191 - EFFECTS OF A PROTOCOL OF ASSISTED DYNAMIC PASSIVE FLEXIBILITY TRAINING IN PARTICIPANT ADULTS OF LABOR GYMNASTICS PROGRAM AT THE BIOMEDICAL SCIENCES COLLEGE OF CACOAL FACIMED.

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INTRODUCTION

The physical efforts in the work environment generate a stress load, at some moments high, taking the employee to have problems of psychological and physical order, as for example the illnesses related to work (DORT), which can happen even with the work market requirement, as increase of productivity, qualification and brusque alterations in the daily routine (HERÉDIA, 2004). Another important factor is the life style that the employee leads, also being able to influence in his health. One of the recurrent situations in the companies is the absenteeism level related to lumbar pains problems, what can be a result of shortenings in the posterior musculature, producing limitations in the articular amplitude of movement (AAM). Flexibility is weighed as a capacity of physical aptitude related to the health (NAHAS, 2003), being defined as the degree of amplitude of the movement of a joint, inside of the morphologic limits, without the risk of provoking injuries (POLLOCK and WILMORE, 1993; POLLOCK, GAESSER *et al.*, 1998) Basically, the flexibility manifests itself in two forms: static and dynamic(DANTAS, 2003.).

In what it is referred to the concept about flexibility, the same one is appraised as the capacity to carry through a movement in the biggest extension possible of its joint - called pendular amplitude (BARBANTI, 1996.), being this one also called as mobility, further understood as *"the sportsman capacity and characteristic to be able to execute movements with great alone oscillatory amplitude or under the influence of external forces, in one or more joints"* (WEINECK, 1999.). To reach definitive flexibility, it is necessary the practice of flexion or stretching exercises, being the second one defined as the form of work that aims to the maintenance of the gotten flexibility levels and the accomplishment of the normal amplitude movements with the least physical restriction as possible, and the flexion process is appraised as a way of work that has as objective a improvement of flexibility through the mobilization of movements in superior articular arcs to the original ones (DANTAS, 2005.), therefore the stretching aims at the maintenance and flexion process aims at the improvement of flexibility. The programs of Labor Gymnastics (LG) use associated stretching exercises and sometimes flexion ones, when an improvement of flexibility is aimed at. For the Labor Gymnastics (Gymnastics of Pause) it is the practice of the guided and directed physical activity during the schedule of the expedient and in the workplace, that is, there is a pause so that the workers can carry through physical exercises that aim at functional benefits in the work. It has as main goal to minimize the deriving negative impacts of the sedentariness in the life and health of the worker (OAK, 2004).

According to the literature, the flexibility capacity, a kinanthropometric variable, is a health component related to the physical aptitude, being trainable in any age (ALTER, 2001.; DANTAS, 2005), for example, it is necessary to keep an adequate position for a minimum of flexibility, as well as to access the functional level of the aged ones, flexibility has been a parameter of the physical qualities often evaluated (NETZ and ARGOV, 1997); (PHILLIPS and HASKELL, 1995). Inside of passive flexibility, the ballistic dynamic method, characterized by movements carried through with speed of rhythmic form, presents a proposal of less monotonous and more specific training (OLCOTT, 1980).

The (AAM) is the capacity to make movements in certain joints with appropriate movement amplitude(BARBANTI, 1994.), being able to be considered as one motor quality, which depends on the muscular elasticity and articular mobility expressed by the maximum necessary movement amplitude for execution of any physical activity, without anatomic-pathological injuries occurrence (ARAÚJO, 1987). Corroborating in the affirmation that the ADM is maximum physiological passive amplitude of a given movement to articulate(ARAÚJO, IN: GHORAYEB *et al.*, 1999.), it leads to the understanding of that the ADM is reached with exercises that involve bigger arcs in movements, no matter if joints are involved, as well as a direct relation between AAM /flexibility/ AAM exists. In relation to the problems caused by restricted flexibility in specific joints, the injuries occur when a member is forced beyond its angulation of normal use (SHARKEY and PETERSEN, 1998.). The present study had as objective, to analyze and compare the effect of a protocol of flexion exercises by using assisted passive dynamic technique in employees of some sectors of an institution of superior education, participants of a program of Labor Gymnastics.

MATERIALS AND METHODS

The present research has comparative almost-experimental type (THOMAS and NELSON, 2002.), using descriptive method with quantitative approach. The studied sample was composed by 19 employees of some sectors of an institution of superior education, more specifically the sectors of general services, warehouse and secretariat, of both genres with ages between 18 and 50 years, who participated of the program of Labor Gymnastics of the FACIMED, being the same ones randomized and divided into two groups, Control Groups (CG), each one with 10 individuals, who did not perform the flexion protocol, and Experimental Group (EG) composed by 9 individuals, the ones who carried through the protocol during eight weeks, having their characteristics showed in table 1. The inclusion criteria had been: to be in the stipulated age range, to be employee of the institution, participant of the GL program and to have signed the term of free and clarified assent. The exclusion criteria had been: to be hindered to carry through physical exercises for medical diagnosis, to have limitations in the ADM that makes the stretching maneuvers difficult, to have body mass index (BMI) above of 29,99 kg/m²; to be athlete in some sportive modality and not to be able do the proposed exercises. This study had the approval from the Committee of Ethics in Research of Biomedical Sciences College of Cacoal-FACIMED, with protocol number 252B-08, and all the procedures had been approved in accordance with the declaration of Helsinki of 1975 and the Resolution number 196 of 10 of October, 1996.

All the individuals had been submitted to an evaluation with occupational doctor, being enclosed one anamnesis on the capacity for the accomplishment of physical exercises, carried through before the signature of the term of free and clarified assent. For a deep verification of the sample homogeneity, they had had its total corporal weight surveyed by a digital scale (Filizolla, Brazil), with gram precision. The stature was measured through one stadiometer (Cardiomed, Brazil), with precision in centimeters. From these data, the corporal mass rate was calculated (BMI kg/m²). The criterion used for division of the groups was to respect the time defined for the LG being been all aggregates in the same local, because the institution where has a specific schedule for accomplishment of the LG in group, where Experimental Group (EG) executed the stretching protocol and

the Control Group (CG) waited for the ending of the accomplishment of this procedure to initiate the participation in the LG. Flexibility was measured by one goniometer ALCACER of 16 inches, with 360º, of steel, through the protocol of goniometry LABIFIE (DANTAS, 2005.), to verify the amplitude to articulate, in degrees, Thoracic Lumbar Flexion (TLF); Right Hip Flexion (RHF); Left Hip Flexion (LHF); Right Shoulder Horizontal Extension (RSHE) and the Left Shoulder Horizontal Extension (LSHE). The control group had a compromise in not participating in the flexion protocol, being that the two groups had not participated in other physical activities during the period of intervention. The exercises had been executed in the vespertine turn, during working hours, for a period of eight weeks, on Mondays, Wednesdays and Fridays, with insistence time of the movement of 10 seconds, frequently of 3 times a week and 48-hour break between sessions. In the exercises sessions, the same ones had been carried through in two series and had had 30-second rest in between, with a total time of 6 minutes. The exercises had been guided with practical demonstrations, where the movement was accomplished until the discomfort point in relation to muscular pain (GHORAYEB and BARROS GRANDSON, 1999.), considering the subjective sensation of pain, having a 10-second incursion, each one with 1 second, totalizing 10 incursions, applied to the individuals by the assistants 1, 2, 3 and 4, in the seated, lying and standing positions, the same ones forcing for the back (fig.1), the posterior portion of the leg (fig.2) and for the hands (fig.3).

The exercises had been done in dynamic movement until the threshold of the ADM in a total of 10 repetitions of 1 second each.

Fig.1 Thoracic Lumbar Flexion Fig. 2 Hip Flexion Fig.3 Shoulder Horizontal extension



STATISTICAL TREATMENT

To verify the normality of the sample data, it was used the test of Shapiro-Wilk, and the results had been: for Thoracic Lumbar Flexion (TLF), p=0,001; and for Right Hip Flexion (RHF), p=0,020, Left Hip Flexion (LHF), p=0,001; Right Shoulder Horizontal Extension (RSHE), p=0,02; Left Shoulder Horizontal Extension (LSHE), p=0,000, for. The value of p<0,05 was adopted for significance of statistics. According to the results in the data of the volunteer groups, which presented gaussian characteristics of normality, it was applied Paired-Sample t Test student for analysis. The value of p<0,05 was adopted for statistics significance of the alpha error.

RESULTS AND QUARREL

Table 01: demonstrative of the participants of the research for amount and sex

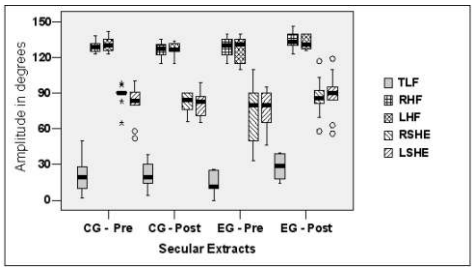
TOTAL EG		Masculine EG		Feminine EG		TOTAL CG		Masculine CG		Feminine CG	
N	%	N	%	N	%	N	%	N	%	N	%
9	100	4	44,44	5	55,56	10	100	5	50	5	50
9	100	9	44	9	56	10	100	10	50	10	50

Table 02: demonstrative of the results for joint in EG

Period	TLF	RHF	LHF	RSHE	LSHE	BMI
Before	14,9(9,3)	128,2(9,1)	125,7 (11,4)	71,2 (25,6)	74,8 (18,0)	21,3(2,5)
After	27,0 (10,8)	134,1(7,5)	133,1 (6,7)	86,3 (17,2)	88,0 (19,9)	21,1(2,2)
Sig.p	**0,001**	**0,020**	**0,010**	**0,020**	**0,000**	0,41

TLF= Thoracic Lumbar Flexion; RHF=Right Hip Flexion; LHE=Left Hip Flexion; RHES=Right Shoulder Horizontal Extension; EHOE= Left Shoulder Horizontal Extension.

Fig. 4 Pre- and post-test secular extracts in EG and CG for the studied variable.



p<0,05-EG - p>0,05-CG

In a study with 20 individuals(COELHO and ARAÚJO, 2000), the participation in one supervised exercises program, had concluded that the performance in carrying through daily tasks, is associated with an improvement of global flexibility, leading to the idea of the importance of this capacity to working people. Leading a study with classic ballet dancers(CIGARETTE, FERREIRA *et al.*, 2006) , it had been observed significant increases in the amplitude to articulate of classic ballet dancers after 10 weeks of flexibility training with one hour of duration, once a week, using the active method with three repetitions of 20 seconds each one, however, in association to the method of Neuromuscular Proprioceptive Facilitation (FNP), what, beyond the population, it also differentiates from the present study, being for the joint of the hip, in the flexion movements, extension and abduction, demonstrating that the participation in the program of flexibility training got success in the experimental group.

One of the factors to be observed, when it is about the evaluation and training of flexibility in women, is the menstrual period, however (MELEGARIO, SIMÃO *et al.*, 2006), they had evidenced in a study with 20 women with age between the 18 and 35 years, practitioners of physical exercises in gymnastics academies, that this factor did not intervene significantly with what it is mentioned to the alterations of the amplitude to articulate. Being the capacity of important flexibility in what it refers to the

preventive aspects, (SILVA, TARANTO *et al.*, 2006), it is affirmed that the increase of flexibility contributes for the tolerance to loads imposed to the human body, as well as in the prophylaxis of injuries that may come to occur by means of such loads, which can be understood in the diverse scopes of the physical income.

According to the study of (CRISTOPOLISKI, SARRAF *et al.*, 2008), the authors had confirmed the hypothesis that infers a relation between flexibility of the extensor and flexor muscles of the hip on the walk of aged individuals, evidencing significant differences in some important variables in the conduction of the march of aged, as for example the increase of the height of metatarsus in relation to the ground, what would diminish the risk of falls and slips, making those individuals have a way of march with more insurance. In study led with participants of program of labor gymnastics (OF SILVEIRA, DA SILVA *et al.*, 2007), evaluating diverse morphologic, functional and life style variables, it was evidenced increases in all variables from the study after 6 months of participation in the program of LG, being carried through 3 times a week, what did not occur with the present study, which verified only differences in flexibility in the movements of, (TLF)p=0,001, (RHF)p=0,020; (LHF)p=0,010; (RSHE)p=0,02; (LSHE) p=0,000 carrying through the exercises during 8 weeks, frequently of 3 days a week, getting significant statistical differences. Another aspect to be considered in what it refers to the increase of AAM, is the time of duration of the stretch, where the findings demonstrate that variations of time and results exist. In conformity to (VOIGT, VALLEY *et al.*, 2007), in a field study with 59 employees of the male genre of a great company, divided in two groups, it was evidenced that a time of 10 seconds using the static method of an only insistence of the related time, was enough to produce significant effect in the joints of the shoulder and the hip. On the other hand, the study of (BONVICINE, GONÇALVES *et al.*, 2005) compared two times of insistence, which the authors call stretching techniques, where it had been executed a session of stretch supported per 60 seconds in the right inferior member and 2 stretch sessions of 20 seconds, with interval of 10 seconds, in the left inferior member. According to the results, the authors had gotten evidences that only one insistence with time of 60 seconds, was more effective in the increase of the AAM, however the two insistences of 20 seconds, had promoted significant profits, as well as the ones of 60 seconds, what reveals that, in terms of effectiveness of the method, did not have difference between the techniques, occurring an increase of quantitative form in favor to the insistence of 60 seconds. Corroborating with the findings above(CONCEIÇÃO, VALLEY *et al.*, 2008) searched in individuals with age range between 15 and 19 years, the influence of several periods of time of permanence of static stretch, evidencing that it did not have significant differences between the groups, that is, in relation to the permanence, all the periods of time had produced significant results, converging to the understanding that the insistences above of 10 seconds are unnecessary in when it is about the increase of AAM, being the other times similar to the one of 10 seconds(FORD GS, BAD MAZZONE *et al.*, 2005). In addition, according to (ROBERTS and WILSON, 1999) evidences can demonstrate that to a period of time shorter than 10 seconds is effective for the increase of AAM, considering the insistences above of 1 repetition with permanence of 5 seconds, proposed in their study with 24 citizens, being 19 men and 5 women. According to authors (MCARDLE, KATCH *et al.*, 2008.), the majority of the studies on the frequency of the training indicates that a reply to the training with the exercise carried through at least 03 times per week during at least 06 weeks occurs, what happened in the present work that verified the effect of eight weeks of training.

CONCLUSION

In accordance with the results gotten in the present study, which can be inferred that a protocol of assisted dynamic passive flexibility training, promoted significant profits of AAM in the studied variables, resulting in arcs to articulate with increased amplitude comparing the pre- and post-training secular stratus when compared with the control group, did not demonstrate important alterations in the AAM, letting understand that the used technique can benefit the improvement of flexibility in participants of the programs of labor gymnastics.

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EFFECTS OF A PROTOCOL OF ASSISTED DYNAMIC PASSIVE FLEXIBILITY TRAINING IN PARTICIPANT ADULTS OF LABOR GYMNASTICS PROGRAM AT THE BIOMEDICAL SCIENCES COLLEGE OF CACOAL FACIMED

The main objective of this research was to analyze and compare the effects of a assisted dynamic flexibility protocol in labor gymnastics at the Biomedical Sciences College of Cacoal-FACIMED, (Rondônia Brasil). The sample was composed by 19 employees from both genres with an average age of 32,2 years ±11,94, divided into 2 groups: Experimental group (EG) (women, n=5 and men, n=4) and the control group (CG) (women, n=5 and men, n=5). All the evaluations were made at the FACIMED`s Physiology and Biomechanics Laboratory from Biomedical Sciences College of Cacoal-FACIMED the 17 to the 20 of March, 2008 (diagnostic evaluation) and from the 23 to the 28 of May, 2008 (post-training evaluation), having the corresponding schedule from 14:00 to 17:00. The pre- and post-tests (which measured the articular amplitude) were applied by using the goniometric method in Thoracic Lumbar Flexion (TLF); Right Hip Flexion (RHF); Left Hip Flexion (LHF); Right Shoulder Horizontal Extension (RSHE) and the Left Shoulder Horizontal Extension (LSHE). The training was executed during six minutes in the labor gymnastics program, two or three times a week in a period of eight weeks, and these employees attended at least 15 sessions, and at most 23 sessions of gymnastics, and a control group was formed to make a comparison possible. **Results:** Through the statistical analysis by using a Paired-Samples t Test Student, it has been noticed meaningful differences ($p<0,05$) in the articular amplitude movement (AAM) in the studied variables (TLF)$p=0,001$, (RHF)$p=0,020$; (LHF)$p=0,010$; (RSHE)$p=0,020$; (LSHE)$p=0,000$, comparing the secular stratus of pre- and post-training. **Conclusion:** After the gotten results it is concluded that the application of a protocol of assisted passive dynamic flexibility modified the AAM in the mentioned variables, producing an increase of the articular arcs in the researched individuals, in comparison to the control group, which did not demonstrate any important alteration of the arcs to articulate.

Words key: Stretching technique, labor gymnastics, flexibility.

EFFECTS D´UM PROTOCOLE D´ENTRAINEMENT DE LA FLEXIBILITE PASSIVE DYNAMIQUE AIDEE POUR DES ADULTES PARTICIPANT D´UN PROGRAMME DE GYMNASTIQUE LABORIELLE A LA FACULTE DE SCIENCES BIOMEDICAL DE CACOAL FACIMED.

Cette recherche a eu pour but principal d´analyser et de comparer les effects d´un protocole de flexibilité dynamique au sein d´un programme de gymnastique laborielle à la Faculté de sciences biomédical de CACOAL FACIMED, (Rondônia Brasil). Le groupe a été composé de 19 membres du personnel des deux sexes d´âge moyen de 31,2 ans ±11,94, divisé en deux sous-groupes: le premier Group Expérimental(GE) (femmes, n=5 e hommes, n=4) et le second Group de Contrôle (GC) (femmes, n=5 e hommes, n=5). Toutes les évaluations furent réalisées au laboratoire de Physiologie et de biomécanique de la FACIMED entre le 17 et le 20 mars 2008 (évaluation du diagnostique) et entre le 23 et le 28 mai 2008 (évaluation post-entraînement), de 14h00 mn à 17h00 mn. Des pré-tests et post-tests (mesurant l´Amplitude Articulaire) furent appliqués utilisant la méthode goniométrique aux mouvements suivants: Flexion Thoracique Lombaire (FTL); Flexion de Hanche Droite(FHD); Flexion de Hanche Gauche(FHE); Extension Horizontale de l´épaule Droite (EHID) e Extension Horizontale de l´épaule Gauche (EHIG). L´entraînement fut appliqué durant six minutes au sein d´un programme de gymnastique laborielle, de deux à trois fois par semaine sur une période de huit semaines. Les membres du personnel ont réalisé un minimum de 15 séances et un maximum de 23 séances gymnastique laborielle, ayant été utilisé un groupe de contrôle en vue d´une comparaison. **Résultats:** une analyse estatistique utilisant le Paired-Samples t Test Student a permis de constater que sont apparues des différences significatives ($p<0,05$) au niveau de l´amplitude du mouvement (ADM) des variables étudiées (FTL)$p=0,001$, (FHD)$p=0,020$; (FHE)$p=0,010$; (EHID)$p=0,020$; (EHIG)$p=0,000$, comparées à des données temporaires pré-tests pré et post-tests. **Conclusions:** Les résultats obtenus ont permis de conclure que l´application d´un protocole de flexibilité passive dynamique aidée a modifié l´ADM des variables mentionnées, ayant produit une augmentation des arcs articulaires sur les personnes analysées, celles-ci ayant été comparées au groupe de contrôle, lequel groupe n´ayant pas montré d´altérations importantes au niveau des arcs articulaires

Mots-clés : technique d´allongement, gymnastique laborielle, flexibilité.

EFECTO DE UN PROTOCOLO DEL ENTRENAMIENTO DE LA FLEXIBILIDAD PASIVA DINÁMICA ASISTIDA EN ADULTOS PARTICIPANTES DEL PROGRAMA DE GIMNASIA LABORAL EN LA UNIVERSIDAD DE CIENCIAS BIOMÉDICAS DE CACOAL FACIMED.

Esta investigación tuvo como objetivo central analizar los efectos de un protocolo de flexibilidad dinámica auxiliada como parte de un programa de gimnasia laboral, en la Facultad de Ciencias Biomédicas de la ciudad de Cacoal FACIMED, (Rondônia Brasil). La muestra fue compuesta por 19 empleados de la FACIMED, de ambos los sexos, con media de edad de 31,2 años (± 11,94), divididos en dos grupos: grupo experimental (GE) (mujeres, n=5; hombres, n=4) y grupo control (GC) (mujeres, n=5; hombres, n=5). Todas las evaluaciones fueran realizadas en el laboratorio de Fisiología Y Biomecánica de la FACIMED, entre los días 17 a 20 de marzo de 2008 (Evaluación Diagnóstica), y entre los días 23 a 28 de mayo de 2008 (Evaluación pos-entrenamiento), en el horarios de las 14:00 hasta las 17:00 h. Fue aplicado un pre-test y un pos-test, para hacer la medida de la amplitud articular, utilizando el método goniométrico en los movimientos: Flexión Tóraco-lombar (FTL), Flexión del Cuadril Derecho (FCD), Flexión del Cuadril Izquierdo (FCI), Extensión Horizontal del Hombro Derecho (EHHD), Extensión Horizontal del Hombro Izquierdo (EHHI). El entrenamiento fue ejecutado durante seis minutos, dentro del programa de gimnasia laboral, dos a tres veces en la semana, en un período de ocho semanas; Los empleados participaran de un mínimo de quince secciones, y un máximo de veinte y tres secciones de gimnasia laboral, sendo creado un grupo control para hacer la comparación. **Resultados:** a través del análisis estadístico, utilizando el Test t Student pareado, fue constatado que ocurrieran diferencias significativas ($p<0,05$) en la amplitud articular del movimiento (ADM), en las variables estudiadas (FTL) p=0,001; (FCD) p=0,020; (FCI) p=0,010; (EHHD) p=0,020; (EHHI) p= 0,000; comparándose los estratos temporales pre y pos entrenamiento. **Conclusiones:** después de los resultados obtenidos, se puede concluir que la aplicación de un protocolo de flexibilidad dinámica auxiliada alteró la ADM en las variables mencionadas, produciendo la ampliación de los arcos articulares en los individuos investigados, comparándose con el grupo control, el cual no demostró alteraciones importantes en los arcos articulares.

Palabras clave: técnica del alongamiento, gimnasia laboral, flexibilidad.

EFEITOS DE UM PROTOCOLO DE TREINAMENTO DA FLEXIBILIDADE PASSIVA DINÂMICA AUXILIADA EM ADULTOS PARTICIPANTES DE PROGRAMA DE GINÁSTICA LABORAL NA FACULDADE DE CIÊNCIAS BIOMÉDICAS DE CACOAL FACIMED.

Esta pesquisa teve como objetivo principal analisar e comparar os efeitos de um Protocolo de flexibilidade dinâmica auxiliada dentro de um Programa de Ginástica Laboral na Faculdade de Ciências Biomédicas de Cacoal-FACIMED, (Rondônia Brasil). A amostra, foi composta por 19 funcionários de ambos os sexos com idade média 31,2 anos ±11,94, divididos em dois grupos: grupo treinamento (GE) (mulheres, n=5 e homens, n=4) e grupo controle (GC) (mulheres, n=5 e homens, n=5). Todas as avaliações foram realizadas no laboratório de Fisiologia e Biomecânica da FACIMED entre os dias 17 a 20 de março de 2008 (Avaliação diagnóstica) e entre os dias 23 a 28 de maio de 2008 (avaliação pós-treinamento), no horário correspondente as 14h00min até as 17h00min. Foi aplicado pré-teste e pós-teste (que mediram a Amplitude Articular) utilizando o método goniométrico nos movimentos Flexão Tóraco Lombar(FTL); Flexão de Quadril Direito(FQD); Flexão de Quadril Esquerdo(FQE); Extensão Horizontal de Ombro Direito(EHOD) e Extensão Horizontal de Ombro Esquerdo(EHOE). O treinamento foi executado durante seis minutos dentro do programa de ginástica laboral, de duas a três vezes por semana em um período de oito semanas, estes funcionários atenderam a um mínimo de 15 sessões e a um máximo de 23 sessões de ginástica laboral sendo constituído um grupo controle para comparação. **Resultados:** Através da análise estatística utilizando-se o Teste t de Student pareado, constatou-se que ocorreram diferenças significativas ($p<0,05$) na amplitude articular de movimento (ADM) nas variáveis estudadas (FTL)p=0,001, (FQD)p=0,020; (FQE)p=0,010; (EHOD)p=0,02; (EHOE)p=0,000, comparando-se os estratos temporais pré-treino e pós-treino. **Conclusões:** Após os resultados obtidos, conclui-se que a aplicação de um protocolo da flexibilidade dinâmica passiva auxiliada, alterou a ADM nas variáveis mencionadas, produzindo um aumento dos arcos articulares nos sujeitos pesquisados, comparando-se ao grupo controle, o qual não demonstrou alterações importantes dos arcos articulares.

Palavras chave: técnica de alongamento, ginástica laboral, flexibilidade.