

44 - EFFECTS OF AN INACTIVE PERIOD IN THE AMPLITUDE AND FUNCTIONAL CAPACITY OF THE HIP AND KNEE ARTICULATIONS, AFTER STRETCHING EXERCISES, IN AGED PEOPLE.

ELIANE FLORENCIO GAMA; DANIEL RUIZ VEIGA; BRUNO JOSÉ DE SOUZA CUNHA; ROMEU RODRIGUES DE SOUZA
São Judas Tadeu University São Paulo SP Brazil
prof.efgama@usjt.br

Introduction

Articular flexibility is an important component of physical aptitude related to health (Achour Júnior, 1994). However, several factors can interfere in this capacity and diminish it (Hall, 1993).

There is an increasing loss of flexibility, particularly in older people, due to alterations that take place in the aging of articulations: articular cartilages wear out, there is matrix edema, fibrillation of the tissue and loss of elasticity (Shephard, 1998). An increase in the number and length of the villousities can be observed in the synovial membrane. There is thickening of the capsule and synovial fragments can protrude, causing joint pain (Nicola, 1999). Reduction of movement amplitude can restrict functional capacity and prevent older adults from carrying out certain activities and make them physically dependent (Pickles, 2000).

Stretching exercises can contribute to the improvement of articular flexibility in older adults and, with this, maintain their capacity to perform day-to-day activities independently.

Stretching reduces muscular tension and consequently movements become freer (Cristophe, 2001). Flexibility programs act on the elastic components of the connective tissues preventing their shortening. Consequently, it improves the capacity of extensibility that is reduced in aging (Dantas, 1995). Its regular practice will additionally provide the subjective sensation of muscular tension reduction and of a more relaxed body (Bob, 2001).

Aging is a complex process and, therefore, one model alone cannot be defined to categorize the great variety of old people that exist in this population. Therefore, researchers have used criteria that combine functional status with health level corresponding to day-to-day practical activities (Cotton, 1998). Some daily activities have been used for this as reference, such as getting dressed, taking a shower, getting up from bed and sitting on a chair, to determine an older adult's degree of independence.

The objective of this work was to analyze the effects of a 30-day period of inactivity on the amplitude of movement and functional capacity of the hip and knee articulations in aged people who did stretching sessions for a 4-month period.

Materials and Methods

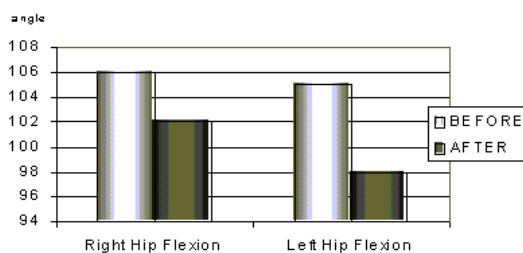
Eleven older adults from both sexes, between 65 and 75 years of age were analyzed. All these participants followed a routine of active static stretching for upper and lower extremities. Each exercise lasted 30 seconds with 10-second intervals to prepare for the following exercise, carried out 3 times a week, in the afternoon, for a period of 50 minutes each session (Clark, 1992). Each exercise was repeated between 3 to 5 times for each muscular group (Magnusson et al, 1995). The articular amplitude of the movements of flexion, extension, abduction and adduction of the hip and flexion movement of the knee were measured through goniometry on two occasions: 1st - after 4 months of training, and 2nd - after 30 inactive days. Besides, the participants were given a questionnaire with four questions related to major or minor difficulty to carry out day-to-day activities: 1 sit and get up; 2 go up steps; 3 get up from the floor and 4 put on socks. Similarly, the questionnaire was applied after the end of the stretching program and again after 30 inactive days. The objective was to know how much the inactive period could influence in day-to-day activities of the elderly adults. The data was statistically compared by the student t test for paired samples.

Results

1 Articular amplitude

In the flexion movement of the right hip, the initial average amplitude was 106° and after 30 days 102°. In the flexion movement of the left hip, the initial average was 105° and after 30 days it was 98° (Figure 1).

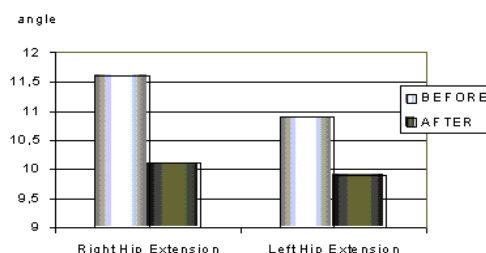
Figure 1 - Flexion amplitudes of the right and left hips before and after the exercises



In Figure 1, we can observe that there was a reduction in amplitude after a period of 30 inactive days and a greater loss on the left side despite the right side being more flexible.

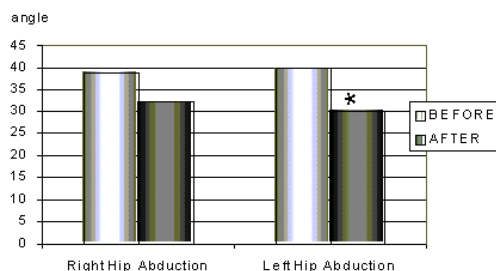
In the hip extension movement, the average maximum amplitude of the right side after the exercises was 11.6°. After the inactive period it was 10.1°; however, on the left side, the amplitude in the first test was 10.90° and in the second 9.90° (Figure 2).

Figure 2 - Right and left hip extension amplitudes before and after the exercises



With regard to the hip abduction movement, on the right side in the first test the amplitude was 38.7° and in the second test it was 32.1°. On the other hand, on the left side, in the first test the value was 39.7° and in the second test 30.2°(significant difference) (Figure 3).

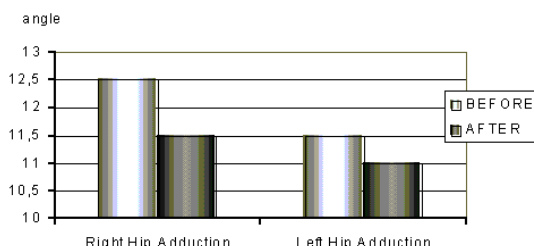
Figure 3 – Right and left hip abduction amplitudes before and after the exercises



* Significant ($p < 0.01$)

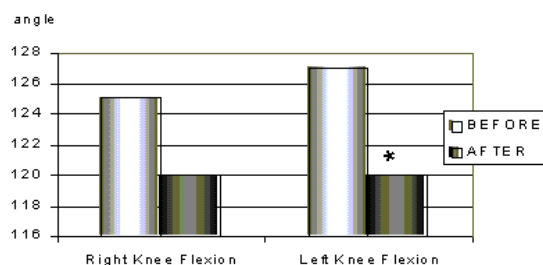
The adduction movement of the right hip presented an amplitude of 12.5° in the first test and in the second 11.5°; on the left side, the values obtained were: 11.5° in the first test and 11° in the second test (Figure 4).

Figure 4 – Adduction amplitudes of the right and left hips before and after the exercises



For the knee flexion movement, on the left side the first test showed an amplitude of 125° and the second test 120°; on the right side in the first test the amplitude was 127° and in the second test 120° (significant difference; $P < 0.05$) (Figure 5).

Figure 5 – Flexion amplitudes of the right and left knee before and after exercises



*Significant ($p = 0.05$)

Table 1 shows the results of the articular amplitude measurements (Mean ± Standard Deviation) of all the movements carried out by the 11 older adults, before and after the inactive period of 30 days after the 4-month stretching program to which they were submitted. Notice that all the values obtained before the inactive period are higher than at the end of this period, some being significant.

MOVEMENT	BEFORE	AFTER
Right hip flexion	106 ± 8,37	102 ± 8,40
Left hip flexion	105 ± 11,3	98 ± 9,39
Right hip extension	11,6 ± 3,29	10,1 ± 1,58
Left hip extension	10,9 ± 2,34	9,91 ± 2,30
Right hip abduction	38,7 ± 8,13	32,1 ± 8,36
Left hip abduction	39,7 ± 8,58**	30,2 ± 8,38
Right hip adduction	12,5 ± 1,92	11,5 ± 1,51
Left hip adduction	11,5 ± 2,38	11 ± 2,24
Right knee flexion	125 ± 7,08	120 ± 7,25
Left knee flexion	127 ± 3,78*	120 ± 6,94

Table 1 - Articular amplitude measurements (Mean± Standard Deviation) of all the movements studied.

2- Questionnaire

Out of the 11 participants who replied to the questionnaire, 9 performed the activities of sitting and getting up and going up steps normally before the inactive period. After this period, only 8 performed these activities; with regard to getting up from the floor, 7 older adults did it normally both in the 1st and in the 2nd period. Survey on the activity of putting on socks showed that 8 older adults replied that they did it normally in the 1st questionnaire and 7 of them in the 2nd questionnaire (Figure 6).

Out of the same 11 participants, in the 1st questionnaire, 2 mentioned that they performed the activity of sitting, getting up and going up steps with certain difficulty. This number increased to 3 older adults in the second questionnaire. With regard to getting up from the floor, 4 participants replied that they performed this activity with difficulty, both in the 1st and 2nd questionnaires. In the activity of putting on socks, 3 participants had difficulty doing it in the 1st questionnaire and this number

increased to 4 participants in the 2nd questionnaire (Figure 7).

Discussion

The results of this work show that the articular amplitude related to all the movements researched (flexion, extension, adduction and abduction of the hip and flexion of the knee) on both sides (right and left) had a loss at the end of the 30-day inactive period, although the difference had been statistically significant only for the flexion movements of the left knee ($p=0,05$) and abduction of the left hip ($p=0,01$). We applied static stretching, which is considered efficient by most of the authors and does not present risks for older adults (Band & Irion, 1994).

We observed that the losses were generally greater on the left side, both for the hip and knee movements. This result perhaps reflects the lesser use of the lower left member by older adults.

Dantas (1995) mentions that with aging, flexibility is mainly reduced in the hip articulation. This causes older adults to have postural problems. According to Rauchbach (1990), the loss of hip amplitude also interferes with elderly people's walk. Therefore, the questionnaire we applied tried to analyze the effect of this loss in day-to-day activities.

Over the span of working life, adults lose around 8-10 cm of hip flexibility. Restriction in the range of movement at the major joints becomes even more pronounced during retirement, and eventually, independence is threatened because the person cannot get into a car or a normal bath, go up a small step or complete the movements required for dressing and combing hair (Shephard, 1998)

According to the results obtained in the questionnaire applied after the stretching program (4 months) and repeated after a 30-day period of inactivity, we ascertained that out of the 4 activities researched, only that of getting up from the floor was not affected. The other activities, i.e., that of sitting and getting up, going up steps and putting on socks were hampered.

According to Hall (1993) good articular amplitude contributes to major efficiency in the performance of everyday activities and Pickes (2000) states that amplitude reduction of these movements can restrict the functional capacity and prevent elderly adults from carrying out certain activities. According to Shephard (1998), flexibility is thought to be conserved or improved by gently taking the main joints through their full range of motion each day.

It is possible that if the inactive period were increased, it would affect older adults' daily activities more intensely, therefore, gradually making them more dependent.

Flexibility is thought to be conserved or improved by gently taking the main joints through their full range of motion each day. If muscle weakness and arthritis are already advanced, such activities are best attempted in warm water. Buoyancy then supports body-weight, and warmth increases the immediate flexibility of the joints.

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Address: Rua Taquari, 546 B/C, 2ª Mooca São Paulo SP Brazil 03166-000
 e-mail: prof.efgama@usjt.br
 Telephone: 55 11 6099 1849

EFFECTS OF AN INACTIVE PERIOD IN THE AMPLITUDE AND FUNCTIONAL CAPACITY OF THE HIP AND KNEE ARTICULATIONS AFTER STRETCHING EXERCISES IN ELDERLY ADULTS.

Abstract. Alterations that occur in the aging of articulations in elderly adults cause an increasing loss of flexibility. Stretching exercises can improve articular flexibility and maintain the capacity of elderly adults to perform their daily life activities with independence. In this work we analyze the effects of a 30-day inactive period on the movement amplitude and functional capacity of the hip and knee articulations, in elderly adults who did stretching exercises for 4 months. Eleven older adults of both sexes, between 65 and 75 years old participated. They performed static stretching exercises for upper and lower extremities. Movement amplitude of flexion, extension, abduction and adduction of the hip and flexion of the knee were measured through goniometry: 1st - after 4 months of training, and 2nd after 30 inactive days. A questionnaire with 4 questions related to the performance of daily life activities was applied to the participants: 1 sitting and standing up; 2 going up steps; 3 getting up from the floor and 4 putting on socks. All the movements researched lost amplitude on both sides after 30 inactive days, although the difference had been statistically significant only for the movements of flexion of the left knee ($p=0.05$) and abduction of the left hip ($p=0.01$). With regard to the replies of the questionnaire, we ascertained that the activities of sitting and standing up, going up steps and putting on socks were affected. Only getting up from the floor was not affected. It is possible that if the inactive period were increased, it would affect the day-to-day activities more intensely, thereby making elderly adults increasingly dependent.

Key words: hip; knee; stretching exercise

EFFET D'UNE PÉRIODE D'INACTIVITÉ SUR AMPLITUDE ET CAPACITÉ FONCTIONNELLE DES ARTICULATIONS DE LA HANCHE ET DU GENOU APRÈS DES EXERCICES D'ALLONGEMENT POUR LES ÂGÉS.

Sommaire. Les personnes âgées se ressentent d'une progressive perte de flexibilité à cause des changements

produits par le vieillissement des articulations. Exercices d'allongement peuvent améliorer la flexibilité articulaire et maintenir la capacité de la personne âgée d'exécuter ses activités journalières avec indépendance. Ce travail analyse les effets d'une période de 30 jours d'inactivité sur l'amplitude du mouvement et la capacité fonctionnelle des articulations de la hanche et du genou de personnes âgées qui ont fait des exercices d'allongement pendant 4 mois. Ont pris part 11 personnes des deux sexes, entre 65 et 75 ans qui faisaient des exercices d'allongement statique, actif, destiné aux membres supérieurs et inférieurs. Les amplitudes des mouvements de flexion, extension, abduction et adduction de la hanche et de flexion du genou ont été mesurées faisant usage de la goniométrie : 1^{er} après 4 mois d'entraînement et 2nd après 30 jours d'inactivité. Les participants ont du remplir un questionnaire avec 4 questions connexes à la performance des activités de la vie journalière : 1 s'asseoir et lever, 2 monter des marches ; 3 se lever du sol et 4 mettre des bas. Après trente jours d'inactivité, tous les mouvements sondés montraient une perte d'amplitude des deux côtés même si la différence était statistiquement significative seulement pour les mouvements de flexion du genou gauche ($p=0,05$) et d'abduction de la hanche gauche ($p=0,01$). Concernant les réponses au questionnaire, nous avons observé que les activités de s'asseoir et lever, monter des marches et chausser des bas, présentèrent un affaiblissement. Seulement celle de se lever du sol n'est pas décriée. C'est possible qu'une période d'inactivité plus prolongée irait sérieusement restreindre les activités journalières des personnes âgées, les rendant ainsi, de plus en plus dépendantes.

hanche ; genou ; exercices d'allongement

EFFECTOS DE UN PERÍODO DE INACTIVIDAD EN LA AMPLITUD Y CAPACIDAD FUNCIONAL DE LAS ARTICULACIONES DEL CUADRIL Y RODILLA DESPUÉS DE EJERCICIOS DE ALARGAMIENTO, EN ADULTOS MAYORES.

Resumen. Debido a las alteraciones que ocurren en el envejecimiento de adultos mayores, se produce una creciente pérdida de flexibilidad. Ejercicios de alargamiento pueden mejorar la flexibilidad articular y mantener la capacidad de los adultos mayores de desempeñar sus actividades de la vida diaria con independencia. En este trabajo, analizamos los efectos de un período de inactividad de 30 días sobre la amplitud de movimiento y capacidad funcional de las articulaciones del cuádril y rodilla, en adultos mayores después de hacer ejercicios de alargamiento por 4 meses. Participaron once adultos mayores de ambos los sexos, entre 65 y 75 años de edad. Realizaron ejercicios de alargamiento estático activo para los miembros superiores e inferiores. La amplitud de los movimientos de flexión, extensión, abducción y aducción del cuádril y de flexión de la rodilla fue medida a través de goniometría: 1° - después de 4 meses de entrenamiento, y 2° - después de 30 días de inactividad. Un cuestionario con 4 preguntas relacionadas con la realización de actividades de la vida diaria fue aplicado a los participantes: 1 sentarse y levantarse; 2 subir escalones; 3 levantarse del suelo y 4 calzar medias. Todos los movimientos investigados tuvieron pérdida de amplitud de ambos los lados después de treinta días de inactividad, aunque la diferencia haya sido estadísticamente significativa sólo para los movimientos de flexión de la rodilla izquierda ($p<0,05$) y abducción del cuádril izquierdo ($p<0,01$). En relación a las respuestas del cuestionario, verificamos que las actividades de sentarse y levantarse, subir escalones y calzar medias fueron afectadas. Sólo la de levantarse del suelo no fue afectada. Es posible que si el período de inactividad fuera ampliado, afectaría las actividades del adulto mayor más intensamente, por consiguiente, haciéndolo cada vez más dependiente.

Palabras clave: cuádril; rodilla; ejercicios de alargamiento

EFEITOS DE UM PERÍODO DE INATIVIDADE NA AMPLITUDE E CAPACIDADE FUNCIONAL DAS ARTICULAÇÕES DO QUADRIL E JOELHO APÓS EXERCÍCIOS DE ALONGAMENTO, EM IDOSOS.

Resumo. Na terceira idade há uma crescente perda de flexibilidade devido às alterações que ocorrem no envelhecimento das articulações. Exercícios de alongamento podem melhorar a flexibilidade articular e manter a capacidade do idoso de desempenhar suas atividades da vida diária com independência. Neste trabalho analisamos os efeitos de um período de inatividade de 30 dias sobre a amplitude de movimento e capacidade funcional das articulações do quadril e joelho, em idosos que fizeram exercícios de alongamento por 4 meses. Participaram 11 idosos, de ambos os sexos, com idade entre 65 e 75 anos, que realizaram exercícios de alongamento estático ativo direcionado para membros superiores e inferiores. As amplitudes dos movimentos de flexão, extensão, abdução e adução do quadril e de flexão do joelho foram medidas através de goniometria: 1° - após 4 meses de treinamento, e 2° - após 30 dias de inatividade. Foi aplicado aos participantes, um questionário com 4 perguntas relacionadas à realização de atividades da vida diária: 1 sentar e levantar; 2 subir degraus; 3 levantar do solo e 4 calçar meias. Todos os movimentos pesquisados tiveram perda de amplitude de ambos os lados após trinta dias de inatividade, embora a diferença tenha sido estatisticamente significativa apenas para os movimentos de flexão de joelho esquerdo ($p=0,05$) e abdução do quadril esquerdo ($p=0,01$). Em relação às respostas do questionário, verificamos que as atividades de sentar e levantar, subir degraus e calçar meias sofreram prejuízo. Apenas a de levantar do solo não foi prejudicada. É possível que se o período de inatividade fosse ampliado, ele afetaria mais intensamente as atividades do dia a dia do idoso tornando-o, portanto, cada vez mais dependente.

Palavras-chave: quadril; joelho; exercícios de alongamento.