18 - CORRELATION OF MUSCLE STRENGTH AND FUNCTIONAL CAPACITY IN ELDERLY AND PRACTITIONERS OF GYM LOCATED INSTITUTIONALIZED

[13] DILMAR PINTO GUEDES JÚNIOR
[2] BEATRIZ LOPES DE ALMEIDA
MARCELO C. FERNANDEZ
JOÃO PAULO DUBAS
[123]ALEXANDRE C. ROCHA
[1] CEFE/SP; [2] LAMORF; [3] FEFIS - Santos/SP, Brasil
biacalopes@hotmail.com

INTRODUCTION:

According to Douglas et al. (2006), the number of elderly is increasing in almost all countries, specifically Japan, United States, Switzerland and England, where 15% of the population are over 65 years. We estimate that in 2025 Brazil will be the sixth elderly population, reaching 32 million people (IBGE, 2009). According SHEPHARD (2003), several hypotheses have been raised in an attempt to explain aging. This condition is marked by a reduction in strength, muscle mass, bone mineral density and activities of daily living (ADL), in contrast to a perceived increase in the percentage of fat, in addition, the accumulation of disease, as well as the use of drugs produce side effects that impair the functional capacity of the elderly (and CORTES SILVA, 2005), so it is essential to health, functional capacity and independence, maintain physical fitness as we get older (PAULA, VALE and Dantas, 2006).

The National Center for Health Statistics shows that 84% of older people are dependent to perform ADLs, and those conditions may generate in 2020, an increase of 84% to 167% in the number of elderly patients with moderate or severe levels of disability (SBME and SBGG, 1999).

The practice of regular physical activity seems to promote a delay in the adverse effects of aging, associated with physical inactivity in relation to functional capacity and fragility (ROLIM et al. 2006; ARAGON, and Dantas Dantas, 2002). According MAZZEO and TANAKA (2001), strength training can help offset the loss of strength associated with aging, thereby improving their functional capacity. According to Mazza and TANAKA (2001) and SEGUIN and NELSON (2003), the adjustments caused by strength training contribute significantly to increased muscle mass and the observed improvements in functional capacity.

Because of these evidences, the elderly is increasingly looking at an alaternative physical activity to improve their functional capacity and thereby maintain good quality of life and health (MOREY et al, 2003). The walking programs, flexibility and strength are adequate to prevent muscle weakness (Dantas et al, 2002). Strength training can result in gains of 25 to 100% or more of muscular strength in elderly (NIED and Franklin, 2002). According to Hunter et al. (2004), the primary focus of the prescription of strength training for the elderly is to increase in muscle mass in an effort to sarcopenia contrary, given the fact that directly with the loss of muscle mass also have reduced strength.

The muscle atrophy can be explained by disuse and by the gradual loss of muscle fibers, mainly type II fibers (fast fibers, glycolytic), so the elder loses its potency, thus undermining the ADLs, such as climbing strairs and lift chair. (SIMON, 2008) Sarcopenia brings other problems such as increasing the risk of falls and / or using crutches or walkers (MAZZEO and TANAKA, 2001; BAUMGARTEN et al. 1998). In addition, several studies show that physical activity, if well targeted, promotes health benefits. Prefectures in various cities are offering exercise programs non profit for this population. Among the activities we can highlight the practiced gymnastics classes located, stretching and weight training. The aim of this study is: a) compare the levels of muscular strength in elderly women engaged in community programs for institutionalized elderly women with localized exercise, b) assess the correlation between muscle strength with performance on selected tests of ADL.

METHODS:

Study participants aged 19 who were divided in two groups: group 1 (GL), composed of 13 elderly participants in the program regularly localized exercise developed by the Centro de Convivência (CECON) of São Vicente, for at least six months. The program was performed 3 times weekly, lasting an average of 45 minutes. The training sessions consisted of warm-up (calisthenics), main part (gym located) and the cool down (stretching). Group 2 (CG), control group, consisting of 6 elderly residents Asilo São Vicente de Paulo, sedentary for at least 10 years. The sample profile is shown in table 1. Before starting the study all responded to the PAR-Q questionnaire and underwent a medical evaluation, then the volunteers signed an informed consent form.

MATERIALS AND METHODS:

Anthropometric Assessment

Body Mass: The evaluated were positioned in the center of the scale, using as little clothing as possible, with feet apart laterally, leaving the platform between them. Then took the stance and look at a fixed point in front (FERNANDES FILHO, 2003). For this evaluation we use a digital scale(Sanny).

Height: The subject was instructed to assume a standing position: standing upright, arms extended along the sides, feet together. The posterior surface of the heel, pelvis, shoulder girdle and occipital region should contact the measuring instrument. The subject was instructed to position the head in the plan Frankfourt and measurements were made on the individual in inspiratory apnea (FERNANDES FILHO, 2003).

For muscle strength was evaluated by testing handgrip dynamometer and it adjusted for each evaluated. All subjects were instructed to leave the arm extended along the body and make the maximum grip possible, with the dominant hand. It was rated the best result of attempts made. (Johnson and Nelson, 1979 cited by MARINS and Giannichi, 2003). Dynamometer was used to grip the mark JAMA, USA expressing your result in pounds.

Tests selected DLA

Chair Lift Speed (CLS): The individual is instructed to sit in the chair with hands on hips, looking ahead, feet together, flat on the floor, not caring that you can not completely pull into the chair.

At a signal from the evaluator assessed rises from his chair, hands on hips adopting the standing position. Are performed three trials and calculated the mean of three as the final value in seconds and hundredths of seconds (and ANDREOTTI OKUMA, 1999).

Raise the Floor (RF): Position the mat on the floor and 40 cm in front of you, mark a line 60 cm in length. Being on the mat in the supine position with arms at your sides and legs extended, the individual must in the shortest possible time, to rise in order to assume a standing position, with legs together and arms extended over and body position on the demarcation line. Must be made two attempts at an interval of 60 seconds or more between each one. Will be computed as little time (ANDREOTTI OKUMA, 1999).

Put on socks (PS): Sitting in a chair, the individual must wear the shortest time possible half. With knees bent feet on floor, arms along the body and placed over a half of the thighs, the signal, the individual should put half as fast as possible, preferably on foot. Must be made two attempts at an interval of 60 seconds or more between each one. Will be computed as little time (and ANDREOTTI OKUMA, 1999).

Normal Walking Speed (NWS): It is marked on the ground with a track width of 33,3 cm and a length of 33,3 m with a tape. The individual is instructed to walk the path marked out, moving at the speed that usually goes on day after day, without running and without leaving the path. Are performed three trials and calculated the mean of three as the final value in seconds and hundredths of seconds (MATSUDO, 2005).

Maximum Walking Speed (MWS) is demarcated on the ground with a track width of 33.3 cm and a length of 3.33 m with a tape. The individual is instructed to walk the path marked out, to the maximum speed that can walk but not run. Are performed three trials and calculated the mean of three as the final value in seconds and hundredths of seconds (MATSUDO, 2005).

STATISTICAL ANALYSIS;

The characteristics of the subjects (age, body mass, height and BMI) and the tests of handgrip strength (HS), CLS, RF, PS and NWS and MWS were compared between groups using t-student test for independent samples. Any level of significance was set at $p \leq 0.005$. To analyze the correlation between muscle strength and selected tests of ADL, we used the Pearson correlation coefficient.

RESULTS:

Table 1. Profile of groups.

	N	Age	Body Mass (Kg)	Stature (m)	BMI
Control Group	6	75 ± 13,44	59,38 ± 15,86	1,52 ± 0,10	25,76 ± 8,63
Gym Localed	13	68 ± 4,51	68, 33 ± 7,53	1,56 ± 0,04	28,10 ± 3,43

Data are presented as mean and standard deviation

Table 2. Comparative analysis of muscular strength (MS) and performance in ADL among the elderly women located (GL) and institutionalized (GC).

	HS (kg)	CLS (seg)	RF (seg)	PS (seg)	NWS(seg)	MWS(seg)
GC	*18,83±3,97	*1,78±0,68	*13,97±4,54	*13,41±9,35	*4,83±1,38	*3,28±0,80
GL	26,75±4,71	0,74±0,33	4,96±3,07	4,89±1,73	3,06±0,97	2,25±0,64

Data are presented as mean and standar deviation, the symbol * represents significant difference between the CG group and GL for tests of HS (p=0,002), CLS (p=0,000), RF (p=0,000), PS (p=0,000), VAN (p=0,004), VAM (p=0,006)

The elderly of the GL obtained better results for muscle strength when compared to GC, corroborating other studies. Matsudo et al (2005) evaluated muscle strength by handgrip test in physically active elderly aged 60-69 years, and the results (26.8 kg) were similar to those found in this study. Note that the grip strength is related to the annual rate of falls. Rebellato et al (2006) evaluated the grip strength of 61 sedentary elderly institutionalized and correlated with the number of falls. According to the results the weaker elderly had a higher incidence of falls. Matsudo et al (2005) conducted the test VAM and VAN in physically active elderly aged 60-69 years and the results were also similar to the current study, 3 (0.4) seconds, and 2.49 (0, 4) seconds, respectively. In a study by Guimaraes et al (2004), we performed the test Time Up & Go (the elderly must rise from a chair, walk 3 meters and return to the chair, this test is strongly associated with balance, walking speed and capacity functional), the sample was divided in two groups, the group engaged in physical activity (GPA) and sedentary (GS), aged between 65 and 75 years. According to the results of performance test (7,75 seconds for GPA and 13,56 seconds to GS), one can notice that the active group showed better performance, confirming the results of this study, where the GL showed better the GC performance in tests of VAN and VAM. It is noteworthy, the study by Sayer (2006), where we evaluated the handgrip of 2.987 elderly people aged 59 to 73 years and the results showed that low muscle strength is related to low quality of life. Geraldes et al (2008) found a positive correlation between test and handgrip tests of ADL in the elderly.

Table 3. Correlation between muscular strength (MS) and selected tests of the ADL in the control group and gym located

	CLS	RF	PS	NWS	MWS
MSGC	0,83	0,47	0,63	0,09	0,36
MSGL	-0,41	-0,41	-0,32	-0,47	-0,37

MSGC: muscular strength for the control group; MSGL: muscular strength exercise for the group gym located

According to table 3 the GL were weak correlations between muscle strength and performance tests selected for the ADL. However, there is a moderate correlation to the GC and CM VLC in testing which belies most results in the literature. This may be related to other individual characteristics of the samples of volunteers.

CONCLUSION:

The results show that the active seniors have better levels of performance and muscle strength test for selected ADL. However, this study found no correlation between grip strength and ADL tests performed. The study also justifies the inclusion of exercise programs in the institutions responsible for caring for the elderly, with the aim of providing better quality of life and functional autonomy.

REFERENCES:

ANDREOTTI, R.A.; OKUMA,S.S. Validação de uma bateria de testes de atividades da vida diária para idosos fisicamente independentes. **Rev. Paul. Educ. Fís**. 13(1): 46-66, 1999.

BARBOSA, A. R.; SOUZA, J. M. P.; LEBRÃO, M. L. & MARUCCI, M. F. N. Relação entre estado nutricional e força de preensão manual em idosos do município de São Paulo, Brasil dados da pesquisa sabe. **Revista Brasileira Cineantropometria e Desempenho Humano**; 8(1):37-44, 2006.

BASSEY, E. J. Measurement of muscle strenght and power. **Muscle Nerve**, n. 5, p. S44-S46, 1997.

BAUMGARTNER, R. N.; KOEHLER, K. M.; GALLAGHER, D.; ROMERO, L.; HEYMSFIELD, S. B.; ROSS, R. R.; GARRY, P. J.; LINDEMAN, R. D. Epidemiology of sarcopenia among the elderly in New Mexico. Am. J. Epidemiol., n. 147, p. 755-763, 1998.

EVANS, W. Exercise training guidelins for the elderly. Medicine and Science in Sports and Exercise, 31(1):12 – 17, 1999.

FERNADES FILHO, J. **A prática da avaliação física**. 2ªed. Rio de Janeiro:Shape, 2003.

HUNTER, G.R.; McCARTHY,J.P.; BAMMAN,M.M. Effects of resitance training on older adults. **Sports Med.** 34(5):329 – 348, 2004.

MARINS, J.C.B.; GIANNICHI, R.S. Avaliação e prescrição de atividade física: **Guia prático.3ªed**. Rio de Janeiro:Shape, 2003.

MATSUDO, S.M.M. Avaliação do idoso: Física e Funcional. 2ªed. Londrida:Midiograf, 2005.

MAZZEO, R.S.; TANAKA, H. Exercise prescripition for the elderly. **Sports Med.,** 31(11):809 – 818, 2001.

MCCOMAS, A. J. Skeletal muscle: form and function. New York: Human Kinetics, 1996.

MONTEIRO, N.; SILVA, D.M.; PEREIRA, F.F.; OLIVEIRA, L.S.; ABREU, F.M. DANTAS, E.H.M. IGF-1 em idosas: Efeitos de um programa de atividade física regular sobre os núiveis séricos basais de IGF – 1 em idosas. **Fitness & Performance Journal**, 3(3): 130 – 135, 2004.

NIED, R.J. FRANKLIN, B. Promoting and prescribing exercise for elderly. **American Family Physician,** 65(3):419 – 426, 2002. ROSENBERG, I. H**. Summary comments.** Am. J. Clin. Nutr., n. 50 (Suppl.), p. 1231-1233, 2002.

ROLIM, A. L. S., ROCHA, A. C., DUBAS, J. P., DA SILVA, A. C S. & GUEDES JR., D. P. Análise comparativa das AVDs de mulheres de diferentes faixas etárias participantes do programa de atividade física comunitário. XXIX Simpósio Internacional de Ciências do Esporte, p.98-98, 2006.

SEGUIN,R.B.S.;NELSON, M.E. The benefits of strenght training for older adults. **Am J Prev Med**. 25(3Sii:141-149), 2003.

SHEPHARD, R.J. Envelhecimento, atividade física e saúde. São Paulo: Phorte, 2003.

SULLIVAN, D.H.; ROBERSON, P.K.; JOHNSON, L.E.;BISHARA, O.; EVANS W.J.; SMITH, E.S.; PRINCE, J.A. Effects of muscle strenght training and testosterone in frail elderly males. **Med Sci. Sports. Exerc**. 37(10):1664 – 1672, 2005.

TRANCOSO, E.S.F.; FARINATTI, P.T.V. Efeitos de 12 semanas de treinamento com pesos sobre a força muscular de mulheres com mais de 60 anos. **Rev. Paul. Educ. Fís**.16(2):220 – 29, 2002.

TRAPPE, S. ; WILLIAMSON, D.; GODARD, M.; PORTER, D.; ROWDEN, D.;COSTILL,D. Effects, resistance training on single muscle fiber contractile function in older men. J. **AplIl. Physiol**, 89:143 – 152, 2000.

VANDERVOORT, A. A.; MCCOMAS, A. J. Contractile changes in opposing muscles of the human ankle joint with aging. J. **Appl. Physiol**. n. 61, p. 361-367, 1986.

RENATA MARTINS PIMENTEL; MARCOS EDUARDO SCHEICHER. Comparação do risco de quedas em idosos sedentários e ativos por meio da escala de equilíbrio de Berg. **Fisioterapia e Pesquisa**, São Paulo, v. 16, n.1, p6-10, jan/mar.2009.

GUIMARÃES, L.H.C.T.; GALDINO D.C.A.; MARTINS F.L.M.; VITORINO, D.F.M.; PEREIRA K.L.; CARVALHO, E.M. Comparação da propensão de quedas entre idosos que praticam atividade física e idosos sedentários. **Revista Neurociências** V12 N2 – Abr/Jun 2004

SIMÃO, ROBERTO. Fisiologia e Prescrição de Exercícios para Grupos Especiais. 3ªed. Phorte Editora, 2008

DOUGLAS E. CREWS e SUSAN ZAVOTKA. Aging, disability and frailty: implications for Universal Design. Journal Physiol Anthropol, 25: 113-118, 2006

FABER Mj, BOSSCHER RJ, CHIN AP, VAN WIERINGEN PC.Effects of exercise programs on falls and mobility in frail and pefrail older adults: a multicenter randomized controlled. **Trial. Arch. Phys Med. Rehabil**. 2006; 87: 885-96.

NAOTO TAGUCHI, YASUKI HIGAKI, SHINICHI INOUE, HIROMI KIMURA, e KEITARO TANAKA. Effects of a 12-month multicomponent exercise program on physical performance, daily physical activity, and quality of life in very eldery people minor disabilities: an intervention study. **J. Epidemio**l 2010; 20(1): 21-29.

AVAN AIHIE SAYER, HOLLY E. SYDDALL, HELEN J. MARTIN, ELAINE M. DENNISON. Is grip strength associated with health-related quality of life? Findings from the Hertfordshire Cohort Study. **Age and Ageing** 2006; 35: 409-415.

MAIOR, ALEX SOUTO. Fisiologia dos Exercícios Resistidos. Phorte Editora, 2008.

R: NAPOLEÃO LAUREANO, 17 APT 34
MARAPÉ – SANTOS/SP - CEP 11070-140
BIACALOPES@HOTMAIL.COM

CORRELATION OF MUSCLE STRENGTH AND FUNCTIONAL CAPACITY IN ELDERLY AND PRACTITIONERS OF GYM LOCATED INSTITUTIONALIZED

ABSTRACT:

The elderly population is growing all over the world and many of these elderlys have no dependence in activities of daily living (ADLs). Therefore, the objective of this study was to compare the levels of muscular strength in active elderly and institutionalized elderly with muscle strength correlate with performance on selected tests of ADL. The sample was aged 19, 6 in the control group (CG) with a mean age of 75 and 13 elderly active (EA) with a mean age of 68 years and muscular strength were assessed by testing handgrip, speed chair lift (SCL), raising the floor (RF), put on socks (PS), normal walking speed (NWS) and maximum walking speed (MWS). The results show that active elderly have better performance in ADL compared with sedentary women. However, we found no correlation with muscle strength performance in selected tests of ADL. The possible reason for this outcome may not be the specificity of the handgrip with the selected tests, which uses the strength and muscle power in lower limbs.

KEY WORDS: elderly, ADL, handgrip

CORRESPONDANCE DE LA FORCE MUSCULAIRE ET LA CAPACITE FONCTIONNELLE POUR PERSONNES ÂGÉES ET DES PRATICIENS DE GYM SITUE INSTITUTIONNALISÉE

RÉSUMÉ:

la population âgée est en croissance à travers le monde et bon nombre de ces personnes âgées n'ont pas de dépendance dans les activités de la vie quotidienne (AVQ). Par conséquent, l'objectif de cette étude était de comparer les niveaux de la force musculaire en activité des personnes âgées et des personnes âgées institutionnalisées avec la force musculaire en corrélation avec la performance aux tests sélectionnés de l'ADL. L'échantillon a été de 19, six dans le groupe contrôle (GC) avec un âge moyen de 75 et 13 situés les femmes âgées (GL) avec un âge moyen de 68 ans, et la force musculaire a été évaluée par des essais de préhension, télésiège de vitesse (VLC), ce qui soulève le sol (LS), mettre des chaussettes (CM), la vitesse de marche normale (VAN) et la vitesse de marche maximale (VAM). Les résultats montrent que les personnes âgées actives performances ont mieux ADL par rapport aux femmes sédentaires. Cependant, nous n'avons trouvé aucune corrélation avec le rendement de la force musculaire dans les essais sélectionnés de l'ADL. La raison possible de ce résultat ne peut être la spécificité de la poignée avec les tests de sélection, qui utilise la force et la puissance musculaire des membres inférieurs.

MOTS CLÉS: personnes âgées, les activités quotidiennes, l'adhérence

CORRELACIÓN DE LA FUERZA MUSCULAR Y LA CAPACIDAD FUNCIONAL EN LOS ANCIANOS Y LOS PRACTICANTES DE GIMNASIO SITUADO INTERNADO

RESUMEN:

La población de ancianos está creciendo en todo el mundo y muchas de estas personas mayores no tienen la dependencia en las actividades de la vida diaria (AVD). Por lo tanto, el objetivo de este estudio fue comparar los niveles de fuerza muscular en ancianos activos y de los ancianos institucionalizados con la fuerza muscular se correlacionan con el rendimiento en las pruebas seleccionadas de la ADL. La muestra fue de 19 años, seis en el grupo control (GC) con una edad media de 75 y 13 ubicadas las mujeres de edad avanzada (GL) con una edad media de 68 años, y la fuerza muscular fueron evaluados mediante pruebas de empuñadura, velocidad de elevación del sillón (VLC), elevando el suelo (LS), se puso los calcetines (CM), la velocidad de marcha normal (VAN) y una velocidad de recorrido máxima (VAM). Los resultados muestran que los ancianos activos tienen mejor rendimiento en las AVD en comparación con las mujeres sedentarias. Sin embargo, no encontramos correlación con el rendimiento de la fuerza muscular en las pruebas de selección de ADL. La posible razón para este resultado no puede ser la especificidad de la empuñadura con las pruebas seleccionadas, que utiliza la fuerza y la potencia muscular en las extremidades inferiores.

PALABRAS CLAVES: ancianos, las AVD, la adherencia

CORRELAÇÃO DA FORÇA MUSCULAR E CAPACIDADE FUNCIONAL DE IDOSOS PRATICANTES DE GINÁSTICA LOCALIZADA E INSTITUCIONALIZADOS

RESUMO:

A população idosa está crescendo mundialmente e muitos desses idosos não têm dependência nas suas atividades da vida diária (AVD). Por isso, o objetivo desse estudo foi comparar os níveis de força muscular em idosas ativas com idosas institucionalizadas e correlacionar à força muscular com o desempenho em testes selecionados de AVDs. A amostra estudada foi de 19 idosas, 6 no grupo controle (CG) com idade média de 75 anos e 13 idosas praticantes de ginástica localizada (GL) com idade média de 68 anos, e foram avaliados força muscular através do teste de preensão manual, velocidade de levantar da cadeira (VLC), levantar do solo (LS), calçar meias (CM), velocidade normal de andar (VAN) e velocidade de andar máxima (VAM). Os resultados obtidos comprovam que idosas ativas têm melhor desempenho nas AVDs em comparação a idosas sedentárias. No entanto, não encontramos correlação da força muscular com desempenho nos testes selecionados de AVDs. O possível motivo desse resultado pode ser a não especificidade do teste de preensão manual com os testes selecionados, onde se utiliza a força e potência muscular de membros inferiores.

PALAVRAS CHAVES: idosas, AVD, preensão manual