from one to another. In our study, as a caution, we use individuals beginners to weight training exercises, the training protocol consisted of a minor mechanical work, with 3 sets on leg press and 3 series on leg extension, with intervals of 50 seconds between series and 2 minutes between exercises, as imagined by the fact that this group is not experienced with weight training, could emerge a high cell trauma (MTA).

Leme (2008, p. 35) mentions that: the protocol for fast speed of muscle actions may be better suited to a different population. Beginners, sedentary people, or people who have no patience with strength training, possibly should take precautions if they are to apply this training model. This fact can be explained by the high incidence in the effects of MTAs and can cause more serious injuries in a population not prepared and familiar with strength training.

Other papers published in the literature have used isokinetic equipment: According to Chapman et al. (2006), 12 individuals divided into two groups classified by the execution speed of movement for the elbow flexor muscles: fast speed group (120°/s) and slow group velocity (30°/s). After two training sessions verified that the fast execution speed protocol observed has higher plasma concentrations of creatine kinase (CK), and greater increases in arm circumference, which, according to Ide and Lopes (2010), we can infer that the incidence of MTA was much more pronounced in the protocol with fast execution speed.

According to Leme (2008, p. 31), the impact of the MTA is characterized by:1) Rupture of the extracellular matrix, basal lamina and the sarcolemma, 2) release into the bloodstream of intracellular protein as myoglobin and creatine kinase (CK), 3) the structure myofibrillar disorganization, disruption, enlargement or extension of the Z line (in sarcomeres), 4) material damage to the contractile and cytoskeletal proteins, with a further commitment to the anchorage of thin filaments, and the connection of adjacent myofibrils, 5) decrease in the tension exerted by the fiber, and eventual death of them.

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 will negatively influence the process of muscle contraction.

We can infer the LEG for our experiment, when compared with the results of the FEG, the largest downward trend

demonstrated by the SHJ, the leg press 90 ° 1RM, in virtually all times after application of the training protocol (0, 24 and 48 hours), in Figures 2 and 3, is due to the high magnitude of tissue damage, generated by the stimulus, and consequently a large impact on the ability to produce tension, the myofibrils, apart from possible disturbance of the integrity of the contractile tissue, resulting inhigher TC, observed by muscle swelling (edema) (LEME, 2008). Antunes Neto et al. (2006) report that this condition of swelling seems to have developed because of an accumulation of interstitial or intracellular fluid - resulting effect on the breakdown of muscle ultrastructure (STAUBER, 1990) - can cause stress and strain on the connective tissue elements, that tend to affect afferent receptors located close to the myotendinous unit, and provide important stimulus to the sense of disorder and proprioceptive neuromuscular performance (SAXTON, 1995).

6 CONCLUSION

At the end of this research, we found that the slow execution training protocol responses generated higher percentage of falls in 1RM tests, and increased SHJ and TC. Therefore, we conclude that the results of this study, the training leads to higher SEG micro damage muscle, thus increasing the TC and a drop in income in the 1RM tests and SHJ, compared to training with the FEG, however, these results may have been found due to the small number of women coupled with little experience in weight lifting.

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ACUTE EFFECTS IN FULL FORCE, STANDING HORIZONTAL JUMP AND THIGH CIRCUMFERENCE, FRONT OF A STRENGTH TRAINING PERFORMED WITH DIFFERENT EXECUTION SPEEDS

ABSTRACT

The objective of this study was to develop a model of classroom practice, using two different execution speeds protocols of movement to monitor the possible changes that the acute specific protocol could generate the following variables: maximal strength (1RM), standing horizontal jump (SHJ) and thigh circumference (TC) of individuals beginners to exercise against resistance, before and after protocol classified as a fast and slow execution of movement in the concentric-eccentric cycles. The sample consisted of four healthy female volunteers, students of Physical Education at the South Minas Gerais Federal Institute of Education, Science and Technology campus Muzambinho/MG, with a low level of strength training. The sample was divided into two groups, the first, individuals aged 19±0.00 years old, called the Fast Execution Group (FEG), mechanical actions performed with a time of 1.5 sec. for each repetition, and the other 2 subjects aged 23.50±0.71 years old, called Slow Execution Group (SEG), carried out such actions with 6 sec. by repetition. The tests used were: metronome (Crystal), leg press 90° and leg extension chair (Physicus), anthropometric tape to check the TC (Sanny), measuring tape to check the SHJ (Western), weight scale to total body mass (Tanita) and a height scale (Filizola). With the SEG TC results (0 hours = 2.03%, 0.78 s% = 24 hours, 48 hours = 0.10%) and FEG (0 hours = 1.36%, 0.31 s% = 24 hours, 48 hours = 0 10%), it was observed that the training protocol executions generated most of the SEG response falls in the percentage 1RM tests, and increased SHJ and TC. Therefore, we can say that the results of this study, the training leads to higher SEG micro muscle damage, thus increasing the TC and a drop in 1RM tests and SHJ, compared to training with the FEG, however, these results may be found due the small number of women, coupled with little experience in weight lifting.

KEYWORDS: women strength training beginners, speed of execution; acute effect

EFFETSEN PLEINE FORCE, SAUT HORIZONTALET LA CIRCONFERENCE DELA CUISSE, AVANTD'UNACCROISSEMENT DE LA FORCEAVECEFFECTUÉVITESSES D'EXECUTIONDIFFÉRENTES

RÉSUMÉ

L'objectif de cette étude était de développer un modèle de pratique en classe, en utilisant deux protocoles différents avec des vitesses d'exécution du mouvement pour surveiller les changements éventuels que le protocole aiguë spécifiques pourraient générer les variables suivantes: la force maximale (1RM), le saut à la performance fonctionnement horizontal (SH) et la circonférence de la cuisse (PC) de nouveaux individus à exercer contre une résistance, avant et après le protocole classée comme une vitesse rapide et lente exécution des mouvements dans les cycles concentriques-excentriques. L'échantillon se composait de quatre femmes volontaires saines, les étudiants d'éducation physique à l'Institut fédéral des Mines, de South Campus Muzambinho / MG, avec un faible niveau de formation de force. L'échantillon a été divisé en deux groupes, le premier, deuxième 0,00 individus âgés de 19 ans, a appelé la vitesse de groupe Quick (GVR), les actions mécaniques réalisées avec un temps de 1,5 sec. pour chaque répétition que les deux autres sujets âgés 23,50 0,71 années, appelé Groupe de vitesse lente (GVL), réalisé de telles actions avec les 6 sec. par la répétition. Les tests utilisés étaient: le métronome (Crystal), 90 presse jambes et extension des jambes (physicus), ruban anthropométrique pour vérifier le capteur CCD (Sanny), ruban à mesurer pour vérifier le SHP (Ouest), l'équilibre de la masse totale du corps (Tanita) et un stadiomètre (Filizola). Avec les résultats de la PC GVL (0horas = 2,03%, 0,78% s = 24 heures, 48 heures = 0,10%) et GVR (0horas = 1,36%, 0,31% s = 24 heures, 48 heures = 0 10%), il a été observé que les exécutions protocole de formation générés plus de la réponse GVL tombe dans les tests de pourcentage 1RM, et augmenté SH PC. Par conséquent, nous pouvons dire que les résultats de cette étude, la formation conduit à plus de muscle microlésions GVL, augmentant ainsi le PC et une baisse dans les tests de 1RM et SH, par rapport à la formation avec la GVR, cependant, ces résultats peuvent être trouvés en raison le petit nombre de femmes, couplé avec peu d'expérience en haltérophilie.

MOTS-CLÉS: les débutants la formation des femmes de force, la rapidité d'exécution; effet aigu

EFECTOS AGUDOS ENTODA SU FUERZA,SALTO ENHORIZONTALY LA CIRCUNFERENCIA DELOS MUSLOS,FRENTE A UNENTRENAMIENTO DE FUERZAREALIZADOSCON VELOCIDADES DE EJECUCIÓNDIFERENTES

RESUMEN

El objetivo de este estudio fue desarrollar un modelo de práctica en el aula, el uso de dos protocolos diferentes, con velocidades de ejecución de movimiento para controlar los posibles cambios que el protocolo específico aguda podría generar las siguientes variables: fuerza máxima (1RM), el salto de rendimiento funcionamiento horizontal (SH) y la circunferencia del muslo (PC) de nuevos individuos a ejercer en contra de la resistencia, antes y después del protocolo de clasificarse como una velocidad rápida y lenta ejecución del movimiento en los ciclos concéntricos, excéntricos. La muestra estuvo conformada por cuatro voluntarios sanos mujeres, los estudiantes de Educación Física en el Instituto Federal de Sur de Minas, Campus Muzambinho / MG, con un bajo nivel de entrenamiento de fuerza. La muestra se dividió en dos grupos, el primero, el segundo 0,00 personas mayores de 19 años, llamada velocidad de grupo rápida (GVR), las acciones mecánicas, realizadas con un tiempo de 1,5 segundos. para cada repetición de los otros dos sujetos de entre 23,50 0,71 años, llamado Grupo de velocidad lenta (GVL), llevado a cabo estas acciones con 6 seg. por la repetición. Las pruebas utilizadas fueron: metrónomo (Crystal), prensa de piernas 90 y extensión de la pierna (Physicus), cinta antropométricas para comprobar el PC (Sanny), cinta de medir para comprobar la SH (occidental), el balance de la masa corporal total (Tanita) y estadiómetro un (Filizola). Con los resultados del PC GVL (0horas = 2,03%, 0,78% s = 24 horas, 48 horas = 0,10%) y GVR (0horas = 1,36%, 0,31% s = 24 horas, 48 horas = 0 10%), se observó que la ejecución del protocolo de capacitación generan la mayor parte de la respuesta GVL cae en las pruebas de porcentaje de 1RM, y el aumento de SH PC. Por lo tanto, podemos decir que los resultados de este estudio, la formación conduce a un mayor músculo microlesiones GVL, lo que aumenta el PC y una caída en las pruebas de 1RM y SH, en comparación con el entrenamiento con el GVR, sin embargo, estos resultados se pueden encontrar por el pequeño número de mujeres, junto con la poca experiencia en levantamiento de pesas.

PALABRAS CLAVE: mujeres principiantes de entrenamiento de fuerza, velocidad de ejecución, los efectos agudos

EFEITOS AGUDOS NA FORÇA MÁXIMA, NO SALTO HORIZONTAL E CIRCUNFERÊNCIA DE COXA, FRENTE UMA SESSÃO DE TREINAMENTO DE FORÇA REALIZADA COM DIFERENTES VELOCIDADES DE EXECUÇÃO

RESUMO

O objetivo do presente estudo foi de desenvolver um modelo de aula prática, que utiliza dois protocolos com diferentes velocidades de execução de movimento, para acompanhar as possíveis modificações agudas que o protocolo específico pudesse gerar nas variáveis: força máxima (1RM), desempenho no salto horizontal parado (SHP) e circunferência da coxa direita (CCD), de indivíduos iniciantes em exercícios contra resistência, antes e após um protocolo classificado como velocidade rápida e lenta de execução dos movimentos no ciclo concêntrico-excêntrico. A amostra foi composta por 4 voluntários do sexo feminino saudáveis, alunos do Curso Superior de Educação Física do Instituto Federal do Sul de Minas–Campus Muzambinho/MG, com baixo nível de treinamento de força. A amostra foi dividida em dois grupos, o primeiro, 2 indivíduos com idade $\bar{X}$19+0,00 anos, chamado de Grupo Velocidade Rápida (GVR), executou ações mecânicas com tempo de 1,5 seg. para cada repetição já o outro, 2 indivíduos com idade 23,50+0,71 anos, chamado de Grupo Velocidade Lenta (GVL), realizou tais ações com 6 seg. por repetição. Os testes utilizados foram: metrônomo (Crystal), leg press 90º e cadeira extensora (Physicus), fita antropométrica para verificar a CCD (Sanny), trena para verificar o SHP (Western), balança para massa corporal total (Tanita) e um estadiômetro (Filizola). Com os resultados da CCD do GVL (0horas=2,03%; 24horas=0,78s%; 48horas=0,10%) e do GVR (0horas=1,36%; 24horas=0,31s%; 48horas=0,10%), observou-se que o protocolo de treinamento com execuções do GVL gerou maiores respostas de quedas percentuais nos testes de 1RM, SHP e aumento na CCD. Portanto, podemos afirmar que, com os resultados deste estudo, o treinamento com GVL gera maiores microlesões musculares, aumentando assim a CCD e queda nos testes de 1RM e SHP, comparado ao treinamento com o GVR, porém, esses resultados podem ter sido encontrados devido ao reduzido número de mulheres, somado a pouca experiência em levantamento de peso.

PALAVRAS CHAVE: treinamento de força com mulheres iniciantes; velocidade de execução; efeito agudo