128 - INFLUENCE OF STRENGTH TRAINING ON ELDERLY AUTONOMY

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INTRODUCTION

The elderly represent a group of great world significance, this because with the increase in life expectancy, there was also an increase in population. According Ruipérez and Llorente (2002) over the years the number of elderly in the world will be enough to make them economically ordered and also a concern about the lack of autonomy they may have in response to negative aspects caused by the aging process.

It was suggested in 2002 an estimated 7% of elderly people in the world (VAN ER BIJ; LAURANT; WENSING, 2002), with the gradual increase in this population, can be predicted, according to IBGE (2000), that in 2020 in Brazil, the elderly will be 13% of the national population.

The aging process is influenced by the characteristics and habits of who is suffering it, among them, sedentarism has entered into discussion lately, because this behavior is largely responsible for the progressive loss of functional capacity and consequently the autonomy (MAZO; LOPES; BENEDETTI, 2001).

Continued participation in physical activity programs could reduce the risk of chronic degenerative diseases, and reduce mortality and morbidity among the elderly (NELSON, 2007), which, according to King (2001), the majority of them are not aware of the benefits of physical activity in the prevention and reduction of disorders caused by aging.

Sarcopenia is one of the changes caused by aging that most influence on the reduction of muscle strength. Thus, the effect of reduced muscle mass, with a lower conduction velocity, leads to a strong commitment of the motor functions of these subjects (BARRY; CARSON, 2004; GREENLUND; NAIR, 2003). Doherty (2003) also considers sarcopenia as a key contributor to the decrease in performance of all components of functional capacity.

Silva and Farinatti (2007) point a reduction of 12% to 15% per decade in strenght capacity from 50 years, which can be faster after 65 years, and this may be responsible for slowing down speed walking, making the elderly more susceptible to risks and dependent in activities like crossing the street.

In this view, according to the ACSM (2002), strength training is suggested as an alternative to minimize the changes caused by advancing age, being used as an important instrument to mitigate the degenerative processes in older subjects and making a positive impact especially on body composition and strength.

Weineck (2003) compares the strength training with the ability to maintain the performance of daily living activities, while pointing out that the muscle retains the ability of trainability until the end of life, allowing a positive response, even in older subjects when exposed to this type of training.

The possibility of offering a strength training program in elderly enhances its usefulness with this population, being even nominated as one of non-pharmacological strategies of greater effectiveness in preventing and minimizing the negative effects of aging (TORAMAN; AYCEMAN, 2005), enabling the physical and functional capacity required to make the elderly more independents, with safety and autonomy in daily activities.

Thus, this study investigates the influence of 12 weeks of strength training on the autonomy of elderly practitioners and subjects not engaged in strength training.

METHODS

The research is characterized as being almost-experimental, which according to Thomas and Nelson (2002), the researcher tries to adjust the research design to environments more similar to reality and still control the threats to internal validity as possible.

SUBJECTS

The study included 30 subjects, in which 21 female and nine male, with mean age of 62.5 years (± 2,5) enrolled in an academy of Maringá-PR. The subjects were divided into two groups, group 1 (G1) and group 2 (G2). G1 was composed of 14 subjects, nine females and five males, who have already practiced strenght training for at least three months. In G2 were individuals who did not practice any modality that involves strength training, the group was consisted of 16 subjects, 12 females and four males.

Participants presented a medical certificate attesting appropriate health for physical exercise and signed a consent term, agreeing to participate by their own free will, following the frequencies, orientations and approaches of the professionals involved, knowing that they could abandon the project at any point of the study. The project was approved by the Standing Committee on Ethics in Research Involving Human Beings of the UEM as opinion No.399/2008.

STUDY VARIABLES

The variables analyzed were aspects of anthropometry, functional capacity and strength.

For the anthropometric measurements were recorded weight (kg) and height (m) to calculate BMI (kg/m2), waist circumference and hip circumference to calculate the Waist-Hip Ratio (WHR) and skin fold measurements to calculate fat percentage (%F) according to Petroski (2007). For the analysis of %F were measured four anatomical points, for the male subjects the subscapular skinfold, triceps, suprailiac and medial calf, and female subjects folds midaxillary, suprailiac, medial thigh and medial calf.

The instruments used were: Caudura scientific balance, stadiometer graduated in millimeters, Sanny anthropometric tape and Sanny scientific skinfold caliper.

For strength evaluation was used the dynamometric strength test, for the manual strength and strength of lower limbs. The instruments used were a manual dynamometer Jamar and a back and leg dynamometer Takei Kiki Kogyo Co. Ltda.

To assess the functional capacity in the elderly, was checked according Matsudo (2000), the performance to do one activity of daily life and self-perception of performance in activities of daily living (ADL). The subjects were evaluated in the test of

climbing stairs, in which the individual had to climb 15 steps as fast as possible, it was used a Kadio stopwatch to check the time in seconds. To test the self-perception of performance in ADL, the scores showed a rating of "very bad", "bad", "medium", "good" and "very good" according to the amount of activities performed more independent. For this, subjects cataloged a list of 40 daily activities, classified as: A (I can not perform this activity), B (I perform this activity only with the help of another person), C (I perform this activity alone, but with great difficulty), D (I perform this activity alone with a little difficulty), and E (realize this activity alone and with ease), with scores of zero to four, zero being applied to the response A and four to E.

PROCEDURES

The intervention process with strength training in elderly, lasted 12 weeks, marked by two evaluations, a diagnosis, before the start of training and other formative, at the end of the scheduled intervention.

Both G1 and G2 attended two training sessions per week, lasting about 50 minutes, each training session contained exercises for major muscle groups, in which elders performed an alternate segment training, the sequence was: chest, quadriceps, back, posterior thigh, triceps, calf, biceps and abdominal, in three sets of 10 repetitions with a resting interval of approximately 30 seconds, the load was increased by 10% if it was noticed extreme ease at the end of a set, always with the accompaniment of a physical education teacher. The training was preceded by a warm up and a stretch in order to protect the body from possible injury and increase the performance of the subjects (Dantas, 2003, Uchida et al., 2005).

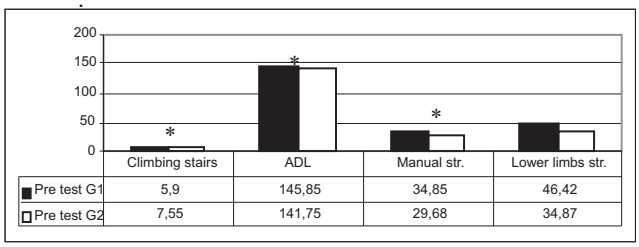
STATISTICAL ANALYSIS

For the statistical treatment of data collected in the pre and post-test and so the comparison of results, was used Statisca package for descriptive statistics and Student's t test for dependent and independent variables, differences being significant at $p < 0.05$. The results were presented as mean and standard deviation of pre and post-test.

RESULTS AND DISCUSSION

The discussions will follow the presented results, which will follow the order of functional capacity and dynamometric strength followed by anthropometric variables. The results will be compared between pre and post-tests of G1 and G2.

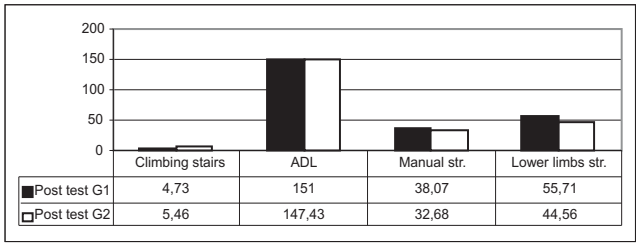
Figures 01 and 02 are the comparisons of pre and post-test between groups 1 and 2, in functional variables and dynamometric force.



	Climbing stairs	ADL	Manual str.	Lower limbs str.
Pre test G1	5,9	145,85	34,85	46,42
Pre test G2	7,55	141,75	29,68	34,87

Figure 01. Differences between groups 1 and 2, in pre-test for variables: climbing stairs, AVD, manual and lower limbs strength.

* Level of significance $p < 0.05$ reached



	Climbing stairs	ADL	Manual str.	Lower limbs str.
Post test G1	4,73	151	38,07	55,71
Post test G2	5,46	147,43	32,68	44,56

Figure 02. Differences between groups 1 and 2, in post-test for variables: climbing stairs, AVD, manual and lower limbs strength.

* Level of significance $p < 0.05$ reached

It is noticed in Figure 01 a significant difference in functional variables and manual strength between the groups. In climbing stairs, G1 showed an average performance of 1,65 seconds better than the G2. In ADL, G1 showed better results in 3,57 points. Finally, in manual strength, G1 achieved a performance of 5,39 kg/f better than G2.

For these variables, it can be noticed that G1 had already the advantages of being included in a program of strength training. This improvement in strength could influence the activities of daily life, conforming to Faulkner (2007), this is essential for routine activities that require movements like getting up, moving around, pushing, among others.

According to Silva et al. (2002) muscle strength in lower limbs is crucial for sustaining the weight, therefore, only the daily activities carried out by G2 may have influenced the non-significant difference of lower limbs strength in pre test. Nevertheless, with the training already carried out, the G1 got significantly better responses in climbing stairs test, in which is also used the lower limbs strength.

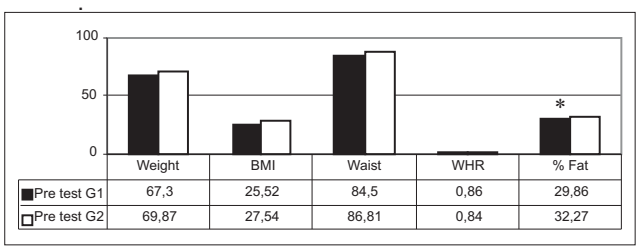
Overall, the strength of trunk and lower limbs are responsible for locomotion, daily tasks and balance (support), being the three components constantly present in daily life of independent elderly (Weineck, 2003), in this case, the higher punctuation on the self-perception of performance in ADL, indicates that more activities were possible to be independently carried out by the elderly which were on the strength training program before the study, showing the effectiveness of such training.

In the post-test (Figure 02), it was possible to perceive positive responses derived from training in both groups, however the significant differences in the pre-test between G1 and G2 were gone after 12 weeks of training, this shows that G2 had better responses than G1, reaching it in relation to the initial advantage.

Uchida et al. (2005) indicate the volume and intensity as possible factors to increase the muscle stimulation, and considering that the volume was similar between the groups, since the sequence and the number of repetitions were equal, the elderly in G1 should work with heavier loads, to improve in higher levels the previous capacity, had before the study.

To Weineck (1999), with the improvement of the training level, the stimulation adopted leads to smaller disturbances in homeostasis, and therefore a lower development in training status, and in the novices the training causes adaptive reactions in the neuromuscular system (coordination) and energetic (conditioning). Thus, it is observed that in pre-test, G1 had advantages, because they had already certain adaptations resulting from the previous training, however, G2 reached close levels to G1 after 12 weeks of training, with better results in the analyzed variables, which possibly demonstrates the implementation of these phases of adaptation in G2.

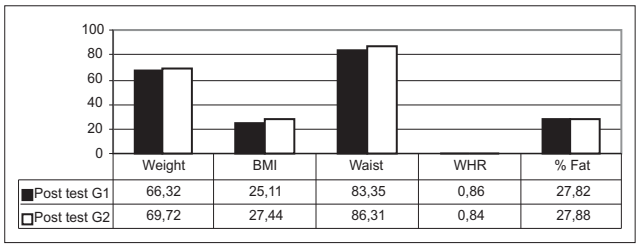
Figure 03 and 04 are the comparisons of pre and post-test between G1 and G2, in anthropometric variables.



	Weight	BMI	Waist	WHR	% Fat
Pre test G1	67,3	25,52	84,5	0,86	29,86
Pre test G2	69,87	27,54	86,81	0,84	32,27

Figure 03. Differences between groups 1 and 2, in pre-test, for anthropometric variables: weight, BMI, waist, WHR and fat percentage.

* Level of significance p <0.05 reached



	Weight	BMI	Waist	WHR	% Fat
Post test G1	66,32	25,11	83,35	0,86	27,82
Post test G2	69,72	27,44	86,31	0,84	27,88

In anthropometric variables (Figure 03), G1 had significantly better results in fat percentage in pre test, with an average of 2.41% fat less than the G2.

One more time, G1 had already the benefits of being inserted into a strength training program; Philips and D'orso (2000) defend this type of training as a way to order a higher maintenance energy, and thus a greater mobilization of fat at rest, due to maintenance or muscle development.

In post-test (Figure 04), G2 approached to G1, with no significant difference in any analyzed variable, the fat percentage decreased significantly in both groups, but the result of G2 was better, making the difference not significant anymore.

According to Pereira (1995) the stimulation produced by exercise, in this case, the strength training, causes certain body reactions, making it able to stand even higher doses of exercise, due to the phenomenon of overcompensation that happens when the exercise is repeated in short time previously established. Such changes provide an increase in strength and a development of muscle mass, besides the consequent functional benefits.

Perhaps the exercises done by G1 did not produce enough stimulation to cause major changes, and possibly, the overload applied wasn't highly effective in the destabilization of organic and cellular homeostasis, but in G2, smaller stimulation (overload) maybe was able to do so (BADYAEV, 2005).

Even if G1 has also good results in the reduction of body fat, G2 was able to approach and decrease the significant difference saw in the pre-test. This suggests that even elderly subjects need changes in training methods, to allow a continuous and progressive result caused by a strength training program, in this case, the improvement in body composition.

CONCLUSION

The study showed that 12 weeks of strength training in older people can influence functional variables, anthropometric and dynamometric strength in beginners and practitioners.

However it is necessary to consider the level of training of each individual, so this way there isn't stagnation in results during a longer period of practice. Therefore, it is necessary modifications in the structures of training, such in volume, intensity, method, rest or other, so, the exercise can keep producing changes in the homeostasis, what causes adjustments that result in improvements in body composition, strength and functional capacity, items of great usefulness to autonomy.

Besides that, it can be concluded that the elderly subjects maintain their ability of trainability, and adaptation to the exercise, especially the strength training, this because, the beginners had better improvements in relation to practitioners.

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INFLUENCE OF STRENGTH TRAINING ON ELDERLY AUTONOMY

ABSTRACT.

The aging process leads to several body changes. Thus it is necessary to search for ways to mitigate the negative effects of this involution. Therefore, knowing that the improved strength of the subjects represents a greater availability of these for daily activities, the aim of this study, was to investigate in strength training, evidence of improvements in variables related to it, and compare the possible improvement in beginners and elderly already practitioners of a program with this character. Were performed between 12 weeks of training, a pre and post-assessment, in which were measured variables as weight, height, BMI, waist, hip, WHR and %fat. Were also conducted tests of strength with a manual and a lower limbs dynamometer, and functional capacity tests such as climbing stairs and self-perceived performance of activities of daily living (ADL). The sample consisted of 30 subjects of both genders, with a mean age of 62,5 years (± 2,5), with 14 of them being already practitioners of the modality (G1) and 16 beginners in the practice of strength training (G2). The results revealed significant differences in pre-test between G1 and G2 for functional variables in the test of stair climbing and self-perception of ADL, for manual strength and for the anthropometric variable %fat. After 12 weeks, both groups had positive results caused by strength training, but G1 has reached G2, because none of the variables in the post-test had significant difference between groups. It's possible to conclude that elderly subjects maintain their capacity of adaptability and trainability; furthermore, the training should be modified to keep providing long-term results.

KEYWORDS: Strength training, elderly, autonomy.

L'INFLUENCE DE L'ENTRAÎNEMENT DE FORCE A L'AUTONOMIE DES PERSONNES AGEES

RÉSUMÉ.

Le vieillissement entraîne plusieurs changements dans l'orgamisme, par conséquent il faut que l'on recherche les façons de tarder les effets négatifs de ce processus. Pour cela, on sait que l'améloration de la force des sujets représente une disponibilité majeure de ceux pour les activités quotidiennes, cette étude s'est préoccupée de vérifier lors de l'entraînement de force, des indices d'améliorations chez les variables liées à l'entraînement de force, et comparer la possible amélioration chez les personnes âgées débutantes dans la modalité et chez les perssones âgées déjà pratiquantes. On a fait entre 12 semaines d'entraînement de force, une évaluation avant et une après, dans lesquelles on a mésuré les variables anthropométriques comme le poids, la staure, l'IMC, la taille, la hanche, le RCQ et le pourcentage de graisse. On a fait aussi des tests de force avec un dynamomètre manuel et des membres inférieurs, en plus de tests de capacité fonctionnelle de monter les escaliers et d'auto-perception à la performance d'activités de la vie quotidienne (AVQ). L'échantillon a été composé par 30 individus des deux sexes, âgés de 62,5 ans (±2,5), où 14 pratiquaient déjà la modalité (G1) et 16 étaient débutants dans la réalisation de l'entraînement de force (G2). Les résultats se sont présentés avec des différences significatives au moment du pré-test entre les groupes G1 et G2 pour les variables fonctionnelles, lors du test de monter les escaliers et d'auto-perception d'AVQ, pour la force de membre supérieur et pour la variable anthropométrique de pourcentage de graisse. Après 2 semaines, malgré les deux groupes

présentent des résultat positifs advenus de l'entraînement de force, le G1 a porté le G2, puisqu'aucune des variables lors du post-test n'a eu de différence significative entre les groupes. Pour conclure, les personnes âgées tiennent leur capacité d'adaptation et d'entraînabilité, où il faut changer l'entraînement pour continuer à proposer des résultat à long terme.

Mots-clés : Entraînement de force, personnes âgées, autonomie.

INFLUENCIA DEL ENTRENAMIENTO DE FUERZA EN LA AUTONOMÍA DE PERSONAS MAYORES

RESUMEN.

El envejecimiento lleva a diversas alteraciones en el organismo, siendo necesário la búsqueda por maneras de prorrogar los efectos negativos de ese proceso. Para eso, sabiendo que la mejora de la fuerza de los sujetos representa una mayor disponibilidad de estos individuos para las actividades del cotidiano, este estudio buscó verificar en el entrenamiento de fuerza, indicios de mejoras en las variables relacionadas al entrenamiento de fuerza, y comparar la posible mejora en personas mayores principiantes en la modalidad y en mayores ya practicantes. Fueron realizadas entre 12 semanas de entrenamiento de fuerza, una pre y una pos-evaluación, en las cuales fueron mensuradas variables antropométricas como peso, altura, IMC, talle, cadera, RCQ y % de grasa. También fueron realizados testes de fuerza con dinamómetro manual y de miembros inferiores, además de testes de capacidad funcional como subir escaleras y auto-percepción en el desempeño de actividades de la vida diaria (AVD). La muestra fue compuesta por 30 sujetos de ambos géneros, con media de edad de 62,5 años (2,5), siendo que 14 de ellos ya practicaban la modalidad (G1) y 16 eran principiantes en la realización de entrenamiento de fuerza (G2). Los resultados se presentaron con diferencias significativas en el pre-teste entre los grupos G1 y G2 para las variables funcionales, en el teste de subir escaleras y de auto-percepción de AVD, para fuerza de miembro superior y para la variable antropométrica % de grasa. Después de 12 semanas, mismo los dos grupo presentando resultados positivos advenidos del entrenamiento de fuerza, el G1 alcanzó el G2, ya que ninguna de las variables en el pos-teste tuvo diferencia significativa entre los grupos. Se concluye entonces que los mayores mantienen su capacidad de adaptación y entrenabilidad

PALABRAS-LLAVE: Entrenamiento de fuerza, mayores, autonomía.

INFLUÊNCIA DO TREINAMENTO DE FORÇA NA AUTONOMIA DE IDOSOS

RESUMO. O envelhecimento leva à diversas alterações no organismo. Dessa forma se faz necessária a busca por maneiras de protelar os efeitos negativos desse processo. Para tanto, sabendo-se que a melhora da força dos sujeitos representa uma maior disponibilidade destes para as atividades do cotidiano, este estudo buscou verificar no treinamento de força, indícios de melhoras nas variáveis ligadas ao treinamento de força, e comparar a possível melhora em idosos iniciantes na modalidade e em idosos já praticantes. Foram realizadas entre 12 semanas de treino, uma pré e uma pós-avaliação, nas quais foram mensuradas variáveis antropométricas como peso, altura, IMC, cintura, quadril, RCQ e % de gordura. Também foram realizados testes de força com dinamômetro manual e de membros inferiores, além de testes de capacidade funcional como subir escadas e auto-percepção no desempenho de atividades da vida diária (AVD). A amostra foi composta por 30 sujeitos de ambos os gêneros, com idade média de 62,5 anos (±2,5), sendo que 14 deles já praticavam a modalidade (G1) e 16 eram iniciantes na realização de treinamento de força (G2). Os resultados apresentaram-se com diferenças significantes no pré-teste entre G1 e G2 para as variáveis funcionais, no teste de subir escadas e de auto-percepção de AVD, para força de membro superior e para a variável antropométrica % de gordura. Após as 12 semanas, mesmo os dois grupos apresentando resultados positivos advindos do treinamento de força, o G1 alcançou o G2, já que nenhuma das variáveis no pós-teste teve diferença significativa entre os grupos. Conclui-se então que os idosos mantêm sua capacidade de adaptação e treinabilidade, além de que o treinamento deve sofrer modificações para continuar propiciando resultados em longo prazo.

PALAVRAS-CHAVE: Treinamento de força, idosos, autonomia.

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