

MUSCLE STRENGTH IN OLDER PEOPLE WITH AND WITHOUT DEPRESSION PARTICIPATING IN A GYM PROGRAM

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ABSTRACT

Objective: To assess the effect of an activity program on the hand grip strength of depressed and non-depressed elderly people. **Methods:** We evaluated 85 older people (30 depressed women and 39 non-depressed women, and four depressed men and 12 non-depressed men) with a mean age of 65.59 (± 8.26) years, who participated in an activity program developed for older people and lasting one year. In this period, four hand grip strength assessments were held: one at the beginning of the program, two during the program and one at the end. Data analysis was performed using Analysis of Variances, Tukey's test and t test. **Results:** We did not find any significant

differences among the four evaluations in terms of strength in the total group and in the subgroups. Moreover, there were no significant differences between the depressed women and the non-depressed women, or between the depressed men and the non-depressed men, in any one of the four evaluations. **Conclusions:** The activity program evaluated was incapable of increasing the hand grip strength of the depressed and non-depressed older people and it appears there is no association between such condition and strength.

Keywords: Aging. Hand strength. Aged. Depression. Motor activity.

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INTRODUCTION

Aging produces a decline in physical conditions and capacities, including muscle strength.¹

Muscle weakening is directly related with impairments in muscle flexibility, in balance, and particularly in speed,² and is responsible for frequent falls, a fact that is considered one of the main causes of morbidity and mortality in this population.³

People with little strength in their hands generally also present weakness in the other muscle groups.⁴ Thus hand grip evaluation is considered a predictor of body strength. Longitudinal data of Kallman et al.⁵ demonstrated that the loss of hand grip strength is related to aging, and Fleck and Kraemer⁶ reported an annual regression of hand grip strength of 3% in men and 5% in women.

Aging also contributes toward the emergence of depression as a consequence of physical illnesses and disabilities, or due to changes in cerebral circulation, the so-called late-onset Vascular Depression. Moreover, the breaking of social ties, loss of occupational space, decrease of economic out-

put and isolation are elements of social support that favor depression. It is estimated that the prevalence of depressive disorders in the elderly is from 23 to 40%⁷ and in elderly people with a low purchasing power, 35%.⁸

The regular practice of physical exercise has been widely discussed in literature. This practice is a primary, preventive, attractive and effective strategy to maintain and improve the physical and mental state of health at any age, having direct and indirect beneficial effects to prevent and delay the functional losses of aging. Lexell et al.⁹ report that strength training reduces muscular atrophy in older individuals and can actually cause them to increase the transverse muscle area. Many studies have analyzed the influence of physical activity on depression in the elderly as well. Such studies present physical activity as a means of prevention and minimization of depressive symptoms and as an aid in the treatment of depressive illness.¹⁰⁻¹¹ Lee and Park.¹² concluded that the association between depressive symptoms and physical disability in the elderly is moderated by physical activity. In the

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elderly people that took part in an activity program lasting for one year, the strength of association between depression and disability was reduced.

Considering the relationship existing between depression and the practice of physical activity, it is possible to assume that there is also a relationship between depressive symptoms and some of the physical abilities evaluated separately, like muscle strength. In fact, Park and Park¹³ verified that depression has a mediating effect between the frailty of the lower limbs and falls in elderly people, whereas frailty increases depression and depression increases the frequency of falls. Rantanen et al.¹⁴ monitoring 2,275 elderly men over a period of three years, also concluded that the depressive state is associated with a greater risk of sudden loss of hand grip strength.

Based on the theory that the muscle strength of elderly individuals responds differently to an activity program, according to the presence or absence of a medical diagnosis of depression, this study was aimed at verifying the effects of an activity program lasting for one year on the hand grip strength of depressed and non-depressed older people.

MATERIAL AND METHOD

A quantitative longitudinal study was conducted.

Subjects

the subjects of this study were the elderly participants of the Adult Revitalization Program, which is a physical activity program created and maintained by Universidade Federal de São Carlos (UFSCar) and by the City Council of São Carlos. The inclusion criteria were: recent medical certificate, non-existence of musculoskeletal or organic diseases that would prevent the performance of physical activities and personal availability. The individuals with contraindication, excluded due to lack of satisfactory physical conditions for participation in the activity program, were referred for treatment with physiotherapists from Unidade de Saúde Escola of UFSCar. All the participants signed an Informed Consent Term, and the study was approved by the Ethics Committee of UFSCar, under opinion n^o. 190/2006. The survey was conducted according to the 1995 Declaration of Helsinki.

Of the 230 individuals entered in the Revitalization Program for the elderly in the municipality of São Carlos, 52 people were excluded from the study group as they were considered incapable of practicing safe physical activity. Another 51 people were excluded as they were not in the age bracket considered elderly in accordance with the World Health Organization,¹⁵ in other words, aged 60 years or over. And, finally, 55 people were excluded for having missed one or more assessments. Accordingly, 85 individuals took part in the study, aged between 60 and 88 years (mean age 65.59 ± 8.26), with 69 women and 16 men.

The individuals were distributed in two groups: Non-Depressed and Depressed. This distribution was performed

through application of the Geriatric Depression Scale¹⁶ and the existence of medical diagnosis was considered as well. The group with depressive characteristics and with depression diagnosis was formed by 34 individuals, with 30 women and four men. The Non-Depressed group was composed of 51 individuals, with 39 women and 12 men.

Measures and Procedures

The assessments were carried out at four different times over a year, with the first held prior to the start of the activity program, the second after 10 weeks of activity, the third after 21 weeks of physical activity and the last a year after the start of the program.

The muscular strength conditions of the muscles responsible for the hand grip movement were measured by means of the manual dynamometer of the North Coast (NC70142) brand, hydraulic and analogical, with a scale from 0 to 90 kgf and with a static indicator to facilitate reading. At the time of the test, the individuals were positioned seated in a chair, with the dominant arm resting on a table (Figure 1). The study subject was instructed to breathe in, and on breathing out to squeeze the device as hard as possible for three seconds. The test was repeated three times and only the highest value was considered.¹⁷



Figure 1: Measurement of hand grip strength.

Physical Activity Program

The physical activity program was designed to enhance flexibility, muscle strength, cardiorespiratory resistance, motor coordination and balance. Each session consisted of eight to 10 minutes of stretching exercises involving the main groups of muscles (posterior leg and thigh, anterior thigh and pelvis, vertebral, pectoral and others), nine minutes of aerobic resistance exercises, seven to 10 minutes of adapted strength, power and resistance exercises; 14 to 16 minutes

of coordination, agility and flexibility activities; and five to seven minutes of respiratory and relaxation exercises. The activity program started in April 2005 and consisted of 10 weeks of physical activities, followed by three weeks of rest that coincided with the holidays of July 2005. Afterwards another 21 weeks of activity, four weeks of rest and finally, 11 weeks of activity. In this period there were 123 sessions of physical activity, which were held three times a week, with at least one day of interval between them. The sessions were given by previously trained physical training instructors with assistants. For the exercises they used 1 kg dumbbells, a 1 kg ankle weight, mattresses, chairs and unweighted batons.

Data analysis

The data analysis was conducted by means of the Variance Analysis (ANOVA) with repeated measures and Tukey's Test as post hoc analysis to ascertain the differences among assessments, and t Test for two samples for the comparison of strength between the groups.¹⁸

RESULTS

Table 1 presents mean value and standard deviation obtained in the physical assessments, and p value of ANOVA in the comparison between assessments, of all 85 elderly people that were not absent at any of these times, considering gender and depressive state.

As we can observe, no significant differences were found in the hand grip strength scores of the total group and of the subgroups. That is, the participation of the elderly person in the long-term activity program regardless of their depressive state or gender did not produce a significant increase of scores, but neither did it allow natural decline with aging. No significant differences were found between depressed

Table 1: Mean Values, Standard deviations of hand grip strength (kgf) of elderly people and value of p (ANOVA).

	Assessments				Value of p
	1 st	2 nd	3 rd	3 rd	
All	30.83 (±10.29)	33.04 (±9.23)	32.27 (±9.52)	32.44 (±9.83)	0.501
Female/ Depressed Group	27.77 (±6.65)	29.70 (±6.41)	29.77 (±5.93)	29.47 (±6.14)	0.566
Male/Depressed Group	44.50 (±12.66)	49.00 (±11.58)	46.75 (±15.13)	48.00 (±13.37)	0.966
Female/Non- Depressed Group	27.20 (±6.44)	30.17 (±5.12)	28.87 (±5.97)	28.84 (±5.89)	0.175
Male/Non- Depressed Group	45.75 (±11.08)	45.42 (±9.84)	44.75 (±10.47)	46.42 (±9.92)	0.983

and non-depressed women, or between depressed and non-depressed men, in terms of hand grip strength, in any of the four assessments. (Table 2)

Table 2: t test for two samples applied in the comparison between the Female/Depressed and Female/Non-Depressed groups and between the Male/Depressed and Male/Non-Depressed groups.

Value of p (t test) in the comparisons between Depressed and Non-Depressed		
Assessments	Female Group	Female Group
1 ^a	0.664	0.996
2 ^a	0.867	0.680
3 ^a	0.479	0.804
4 ^a	0.712	0.753

DISCUSSION

The data obtained indicate that the muscle strength of older people, both depressed and non-depressed, was stabilized with participation in the proposed activity program over a period of one year. A study evaluated the effect of a similar group activity program for older women on hand grip strength and also verified that this did not undergo significant changes after 58 weeks of intervention.¹⁹ On the other hand, Gillett²⁰ and Brown and Holloszy²¹ demonstrated that for very elderly people that cannot take part in a strength and high resistance program, substantial strength gains can still be achieved with light exercise or very low impact programs. Fiatarone et al.²² and Charette et al.²³ also concluded that the muscle strength of older women can be increased by means of programs of high or low intensity.

The factor that influences strength gain after physical activity programs for the elderly is perhaps the prioritization of exercises against resistance, which were not the main focal point of the program evaluated in this study (about only 21 to 30 minutes per week were dedicated to specific strength training). In fact, a specific resistance training program showed an increase in hand grip strength of older women in a shorter period, of 10 weeks.²⁴ The flexor digitorum are put to use in many of the upper limb exercises in progressive strength training, which can explain a much faster gain of strength in this case, evaluated by manual dynamometry.

No significant differences were found between depressed and non-depressed elderly people in terms of hand grip strength, at any time in the program. Yanagita et al.²⁵ investigated the association between depression and some physical performance measures in a group of 2,856 elderly men and concluded that hand grip strength was significantly lower in the depressed individuals. We can assume that the mediating factor between this relationship is the quantity of physical activity performed, since this directly influences

muscle strength and is associated with depression.^{10,11} In fact, Bassey²⁶ found a significant association between loss of grip strength in old age and the increase of depressive symptoms, which he considered suggestive of causal relation, suggesting that physical activity and depression control should be encouraged for strength maintenance in old age. However, in this study it was not possible to identify this mediating factor as the results did not show changes in the variable studied. Going by the results obtained, it is possible to conclude that the activity program evaluated

was not capable of increasing the hand grip strength of the depressed or non-depressed elderly people. As the decline of muscle strength expected with aging was not observed, the program had a positive influence, regardless of gender or of depressive state.

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