

60 - EFFECTS OF CARRIED THROUGH EXERCISES OF FLEXIBILITY IN BODYBUILDING DEVICES, ON THE ARTICULAR AMPLITUDE OF MOVEMENT IN PRACTITIONERS OF RESISTED EXERCISE OF THE MASCULINE SEX

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INTRODUCTION

Flexibility is considered as An important component related to the level of physical activity in such a way for the athletical performance as for the health, according to Chagas e Bhering,(2004). Taking in consideration the importance of flexibility in the life of the individuals, the optimization of the physical space in the gyms, the lack of specific devices for the training of this physical capacity (many times for financial reason) (ALTER, 1999). One of the reasons that lead the adults to be adhered to the practical one of physical activities are the improvement of flexibility (TAHARA et al.,2003). In the force training the intensity is considered an essential stimulator to occur the muscular adaptations, not being clearly the same affirmation for the trainings of flexibility (CHAGAS et al., 2008). An observed problem in the gyms in day-by-day is many times the lack of physical space, since the equipment of bodybuilding becomes the space diminished, therefore demands an organization and adequacy in the environment. In this direction, this study can be excellent, therefore it will be able to contribute to optimize the use of these spaces, with the executed exercises of flexibility being in the proper device of resisted training.

Flexibility is a physical quality that directly influences in the voluntary performance of the maximum articular amplitude of the movement taking in consideration the morphologic limits and risks of injuries in a joint or set of articulations (DANTAS, 2005). Flexibility can be developed through the allonge that aims at to the maintenance and the mobilization of the articulate arc or the flexing, this aims at its improvement making possible the amplitude of the already existent articulate arc (RODRIGUES, 1998), differing these two methods for the worked intensity (DANTAS, 2005). Comparatively is easier to together develop flexibility with the force, of what to become stronger to develop it later (ACHOUR JUNIOR, 2004). The related author still affirms that insufficiently prolonged muscles can take to a muscle-esqueleton compromising, however, the excess of flexibility and the insufficiency of force can take to problems as muscle-articulate compromising and consequently negative influence during the trainings of force (ACHOUR JUNIOR, 2004). For the training of flexibility, three method of allonge are used, presenting different assignment between some authors. Some literatures present different assignments as: ballistic method, facilitation to neuromuscular properceptive(FNP) and static (ALTER, 1999). Or active or dynamic method, facilitation to neuromuscular properceptive and the passive or static method (DANTAS, 2005). For each method of Allonge, different techniques of execution exist. The static method is more used due to its easy execution and learning. This method is strategical in the increase of the length of muscular and conjunctive fabrics, inducing changes in the mechanical properties and thus increasing the maximum amplitude of the movement (VIVEIROS et al., 2004).

Flexibility is divided in four types, presenting diverse characteristics, such as ballistic flexibility, dynamic flexibility and controlled flexibility (DANTAS, 2005). Still according to the related author, some factors as malleability, plasticity, mobility and elasticity intervene on the flexibility degree. The malleability of the skin and the muscular elasticity are direct interveners of flexibility. These in turn are related to endogenous factors as age, sex, biological individuality, somatotype, been of physical conditioning, and factors as the hours of the day, ambient temperature and to be worked exercise. Studies strengthen that bigger levels of corporal fat tend to diminish flexibility according to Allsen et al.)2001); Fachini et al.(2006). The devices of resisted exercise have as main objective the force training and not of flexibility, then, some do not present an angle of ideal work for the training of this physical quality. Having in this way the necessity of small adaptations in some devices used for the execution of the training. Flexibility is so important for athlete as for sedentary people (ALMEIDA E JABUR, 2006). In this direction, the present study developed the exercises of flexibility with the use of resisted devices through a eight-week-training-program.

MATERIALS AND METHODS

The present research was proven as of applied field(SEVERINO, 2007), being of applied way (THOMAS E NELSON, 2002). Characterizing as descriptive and inferencial with quantitative approach (OLIVEIRA, 2004). 20 individuals of the masculine sex had participated on the research, with ages between 20 and 40 years (24,7±5,14 years). They had been divided randomly in two groups: 10 citizens had participated of Control Group (CG) (23,6±2,6 years) that they had carried through only resisted training exercises and 10 citizens had participated of the Experimental Group (EG) (26,4±7,04 years) which carried through the resisted training, and the muscular allonge in the devices, being the population composed by practitioners in the Academy School of the College of Biomedical Sciences of Cacoal - FACIMED. The following criteria of exclusion had been adopted: a) no acceptance of the Term of Free and Clarified Consent; b) presented diseases that hindered or limited their mobility to articulate the joints of the shoulder, thoraco-lumbar, hip, ankle; c) she was a professional athlete in sports modalities that the systematic training of flexibility was involved; d) it did not obtain to carry through the exercises considered in the allonge program; e) had IMC above 29,99kg/m². The study it was submitted to the Committee of Ethics in Research(CER) of FACIMED, and approved as in 299/08 of 04/06/2008. In accordance with the Resolution nº. 196 of October 10th, 1996.

PROCEDURES OF DATA COLLECTION AND INTERVENTION

For the accomplishment of the data collection for evaluation of the ADM, the protocol of LABIFIE(DANTAS, 2005). Was used. Goniometer in 14" steel with measure of 0-180° and 180-0° of the Alcacer mark was used, for the mensuration of the articular amplitude. An analogical balance of the Welmy mark with a connected stadiometer, and maximum and minimum capacity of 150 and 02 kilograms (kg) respectively, with precision of 100g, a long cushion of the mark Righetto Fitness Equipment measuring 1,00 x 0,60m. A table in wood with height of 0,80m measuring 1,50m of length for 0,80m of width and a black dermographic pencil. For the application of the allonge, a chronometer was used, cushions of the mark Righetto Fitness

Equipment, measuring 1,00 x 0,60m, and the devices of resisted exercise: vertical convergent supino, rowed seated, leg press 45° and calf, all of the mark Righetto Fitness Equipment.

The following exercises in the intervention had been applied: Thoraco-lumbar flexion (TLF): located in the rowed device of seated with erect column, feet supported in the support, extended legs and arms, footprint in pronation in the short bar and executing the thoraco-lumbar flexion (Fig1). Hip Flexion (RHF): seated in the leg press 45° device, vertebral column supported in the bank, feet supported in the support platform, freeing the security constraint, bending the joints of the knees and the hip, and after returning to the initial position. Fig. 2. Horizontal extension of Shoulder (HES): lying in dorsal decubitus in the device of convergent supino, vertebral column supported on the bank, feet supported in the base of support or the ground, superior joints of the shoulders in abduction, members in extension, footprint in supination, carrying through simultaneously horizontal extension of the shoulders, abducted in 90°, flexion of the cubit. (Fig. 3). Dorsiflexion (DF): located in the vertical calf device, with the joint of the ankle in 90°, the dorsiflexion was executed (Fig. 4).

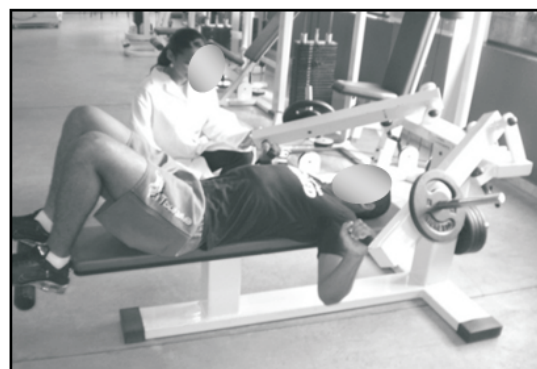
Figura 1 – Flexão Tóraco-Lombar



Figura 2 - Flexão de Quadril



Figura 3 - Extensão Horizontal do Ombro Figura 4 - Dorsiflexão



In all exercises, two repetitions had been taken, kept in the maximum angle of the joint for 10s, with interval of 20 25s of rest between the repetitions. The exercises of flexibility through the passive allonge had been executed in resisted exercise device, being the controlled intensity for the use of the weights (kg) of the devices of resisted training. The mensuration of the intensity was gotten through the scale of subjective perception of effort of Borg (2000), apud (RASO et al., 2000) being this procedure necessary to guarantee the security of the citizens of the research. The counting of the allonge time was initiated when the citizen arrived at the limit of the articular arc, until the discomfort point, of the exercised joint, without the pain presence. The displacement was carried through slow and passive form, thus preventing the neurological reply of the consequence of the stretching and stimulating the activation of the tendinous agency of golgi that facilitates muscular allonge (CONCEIÇÃO E DIAS, 2004). The application of the training of flexibility was carried through before the force training, always in the vespertine schedule between 16h00min and 19h00min, during eight weeks with a week frequency of 3 times per week.

STATISTICAL TREATMENT

To verify the homogeneity of the sample, test of Shapiro-Wilk was used, resulting in parametric sample. For inferencial statistics test "t" of pareado Student was used, and for comparative analysis between the groups it was used ANOVA One Way, in the statistics daily pay and after-training of GE and GC. Adopting the value of $p < 0,05$ for statistic singnificant in all tests.

RESULTS AND DISCUSSION

Chart 1 – Characteristics of the sample GE (n=10) e GC (n=10)

Variable	EG			CG			BOTH		
	Average	SD	VC	Average	SD	VC	Average	SD	VC
Age	26,4	7,04	0,27	23,6	2,6	0,11	24,7	5,14	0,20
Height	1,72	0,08	0,05	1,76	0,04	0,02	1,74	0,06	0,04
Weight	72,66	10,8	0,15	80,2	15,09	0,19	76,05	12,72	0,17
IMC	24,43	2,92	0,12	25,91	4,11	0,16	25,02	3,35	0,13

SD : Stardard Deviation; VC: Variation coefficient

Comparing secular extracts pre-test and after-test, significant differences had been observed (TLF), EG $p=0,026$, CG $p=0,53$; Flexion of Right Hip (FRH), EG $p=0,003$, CG $p=0,146$; Flexion of the Left Hip, (FLH), EG $p=0,003$, CG $p=0,31$;

Horizontal extension of the Right Shoulder (HERS), EG $p=0,047$, CG $p=0,51$; Horizontal extension of the Left Shoulder (HELs), EG $p=0,006$, CG $p=0,72$; Right Dorsiflexion (RDF), EG $p=0,369$, CG $p=0,358$; Left Dorsiflexion (LDF) EG $p=0,611$, CG $p=0,805$. It had a significant increase of the ADM in most of the joints of EG. Whereas in the CG it had improvement, however, without significant statistics.

Chart 2 –Samples of the results between EG and CG groups, in pré and post-test period

Movement	Period	EG	CG	% EG	%CG	ANOVA - One Way			
						F - EG	sigEG	F - CG	sigCG
TLF	Pré	26,20±10,21	27,20±7,46	39,69	25,37	3,455	0,026*	4,309	0,53
	Post	36,60±9,37	34,10±7,40						
FRH	Pré	140,5±8,04	134,4±9,11	5,64	3,87	5,665	0,003*	2,313	0,146
	Post	148,9±8,78	139,4±6,56						
FLH	Pré	141,9±7,82	134,8±7,88	4,38	2,81	5,671	0,003*	1,09	0,31
	Post	148,4±5,71	138,7±8,79						
HERS	Pré	76,5±21,13	78,9±11,11	17,92	9,93	2,922	0,047*	4,391	0,51
	Post	93,2±14,19	87,6±6,99						
HELs	Pré	87,2±17,98	80,7±15,23	15,99	11,42	4,898	0,006*	3,661	0,72
	Post	103,8±12,41	87,6±6,99						
RDF	Pré	-1,90±12,40	0,70±5,73	280	75	1,082	0,369	0,891	0,358
	Post	0,50±5,91	2,80±4,07						
LDF	Pré	-1,70±6,36	1,40±5,39	241,7	50	0,613	0,611	0,63	0,805
	Post	1,20±6,08	0,80±5,32						

% Rise of ADM pre and post-test in percentual terms ; * Significance

Observing the results above, an agreement between the statistical tests for the pre and after-test periods is noticed, as well as in relation to the comparison between the two groups EG x CG. This study demonstrated that a program of exercises of flexibility with the use of device of resisted exercises (bodybuilding) with two repetitions of 10s, through the method of static flexing in young adult citizens (WEINECK, 2000), practitioners of bodybuilding, after 8 weeks of intervention, provided significant increase in the articular amplitude of movement in 75% of the studied joints. A carried through study using the three methods of allonge in the extension of the knee with a repetition of 30 seconds, three times per week, evidenced a significantly bigger increase of flexibility in the static method. Not being enough the same times and durations for dynamic and FNP method in the population studied, that was composed by 19 adult with ages between 21 and 35 years, according to Davis et al apud (VALE et al., 2006). About the volume and frequency of the static allonge, the ACSM apud (NIEMAN, 1999) recommends that the position of allonge for 10 to 30 seconds kept with a frequency of 3 to 5 times per week. On the method of static training they consider the maintenance of the biggest arc to articulate reached, for 10 to 15 seconds in a three routine of six times with intervals of relaxation between them (DANTAS E SOARES, 2001). In a study that compared resulted of 10s, 20s, 30s, it was arrived to the conclusion of that only 10s is necessary for the increase of flexibility, being unnecessary bigger times (BORMS et al., 1987). This finding was confirmed in another study also demonstrating that 10s is necessary for the significant increase of flexibility (VOIGT et al., 2007), corroborating, the present study evidenced significant increase of flexibility in the joints of the hip, thoraco-lumbar and shoulder.

A study that compared the effect of the allonge and passive flexing on functional flexibility and other capacities, with the study of varejão and col., (2004) apud (VAREJÃO et al., 2007), demonstrated that the results of the flexibility of the studied joints (rotation of the cervical column, horizontal flexion of the shoulder, flexion of the shoulder, flexion of the hip, flexion of the knee and others) kept in the average. Done exceptions to the extension of the hip and the thoraco-lumbar, flexion that had been greater than in the comparative studies. It was also verified in the related study that in HES and TLF, the flexing provided a bigger profit of flexibility when compared with allonge (VAREJÃO et al., 2007). The joint of the ankle did not demonstrate significant statistical increase (chart 2). Ratifying this Zito result et al apud (BONVINICE et al., 2005), had not found significant increase in the articular amplitude of movement in the dorsiflexion with the accomplishment of a series of two allonges passive with duration of 15s in each allonge. Contrarily, Worrel et al (1999) apud (BONVICINE et al., 2005) had gotten resulted in its study, however, the study was carried through therapeutically. In a possible justification for the result gotten in this study, it has some factors to be observed. This joint presents anatomic- functional characteristics for stability instead of mobility (HAMILL E KANUTZEN, 1999). It is a joint in uniaxial hinge and presents 20° of ADM in the dorsiflexion (LIPPERT, 2008). The maximum amplitude of the movements is limited by capsule-ligament factors, muscular and bony (KAPANDJI, 2000).

A study with intention was carried through to inquire the relation between the objective and subjective perception of flexibility, not finding significant differences between them (SILVA et al., 2000). The allonge is a practical one used for the training of the flexibility, that must lead in component consideration as frequency, volume and intensity. However, in relation to the intensity it does not have a consensus in literature related to the used load (CHAGAS et al., 2008). The training of the allonge using the maximum intensity had significant acute effect in the increase of the ADM, contrarily to the submaximal intensity, that demonstrated a controverse acute effect (CHAGAS et al., 2008). The maximum intensity was defined as being the maximum tolerance to the allonge exercise, and submaximal at the moment where the volunteer perceived the beginning of the allonge of the trained muscles, being the passive displacement of the trained member carried through by extern agent (CHAGAS et al., 2008). The present study, took with the objective to verify alterations in the ADM, demonstrated that the training of flexibility in device of resisted exercise with two repetitions of 10 seconds and interval of 20 to 25 seconds, controlling the intensity and using the scale of subjective perception of effort of Borg (2000), apud (RASO et al., 2000) to describe the carried through effort, had significant increase of the ADM in EG comparing the evaluation of flexibility daily pay and after-intervention. The CG had improvement of flexibility, however, not significant statistical, corroborating with the idea of that the resisted exercise can contribute for the maintenance or profit of flexibility (FLECK E KRAEMER, 1999), however without an increase of the significant ADM. In another study in which it was verified the influence of the training of the force on flexibility arrived to the conclusion of that the force training can increase or keep flexibility, if worked together (CORTES et al., 2002). An important aspect for the success of any process that involves systematic physical exercises is the intensity of the same ones, which can be measured by the subjective effort sensation (RASO et al., 2000), that is, if it cannot leave to give the necessary importance of the subjectivity of the intensity of the allonge (SILVA et al., 2000), justifying the individuality biology of each individual.

CONCLUSION

In reply to the hypothesis of the present study considering the presented data, are concluded that the static passive flexing in devices of resisted exercise caused significant increase of the ADM, in EG in the studied variable. Not having the same resulted in the ADM of Dorsiflexion (DF), once that the CG did not present significant differences in none of the studied ones. The

present study will be able to serve as parameter for the accomplishment of the allonge in the daily routine of everyone, thus being able to have a control of its load of daily training, since the use of the intensity to have been done through the load of the devices, which is visible, quantifiable and adjustable, for the proper citizen or its trainer. One suggests that other studies with flexibility in devices of resisted exercise can be carried through to contribute with the thematic one in question.

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EFFECTS OF CARRIED THROUGH EXERCISES OF FLEXIBILITY IN BODYBUILDING DEVICES, ON THE ARTICULAR AMPLITUDE OF MOVEMENT IN PRACTITIONERS OF RESISTED EXERCISE OF THE MASCULINE SEX

ABSTRACT

The present study objectified to analyze the effect of exercises of passive flexibility on the articular amplitude of movement (AAM), in adults of the masculine sex, carried through in resisted training (RT) devices, using the method of passive flexibility. 20 masculine sex people got part on the study, divided in control groups (CG), formed by 10 men (23,6±2,6 years old) that hadn't been submitted to the flexibility training and to the experimental group (EG), formed by 10 masculine sex people (24,7 ±5,14 years old), submitted, during 8 weeks of application of two repetitions of 10 seconds of insistence and from 20 to 25 seconds of break on the thorico-lumbar flexion exercises (TLF). Flexion of the Right and left Hip (LHF and RHF), Horizontal Extension of the Right and left Shoulder (HERS and HELS) and Left and Right backflexion (LBF and RBF) in the devices of seated Rowed, Leg Press 45°, Converging Supino and vertical calf, respectively. For the mensuration of flexibility it was used the

protocol of goniometry of the Laboratory of Biometry and physiology of Effort(LABIFIE), using Goniometric method. For statistics analysis test "t" of Student and ANOVA One Way was used. Results: magnificent rises on the administration of the TLF exercises($p<0,005$), LHF($p=0,026$), RHF ($p=0,003$), HERS($p=0,047$) and HELS exercises($p=0,006$), taking to the understanding that RT devices applied flexibility exercises had the same articular amplitude significant effect in most of the analyzed variables.

KEY WORDS: training, flexibility, devices, resisted exercise.

EFFETS D'EXERCICES DE FLEXIBILITÉ RÉALISÉS AUX AGRÈS DE MUSCULATION, SUR L'AMPLEUR ARTICULAIRE DU MOUVEMENT CONCERNANT L'EXERCICE RÉSISTÉ CHEZ LES HOMMES.

RÉSUMÉ

La présente étude a pour but l'analyse des exercices de flexibilité passive sur l'ampleur articulaire du mouvement (IAM) chez des adultes du sexe masculin, réalisés aux agrès d'entraînement résisté (ER), en utilisant la méthode de flexibilité passive. Vingt personnes ($24,7\pm 5,14$ ans) du sexe masculin, divisées en groupe de contrôle(GC) ont participé de l'étude. Ce groupe-là a été composé de dix personnes ($23,6\pm 2,6$ ans) qui n'ont pas subi l'entraînement de flexibilité et d'un groupe expérimental(GE) composé de 10 personnes ($26,4\pm 7,04$ ans) qui ont subi l'entraînement pendant huit semaines, ayant deux répétitions de 10 secondes d'insistance et 20 à 25 secondes de pause pour les exercices de Flexion Thorax-Lombaire (FTL), Flexion de la Hanche Droite et Gauche (FHD et FHG), Extension Horizontale de l'Épaule Droite et Gauche (EHID et EHIG) et Flexion du Dos Gauche et Droite (FDG et FDD) aux agrès de Rameur Assis, Leg Press 45° , Couché sur le dos Convergent et Mollet vertical, respectivement. Pour la mensuration de flexibilité, a été utilisé le protocole de goniométrie du laboratoire de Biométrie et Physiologie de l'Effort(LABIFIE), en utilisant la méthode goniométrique. Pour l'analyse statistique a été utilisé le test « t » de Student et ANOVA One Way. Résultats: Des mouvements significatifs ont été trouvés concernant l' IAM des mouvements FTL ($p=0,005$), FQD ($p=0,026$) FQE ($p=0,003$) EHOD ($p=0,047$) EHOE ($p=0,006$) ce qui indique que les exercices de flexibilité appliqués aux agrès de ER ont produit un effet significatif en ce qui concerne l'ampleur articulaire dans la majorité des variables analysées.

MOTS-CLÉ: Entraînement; Flexibilité; Agrès; Exercice Résisté.

EFFECTOS DE EJERCICIOS DE FLEXIBILIDAD REALIZADOS EN APARATOS DE MUSCULACIÓN, SOBRE LA AMPLITUD ARTICULAR DEL MOVIMIENTO EN PRACTICANTES DE EJERCICIOS RESISTIDO DEL SEXO MASCULINO.

RESUMEN

El presente estudio tiene como objetivo analizar los efectos de los ejercicios de flexibilidad pasiva sobre la amplitud articular del movimiento(AAM) en jóvenes del sexo masculino, realizado en aparatos de entrenamiento resistido(ER) utilizando el método de flexibilidad pasiva. Participaron en el estudio 20 personas/sujetos ($24,7\pm 5,14$ años) del sexo masculino, divididos en un grupo de control(GC), compuesto por 10 personas ($23,6\pm 2,6$ años) que no fueron sometidos al entrenamiento de la flexibilidad y grupo experimental(GE) compuesto por 10 personas ($26,4\pm 7,04$ años) sometidos durante 8 semanas de aplicación con dos repeticiones de diez segundos de insistencia y 20 a 25 segundos de intervalo en los ejercicios de flexión torácico-Lumbar(FTL), flexión de la cadera derecha e izquierda(FCD y FCE), extensión horizontal del hombro derecho e izquierdo (EHHD y EHHL) y dorsiflexión izquierda y derecha(DFI y DFD) en los aparatos de remada sentada, leg press 45° , supino convergente y pantorrilla vertical, respectivamente. Para la mensuración de la flexibilidad fue empleado el protocolo de goniometría del laboratorio de biometría y fisiología del esfuerzo(LABIFIE), utilizando método Goniométrico. Para el análisis estadístico se utilizó el teste "t" de Student y ANOVA One Way. Resultados: Fueron encontrados aumentos significativos en la AAM de los movimientos FTL ($p=0,005$), FCD ($p=0,026$), FCE ($p=0,003$), EHHD ($p=0,047$), EHHL ($p=0,006$), conduciendo al entendimiento que ejercicios de flexibilidad aplicados en aparatos de ER, produjeron efectos significativos en la amplitud articular en la mayoría de las variables analizadas.

PALABRAS CLAVES: entrenamiento, flexibilidad; aparatos, ejercicio resistido.

EFEITOS DE EXERCÍCIOS DE FLEXIBILIDADE REALIZADOS EM APARELHOS DE MUSCULAÇÃO, SOBRE A AMPLITUDE ARTICULAR DE MOVIMENTO EM PRATICANTES DE EXERCÍCIO RESISTIDO DO SEXO MASCULINO.

RESUMO

O presente estudo objetivou analisar os efeitos de exercícios de flexibilidade passiva sobre a amplitude articular de movimento(ADM) em adultos do sexo masculino, realizado em aparelhos de treinamento resistido(TR), utilizando o método de flexibilidade passiva. Participaram do estudo 20 sujeitos ($24,7\pm 5,14$ anos) do sexo masculino, divididos em grupo controle(GC), composto por 10 sujeitos ($23,6\pm 2,6$ anos) que não foram submetidos ao treinamento de flexibilidade e grupo experimental(GE) composto por 10 sujeitos ($26,4\pm 7,04$ anos) submetidos durante 8 semanas de aplicação com duas repetições de 10 segundos de insistência e 20 a 25 segundos de intervalo nos exercícios de Flexão Tóraco-Lombar(FTL), Flexão do Quadril Direito e esquerdo(FQD e FQE), Extensão Horizontal do Ombro Direito e esquerdo(EHOD e EHOE) e Dorsiflexão Esquerda e Direita(DFE e DFD) nos aparelhos de Remada sentada, Leg Press 45° , Supino Convergente e Panturrilha vertical, respectivamente. Para a mensuração da flexibilidade foi empregado o protocolo de goniometria do Laboratório de Biometria e fisiologia do Esforço(LABIFIE), utilizando método Goniométrico. Para análise estatística utilizou-se o teste "t" de Student e ANOVA One Way. Resultados: Foram encontrados aumentos significativos na ADM dos movimentos FTL($p<0,005$), FQD($p=0,026$), FQE($p=0,003$), EHOD($p=0,047$), EHOE($p=0,006$), conduzindo ao entendimento de que exercícios de flexibilidade aplicados em aparelhos de TR, produziram efeito significativo na amplitude articular na maioria das variáveis analisadas.

PALAVRAS-CHAVES: Treinamento; Flexibilidade; Aparelhos; Exercício Resistido;