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Association between training time, body composition and gender with physical performance of elderly strength training practices

Abstract

Introduction: It is estimated that in 2050 the world population over 60 years old will reach the number of 2 billion individuals, of which about 434 million will be over 80 years old.

Objective: To verify the association between training time, body composition and gender with physical performance of elderly strength training practitioners.

Methods: This was a descriptive, cross-sectional study conducted in an activity center in the city of Fortaleza, CE, from June to September 2019. A sociodemographic questionnaire, body assessment by bioimpedance, blood pressure measurement were performed. Systolic and diastolic blood pressure, heart rate, waist-hip circumference and lastly two tests to assess lower limb strength and agility.

Results: The volunteers had average age and BMI (68.18+4.92 years and 26.92+3.34 kg / m2), respectively. In the total sample, 62.5% were female (n=25). A statistically positive and significant correlation was found between the TUG test and BMI (p=0.044). In the association test there was no statistical difference in the TUG and Lift tests and in the training time, BMI and gender (p> 0.05). In all possible alterations of present subgroups or TUG test result was considered excellent.

Conclusion: Resistance training practitioners resisted a good result for strength and endurance, regardless of gender, body mass index or training time, as well as the higher the body mass index of lower performing elderly. the same about these parameters.

Keywords: aging, functional physical performance, resistance training

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Introduction

It is estimated that in 2050 the world population over 60 years old will reach the number of 2 billion individuals, of which about 434 million will be over 80 years old, and still a good part of these individuals will be in low and low countries. middle income.[1]

Considered as a multifactorial, inevitable and extremely complex process, aging is characterized by the gradual damage of organic systems and tissues. It is largely defined by genetics and motivated by a series of environmental factors, such as diet, physical activity, exposure to microorganisms, pollutants and ionizing radiation. Thus, the reason why two individuals of the same age can differ strongly in terms of physical appearance and physiological status is justified.[2]

As we age, other systems do not work properly before those previously compromised can recover. Cumulative and gradual degradation leads to fragility. Frailty, commonly associated with aging, includes several characteristics, including: low physical activity, muscle weakness, slow performance, fatigue or low resistance and unintentional weight loss. Elderly people who have these characteristics are usually exposed to greater health problems, less independent living capacity, impaired cognitive skills and constantly need help with daily activities (dressing, eating, using the bathroom, mobility).[3,4]

Regular physical activity helps to improve physical and mental functions, as well as being able to reverse some effects of chronic diseases, keeping the elderly mobile and independent. Adherence to physical activity contributes to a better perception of quality of life, functional capacity, reducing the occurrence of falls among the elderly in general and the elderly with morbidities in particular.[5,6]

The benefits of regular physical exercise in the elderly are numerous, however, there is a scarcity of studies that correlate some variables related to strength training with physical performance. Therefore, this study aims to verify the relationship between training time, body composition and gender with the physical performance of elderly people who practice strength training.

Materials and methods

Study design: This is an observational, cross-sectional, descriptive study with a quantitative approach, of the relationships between training time, body composition and gender with the physical performance of elderly people who do strength training.

Study location and period

The study was carried out from June to September 2019, in a strength training center located in the city of Fortaleza, Ceará.

Population and sample

Convenience sampling was performed. Elderly people aged≥60 years, of both sexes, who were regular strength training practitioners for at least three months, were invited to participate in the study. On average, 120 elderly people are regularly enrolled in the training center, according to the inclusion and exclusion criteria, the sample was composed of 40 individuals.

Inclusion and Exclusion Criteria

Elderly regularly enrolled in the training center who met the following inclusion criteria were invited to participate in the study:≥60 years old, who practiced strength training for a period of at least three months, with a frequency of two or three times a week and who signed the free and informed consent form (TCLE).

Elderly people who had some type of motor impairment that made it impossible to carry out the evaluations, who did not present to the researchers a medical certificate of release for physical activity and those who did not complete the sociodemographic questionnaire were excluded.

Research protocol

Initially, the Term of Consent was presented to the owners / guardians of the academy for research authorization. Then, the volunteers who met the inclusion and exclusion criteria and agreed to participate in the research, were asked to sign the informed consent form, shortly afterwards, they were submitted to individual interviews with the researchers to obtain personal and sociodemographic data. On the same day, they underwent anthropometric assessments and then physical tests.

The research was carried out in the shifts: morning, afternoon and night allowing the homogeneous participation of individuals.

Instruments

Sociodemographic data

The sociodemographic questionnaire was composed of questions related to the characteristics and habits of the study population (age, marital status, training time and number of times per week of training)

Anthropometric assessment

The anthropometric assessment consisted of collecting body weight (kg), from a digital scale (Omron scale HBF-514C), and measuring height (m), with a portable stadiometer (Cescorf stadiometer). To calculate BMI, the equation body mass (kg) over height squared (kg / m2) was used. Values between 18.5 and 24.9 kg / m² were adopted as normal weight, between 25 and 29.9 kg / m², correspond to the classification of overweight; values above or equal to 30kg / m², obesity. (ABESO, 2016). The waist circumference (cm) was checked with the measuring tape (Balmak FM150 tape measure). Body composition was estimated by means of bioimpedance, it was used (bioimpedance by Omron HBF-514C). The volunteers were instructed to follow some previous procedures: not to perform strenuous physical exercises in the 12 hours before the test; do not drink alcohol 48 hours before the test; empty the bladder at least 30 minutes before the evaluation.

Functional physical performance tests

Functional physical performance tests refer to the physiological ability to perform Activities of Daily Living (ADL) safely, independently and without fatigue. For the tests of functional physical performance, the tests were used: Lift and Sit from the chair and Timed Up and Go (TUG).

Test to get up and sit from the chair: The chair lift and sit test is a test to indirectly measure the strength of the lower limbs, providing data related to the functional physical performance in the ADL, such as: climbing stairs, walking, getting up, getting out of the car, among others. It is also related to the risk of falling.[7,8]

In this test, the volunteers were asked to get up and return to sit in a chair, without the help of their arms, the greatest number of times in the space of 30 seconds. To do this, they must adopt a posture with an upright torso, with arms crossed on the chest and feet well supported on the ground. Risk performance was considered, for both male and female, less than 8 repetitions.

Test timed up and go (TUG): Used to verify mobility, agility and dynamic balance, which is important for performing ADLs that require quick maneuvers, such as: getting out of the car, going to the bathroom or answering the phone.

It consisted of measuring the time taken by the volunteers to get up from a chair, walk the distance of 3 meters, go around a cone and return to sit in the starting chair, walking at the highest possible speed, but without running, being considered for risk of falls, for both male and female, longer than 8 seconds.[8]

Ethical aspects

All procedures were carried out in accordance with Resolution No. 466, of December 12, 2012, of the National Health Council. Data collection was initiated only after the signing of the Free and Informed Consent Form (ICF) duly approved by the Committee of Research Ethics (CEP) at the Federal University of Ceará (UFC). The study was approved by the Ethics and Research with Humans Committee of the Federal University of Ceará (N°3.784.629).

Statistical analysis

The data were analyzed using the IBM SPSS 22.0 program. To verify the normality and homogeneity of the data, the Shapiro-Wilk and Levene tests were used. To check the comparison between quantitative variables, the t test for independent samples or Mann Whitney was used to correlate two quantitative variables, the Spearman and Pearson test was used for non-parametric and parametric data, respectively. For all tests, the 95% confidence interval was adopted, reflecting the value of p <0,05.

Results

The study sample consisted of 40 elderly people practicing resistance training, 25 (62.5%) were female, with a mean age of 68.18 (±4.92 years). The descriptive data of the sample are shown in the Table 1.

Table 1 General characteristics of the sample

Variables	N	Median	Standard deviation
Age	40	68,18	4,92
Weight (kg)	40	70,26	11,09
Height (m)	40	1,61	0,08
IMC	40	26,92	3,34
Waist Circumference (cm)	40	86,93	9,73
%Fat	40	35,41	10,02

Subtitle: *IMC*, body mass index; CIRC, circumference

Table 2 shows the correlation between the Sit and Stand tests, as well as the TUG test with the other variables in the table. After applying the test, only the BMI showed a significant and positive correlation with the TUG test (p=0.044). Pointing out that the higher the BMI, the longer the test runs.

Table 2 Correlation between TUG and sitting and standing tests with other research variables

	Sit and lift		Tug test	
	r	P	R	p
IMC (kg/m²)	-,210	,193	,320*	,044
Waist Circumference (cm)	-,145	-,145	,212	,190
%Fat	-,261	,104	,240	,136
Age	,109	,505	,095	,560
Training frequency	,142	,381	,800	,624
Training time	,062	,702	-,024	,884

Legend: r = Pearson and Spearman correlation value for parametric and non-parametric data, p = 95% test significance level (p <0.05)

When comparing physical tests with gender, training time and BMI of the elderly, no significant differences were found (Table 3).

Table 3 Comparison between TUG and sitting / standing tests with sex, training time and BMI

	SIT AND LIFT		TUG TEST	
	M + DP	p	M + DP	p
Gênero				
Female	13±3,17	0,635	9,27±1,61	0,471
Man	13,46±2,64		8,92±1,23	
Training time				
< 06 months	12,69±3,32	0,45	9,17±1,89	0,7
≥ 6 Months of training	13,40± 2,80		9,12±1,17	
Body mass index				
Eutrophic	13,62±2,68	0,491	9,0±1,28	0,82
Overweight	12,92±3,09		9,2±1,58	

Legend: M, average; SD, standard deviation; P, significance value with a 95% confidence interval (p <0.05)

It was also verified, in all possible variables of the analyzed groups (sex, training time and BMI), that the participants had results of the TUG test classified as excellent (<20 seconds).

Discussion

The present study aimed to verify the relationship between sex, training time and body composition with the physical performance of elderly people who practice strength training.

Changes in body composition occur during aging, such as: increased body fat, decreased muscle mass and physical performance[9] in this context, the findings of the present study verified the correlation between BMI and body mass execution time of the TUG test being positive, pointing out that the higher the BMI, the longer the test execution time.

These findings corroborate those of Vagetti et al.,[10] who found an association between BMI and physical fitness in the elderly, in a sample of 1,806 elderly women, overweight and obese, in whom they presented low functional aptitude in the Senior Fitness Test (Walking 6 minutes, Sit and stand, Sit and Reach, Reach behind your back and Sit and walk). It is also suggested that this low level of physical fitness is due to overweight and obesity, since these factors impair motor performance.

In a study with a sample of 15 elderly women, the values above the normal BMI values did not correlate with functional capacity in the tests Sit and stand up, TUG, Static balance, Dynamic balance, Abdominal in 30 seconds, Elbow flexion, Walking 6 minutes, sit up and move around the house.[11]

Studies aiming to verify the association between physical performance and anthropometric and body composition variables, have commonly used BMI, considering it a good indicator, but not fully correlated with body fat. BMI is a simple, practical and cost-free measure.[12,13] However, although used to determine obesity, BMI does not distinguish between fat mass (body fat) and lean mass (muscles and bones).[14]

Resistance training has beneficial effects on muscle strength, these effects seem to transfer to functional activities, such as sitting, climbing stairs and walking.[15] In the present study, there were no statistical differences in the TUG and Sentar e Levantar tests in relation to sex and training time.

A study that corroborated with the findings of this research, was carried out with a sample of 61 volunteers, aimed at analyzing the time of physical exercise in health-related physical fitness in elderly women, found no significance in relation to the physical fitness test "sit and stand up "and time of physical activity, but there were significant differences in components related to health and balance.[16] Other authors reported an improvement in muscle endurance and physical performance in the elderly after a resistance training program.[17]

Studies show that resistance exercises represent a positive result, as they improve the physical qualities of strength and localized muscular resistance.[18] These qualities are essential when the aim is to promote health and physical well-being, in addition to preventing injuries.[19]

Elderly people who have reduced gait speed are associated with greater postural instability, thus increasing their risk of falls.[20] The literature shows in percentage terms for elderly people who practice exercises of sufficient intensity and frequency, the reduction of the risk of functional limitation by about 30-50%.[21] In this context, the Timed Up & Go (TUG test) has been widely used in the scientific literature and is recommended by the British Geriatric Society and the American Geriatric Society, with the objective of assessing the functional mobility of the elderly from gait speed and classifying the risk of falls.[10]

Although the present study demonstrates that elderly people who practice resistance training presented an excellent performance during the time of the TUG test (<20 seconds), it has some limitations. One of the most important concerns the type of study, as it is a cross-sectional study, it was not possible to evaluate in more detail the intensity, volume and frequency of training of these elderly people. The sample size, because it took place in only one training center, however our sample is representative of the proposed population. It is suggested that future studies include other training centers located in different regions, that information related to training be collected.

Conclusion

From the results found, it can be observed that the physical performance of the elderly practicing resistance training in the present study was classified as excellent, according to the protocol of the TUG and Sit and carry tests, regardless of gender, BMI and training time.

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Conflicts of interest

Authors declares no conflicts of interest.

References

1. World Health Organization. *Fact sheet – Aging and health*. 2018.
2. Nigam Yamni et al. Physiological Changes Associated with Aging and Immobility. *Journal of Aging Research, London.* 2012;1–2.
3. Guinan Patrick. Frailty and old age. *The Linacre Quarterly, Fort Washington*. 2016;83(2):131–133.
4. Torpy Janet M, Lynm Cassio, Glass Richard M. Frailty in Older Adults. *The Journal of the American Medical Association*, *Chicago*. 2006;296(18):2280.
5. Langhammer Birgitta, Bergland Astrid, Rydwik Elisabeth. The Importance of Physical Activity Exercise among Older People. *BioMed Research International, London*. 2018;1–3.
6. Mcphee Jamie, et al. Physical activity in older age: perspectives for healthy ageing and frailty. *Biogerontology, Holland*. 2016;17(3):567–580.
7. Rikli Roberta E, Jones C Jessie. Development and Validation of a Functional Fitness Test for Community–Residing Older Adults. *Journal of Aging and Physical Activity, Hanover*. 1999;7(2):129–161.
8. Rikli Roberta And, Jones C Jessie. Development and Validation of Criterion–Referenced Clinically Relevant Fitness Standards for Maintaining Physical Independence in Later Years. *The Gerontologist, Washington*. 2013;53(2):255–267.
9. Matsudo Sandra Mahecha, Matsudo Victor Klein Rodrigues, Barros Neto Turíbio Leite. Impact of aging on anthropometric, neuromotor and metabolic variables of physical fitness. *Brazilian Journal of Science and Movement, Taguatinga*. 2000;8(4):21–32.
10. Vagetti Gislaine Cristina, et al. Association of body mass index with the functional fitness of elderly women attending a physical activity program. *Brazilian Journal of Geriatrics and Gerontology, Rio de Janeiro*. 2017;20(2):214–224.
11. Lucio Adriana, et al. Functional capacity characteristics and their relationship with the IMC in elderly women entering a physical education program. *Brazilian Journal of Science and Movement, Taguatinga*. 2011;19(2):13–18.
12. Silva Valeria Regina. *Kinesiology and biomechanics*. 1. ed. Rio de Janeiro: SESES. 2015.
13. Brazilian Association for the Study of Obesity and Metabolic Syndrome Brazilian Guidelines for Obesity. *Abeso – Brazilian Association for the Study of Obesity and Metabolic Syndrome.* – 4.ed. – São Paulo. 2016.
14. Prado Carla M, Gonzalez Maria Cristina, Heymsfield Steven B. Body composition phenotypes and obesity paradox. *Current Opinion in Clinical Nutrition and Metabolic Care, London*. 2015;18(6):535–551.
15. Manini Todd M, Pahor Marco. Physical activity and maintaining physical function in older adults. *British Journal of Sports Medicine, London*. 2009;43(1):28–31.
16. Lamboglia Carminda Maria Goersch Fontenele et al. Effect of physical exercise time on health–related physical fitness in elderly women. *Brazilian Journal on Health Promotion, Fortaleza*. 2014;27(1):29–36.
17. Dias Caroline Pieta et al. Effects of eccentric–focused and conventional resistance training on strength and functional capacity of older adults. *Age Grandville*. 2015;37(5):1–9.
18. Costa Maryelle Rizzatti, Danielle Ledur Antes, Mario Luiz Couto Barroso, et al. Characteristics of physical activity in long–term care facilities for the elderly in Santa Catarina. *Interdisciplinary Studies on Aging, Porto Alegre*. 2015;20(2):441–455.
19. Lima Ana Paula, et al. Mechanotherapy and muscle strengthening: a safe foundation for effective treatment. *Saúde.com, City of Jequié.* 2006;2(2):143–152.
20. Bianchi Adriane Behring, Oliveira Juliana Maria, Bertoline Sonia Maria Marques Gomes. Marching in the aging process: changes, evaluation and training. *Revista Uningá, Maringá.* 2015;45:52–55.
21. Taylor Denise. Physical activity is medicine for older adults. Postgraduate Medical Journal, London. 2014;90(1059):26–32.