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Physical activity and sedentary behavior in elderly in social groups: is there a difference because of the risk of sarcopenia?

Atividade física e comportamento sedentário em idosos de grupos sociais: existe diferença em razão do risco de sarcopenia?

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ABSTRACT
This study aimed to analyze whether the frequency and duration of physical activity and sedentary behavior interfere with the risk of sarcopenia in elderly attending social groups. Cross-sectional study to evaluate 207 elderly people attending social groups in the municipality of Sarandi, state of Paraná. The International Physical Activity Questionnaire (IPAQ) and the SARC-F were used. Data were analyzed using inferential statistics ($p<0.05$). The prevalence of elderly people with active level of physical activity (93.2%) and no risk of sarcopenia (75.8%) was observed. Elderly people at risk of sarcopenia spend more time sitting on weekdays than elderly people with no risk of sarcopenia ($p=0.043$). Duration and frequency of physical activity do not affect the risk of sarcopenia. However, the risk of sarcopenia is associated with sedentary behavior of the elderly.

Keywords: Aging. Health promotion. Motor activity. Sarcopenia.

RESUMO
Este estudo teve o objetivo de analisar se a frequência e duração da prática de atividade física e o comportamento sedentário interferem no risco de sarcopenia em idosos frequentadores de grupos sociais. Estudo transversal, em que foram avaliados 207 idosos frequentadores de grupos sociais do município de Sarandi, estado do Paraná. Foi utilizado o Questionário Internacional de Atividade Física (IPAQ) e o SARC-F. Os dados foram analisados por meio da estatística inferencial ($p<0,05$). Notou-se a prevalência de idosos com nível ativo de atividade física (93,2%) e que não apresentaram risco de sarcopenia (75,8%). Os idosos com risco de sarcopenia ficam mais tempo sentados em dias de semana do que os idosos com ausência de risco de sarcopenia ($p=0,043$). A duração e frequência da prática de atividade física não interferem no risco de sarcopenia. No entanto, o risco de sarcopenia está associado ao comportamento sedentário do idoso.

Palavras-chave: Atividade motora. Envelhecimento. Promoção da saúde. Sarcopenia.
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INTRODUCTION

Sarcopenia is considered a disease at the muscular level, characterized by low levels of muscle strength, reduced volume of muscle mass and low physical performance[1], which is currently one of the emerging public health problems in Brazil[2], with an incidence of 16.1% in elderly women and 14.4% in elderly men[3], while its prevalence is around 17%[2]. Factors such as advanced age, cognitive decline, low income, smoking and malnutrition are associated with sarcopenia[3-6], which, in turn, can lead to physical disability, poor quality of life and, in some cases, death[1].

Additionally, lifestyle changes, such as reduced levels of physical activity[7] and a parallel increase in time spent in low energy expenditure activities, which characterize sedentary behavior[8], may contribute to the earlier onset of sarcopenia. Regarding sedentary behavior, it is usually analyzed the time, in minutes or hours per day, directed to those activities carried out in a sitting or lying position, which are equivalent to an energy expenditure close to rest (between 1.0 and 1.5 metabolic equivalent (MET))[9].

This type of activity with low energy expenditure usually increases over the years and may be associated with the emergence of several diseases, such as diabetes[10], cognitive deficit[8], depressive symptoms[11], in addition to an increase in the difficulty of performing simple daily tasks[12]. In addition, there are indications in the literature that the long time spent in sedentary behavior by the elderly, regardless of the level of physical activity, is considered an indicator of mortality[13].

On the other hand, the practice of physical exercise programs, especially strength, as well as the reduction in the total time spent in sedentary behavior can positively influence the improvement of the variables involved in sarcopenia, such as the increase in muscle strength and mass and other components related to physical fitness[5,14]. In fact, scientific advances in the field of gerontology have highlighted that maintaining an active lifestyle is one of the greatest indicators of prevention and control of different conditions[15,16]. The maintenance of healthy eating habits and the constant practice of physical activities characterize a healthy lifestyle[15] and are essential for successful aging[17,18]. The literature brings increasing evidence that elderly people involved in physical exercise programs are more likely to have better physical function and better life expectancy than inactive elderly people[19,20].

However, most studies analyzing sarcopenia in the elderly investigate its relationship with the practice of physical exercise programs and, to date, there are few investigations addressing the relationship between physical activity and time spent in sedentary behavior and the

sarcopenia[14]. In view of this, the objective of the study was to verify whether the frequency and duration of physical activity, and especially sedentary behavior, interfere with the risk of sarcopenia in the elderly. Our hypothesis is that the higher frequency and duration of physical activity and the low time of sedentary behavior interfere with the low predictors of sarcopenia.

METHOD

PARTICIPANTS

Elderly people of both sexes, participants of activities in social groups, through the project "active life" were included. This is a project associated with the Social Assistance Department, in partnership with the Department of Youth Culture, Sport and Leisure (SEJUV) in the municipality of Sarandi, state of Paraná, for the elderly, which serves 14 neighborhoods; classes in choir, singing, dance and services for coexistence and strengthening community and family ties are offered.

The formula for a finite sample was used to calculate the sample size, with a confidence level of 95%, with an estimation error of 5% and with an expected proportion of 50%[21]. The estimated participation was approximately 368 elderly people in 14 social groups, requiring, therefore, a minimum sample of 207 elderly people, considering possible sample losses. The sample consisted of exactly 207 people.

Elderly people who were dependent on gait assistive device, with hip, knee or ankle prostheses, and or who had undergone major surgery for less than three months were excluded. The Mini Mental State Examination was used to exclude elderly people with possible cognitive impairment[22].

The present study was submitted and duly approved by the Research Ethics Committee of the Centro Universitário Metropolitano de Maringá (Unifamma) (opinion number 2.997.577/2018).

INSTRUMENTS

To assess the health, sociodemographic and activity profile in the groups, a semi-structured questionnaire was applied by the researchers, consisting of questions related to age, age group, schooling, marital status, time of attendance in the group, activities that performs in the group, average income, working condition (retirement), perception of health and the perception of their health compared to other people of the same age, use of medication, falls and near-fall situations in the last semester, weekly frequency in the group and self-reported diseases.

The level of physical activity was assessed using the International Physical Activity Questionnaire (IPAQ), short version. For the classification of the level

of physical activity, the following cut-off points and respective classifications were used: ≥ 150 minutes weekly physical activity = physically active; < 10 minutes per week = sedentary; between 10 minutes and 150 minutes = insufficiently active. Sedentary behavior was assessed by the last two questions of this instrument, which assess the time sitting on a weekday and the time sitting on a weekend day[23].

To assess the risk of sarcopenia, the SARC-f[24,25], validated in Brazil, was used, which includes five components: strength (if the individual is able to lift 2.5 kg), ambulation (if the individual is able to walk around a room or in their bedroom), getting up from a chair (if the individual can get up from the chair), climbing stairs (if the individual can climb 01 flight of 10 steps) and falls (if the individual has fallen in the last year). The scores range from zero to two points, and for the first four, the interpretation is zero = no difficulty, 1 = some difficulty and 2 = a lot of difficulty or inability to do it, while for the last one, the interpretation is zero = no falls in the last year, 1 = fell 1-3 times in the last year, and 2 = 4 or more falls in the last year. The elderly with four points or more scored for the risk of sarcopenia, in the total sum of the scores of the five components.

DATA COLLECTION PROCEDURES

Data were collected from April to June 2018 in 14 social groups serving the elderly in the municipality of Sarandi, state of Paraná, registered with the Municipal Social Assistance Department, which make up all the places in the municipality that offer this service. Initially, the person responsible for each social group was contacted to obtain authorization for the research and, then, a list was requested with the days and times when each group carried out the activities. The elderly from social groups were approached before or after classes, so that they were informed about the procedures to which they would be subjected to, and those who agreed to participate in the research signed an informed consent.

The study lasted 90 days. The first 60 days were dedicated to data collection. The level of physical activity, sedentary behavior, predictor of sarcopenia and sociodemographic profile of the participants were evaluated. Questionnaires were applied as interviews, in order to avoid possible reading errors by the elderly. Each interview lasted approximately 10 minutes per research participant.

DATA ANALYSIS

Data were analyzed in the SPSS 22.0 software, using a descriptive and inferential statistical approach. Frequency and percentage were used as descriptive measures for categorical variables. For numerical variables, initially, data normality was checked by the Kolmogorov-Smirnov test. As the data did

not show a normal distribution, Median (Md) and Quartiles (Q1; Q3) were used to characterize the results. The comparison of the duration and frequency of physical exercise and sedentary behavior as a function of the risk of sarcopenia was performed using the Mann-Whitney "U" test. The correlation of duration and frequency of physical exercise and sedentary behavior with the risk of sarcopenia was tested by the Spearman's correlation coefficient. The significance of $p \leq 0.05$ was adopted.

RESULTS

A total of 207 elderly people of both sexes participated in the study, with a mean age of 66.32 ± 6.19 years. Table 1 lists that most of the elderly had a partner, aged between 60 and 70 years, a monthly income of one to two minimum wages, white, retired and did not smoke. It is noteworthy that most of the elderly had incomplete or complete elementary education.

Table 1. Sociodemographic profile of the elderly attending social groups in the municipality of Sarandi, state of Paraná

Variables	*f*	%
Gender		
Male	10	4.8
Female	197	95.2
Marital status		
With partner	123	59.4
No partner	84	40.6
Age group		
60 to 70 years	165	79.7
Over 70 years	42	20.3
Monthly income		
1 to 2 MW	157	75.8
Over 2 MW	50	24.2
Education		
Illiterate	23	11.1
Incomplete elementary	77	37.2
Complete elementary	77	37.2
Complete high school	30	14.5
Color		
White	171	82.6
Black	36	17.4
Retirement		
Yes	131	63.3
No	76	36.7

MW: minimum wage(s).

According to Table 2, most of the elderly reported had a perception of good health, taking more than two medications regularly, no history of falls, but a history of near falls in the last six months. In addition, most elderly people attended social groups for more than three years, two to three times a week, with an active level of physical activity and no risk of sarcopenia.

Table 2. Health and the physical activity profile of elderly people attending social groups in the municipality of Sarandi, state of Paraná

Variables	*f*	%
Health perception		
Good	98	47.3
Regular	84	40.6
Bad	25	12.1
Health perception compared to other elderly people		
Worse	16	7.7
The same	46	22.3
Better	145	70.0
Drugs		
None	40	19.3
1 to 2	77	37.2
More than 2	90	43.5
Falls in the last six months		
Yes	75	36.2
No	132	63.8
Near-falls in the last six months		
Yes	140	67.6
No	67	32.4
Time attending the group		
3 months to 1 year	66	31.9
1.1 to 3 years	23	11.1
More than 3 years	118	57.0
Weekly attendance in the group		
Once	29	14.0
2 to 3 times	178	86.0
Level of physical activity*		
Active	193	93.2
Irregularly active	14	6.8
Risk of sarcopenia		
Yes	50	24.2
No	157	75.8

* no elderly person was classified as sedentary or irregularly active.

The majority of the elderly reported no heart disease (78.7%), cerebrovascular accident (CVA) (89.4%), diabetes (76.3%), cancer (92.3%), osteoarthritis (68.1%),

lung diseases (92.8%), depression (79.2%) and osteoporosis (82.1%), however, 55.6% elderly reported arterial hypertension. Table 3 lists the descriptive analysis of the duration and frequency of physical activity, sedentary behavior and the predictor of sarcopenia in the elderly attending social groups. The elderly reported not performing vigorous activities (Md = 0.0), but light (Md = 4.0) and moderate (2.0) activities a few times a week. There was a median of 60 and 180 minutes per day and per week of light physical activity, respectively, and 60 and 120 minutes of moderate physical activity per day and per week, respectively. Regarding sedentary behavior, a median of 240 minutes of sitting time was observed during the week and 360 minutes on the weekend. There was also a median of 2.0 for the risk of sarcopenia.

Table 3. Duration and frequency of physical activity, sedentary behavior and risk of sarcopenia in the elderly attending social groups in the municipality of Sarandi, state of Paraná

Variables	Md	Q1-Q3
Physical activity		
Walking days	4.0	3.0-5.0
Min. walk per day	60.0	30.0-90.0
Min. walk per week	180.0	80.0-300.0
Days of moderate activity	2.0	2.0-2.0
Min. moderate activity per day	60.0	60.0-60.0
Min. moderate activity per week	120.0	120.0-120.0
Days of vigorous activity	0.0	0.0-0.0
Min. vigorous activity per day	0.0	0.0-0.0
Min. vigorous activity per week	0.0	0.0-0.0
Sedentary behavior		
Time sitting during the week (min)	240.0	180.0-360.0
Time sitting during the weekend (min)	360.0	240.0-360.0
Risk of sarcopenia	2.0	0.0-3.0

Md = median, Q1 = 1st quartile, Q3 = 3rd quartile, min = minutes.

Table 4 presents a comparison of the duration and frequency of physical activity and sedentary behavior in the elderly as a function of the risk of sarcopenia. There was a significant difference between the elderly with and without risk of sarcopenia only in the time sitting on weekdays ($p = 0.043$), evidencing that the elderly at risk of sarcopenia (Md = 300.0) spend more time sitting on weekdays than the elderly with no risk (Md = 240.0). No significant difference ($p > 0.05$) was detected in the variables of duration and frequency of physical activity, indicating that the practice of physical activity by these elderly people does not interfere with the risk of developing sarcopenia.

Table 4. Comparison of duration and frequency of physical activity and sedentary behavior of elderly people attending social groups in the municipality of Sarandi, state of Paraná, according to the risk of sarcopenia

Variables	Risk of sarcopenia		*P*
	No (n = 157)	Yes (n = 50)	
	Md (Q1-Q3)	Md (Q1-Q3)	
Walking days	4,0 (3,0-5,0)	4,0 (2,0-5,0)	0,362
Min. walk per day	60,0 (30,0-90,0)	60,0 (30,0-120,0)	0,371
Min. walk per week.	180,0 (80,0-300,0)	190,0 (87,5-360,0)	0,607
Days of moderate activities	2,0 (2,0-2,0)	2,0 (2,0-2,0)	0,734
Minutes of moderate activities per day	60,0 (60,0-60,0)	60,0 (60,0-60,0)	1,000
Minutes of moderate activities per week	120,0 (120,0-120,0)	120,0 (120,0-120,0)	0,406
Days of vigorous activities	0,0 (0,0-0,0)	0,0 (0,0-0,0)	0,573
Minutes of vigorous activities per day	0,0 (0,0-0,0)	0,0 (0,0-0,0)	0,573
Minutes of vigorous activities per week.	0,0 (0,0-0,0)	0,0 (0,0-0,0)	0,573
Sitting time during the week	240,0 (180,0-360,0)	300,0 (180,0-360,0)	0,043*
Sitting time during the day	360,0 (240,0-360,0)	360,0 (240,0-420,0)	0,295

*Significant difference - p≤0.05: *Mann-Whitney* U-test. Min.: minutes.

No significant correlation (p > 0.05) was found for related to the duration and frequency of physical activity and sedentary behavior with the risk of sarcopenia (Table 5).

Table 5. Correlation of duration and frequency of physical activity and sedentary behavior with the risk of sarcopenia in the elderly

Physical activity and sedentary behavior	Risk of sarcopenia
Walking days	-0.08
Min. walk per day	0.01
Min. walk per week	-0.01
Days of moderate activities	-0.07
Minutes of moderate activities per day	0.01
Minutes of moderate activities per week	-0.09
Days of vigorous activities	-0.09
Minutes of vigorous activities per day	-0.09
Minutes of vigorous activities per week	-0.09
Sitting time during the week	0.13
Sitting time during the day	0.14

*Significant correlation (p ≤ 0.05) – Spearman correlation. Min.: minutes.

DISCUSSION

This study was carried out to verify whether the frequency and duration of physical activity and sedentary behavior measured through the IPAQ influence the risk of sarcopenia in the elderly based on the SARC-F. According to the measurements of our study, sarcopenia may be present in approximately 24.2% elderly, which is similar to the general

prevalence of sarcopenia among the elderly in Brazil, which is around 17%[2].

The main results of our study showed that elderly people who had an active level of physical activity (150 min weekly physical activities) also had a low risk of sarcopenia (24.2%). This result may be an indication that the practice of physical activity, performed at higher levels, is a protective factor for sarcopenia in the elderly. Taking into account the etiology of sarcopenia, the practice of physical activity is a promising intervention to prevent and delay sarcopenia[5]. On the contrary, low levels of physical activity are one of the most important factors for developing sarcopenia[26,27].

Elderly people at risk of sarcopenia spend more time in sedentary behavior and, possibly, short time (or even absence) in vigorous physical activities. It is worth remembering that, in the present study, no elderly person reported performing vigorous physical activities.

This study showed that 63.8% elderly had no history of falls in the last six months. It is possible that the low propensity to sarcopenia has influenced this finding, since the presence of sarcopenia is associated with functional disability and impaired balance, which may increase the chances of falling[2,4].

The duration and frequency of physical activity practice do not seem to interfere with the possibility of sarcopenia, since no significant difference was found in the variables studied. However, it is possible to infer that the simple fact of people with

is related to the set of behaviors adopted in a sitting or lying position, in which little energy is spent, which does not increase energy expenditure above resting levels (1.0 - 1.5 metabolic equivalent task - METs)[28].

It is recommended that the elderly practice at least 75 min per week of vigorous intensity activities to improve their general muscle condition[29], however, Oliveira et al.[30], in a study carried out with 970 elderly people, found that as the sedentary behavior of the elderly increases, the performance of vigorous physical activities decreases, which may partially explain the elderly at risk of sarcopenia spending more time in sedentary behavior

practicing physical activity, regardless of frequency and duration, can have a positive influence on the possibility of having sarcopenia or not. This is what the systematic review and meta-analysis by Vliestra *et al*.[5] suggests, in which even short-term interventions, such as three months, were able to promote satisfactory improvements in the variables studied in sarcopenia.

However, as mentioned above, it is worth noting that the interventions proposed in the literature are heterogeneous[4,5,27] in terms of frequency, duration, type of exercise (stretching, strength training, resistance training, etc.) and that this also causes different

responses. in the elderly[5], so that a protocol may be enough to produce measurable changes in muscle function, but it may not be enough to cause the muscle to hypertrophy, especially in elderly people who already have a clinical diagnosis of sarcopenia.

Nevertheless, for a more in-depth and robust analysis, further studies are needed and, in this context, it is possible to point out some limitations of our study: low number of participants, absence of a questionnaire that qualified the exercises, and lack of follow-up of the participants to check the real potential of the physical activity on sarcopenia. The sample evaluated was composed of elderly people attending a social group, which, in turn, has different characteristics from the elderly population in general, such as, for example, the level of physical activity, which is generally higher than the community elderly. Experimental studies are suggested to assess the impact of physical activity in different contexts, intensities and weekly duration on the muscle quality of the elderly, especially those without involvement with social groups, institutionalized elderly people and with different health conditions.

CONCLUSION

In conclusion, for the elderly in the present study who attend a social project in the municipality of Sarandi, state of Paraná, the duration and frequency of physical activity do not interfere with the risk of sarcopenia. However, the risk of sarcopenia is associated with the sedentary behavior of the elderly.

As practical implications, the importance of guidance from health professionals and competent public bodies regarding the practice of physical activity by elderly attending social groups, regardless of age group, at more vigorous intensities, preferably performed through physical activity, as a means of promoting the health of the elderly.

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