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Relation between high leisure-time sedentary behavior and low functionality in older adults

Relação entre alto comportamento sedentário no lazer e baixa funcionalidade de idosos

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Abstract – Sedentary behavior refers to activities with low energy expenditure, usually performed in sitting or lying positions, and includes behavior belonging to the current lifestyle, such as watching television. In the course of aging, this activity is performed for longer periods by individuals on a daily basis. This is worrying, since aging associated with sedentary behavior accentuates functionality decline. The aim of this study was to analyze the relationship between high leisure-time sedentary behavior and low functionality in older adults. The sample consisted of 375 older adults aged 60-97 years (70 ± 7 years), and of these, 114 (30%) were men and 261 (70%) women. Functionality was assessed by two functional tests and information related to sedentary behavior was obtained using the self-reported physical activity questionnaire proposed by Baecke et al. The chi-square test was used to verify the association between sedentary behavior and functionality, and binary logistic regression analysis was used to build the multiple model. Older individuals with high leisure-time sedentary behavior were more likely to have low functionality [OR 2.57; 95% CI 1.40 to 4.71] and [OR 2.35; 95% CI 1.29 to 4.29] regardless of gender, age, smoking, osteoporosis, arthritis / osteoarthritis, low back pain and physical activity. Extended permanence in sedentary behavior was associated with low functionality in older subjects. Preventive measures to stimulate the practice of physical activities and encourage the reduction of time spent in sedentary activities such as watching television should be adopted by health professionals in an attempt to maintain functionality among older adults.

Key words: Aging; Functioning; Sedentary lifestyle.

Resumo – *O comportamento sedentário refere-se à realização de atividades que têm baixo gasto energético, realizadas nas posições sentadas ou deitadas, e abrange comportamentos pertencentes ao estilo de vida atual, como por exemplo, ver televisão. Com o decorrer do envelhecimento essa atividade é executada por períodos mais prolongados pelos indivíduos diariamente. Isso é preocupante, uma vez que o envelhecimento associado ao comportamento sedentário acentua o declínio da funcionalidade. O objetivo do presente estudo foi analisar a relação entre alto comportamento sedentário no lazer e baixa funcionalidade de idosos. A amostra foi composta por 375 idosos com idade entre 60 e 97 anos (70±7anos), e desses 114 (30%) eram homens e 261 (70%) mulheres. A funcionalidade foi avaliada por meio de dois testes funcionais e as informações referentes ao comportamento sedentário foram levantadas utilizando-se de questionário de atividade física autorreferido, proposto por Baecke et al. Foi empregado o teste qui-quadrado para verificar a associação entre comportamento sedentário e funcionalidade, e análise de regressão logística binária para construção de modelo múltiplo. Idosos com alto comportamento sedentário no lazer tiveram maior chance de apresentarem baixa funcionalidade [OR:2,57; IC95% 1,40–4,71] e [OR:2,35; IC95% 1,29–4,29] independentemente de sexo, grupo etário, fumo, osteoporose, artrite/artrose, lombalgia e atividade física. A permanência prolongada em comportamento sedentário foi associada à baixa funcionalidade de idosos. Medidas preventivas como, estimular a prática de atividades físicas e incentivar a redução do tempo despendido em atividades sedentárias, como assistir televisão, devem ser adotadas pelos profissionais da saúde para tentar manter a funcionalidade de idosos.*

Palavras-chave: *Estilo de vida sedentário; Funcionalidade; Idoso.*

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INTRODUCTION

Sedentary behavior refers to activities with energy expenditure of less than 1.5 Metabolic Equivalent of Task (METs), which are performed in the sitting or lying positions, and include behaviors belonging to the current lifestyle of most people such as watching television, using the computer, sitting in the car, excessive involvement in intellectual activities (homework, reading, training courses), or working for long time in the sitting position[1,2].

With aging, some of these activities are performed for longer periods, especially watching television, which consists of an activity reported by a considerable proportion of Brazilian adults[3,4].

It is estimated that older adults remain about 65% and 80% of their time awake in sedentary activities[2]. This is worrying, since aging associated with sedentary behavior increases functionality decline because it decreases neuromotor functions, weakening the individual and increasing the risk of falls and fractures[5]. With compromised functionality, individuals may lose independence to perform their basic daily activities[6].

Currently, due to the occurrence and intensification of health problems associated with sedentary behavior in the world population of all age groups, especially older adults, the time spent in sedentary activities has become a public health problem. However, there is a gap in literature regarding research aimed at investigating the relationship between sedentary behavior and functionality in Brazilian older adults of both genders. In view of the above, the aim of the present study was to analyze the relationship between high sedentary behavior and low functionality in older adults.

METHODOLOGICAL PROCEDURES

Study design and recruitment of subjects

The data used in this study refer to the initial evaluation of a cohort performed between January 2015 and May 2017 in the municipality of Presidente Prudente, São Paulo State, Brazil, whose objective was to investigate the influence of physical activity on sarcopenia, sarcopenic obesity, "dysmobility" syndrome, and functional disability in older adults. Sample selection was performed by convenience sampling. Initial evaluations were carried out between January and February 2015.

The minimum sample size was identified by an equation for correlation coefficient. Thus, using 80% power, 5% alpha error and expected correlation coefficient between appendicular lean mass and physical activity of 0.28[7], the equation indicated the need to evaluate at least 99 subjects. Additionally, considering a possible 100% sample loss during follow-up, the study should include 200 subjects.

The study included individuals aged 60 years or older living in the municipality of Presidente Prudente and who attended the laboratory to perform evaluations. At the first moment, the recruitment of subjects was performed in two Basic Health Units indicated by the Municipal Health

Department of the city of Presidente Prudente-SP. Invitation and scheduling of evaluations were carried out when participants waited for the service or after the end of consultation in the Basic Health Unit. Overall, 105 older adults aged 60-85 years were evaluated.

Subsequently, the invitation to individuals was extended to the general population. The research was disclosed in the local media and in other places of the municipality with high concentration of older adults (squares, health academies, social centers and other social projects). Evaluations were scheduled by phone call. A total of 328 calls were received from older adults interested in participating in the study. Of the 328 evaluations scheduled, 38 elderly people did not attend the laboratory and 290 individuals aged 60-97 years were evaluated.

As exclusion criteria, the following factors were considered: living in a long-term institution; presence of disease that could lead to muscle mass reduction, such as cancer, HIV / AIDS, tuberculosis and chronic kidney disease.

Data collection was performed at the Center for Studies and Laboratory of Assessment and Motor Activity Prescription (CELAPAM), Department of Physical Education, FCT-UNESP, municipality of Presidente Prudente. At the end of this stage, a total of 400 individuals were evaluated. However, 25 of them did not respond to the physical activity questionnaire, containing the sedentary behavior question. Thus, the sample of the present study consisted of 375 older adults aged 60-97 years.

Participants who accepted the invitation to participate in the project signed the "Informed Consent Form". All protocols were reviewed and approved by the Ethics Research Committee

Sedentary behavior and physical activity

Information regarding habitual physical activity practice was collected from an interview using questionnaire developed by Baecke et al.[8]. This instrument was validated for Brazilian adults and older adults by Florindo and Latorre[9], since part of the sample of the Initial project was composed of adults aged 50-59 years (not included in the present study).

After instrument application, it was possible to identify the habitual physical activity level in each domain (leisure, occupational, locomotion) and the sum of the scores of each domain represents habitual physical activity. For its classification, the formula proposed by Baecke et al.[8] was used. The physical activity level of the sample estimated by the total score (habitual physical activity) was divided into quartiles. Individuals who were in quartile 4 (7.37 points) were considered sufficiently active.

In order to evaluate sedentary behavior, question 13 of the questionnaire was used, "During leisure time I watch television: never / rarely / sometimes / frequently / very often". Individuals who reported always watching TV were considered to have high leisure-time sedentary behavior.

Functionality

Functionality was evaluated through two functional tests: chair stand test[10]

and timed-up-and-go[11]. These two tests are described below:

- Chair stand test

For the evaluation of the strength / power of lower limbs, the chair stand test was applied, where the subject kept arms crossed over his chest and, at the evaluator's signal, got up from and sat back on the chair as fast as possible five times without pausing. Those who failed to perform the task described in less than 60 seconds had the test discontinued.

Performance in the test was assessed according to the time quartile values in seconds. Those with values higher than the first quartile (9.11 seconds) were considered to have poor performance in the test.

- Timed-up-and-go

To evaluate gait speed and dynamic balance, the timed-up-and-go test was applied, which consists of getting up from a chair, walking a distance of three meters, turning around and returning. The test was started with the individual correctly sitting on a stable chair and with arms on support (hips and backs completely leaning on the seat); the individual could use the arms of the chair to move from the sitting position to the standing position and vice versa.

At the sign of the evaluator (who started the stopwatch concomitantly), the subject got up, walked (at his usual pace) to the demarcation, walked around it, returned, and sat down in the chair again (the stopwatch stopped at the time the subject was sitting correctly, with arms on the chair, at the end of the test).

For the test, any apparatus for walking (walking stick, walker, etc.) could be used, and the subject could stop and rest throughout the test. However, they could not be helped by another person or sit down during the course.

The cutoff point adopted to identify poor performance in this test was values higher than the first quartile (8.16 seconds).

Co-variables

- Anthropometric measurements

Body mass was measured using an electronic scale and stature used a fixed stadiometer. The values obtained for weight and height were used to calculate body mass index (BMI, in kg/m^2) from the ratio of weight to squared height. Measurements were performed according to the standardization described by Freitas Júnior et al.[12].

BMI classification was performed according to values suggested by Lipschitz et al.[13].

- Osteoarticular diseases

In order to identify the prevalence of osteoarticular diseases, the short-version morbidity questionnaire of the Standard Health Questionnaire for

Washington State was used, which consists of a closed survey addressing the presence / absence of chronic diseases distributed into three groups: metabolic, cardiovascular and osteoarticular[14].

- Smoking, ethnicity, gender and age

Smoking, ethnicity, gender and age were reported by individuals through an interview. The two questions and answer options are described below:

1) Do you smoke? Yes or no
2) What is your race / ethnicity? White, brown, black, or Asiatic.
3) How old are you?
4) What is your gender?

Statistical analysis

Descriptive statistics were composed of relative and absolute values. The percentage values of each variable were associated with sedentary behavior (normal or high) using the chi-square test. The chi-square test was also used to verify the association between dependent variable (functionality) and independent variable (sedentary behavior). Subsequently, univariate and multiple binary logistic regression analysis was used to identify the magnitude of associations in odds ratio (OR) values and respective 95% confidence intervals. All variables with p values <0.20 observed in the chi-square test were selected for the construction of multiple models using the stepwise forward modeling strategy. The statistical treatment was performed using the SPSS software (SPSS inc. Chicago, IL), version 17.0 and the significance level adopted was 5%.

RESULTS

Table 1 presents the general characteristics of the sample according to leisure-time sedentary behavior. It was observed that smokers present high leisure-time sedentary behavior compared to nonsmokers.

The prevalence of high sedentary behavior in subjects investigated in the present study was approximately 33% and no difference between genders and age was observed (p> 0.05).

Table 2 shows the frequency of responses regarding screen time and association with performance in functional tests. It has been found that subjects who have reported always watching TV are approximately 2 and 3 times more likely of having poor performance in the chair stand and timed-up-and-go tests, respectively.

It was observed that subjects with high leisure-time sedentary behavior (always watching TV) presented poor performance in both functional tests for the general sample. When analyzed separately by gender, men with high leisure-time sedentary behavior presented poor performance in the chair stand test test and the women in both tests (Table 3).

Table 1. General characteristics of the sample according to leisure-time sedentary behavior in older adults of Presidente Prudente, São Paulo

	Total (n)	Sedentary behavior (%)		P
		Normal (253)	High (122)	
Gender				
Male	114	72.8	27.2	0.145
Female	261	65.1	34.9	
Age (years)				
60-69	201	63.2	36.8	0.057
> 70	174	72.4	27.6	
BMI (Kg/m²)				
Low weight	119	72.1	27.9	0.743
Normal weight	43	68.1	31.9	
Overweight	213	66.2	33.8	
Ethnicity				
White	232	69.8	30.2	0.460
Brown/Black	115	63.5	36.5	
Asiatic	28	64.3	35.7	
Smoker				
No	347	69.5	30.5	≤0.001
Yes	26	38.5	61.5	
Osteoporosis				
No	314	67.8	32.2	0.730
Yes	61	65.6	34.4	
Arthritis/ arthrosis				
No	190	65.8	34.2	0.482
Yes	185	69.2	30.8	
Low back pain				
No	303	66.0	34.0	0.216
Yes	72	73.6	26.4	
Physical activity				
Sufficient	97	72.2	27.8	0.251
Insufficient	278	65.8	34.2	

BMI = Body mass index.

Table 2. Relationship between leisure-time sedentary behavior and performance in the chair stand test and timed-up-and-go tests

	Total (n)	Chair stand test (%)		OR	95%CI
		Normal (n=94)	Low (n=281)		
TV watching					
Never/rarely	80	28.8	71.2	1.00	-----
Sometimes	94	30.1	69.9	0.94	0.49-1.81
Frequently	79	31.6	68.4	0.87	0.44-1.72
Always	122	14.0	86.0	2.47	1.22-5.00
	Total (n)	Timed-up-and-go (%)		OR	95%CI
		Normal (n=92)	Low (n=283)		
TV watching					
Never/rarely	80	31.2	68.8	1.00	-----
Sometimes	94	27.7	72.3	1.19	0.62-2.29
Frequently	79	29.1	70.9	1.11	0.56-2.18
Always	122	14.8	85.2	2.63	1.32-5.23

TV = television; OR = odds ratio; 95% CI = 95% confidence interval

Table 3. Relationship between high sedentary behavior and low functionality for the general sample and according to gender

	Sedentary behavior					
	General sample		Men		Women	
Tests (sec)	Normal	High	Normal	High	Normal	High
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Chair stand test						
- normal	77 (81.9)	176 (62.6)	27 (90.0)	56 (66.7)	50 (76,9)	120 (61,2)
- low	17 (18.1)	105 (37.4)	03 (10.0)	28 (33.3)	15 (23,1)	76 (38,8)
- $\chi 2$ (p)	11.334 (≤0.001)		5.723 (0.017)		6.089 (0.014)	
Timed-up-and-go						
- normal	74 (80.4)	179 (63.3)	21 (75.0)	62 (72.1)	53 (82,8)	117 (59,4)
- low	18 (19.6)	104 (36.7)	07 (25.0)	24 (17.9)	11 (17,2)	80 (40,6)
- $\chi 2$ (p)	9.340 (0.002)		0.090 (0.764)		11.669 (≤0.001)	

High sedentary behavior = always watching TV.

It was verified that subjects with high leisure-time sedentary behavior are more likely to present low functionality when compared to those with lower behavior, regardless of gender, age, smoking, presence of osteoporosis, arthritis / arthrosis, low back pain and physical activity (Table 4).

Table 4. Univariate and multiple logistic regression models of the association between high sedentary behavior and low functionality

Tests (sec)	Unadjusted		Adjusted*	
	OR	95% CI	OR	IC 95%
Chair stand test	2.64	1.48 - 4.71	2.53	1.38 - 4.62
Timed-up-and-go	2.39	1.35 - 4.22	2.31	1.26 - 4.22

* Regression adjusted by gender, age group, BMI, ethnicity, smoking, osteoporosis, arthritis / arthrosis, low back pain and physical activity; Hosmer and Lemeshow test = 0.41 and 0.97; OR = odds ratio; 95% CI = confidence interval; high sedentary behavior = always watching TV.

DISCUSSION

The main finding of this study was that after evaluating leisure-time sedentary behavior in the elderly, it was observed that those who reported always watching TV (high leisure sedentary behavior) were more likely to have low functionality.

The prevalence of high sedentary behavior in subjects investigated in the present study was approximately 33% and no difference between gender and age was observed. In contrast, previous results have indicated that the time spent in sedentary behavior increases with advancing age and there is a tendency for older men to spend more time in sedentary behavior compared to women[2,15]. It was verified that smokers present higher prevalence of high sedentary behavior compared to nonsmokers, which result is similar to those previously observed[16,17]. Individuals who smoke tend to spend more time in sedentary activities due to complications, such as the sensation of dyspnea developed in activities that require greater energy expenditure[18].

In the study conducted by Hamer and Stamatakis[16], which investigated

the association between time spent watching TV and performance in the chair stand test, the authors used linear regression models and observed a direct association between these two variables only with adjustment for gender. In the present study, logistic models were used and such association was observed in both models investigated (univariate and multiple). Other studies have also found an association between high leisure-time sedentary behavior and low functionality with the use of different tests and physical capacities[17,19,20,21].

One of the factors that may explain the fact of an individual to remain for long periods in sedentary behavior and affect functionality refers to the multifactorial origin of reduced musculoskeletal function and sedentary lifestyle can be considered an important factor for this problem[22]. The time spent in the sitting or lying position are situations in which there is no contractile activity of the muscle and this absence of stimulus decreases muscle amount (mass) and quality (strength and power), affecting physical capacities such as speed, strength / power and balance, and consequently functionality in the elderly.

It is noteworthy that the cross-sectional design of the present study does not allow the establishment of a cause-effect relationship. Another factor would be the subjective analysis of sedentary behavior; however, the difficulty of using more accurate instruments to measure sedentary behavior such as accelerometers in epidemiological studies must be highlighted. However, the evaluation of functionality through physical tests in a considerable sample of Brazilian elderly of both genders attended in Basic Health Units and the general community can be considered as strong aspects of the study. The various adjustments made in the statistical analysis with the objective of avoiding possible confounding factors and analysis stratified by gender in order to verify if associations occur regardless of gender should also be emphasized.

CONCLUSION

The daily permanence in leisure-time sedentary behavior was associated with low functionality in older adults assessed in the present study. Preventive measures such as stimulating the practice of physical activities and encouraging the reduction of time spent in sedentary activities, such as watching television, should be adopted by health professionals in an attempt to maintain functionality among older adults.

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