

ASSOCIATION BETWEEN RISK OF MALNUTRITION AND SEDENTARY BEHAVIOR IN THE ELDERLY

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Abstract: Introduction: The nutritional deficit, including the risk of malnutrition and malnutrition, deserve attention, especially when it comes to the elderly population, as well as the sedentary behavior that has been pointed out as frequent among the elderly. **Objective:** Investigate the association between risk of malnutrition and sedentary behavior in community-dwelling elderly people. **Methods:** Cross-sectional study, carried out with individuals aged ≥ 60 years, living in 24 municipalities in the state of Minas Gerais, Brazil. Nutritional status was assessed by the Mini Nutritional Assessment and sedentary behavior according to the questions of the International Physical Activity Questionnaire. Relative and absolute frequency distributions of the variables studied were calculated. Poisson regression was used to perform univariate and multivariate analyses. **Results:** A total of 3,100 elderly people were analyzed, of which 862 (27.8%) were classified as at risk of malnutrition and 778 (25.1%) with sedentary behavior. In the crude analysis, there was an association between sedentary behavior and risk of malnutrition, remaining after adjustment for confounding factors [(PR= 1.21, 95%CI 1.04-1.41); (RP=1.18, 95%CI 1.05-1.39); respectively]. **Conclusion:** It can be concluded that there is an association between risk of malnutrition and sedentary behavior.

Keywords: Nutritional status, sitting time, elderly, cross-sectional study.

INTRODUCTION

The elderly population is at risk of malnutrition, in the order of 31% to 46% [1]. In addition, sedentary behavior has also been pointed out as frequent among the elderly. The study by Harvey et. there^[2] observed that 60% of the elderly reported being seated for more than 4 hours, 54% watched more than 3

hours of TV, and 65% sat in front of a screen for more than 3 hours a day.

On the other hand, studies point to a positive association of sedentary behavior with the risk of developing morbidities, including diabetes mellitus, cardiovascular disease^[3] and the obesity^[4]. However, little is known about its effect related to nutritional deficit.

Nutritional deficits, including the risk of malnutrition and malnutrition, deserve attention in themselves, as they can predispose to disability and mortality,[5,6] especially in the case of the elderly population, which is more vulnerable to various diseases.

In addition, anorexia and inadequate nutrition can result in macro and micronutrient insufficiency, compromising systemic functioning and organic metabolic processes,[7] important for the prevention of malnutrition. Therefore, the aim of this study was to investigate the association between risk of malnutrition and sedentary behavior in community-dwelling elderly people.

METHODS

STUDY CHARACTERIZATION

Cross-sectional study, carried out with 3,430 individuals aged ≥ 60 years, living in 24 municipalities located in the southeast of the State of Minas Gerais. For the sample size calculation, the population base of 79,924 individuals aged ≥ 60 years was considered^[8] with the following parameters: sample error of 0.05; 95% confidence interval and population proportion of the elderly in each municipality (the elderly population of the municipality divided by the total population of the municipality).

All individuals residing in the urban area aged ≥ 60 years, through the Municipal Health Departments, were invited to attend the Primary Health Care Units of the municipalities to carry out the evaluations.

The inclusion criteria considered were: reaching the minimum score according to the level of education in the Mini Mental State Examination [9,10] and be able to walk even with the aid of a cane or walker. Elderly people who had severe hearing or vision deficits, making communication difficult, bedridden and wheelchair users were not included.

Data collection was performed using a multidimensional questionnaire applied individually by trained interviewers from May 2012 to April 2013. Data were collected after participants signed the Free and Informed Consent Form. The research protocols were evaluated and approved by the Ethics Committee in Research with Human Beings of "Universidade Federal do Triângulo Mineiro" (Opinion Number: 1640/2010).

To assess nutritional status, the version translated into Portuguese of the Mini Nutritional Assessment was used^[11]. The MAN considers 18 questions grouped into five sections: anthropometric, health, food, self-assessment of the perception of health and nutritional status and type of housing. A final score was obtained through each response being classified: ≥ 24 indicated normal weight, from 17 to 23.5 risk of malnutrition and < 17 malnutrition^[12].

Sedentary behavior was assessed according to questions from the International Physical Activity Questionnaire,^[13] validated in Brazil for older women^[14] and old men^[15]. For data analysis, the following formula was used: Total sitting time = (time on a weekday * 5) + (time on a weekend day * 2). Sitting time per day = Total sitting time / 7^[16,17].

The following variables were considered as independent: sex (female, male), age group (60-69, 70-79, ≥ 80 years), education (none, 1 to 4 years, ≥ 5 years), skin color (white, yellow, brown, black), family income (0, 1 minimum wage, > 1 and ≤ 3 minimum wages, > 3 minimum wages), smoking (ex-

smoker, yes), alcohol (no, yes), diseases (no, yes).

DATA ANALYSIS

The collected data were processed by double typing in the Microsoft Office Excel® 2007 program and then their consistency was performed. Statistical analyzes were performed in the *software* SPSS (*Statistical Package for Social Sciences*, version 20.0).

Sedentary behavior was determined by the distribution obtained from the 75th percentile (330 min/day) where: < 330 min/day = no and ≥ 330 min/day = yes.

The relative and absolute frequency distributions of the variables studied were calculated, adopting the value of $p < 0.05$ as significant.

First, univariate Poisson regression was performed between nutritional status and confounding factors (independent variables) considered according to $p \leq 0.20$ ^[18]. Subsequently, a univariate analysis was performed between sedentary behavior and nutritional status (Model 1). Then, the multivariate analysis (Model 2) between sedentary behavior and nutritional status, with the association being adjusted for confounding factors.

RESULTS

Of the total of 3,430 elderly people who participated in the research, 3,100 (90.3%) contained all the information for the present analysis and, of these, 54 (1.7%) were classified as malnourished, being excluded from the analyses. 862 (27.8%) were classified as at risk of malnutrition and 778 (25.1%) with sedentary behavior.

When analyzing socioeconomic characteristics, behavioral habits and diseases, there was a predominance of females, aged between 60 and 69 years, 1 to 4 years of schooling, white skin color, family income

between $> 1 \leq 3$ minimum wages, no smokers, do not consume alcoholic beverages, with the presence of diseases (Table 1).

Variables	Frequency
	n (%)
Gender	
Male	1197 (38,6)
Feminine	1903 (61,4)
Age Group	
60 to 69 years	1632 (52,6)
70 to 79 years	1105 (35,6)
≥ 80 years	363 (11,8)
Scholarity	
None	920 (29,7)
1 to 4 years	1695 (54,7)
≥ 5 years	485 (15,6)
Skin color	
White	1857 (59,9)
Yellow	65 (2,1)
Brown	757 (24,4)
Black	421 (13,6)
Family income (in minimum wages)[†]	
0	43 (1,4)
1	1171 (37,8)
$> 1 \leq 3$	1514 (48,8)
> 3	372 (12,0)
Tobacco smoking	
No	1840 (59,4)
Ex smoker	795 (25,6)
Yea	465 (15,0)
Alcoholic beverage	
Not	2611 (84,2)
Yes	489 (15,8)

Illnesses

Not	305 (9,8)
Yes	2795 (90,2)

[†] Minimum salary in force in the period of realization = R\$678.00.

Table 1. Socioeconomic characteristics, behavioral habits and diseases of the elderly.

In the crude analysis, it was observed that all independent variables were associated with nutritional risk and sedentary behavior (data not shown).

Table 2 demonstrates the association between the risk of malnutrition and sedentary behavior in the elderly. In the crude analysis, there was an association between sedentary behavior and risk of malnutrition, remaining after adjustment for confounding factors [(PR= 1.21, 95%CI 1.04-1.41); (RP=1.18, 95%CI 1.05-1.39); respectively].

Risk of malnutrition	Model 1 RP (IC 95%)	P*	Model 2 RP (IC 95%)	P*
Not	1		1	
Yes	1,21 (1,04 - 1,41)	0,013	1,18 (1,05 - 1,39)	0,003

* Wald test.

Model 1 = Gross.

Model 2 = Model 1 + Confusion Factors.

Confusion Factors = sex, age group, education, skin color, family income, smoking, alcohol, diseases.

Table 2 – Association between risk of malnutrition and sedentary behavior in the elderly.

DISCUSSION

In the present study, there was a positive association between sedentary behavior and risk of malnutrition. Unfortunately, to date, we do not have any comparative studies that have evaluated the association between risk of malnutrition and sedentary behavior.

A recent systematic review with meta-analysis carried out by our group did not find studies that established an association between more time spent in sedentary behavior and malnutrition in the elderly^[19].

On the other hand, two studies used the body mass index to assess low weight (BMI < 22.0 kg/m²). In the study by Boscatto et al^[20], with the objective of verifying factors associated with the nutritional status of a population of individuals aged ≥ 80 years, did not find an association between low weight and sitting time. However, the study by Fares et al.^[21] found that low weight was inversely associated with longer sitting time (≥ 6h/day). The differences found in the results between the studies may be related to the age group of the individuals, the way of obtaining and analyzing the sedentary behavior.

The body mass index has been frequently used for its association between low weight and risk of morbidity and mortality, as it expresses a ratio obtained by the quotient of body mass by the square of height. However, this index does not discriminate body composition^[22]. In addition, the assessment of the nutritional status of the elderly must incorporate several aspects and not only the anthropometric assessment provided by the body mass index. To perform the nutritional diagnosis of the elderly in a global way, there are several instruments developed and used, among them, the Mini Nutritional Assessment (MAN) which is the most frequently used^[23,24].

According to the observed results, the risk of malnutrition increased the chance of maintaining sedentary behavior by 18% after adjusting for confounding variables. It is known that sitting activities use very little total caloric expenditure, which may be favorable for individuals at risk of malnutrition; on the other hand, we believe that it can trigger other mechanisms and damage to the individual.

Meneguci et al^[25], described an explanatory model of sedentary behavior and its deleterious effects on health. According to the authors, muscle tissues reduce glucose utilization, producing insulin resistance and leading to muscle atrophy.

In addition, another aggravating factor for muscle atrophy is the decrease or absence of protein-rich foods^[26]. Therefore, two concomitant mechanisms can stimulate muscle atrophy, the first resulting from sedentary behavior, due to the lack of stimulus and the availability of substrate; in this case, protein for muscle tissue synthesis.

The decrease in caloric intake can also lead the body to catabolize its reserves and, consequently, to the degradation of muscle mass^[27], one of the risk factors for sarcopenia.

Sarcopenia is defined as a reduction in muscle mass, which can lead to impairments in muscle function and strength^[28]. Chen et al (2014)^[29], found that, in the Asian region known for its large number of rapidly aging inhabitants, there was a prevalence of sarcopenia of around 20% in people over 65 years of age and 50% to 60% in people over 80 years of age.

In a study with 1149 healthy Brazilian elderly people aged over 60 years, a prevalence of sarcopenia of 15.4% was identified, and this fact is significantly related to increasing age, not being married, having low income, being insufficiently active (women only), have cognitive impairment, low body mass index, malnutrition and risk for malnutrition, presence of diabetes (only women) and osteoarthritis (only men)^[30].

Gianoudis et al (2015)^[31], observed that a high level of sedentary behavior was associated with decreased muscle mass and increased sarcopenia in community-dwelling elderly people, regardless of the level of physical activity.

Sedentary behavior can trigger inflammatory processes resulting from reduced aerobic capacity, muscle strength and metabolic function^[32,33]. Such changes impair systemic functioning, compromising body homeostasis and favoring the onset of various diseases^[34]. Cândido et al.^[35], found greater chances of involvement in the vascular-metabolic pattern for the elderly who stayed between 3 and 6 hours a day in sedentary behavior.

Our results have some limitations, mainly in relation to the collection of data that were based on self-report, which can induce information bias. On the other hand, to minimize this bias, the Mini Mental State Examination was used as an inclusion criterion^[9]. In addition, as this is a cross-sectional study, we cannot confirm the causality between risk of malnutrition and sedentary behavior.

It can be concluded that there is an association between risk of malnutrition and sedentary behavior. Therefore, the findings reinforce the importance of evaluating, monitoring and intervening in elderly people who are at risk of malnutrition and in sedentary behavior together.

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