Revista Brasileira de Enfermagem
REBEn

THEMATIC ISSUE:
HEALTH OF THE ELDERLY

RESEARCH

Profile of the body mass index and associated factors in active elderlies

Perfil do índice de massa corporal e fatores associados em idosos ativos

Perfil del índice de masa corporal y factores asociados en ancianos activos

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How to cite this article:
Reis LA, Lima PV, Lopes AOS, Duarte SFP, Lopes AS, Batista GTC. Profile of the body mass index and associated factors in active elderly. Rev Bras Enferm [Internet]. 2018;71(suppl 2):876-83. [Thematic Issue: Helth of the Elderly] DOI: http://dx.doi.org/10.1590/0034-7167-2016-0683

Submission: 02-15-2017 **Approval:** 12-09-2017

ABSTRACT

Objective: Identifying the profile of Body Mass Index and associated factors in active elderlies. **Method:** This is an analytical type of research with cross-sectional design and quantitative approach, with sample represented by 105 elderly people. The research instrument consisted of Cognitive assessment, Sociodemographic data, Health conditions and Motor performance evaluation. The data were analyzed by using descriptive analysis and binary logistic regression. **Results:** The elderlies without partners have 7.753 times the chance of presenting excess weight when compared to those with partners. Having an income higher than a minimum wage represents 6.014 times the chance of being overweight. Not having health problems amounts to 0.015 times the chance of being overweight. In the motorperformance, not presenting limitation of balance represents 6.785 times the possibility of being affected by excess weight.
Descriptors: Aging; Obesity; Health Conditions; Social Conditions; Body Weight.

RESUMO

Objetivo: identificar o perfil do Índice de Massa Corporal e os fatores associados em idosos ativos. Trata-se de uma pesquisa do tipo analítica com delineamento transversal e abordagem quantitativa, com amostra de 105 idosos. **Método**: O instrumento de pesquisa foi constituído de: Avaliação cognitiva, Dados sociodemográficos, Condições de saúde e Avaliação do desempenho motor. Os dados foram analisados por meio da análise descritiva e regressão logística binária. **Resultados**: O idoso que não tem companheiro apresenta 7,753 vezes a chance de apresentar excesso de peso quando comparado ao idoso com companheiro. Possuir renda maior que um salário mínimo representa 6,014 vezes a chance de ter excesso de peso. Não apresentar problemas de saúde equivale a 0,015 vezes a oportunidade de ter excesso de peso. No desempenho motor não apresentar limitação do equilíbrio representa 6,785 vezes a possibilidade de ser acometido pelo excesso de peso.
Descritores: Envelhecimento; Obesidade; Condições de Saúde; Condições Sociais; Peso Corporal.

RESUMEN

Objetivo: Identificar el perfil del índice de masa corporal y factores asociados en adultos mayores activo. Es un tipo de análisis de la investigación con diseño transversal y un enfoque cuantitativo con una muestra de 105 personas de edad avanzada. **Método:** El instrumento de investigación consistió en: la evaluación cognitiva, datos sociodemográficos, condiciones de salud y la evaluación del rendimiento del motor. Los datos fueron analizados mediante el análisis descriptivo y regresión logística binaria. **Resultados:** La persona de edad avanzada que no tiene compañero tiene 7.753 veces más probabilidades de tener exceso de peso en comparación con el viejo. Tener un ingreso mayor que el salario mínimo es 6.014 veces más probabilidades de tener sobrepeso. No tiene problemas de salud asciende a 0.015 veces la probabilidad de tener sobrepeso. El rendimiento del motor no presenta saldo de la limitación es 6.785 veces más propensos a ser afectados por el exceso de peso.
Descriptores: Envejecimiento; Obesidad; Las Condiciones de Salud; Condiciones Sociales; Peso Corporal.

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INTRODUCTION

The growth in the number of elderlies in Brazil is notorious and apparent. According to IBGE[1] over the last 20 years, the number of elderly people has doubled in the country because of low population growth and both declining birth rates and fertility. "In 2050, for the first time, there will be more seniors than children under 15 years old. Since 2012, 810 million people are now 60 years old or more than that, constituting 11.5% of the global population"[2-3].

Accompanied by this increase phenomenon in life expectancy and aging population, obesity epidemic arises, triggered by habits of unhealthy modern life, such as inadequate nutrition and reduced physical activity[4]. The disease is increasing among adults and it also affects the elderly population[5]. The World Health Organization (WHO) data show that "overweight and obesity are now observed in all age groups, taking on greater proportions with increased age" [6].

Obesity is classified as a chronic metabolic disease characterized by abnormal or excessive accumulation of body fat that forms theadipose tissue and is directly related to the onset of other chronic diseases[7-8]. It can also be estimated by the Body Mass Index / BMI[9].

Obesity is considered a public health problem which becomes a concern when associated with its high prevalence among elderlies. With advancing age, certain illnesses and disabilities are already physiological and expected. However, with the presence of obesity, besides substantially increasing the likelihood of worsening and making emerge chronic noncommunicable diseases, it directly affects the quality of life of this group[10].

The aggravating factor of obesity is premature death and disability arising from the disease; it is responsible for triggering neoplastic, orthomolecular and cardiovascular pathologies, and it is already considered a major challenge to the maintenance of health and healthy life of elderly people in contemporary society[11].

Despite the high accuracy of complementary methods, its high cost and operational complexity hinder the routine use of these methods in obesity approach. Anthropometric measurements, represented by the Body Mass Index / BMI is indicated as a great efficacy parameter to assess the health risk related to weight[12]. For elderlies, this parameter can be integrated with other tests such as the Daily Life Basic Activities (DLBA) and the Daily Life Instrumental Activities (DLIA) and motor performance assessment, searching for factors related to obesity, its characteristics and disabilities.

Pointing factors that bring to light the problems between the elderly and nutritional changes become greatly important tasks since the number of studies on obesity in specific groups is still insufficient, such as those of elderlies, while the actions and research related to this subject can contribute to reflections, instigate and strengthen public policies with specific measures for controlling and coping with obesity among these population, making it possible to improve life quality and healthy aging. In this perspective, this study aims to identify the profile of the Body Mass Index and the associated factors in active elderlies.

METHOD

Ethical aspects

Initially, the project was submitted to the Brazil platform, approved by the Human Beings Research Ethics Committee at the State University of Southwestern Bahia, obeying the ethical standards required by Resolution nº 466, 2012 (National Health Council), which included the obtainance of the free and informed consent in writing of each participant. During the collection, the confidentiality and anonymity of study participants were respected.

Study design, place and period

This is an analytical type of research with cross-sectional design and a quantitative approach, carried out in a group of living of the elderlies, in the city of Vitória da Conquista/BA, located in the southwestern region of the State of Bahia, Brazil.

Sample and inclusion and exclusion criteria

The study population was represented by 300 elderlies registered in the group, with inclusion criteria: be regularly attending the activities of the group of living, have mental conditions to answer the application of the survey instrument (score above 24 points in the MEMS); exclusion criteria: to present visual and hearing impairment, and be handicapped. After applying the inclusion and exclusion criteria, the study sample was represented by 105 elderly people.

Study protocol

The research instrument consisted of four (4) parts described below:

Part 1: Cognitive evaluation: one used Pfeiffer's MEMS (Useful instrument to detect cognitive impairment in the elderlies, with ten questions, which evaluate the short and long term memory, orientation, daily information and the ability to calculate[13]. Through questions of the Mini examination mental state, in which, from the answers one can know whether the individual is able to continue participating in the research.

Part 2: Socio-demographic data: Assessed through a questionnaire, with the following items: gender (male or female), age (≥ 68 years and <68 years), marital status (married / steady, single, separated / divorced or widow and the income type (≤ 1 minimum wage or> 1 minimum wage), education (literate or illiterate).

Part 3: Health Conditions: One evaluated: self-perception of health, presence of health problems; Functional Capacity: Daily Life Basic Activities (DLBA) and Daily Life Instrumental Activities of (DLIA).

For the evaluation of DLBA, Barthel's index was used and for the DLIA, Lawton's Scale. Barthel's index is used to assess the functional capacity, comprising 10 activities: feeding, bathing, performing personal hygiene, dressing, intestines, bladder, transfer to intimate hygiene, moving- chair and bed, walking and climbing stairs. The score corresponding to the sum of all obtained points, considered independent the individual who achieved the total score, i.e., 100 points. Scores below 50 indicate dependency in ADLs[14].

Lawton's Scale is used to assess functional capacity; it encompasses more complex activities needed for a more autonomous social life, such as making a phone call, going shopping, preparing meals, cleaning the house or taking care of the garden, doing repairs at home, washing and ironing clothes, using transportation, taking medication and controlling private finance and/or of house. For each question, the first answer means independence, the second, partial dependence or ability to help and the third, dependence. The maximum score is 27[14].

Part 4: Motor performance assessment: Carried out through the tests Flexibility/mobility, Sitting down and Standing up Test (SST), walking test for 2.44m, Balance and Handgrip.

-*Flexibility/mobility*: The test "squat and pick up the pencil on the floor" proposed to observe flexibility/mobility of the posterior muscles of the leg and to check the elderlies' ability to get down and get up. The individuals were in standing position with the feet together; then, they had to crouch and pick up a pencil 30 centimeters in front of the tip of their feet. They would stand up again for 30 seconds. It was observed if individuals could accomplish the test or not, and if yes, how long they needed to accomplish it[15].

-Sitting down and Standing up Test and Lift (SST): used as a strength measure of the lower limbs among the elderlies. The individuals started the test in sitting position with the back straight and arms crossed over their chest, feet apart and shoulder width and flat on the ground; one foot should be slightly advanced in relation to the other to help keep balance. They should get up five times as fast as possible, without any break. The test is considered successfully concluded when performed in time equal to or less than 60 seconds[15].

- Walking test for 2.44m: Used to evaluate the physical mobility, speed, agility and dynamic balance. The individuals walked on the path marked on the floor (2.44 m) at their normal speed, as if walking on the street; it was checked whether they could or could not perform the test and how many seconds were spent for the first and second time[16].

-*Balance*: Used to evaluate static balance. Initially, the individuals remained standing up for 10 seconds, keeping the feet together and eyes open. Then, they should remain standing for 10 seconds placing the heel of one foot in front of the other, keeping the eyes open. Later they should keep standing up, leaning on the other leg, for 10 seconds, without using any support. Finally, they should remain standing up, leaning on the other leg for 10 seconds without using any support. The evaluated individuals were classified as incapable if they could not perform any task; weak, if not able to perform only task 1; average, if they could only accomplish tasks 1 and 2 and good if they could only accomplish tasks 1 and 2 plus 3 and/or 4[15].

-*The handgrip*: assessed using a hydraulic hand dynamometer SAEHAN model SH500; one set the machine for each individual according to the size of their hands, performing three measurements on the left and right arm of the participants, alternately by segment. In each of the measurements the individual under examination was sitting with the shoulder in neutral position, elbow at 90°, forearm in neutral position and the wrist between 0 to 30° of extension and 0 to 15° of ulnar deviation; the individual gripped the dynamometer with hands strength and at the end the recording of the strength was established in kg/force [kg/f].One performed three attempts with a one-minute period of recovery between them and the average of the three were the value of FPM. The elderlies undergoing some surgery in the arm or hand in the three months prior to the data collection were excluded from the test[16].

The data of Body Mass Index (BMI) were obtained by means of a portable digital electronic scale with the individual barefoot and wearing the minimal clothing as possible. The height measurement was performed by using the anthropometer, which was attached to a collapsible and portable aluminum support. The body mass was obtained in kilograms (kg) and height in meters (m). The BMI resulted from the calculation of dividing body mass by the squared height (kg/m^2).It considered underweight elderlies those who had a score in BMI <18.5 kg/m^2; Eutrophic or Adequate those who had BMI $\geq$ 18.5 kg/m to 24.9 kg/m; overweight those who hadBMI $\geq$ 25 kg/m to 29.9 kg/m and obese those who had a BMI $\geq$ 30 kg/m[17].

Analysis of the results

The collected data were organized in electronic database by typing in a spreadsheet of the Statistical Program SPSS version 21.0. In the descriptive analysis the distribution of absolute frequency and percentage distribution were performed. In the analytical approach, one initially performed the chi-square analysis for the selection of the main effects, adopting a significance level of 0.025 for input of co-variables in the model.

Afterwards, the binary logistic regression analysis was carried out. To identify the factors related to overweight in the elderly, a multiple logistic regression analysis was performed using hierarchical analysis. Through the strategy established of associations between the studied dimensions (socio-demographic), health conditions and motor performance, three explanatory models of binary logistic regression were developed, introducing the variables in the form of blocks, staying in the subsequent model only those that had statistical significance ($p<0.05$) in the previous model.

The output criteria for all variables introduced in each model was $p<0.05$. Finally, a final regression model was achieved only with the variables of greater statistical significance. The method adopted for the introduction of the variables in the models was the backward conditional. A significance level of $p<0.05$ was considered and confidence interval (CI) of 95%, with calculation of adjusted chance ratios.

RESULTS

Table 1 shows the distribution of the sample in relation to the sociodemographic characteristics, according to BMI. It is observed that the highest frequency was of overweight elderlies in the variables gender, age group, education, marital status and income $\geq$1 minimum wage.

In Table 2, it was found that the distribution of health conditions regarding the BMI had a greater concentration of elderly people classified as overweight in the variables self-perceived health status, the presence of health problems, DLBA and DLIA.

Table 1 – Distribution of the sample in relation to the sociodemographic data, according to the Body Mass Index

	BMI							
	Insufficient Weight (< 22 kg/m2)		Adequate Weight (22 to 27 kg/m2)		Overweight (>27 kg/m2)		Total	
	n	%	n	%	n	%	n	%
Gender								
Feminine	5	5.10	38	38.40	56	56.60	99	100.00
Masculine	2	33.30	2	33.30	2	33.30	6	100.00
Age Group								
≥ 68 years	4	8.50	23	40.40	31	53.40	58	100.00
< 68 years	4	8.50	17	36.20	26	55.30	47	100.00
Education								
Literate	7	7.30	38	39.60	51	53.10	96	100.00
Illiterate	-	-	2	22.20	7	77.80	9	100.00
Marital Status								
Married/steady	4	11.10	21	58.30	13	34.20	38	100.00
Single	-	-	2	13.30	13	86.70	15	100.00
Widow	3	7.70	12	30.80	24	61.50	39	100.00
Divorced/Separate	-	-	5	38.50	8	61.50	13	100.00
Income								
≥ 1 Minimum Wage	4	5.10	26	32.90	49	62.00	79	100.00
< 1 Minimum Wage	3	11.50	14	53.80	9	34.60	26	100.00

Note: BMI - Body Mass Index

Table 2 – Distribution of the sample in relation to health conditions, according to Body Mass Index

	BMI							
	Insufficient Weight (< 22 kg/m2)		Adequate Weight (22 to 27 kg/m2)		Overweight (>27 kg/m2)		Total	
	n	%	n	%	n	%	n	%
Health perception								
Positive	3	3.90	29	38.2	44	57.90	76	100.00
Negative	4	13.8	11	37.90	14	48.30	29	100.00
PresenceofHealth Problems								
Yes	7	8.30	37	44.00	40	47.60	84	100.00
No	-	-	4	20.00	17	80.00	21	100.00
DLBA								
Independent	6	6.50	36	39.10	50	54.30	92	100.00
Dependent	1	7.70	4	30.80	8	61.50	13	100.00
DLIA								
Dependent	6	7.70	30	38.50	42	53.80	78	100.00
Independent	1	3.70	10	37.00	16	59.30	27	100.00

Note: BMI - Body Mass Index; Daily Life Basic Activities (DLBA); Daily Life Instrumental Activities of (DLIA).

Table 3 – Distribution of the sample in relation to the motor performance, according to Body Mass Index

	BMI							
	Insufficient Weight (< 22 kg/m2)		Adequate Weight (22 to 27 kg/m2)		Overweight (>27 kg/m2)		Total	
	n	%	n	%	n	%	n	%
Balance								
With limitation	1	5.30	3	15.80	15	78.90	19	100.00
Without limitation	6	7.00	37	43.00	43	50.00	86	100.00
Sit down/Stand up								
With limitation	1	16.70	1	16.70	4	66.70	6	100.00
Without limitation	6	6.10	39	39.40	54	54.50	99	100.00
Squat and pick up apencilon the floor								
With limitation	7	8.00	37	42.00	44	50.00	88	100.00
Without limitation	-	-	3	17.60	14	82.40	17	100.00
Walk								
With limitation	-	-	-	-	3	100.00	3	100.00
Without limitation	7	6.90	40	39.20	55	53.90	102	100.00

Note: BMI - Body Mass Index

According to the data presented in Table 3, there was an increased frequency of elderlies classified as overweight in the performance of activities.

Based on the results of the binary logistic regression, Table 4, the elderly who has no partner presents 7.753 times the chance of having weight excess when compared to the elderly with a partner; therefore, to be old with a partner is a protective factor for weight excess.

As for the income, having income greater than a minimum wage represents 6.014 times the chance of being overweight, when compared to having lower income or equal to a minimum wage, according to data from table 4. Thus, earning an income less than or equal to a minimum wage is a protective factor against overweight.

In relation to health conditions, presenting a health problem is a protective factor for overweight and not having health problems amounts to 0.015 times the chance of being overweight, so the fact of having health problems is a protective factor against overweight.

In motor performance, presenting limitation of balance is a protective factor against overweight, and not presenting limitation of balance is 6.785 times more likely to be affected by weight excess, according to the Table 4.

Table 4 – Results of the binary analysis of factors associated with overweight for elderlies

Characteristics	Chance Ratio [95%]	Valor de *p*
Sociodemographic		
Marital Status		
Without a partner	Reference	0.00
With a partner	[7.753-2.682-22.412]	
Income		
≥1 Minimum wage	Reference	0.003
<1 Minimum wage	[6.014-1.877-19.850]	
Health Conditions		
Health Problems		
Yes	Reference	0.025
No	[0.150-0.029-0.785]	
Motor Performance		
With limitation	Reference	0.010
Without limitation	[6.785-1.589-28.969]	

DISCUSSION

The studied sample is constituted predominantly by female elderlies, and this number of elderly women, higher than that of men, is in accordance with the reality of elderly people in social groups throughout Brazil, because the highest participation is of women[18].

As the Irish data, about rapid growth of the elderly overweight population[19], Brazil experiences this reality[20]. However, information about the frequency of overweight and obesity among the elderly in Brazilis still scarce[21]. This may be because individuals losing weight are more common with age, but contrary to this reality, what one sees are elderlies increasingly accumulating body fat[22].

According to the present data, most elderlies are overweight; these data are supported by a study conducted in the city of Vitória, state of Espírito Santo, Brazil which found that 65.2% of the researched elderlies were overweight/obese[21]. This reality presented should be considered seriously, because overweight and obesity have significant health consequences, in the sense that they are easily associated with cardiovascular diseases, musculoskeletal disorders, impaired mobility and function. Add to this the association with high mortality, but also with many years lived with disability[19].

When analyzing the relationship between age group and BMI of the elderlies, it was observed that both the age group equal to or older than 68, and the age group less than 68 overweight was prevalent. Similar results were found in the study by Souza et al. [23], where 50.4% of the elderlies were classified as overweight, with obesity grade I and II and in the study of Palma et al.[24] where the 51.4 were overweight.

When analyzing the educational data regarding BMI it was found that literate elderlies presented a higher percentage of weight excess in comparison to non-literate ones; these data are contradictory to those found in a study carried out with 13,943 Brazilian elderlies, from the Household Budget Survey (HBS), where elderly with low and middle education were those with the highest prevalence of overweight[25].

An international study showed that the shorter the education time, the greater are the chances for an individual to be overweight[26]. It is noteworthy that these individuals are more likely to have unhealthy eating habits and have less access to healthcare and adherence to educational and sanitary programs, since education is also related to the possibilities related to income[25].

When analyzing the BMI relationship with marital status, it became clear that single, widowed and divorced elderlies present percentage of weight excess greater when compared to those married. This may be justified by the fact that single elderly people have irregular habits for the frequency of meals, preferring snacks, eating out, choosing to "pinch" food with high caloric density, or even spending less energy.

Regarding the association between income and BMI results showed that elderly people with income equal to or more than a minimum wage have higher overweight rates when compared to those who have income below the minimum wage. A study by Silva et al. [25] concluded that the Brazilian elderly population of high income, even having access to health services, healthy food and physical activity are showing higher overweight and obesity rates.

It was found in this study a greater distribution of positive health perception among the overweight elderlies. This datum was contrary to other studies that have been shown in recent years, since all findings concluded that overweight and obesity are associated with a negative perception of health[27,28].

Regarding the presence of health problems according to BMI, we observed in this study that being overweight is more common in the elderlies who reported health problems. This finding is closely related to changes in habits when an elderly has some pathology, such as in the case of diabetes and hypertension, given that to maintain normal blood glucose levels and blood pressure, elderly people need to maintain a low sodium,

hypocaloricand hypoglycemicdiet, besides doing some kind of physical activity and maintaining other healthy habits[29].

In assessing the relationship between BMI and functional capacity, it was found that most elderlies classified as independents of DLBA presented overweight, data corroborated by studies showing low weight compared with functional dependence[23,30]. Nevertheless, it was still found that those classified as dependents in DLIA were overweight. This is primarily because these older people cannot do any physical activity, many perform only light hiking within their own home environment and spend time sitting or lying down for too long.

In BMI relationship with the motor performance, it was found that most elderlies classified without balance limitation presented overweight; these data were contradictory to a study with 124 elderlies from Presidente Prudente, São Paulo State in which it was possible to observe that "those with more lean mass value performed better in tests of mobility and balance than those with less lean mass value"[31].

In the activity of sitting down and standing up, it was found that there was a greater distribution of elderlies defined overweight without limitation. A study conducted in Campina Grande, Paraíba State indicated that the reduction in muscle mass is associated with decreased muscle strength and impairment of daily activities to be performed by elderly people[32].

The relationship between BMI and motor performance thus becomes relevant, since the higher the nutritional change to malnutrition or overweight identified by BMI, the lower the motor performance for routine activities such as squatting, sitting down and walking[33], in this study, the elderly people classified with limited activity of squatting and picking up a pencil on the floor are overweight. It is true that the elderlies already have a commitment to their functions with advancing age that cause significant anatomo-functional changes that can be worsen with obesity[34], a factor that can be proved with the findings presented here.

As for the walking activity, those defined without limitation were overweight, a possible explanation for this is the fact that elderlies who do not have walk limitations are probably independent elderlies and thus do not require third-party care, and so can present an uncontrolled and appropriate limitation.

According to the results of the binary logistic regression, sociodemographic data related to overweight wwere the marital status related to not having a partner and income greater than or equal to 1 minimum wage. The elderlies who do not have a partner tend to have bad eating habits, which contributes significantly to obesity, whereas those with higher income or equal to 1 minimum wage have greater ability to consume canned food and preservatives.

When analyzing the health conditions by binary regression, the data showed that having a health problem is a protective factor for weight excess. This fact is especially true because those who have a particular disease, chronic in most times, are more likely to lose muscle mass and are also inserted into healthier habits programs.

Limitations of the study

Regarding motorperformance it was found that presenting balance limitation is a protective factor against overweight. This can be justified by the fact that the elderly with balance limitation tend to receive third-party care and thus ultimately present controlled food.

Contributions to the area of nursing, health or public policy

The contributions of the results of the present study to the area of nursing and public health are related to the fact that the identification of the body mass index profile and associated risk factors will serve as a basis for the implementation of preventive measures against obesity in the aging. Nevertheless, the adoption of measures of body weight control in the elderlies in order to reduce the health risks posed by obesity-can also improve the quality of life of the elderly population. Therefore, it is suggested that new studies be performed with a larger sample so that the data to be found can be generalized.

FINAL CONSIDERATIONS

This study found that there was a greater distribution of the evaluated overweight elderlies, most of them being women, aged equal to or greater than 68, literate, without a partner, with income above the minimum wage, who have self perception of positive health, classified as independent in DLBA and dependent in DLIA. It was found that the factors associated with weight excess evaluated were having a partner, having an income above the minimum wage, not presenting health problems and not presenting balance limitation.

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