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Factors associated with the nutritional status of elderly participants of the study "EpiFloripa Idoso"

Fatores associados ao estado nutricional em idosos participantes do Estudo "EpiFloripa Idoso"

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Abstract

Objective: To determine the association between nutritional status and demographic, socioeconomic, lifestyle, and health condition factors in the elderly. *Methods:* A population-based, cross-sectional study, held in 2009, with 1705 elderly in Florianópolis. Nutritional status was assessed by body mass index. We analyzed the data using a multinomial logistic regression. *Results:* The prevalence of under- and overweight was 7.7% and 56.8% in women, respectively, and 9.9% and 44.9% in men. In women, being overweight was associated with being insufficiently active, three or more comorbidities, and disability in daily living activities. In men, underweight was associated with being single, less educated, and lack of Internet use, whereas overweight was associated with lower incomes, being a former smoker, moderate/severe disability, and poorer health perception. In men 80 years of age or older, income in the third quartile and smoking were associated with low and overweight, respectively. *Conclusions:* In women, nutritional status was associated with modifiable lifestyle habits, chronic diseases and disabilities. In men, it was related to sociodemographic factors. Thus, strategies to maintain the nutritional status of women and men must be differentiated.

Keywords: Nutritional Status. Aged. Cross-Sectional Studies. Socioeconomic Factors.

Resumo

Objetivo: Verificar associação entre estado nutricional e fatores demográficos, socioeconômicos, estilo de vida e condições de saúde em idosos. *Método:* Estudo transversal, base populacional, realizado em 2009, com 1.705 idosos de Florianópolis. O estado nutricional foi avaliado pelo índice de massa corporal. Utilizou-se regressão logística multinomial. *Resultados:* A prevalência de baixo peso foi 7,7% e 9,9% e excesso de peso, 56,8% e 44,9%, para mulheres e homens, respectivamente. Nas mulheres, excesso de peso foi associado a ser insuficientemente ativo, três ou mais morbidades e incapacidade nas atividades de vida diária. Nos homens, baixo peso foi associado à ausência de companheiro e não uso de Internet. O excesso de peso associou-se à menor renda, ser ex-fumante, fumante atual, incapacidade moderada/grave e pior percepção de saúde. Ainda, ter 80 anos ou mais e renda no 3º quartil foram associados ao baixo e excesso de peso nos homens. *Conclusões:* O estado nutricional foi associado, para mulheres, a hábitos de vida modificáveis, doenças crônicas e incapacidades. Para os homens, o estado nutricional foi mais relacionado aos fatores sociodemográficos. Assim, as estratégias para manutenção do estado nutricional de mulheres e homens devem ser diferenciadas.

Palavras-chave: Estado Nutricional. Idoso. Estudos Transversais. Fatores Socioeconômicos.

Introduction

In the world scenario of population aging and epidemiological transition, one of the challenges for public health is to keep aging active and healthy.[1] Among the goals agreed upon by the [World Health Organization (WHO)] Global Strategy on Diet, Physical Activity and Health,[2] maintenance of a balanced diet and consequently a healthy weight stands out, since individuals' nutritional status plays a crucial role in modulating chronic diseases and is an important indicator of quality of life and morbidity and mortality for the elderly.[3]

Aging has a negative impact on nutritional status due to decrease in physiological efficiency at this stage. Progressive changes include decreased functional capacity, changes in metabolic processes with modifications in body composition and lack of appetite.[3]

However, multiple determinants are associated with nutritional status of risk (low weight and overweight), such as sociodemographic factors, lifestyle, social relations and health conditions.[4-11] The literature reports that low weight, for example, is associated with males,[4,5,12] increase in age,

lower income,[4, 12] poor self-perception of health status, clinical history of dyslipidemias, smoking, and changes in cognitive function.[5,12-15] And overweight is associated with comorbidities, functional disability, among other factors.[4,6,7,9-11-16]

Despite the relevance of the topic, few Brazilian and recent studies evaluating these determinants have been found, taking into account stratification by gender, which may exert different magnitudes in the association measures. This study shall allow better understanding of gender influence in determining an elderly population's nutritional profile in a state's capital city in southern Brazil. Thus, the objective of this study was to verify the association between nutritional status and demographic, socioeconomic, lifestyle and health conditions, stratified by gender, among elderly people living in the Brazilian city of Florianópolis, Santa Catarina.

Methods

Area and study population

Data from this study are part of the "EpiFloripa Idoso" (www.epifloripa.ufsc.br) project, a cross-sectional population-based and home-based study, conducted with elderly (60 years or older) living in the Brazilian municipality of Florianópolis, state of Santa Catarina, southern Brazil, in 2009/2010.

Information related to location, study population and sampling was published in another study[17] and shall be presented shortly. A two-stage sampling strategy was used. In the first one, 80 (eight in each income decile) were systematically selected from among 420 urban census tracts in the municipality. The second stage units were the households, systematically drawn. All the elderly residing in the households randomly drawn were invited to participate in the study. Among households selected, 1,705 elderly people were interviewed. Interviews not performed after four attempts (including at night and at weekends) were considered as losses. And when people chose not to respond to the questionnaire, interviews were considered as refusals.

For data collection, a separate form was used in face-to-face interviews with the aid of (mobile device that functions as a personal information manager) *Personal Digital Assistant* (PDA) (also known as a handheld PC) for recording the data. Interviewers were previously trained for instrument testing, refinement and calibration (precision and accuracy) of the tests.

Dependent variable

Nutritional status was verified by body mass index for the elderly [BMI = body mass index (Kg) / height^2 (m)]. Measurements of body mass and height for BMI classification were carried out according to standardized procedures.[18] BMI was categorized according to criterion by *American*

Academy of Family Physicians,[19] adopted in Brazil by Brazilian government Food and Nutrition Surveillance System (Sistema de Vigilância Alimentar e Nutricional – SISVAN):[20] < 22 Kg/m², low weight; 22.0 ≤ BMI ≤ 27 Kg/m², adequate; > 27 Kg/m², excess weight.

Independent variables

Demographic and socioeconomic factors: Age group (60-69 years, 70-79 and 80 or more), marital status (with a companion – married, without a companion – single / separated / divorced / widowed), working at the time of interview (no; yes), schooling in years of study (0 to 4; 5 to 8; 9 to 11 and ≥ 12) and per capita family income stratified in quartiles (1st quartile: ≤ BRL 327.50; 2nd quartile: from BRL 327.50 to BRL 700.00; 3rd quartile: from BRL 700.00 to BRL 1,500.00 and 4th quartile: > BRL 1,500.00).

Lifestyle: Alcohol consumption (never, moderate, high or risky) verified through the first three questions in the (WHO) AUDIT (*The Alcohol Use Disorders Identification Test*) questionnaire,[21] smoking (current smoker, former smoker and has never smoked), leisurely physical activity verified through the International Physical Activity Questionnaire (IPAQ),[22] long version (0 to < 10 minutes; from 10 to 149 minutes and ≥ 150 minutes of physical activity/week).

Internet usage: Self-stated ability to use a computer to send and receive messages on the Internet.[23]

Health status: Number of morbidities (none to two morbidities, three or more reported morbidities) verified from questioning, "Have you ever been told by a doctor or health professional that you have or have had...?", in which there were 16 options for injuries [questionnaire for the Brazilian government National Home Sample Survey (PNAD, in the Portuguese abbreviation)][24] and functional disability[25] [absence of dependency, mild dependence (dependence on one to three activities) and moderate/serious (dependency on four or more activities)] assessed by means of the Brazilian Questionnaire on Multidimensional Functional Assessment adapted from the questionnaire *Old Americans Resources and Services* (BOMFAQ/OARS).[25] Health status self-perception was obtained through questioning, "In general, would you say that your health is: very good, good, regular, bad or very bad?"[26] The five response categories for the outcome were categorized in "very good/good," "regular" and "bad/very bad").

Data analysis

Descriptive analyses were performed for all variables. Nutritional status prevalence and respective confidence intervals (95% CI) were calculated according to the nature of exposures. For the crude and adjusted analysis, multinomial logistic regression was used, estimating Odds Ratios (OR) with their respective 95% confidence intervals (95% CI). For the adjusted analysis, the following variables were used in the final model: demographic, socioeconomic, Internet use

and health conditions. All analyses were stratified by gender. The level of statistical significance of 5% was considered.

Statistical program Stata SE 13.0 (*StataCorp., College Station*, EUA) was used to conduct data analysis. All analyses carried out consider the effect of sample design by conglomerates with the incorporation of sample weights.

The study protocol was approved by the Human Research Ethics Committee (HREC) at Brazilian university *Universidade Federal de Santa Catarina* no. 352/2008). Participation was voluntary by obtaining an Informed Consent Form (ICF). The authors declare having no conflict of interest.

Results

Of the total number of elders eligible for the study (n = 1911), 1.705 were interviewed, with a response rate of 89.1%. Nutritional status was evaluated in 1,646 elderly, because 59 participants did not have enough information to calculate the BMI. It was observed that 63.9% were female.

The highest frequency of elderly women was in the group from 60 to 69 years and they would have zero to four years of schooling (46.0%). More than half reported having no companion (55.2%) and would not be working at the time of the interview (90.1%). Over 70.0% did not consume alcoholic drinks, reported never having smoked, and less than 1/5 of the elderly females would practice 150 minutes per week of leisurely physical activity (16.2%). A large proportion reported not using the Internet (83.2%), having three or more morbidities (59.9%) and mild disability in activities of daily living (ADLs or ADL) (39.3%) (Table 1).

Table 1. Description of the sample and bivariate analysis, according to demographic and socioeconomic variables, lifestyle, Internet use and health conditions in women and men in the Brazilian city of Florianópolis, Santa Catarina, 2009/2010.

Variables	Women				Men			
	n	% Low weight	% Excess weight	P value	n	% Low weight	% Excess weight	P value
Age group				0.175				≤ 0.001
60 to 69 years	530	8.05	58.43		324	6.29	49.37	
70 to 79 years	400	5.94	57.11		212	10.84	42.86	
80 years or more	159	11.19	50.35		80	23.29	31.51	
Total	1089				616			

continue

Variables	Women				Men			
	n	% Low weight	% Excess weight	P value	n	% Low weight	% Excess weight	P value
Marital status				0.388				0.120
With a companion	488	6.93	59.03		505	8.78	45.71	
Without a companion	601	8.33	55.03		111	15.38	41.35	
Total	1089				616			
Presently working				0.526				0.054
Yes	108	10.28	57.01		121	5.00	53.50	
No	981	7.41	56.83		495	11.18	43.04	
Total	1089				616			
Schooling				0.408				0.004
≥ 12 years	202	6.57	52.53		192	3.76	54.84	
9 to 11 years	158	7.10	62.58		76	8.00	44.00	
5 to 8 years	244	7.91	54.42		97	13.98	39.78	
0 to 4 years	497	8.35	58.04		248	13.87	39.92	
Total	1101				613			
Per capita income (BRL)				0.372				≤ 0.001
4th quartile	246	5.83	53.33		172	6.59	56.89	
3rd quartile	259	6.88	57.09		166	4.32	45.06	
2nd quartile	284	8.42	59.71		151	16.67	39.58	
1st quartile (lower)	300	9.25	56.85		127	14.05	34.71	
Total	1089				616			
Alcohol consumption				0.682				0.027
No consumption	816	8.16	56.25		292	12.00	38.55	
Moderate	190	7.53	57.53		126	10.40	46.40	
High	83	3.66	60.98		198	6.70	53.09	
Total	1089				616			

continue

Variables	Women				Men			
	n	% Low weight	% Excess weight	P value	n	% Low weight	% Excess weight	P value
Smoking				0.222				≤ 0.001
Has never smoked	814	7.53	56.25		225	7.83	54.38	
Former smoker	208	6.83	62.44		315	9.27	42.72	
Currently a smoker	65	11.29	46.77		76	18.67	26.67	
Total	1087				616			
Physical activity at leisure times				0.086				0.519
150 minutes or more	176	10.29	48.00		147	11.11	43.06	
10 to 149 minutes	157	5.13	60.26		97	5.26	45.26	
0 to < 10 minutes	756	7.63	58.25		372	10.70	45.63	
Total	1089				616			
Internet usage				0.172				< 0.001
Yes	182	6.74	51.89		163	1.86	52.17	
No	907	7.89	57.89		453	12.93	42.26	
Total	1089				616			
Number of morbidities				< 0.001				0.076
0 to 2 morbidities	431	9.0	46.45		346	10.36	40.83	
3 or more morbidities	643	6.98	63.96		265	9.16	50.20	
Total	1074				611			
Disability in the ADL				< 0.001				0.433
Absence of disability	275	7.66	46.72		183	8.24	42.86	
Light	431	7.96	57.85		278	9.35	45.68	
Moderate/severe	383	7.41	63.53		155	13.43	46.27	
Total	1089				616			
Self-perception of health status				0.082				0.279
Very good/good	509	8.03	52.41		351	8.93	44.96	
Fair	438	7.44	60.70		208	11.33	47.78	
Bad/very bad	124	6.72	62.18		51	9.30	32.56	
Total	1071				610			

As for the male population, the highest frequency of the elderly was in the age group from 60 to 69 years (52.6%). More than half reported having a companion (82.0%) and would not be working at the time of the interview (80.4%). The highest prevalence was of elderly having zero to four years of schooling (40.5%), who would not consume alcoholic drinks (47.4%), former smokers (51.1%), insufficiently active at leisure (60.4%), reporting not using the Internet (73.5%), having none to two morbidities (56.6%), mild disability in ADL (45.13%) and very good/good health status self-perception (57.5%) (Table 1).

Prevalence of low weight was 8.5% (95% CI: 0.07 – 0.10) and excess weight at 52.5% (95% CI: 50.10 – 54.96). The proportion of women with low weight was 7.7% (95% CI: 6.23 – 9.48) and excess weight at 56.8% (95% CI: 53.82 – 59.81). While for men it was 9.9% (95% CI: 7.77 – 12.62) presented low weight and 44.9% (95% CI: 40.98 – 48.99), overweight.

Results of associations in the crude and adjusted analysis between nutritional status and independent variables in women and men are shown in Table 2 and Table 3, respectively.

Table 2. Gross and adjusted analyses for women in relation to factors associated with nutritional status. Florianópolis, Santa Catarina, Brazil, 2009/2010.

	Low weight			Excess weight		
Variables	Gross analysis		Adjusted analysis	Gross analysis		Adjusted analysis
	OR (95% CI)	P value	OR (95% CI)	OR (95% CI)	P value	OR (95% CI)
Age group (n = 1052)		0.471			0.309	
60 to 69 years	1		1	1		1
70 to 79 years	0.74 (0.36 – 1.51)		0.65 (0.32 – 1.32)	0.91 (0.61 – 1.36)		0.75 (0.48 – 1.16)
80 years or more	1.77 (0.63 – 4.90)		1.82 (0.63 – 5.28)	0.76 (0.49 – 1.19)		0.68 (0.41 – 1.14)
Marital status (n = 1052)		0.348			0.610	
With a companion	1		–	1		–
Without a companion	1.26 (0.77 – 2.08)		–	0.94 (0.68 – 1.26)		–
Currently working (n = 1052)		0.139			0.290	
No	1		–	1		–
Yes	0.60 (0.30 – 1.19)		–	0.73 (0.40 – 1.32)		–

continue

Variables	Low weight			Excess weight		
	Gross analysis		Adjusted analysis	Gross analysis		Adjusted analysis
	OR (95% CI)	P value	OR (95% CI)	OR (95% CI)	P value	OR (95% CI)
Schooling (n = 1047)		0.394			0.229	
≥ 12 years	1		–	1		–
9 to 11 years	1.37 (0.53 – 3.56)		–	1.52 (0.90 – 2.59)		–
5 to 8 years	1.17 (0.52 – 2.66)		–	1.01 (0.60 – 1.72)		–
0 to 4 years	1.51 (0.63 – 3.62)		–	1.42 (0.94 – 2.13)		–
Per capita income (BRL) (n = 1052)		0.105			0.625	
4th quartile	1		1	1		1
3rd quartile	1.88 (0.88 – 4.03)		1.83 (0.84 – 3.98)	1.15 (0.85 – 1.57)		1.14 (0.84 – 1.13)
2nd quartile	2.15 (0.92 – 5.03)		1.95 (0.79 – 4.78)	1.27 (0.77 – 2.08)		1.03 (0.61 – 1.72)
1st quartile (lower)	2.23 (0.96 – 5.17)		2.21 (0.91 – 5.36)	1.09 (0.70 – 1.70)		1.02 (0.66 – 1.57)
Alcohol consumption (n = 1052)		0.172			0.131	
No consumption	1		1	1		1
Moderate	0.84 (0.41 – 1.72)		1.05 (0.52 – 2.14)	1.17 (0.78 – 1.75)		1.33 (0.87 – 2.03)
High	0.40 (0.08 – 1.93)		0.51 (0.11 – 2.14)	1.39 (0.79 – 2.46)		1.72 (0.98 – 3.03)
Smoking (n = 1051)		0.952			0.955	
Has never smoked	1		–	1		–
Former smoker	1.09 (0.52 – 2.25)		–	1.42 (0.92 – 2.20)		–
Currently a smoker	0.97 (0.31 – 3.00)		–	0.67 (0.30 – 1.48)		–
Physical activity at leisure times (n = 1052)		0.777			0.078	
150 minutes or more	1		1	1		1
10 to 149 minutes	0.62 (0.21 – 1.85)		0.53 (0.18 – 1.60)	1.83 (1.05 – 3.22)		1.74 (1.03 – 2.91)
0 to < 10 minutes	0.90 (0.45 – 1.67)		0.70 (0.34 – 1.45)	1.56 (1.05 – 2.33)		1.35 (0.92 – 1.99)
Internet usage (n = 1052)		0.378			0.238	
Yes	1		–	1		–
No	1.56 (0.58 – 4.21)		–	1.39 (0.80 – 2.43)		–

continue

Variables	Low weight			Excess weight		
	Gross analysis		Adjusted analysis	Gross analysis		Adjusted analysis
	OR (95% CI)	P value	OR (95% CI)	OR (95% CI)	P value	OR (95% CI)
Number of morbidities (n = 1038)		0.502			0.000	
0 to 2 morbidities	1		1	1		1
3 or more morbidities	1.39 (0.86 – 2.26)		1.28 (0.72 – 2.25)	0.39 (1.58 – 3.15)		1.86 (1.29 – 2.69)
Disability in the ADL (n = 1052)		0.216			0.000	
Absence	1		1	1		1
Light	1.46 (0.75 – 2.84)		1.31 (0.64 – 2.68)	1.60 (1.13 – 2.27)		1.59 (1.11 – 2.27)
Moderate/severe	1.75 (0.72 – 4.24)		1.24 (0.44 – 3.48)	2.22 (1.44 – 3.42)		1.94 (1.15 – 3.27)
Self-perception of health status (n = 1047)		0.145			0.005	
Very good/good	1		1	1		1
Fair	1.74 (0.88 – 3.43)		1.47 (0.70 – 3.07)	1.64 (1.22 – 2.21)		1.28 (0.91 – 1.77)
Bad/very bad	1.38 (0.54 – 3.52)		0.96 (0.36 – 2.51)	1.61 (0.92 – 2.80)		0.98 (0.53 – 1.79)

Table 3. Gross and adjusted analyses for men in relation to factors associated with nutritional status. Florianópolis, Santa Catarina, Brazil, 2009/2010.

Variables	Low weight			Excess weight		
	Gross analysis		Adjusted analysis	Gross analysis		Adjusted analysis
	OR (95% CI)	P value	OR (95% CI)	OR (95% CI)	P value	OR (95% CI)
Age group (n = 594)		< 0.001			0.264	
60 to 69 years	1		1	1		1
70 to 79 years	2.48 (0.95 – 6.50)		1.74 (0.54 – 5.58)	1.02 (0.67 – 1.55)		0.78 (0.48 – 1.28)
80 years or more	5.68 (2.89 – 11.52)		6.35 (1.87 – 21.60)	0.57 (0.29 – 1.12)		0.32 (0.13 – 0.74)
Marital status (n = 594)		0.015			0.569	
With a companion	1		1	1		1
Without a companion	2.57 (1.34 – 4.92)		2.73 (1.21 – 6.15)	0.88 (0.56 – 1.37)		0.82 (0.48 – 1.39)
Currently working (n = 594)		0.219			0.343	
No	1		–	1		–
Yes	2.24 (0.61 – 8.20)		–	0.72 (0.36 – 1.43)		–

continue

Variables	Low weight			Excess weight		
	Gross analysis		Adjusted analysis	Gross analysis		Adjusted analysis
	OR (95% CI)	P value	OR (95% CI)	OR (95% CI)	P value	OR (95% CI)
Schooling (n = 592)		< 0.001			0.069	
≥ 12 years	1		1	1		1
9 to 11 years	1.57 (0.41 – 6.03)		0.90 (0.17 – 4.76)	0.41 (0.23 – 0.74)		0.59 (0.29 – 1.20)
5 to 8 years	4.54 (1.42 – 14.48)		2.86 (0.78 – 10.50)	0.57 (0.25 – 1.26)		0.71 (0.29 – 1.20)
0 to 4 years	4.56 (2.08 – 10.01)		1.65 (0.47 – 5.84)	0.62 (0.38 – 0.99)		0.92 (0.42 – 2.01)
Per capita income (BRL) (n = 594)		0.013			0.000	
4th quartile	1		1	1		1
3rd quartile	0.37 (0.13 – 0.97)		0.12 (0.03 – 0.46)	0.47 (0.28 – 0.80)		0.48 (0.24 – 0.96)
2nd quartile	2.48 (0.96 – 6.39)		1.02 (0.34 – 3.05)	0.46 (0.28 – 0.77)		0.41 (0.19 – 0.88)
1st quartile (lower)	2.59 (0.91 – 7.36)		0.79 (0.24 – 2.61)	0.37 (0.23 – 0.57)		0.31 (0.15 – 0.66)
Alcohol consumption (n = 594)		0.066			0.066	
No consumption	1		1	1		1
Moderate	0.73 (0.25 – 2.14)		1.57 (0.57 – 4.33)	1.21 (0.83 – 1.78)		1.27 (0.84 – 1.90)
High	0.41 (0.17 – 0.98)		0.72 (0.30 – 1.75)	1.53 (0.96 – 2.42)		1.52 (0.98 – 2.33)
Smoking (n = 594)		0.547			0.004	
Has never smoked	1		1	1		1
Former smoker	0.77 (0.31 – 1.91)		0.63 (0.24 – 1.66)	0.65 (0.45 – 0.94)		0.59 (0.37 – 0.94)
Currently a smoker	1.58 (0.59 – 4.26)		2.08 (0.65 – 6.66)	0.39 (0.18 – 0.87)		0.30 (0.12 – 0.73)
Physical activity at leisure times (n = 594)		0.974			0.197	
150 minutes or more	1		1	1		1
10 to 149 minutes	0.81 (0.13 – 4.97)		0.70 (0.11 – 4.36)	1.55 (0.67 – 3.57)		1.55 (0.75 – 3.21)
0 to < 10 minutes	0.97 (0.40 – 2.32)		0.57 (0.20 – 1.64)	1.57 (0.80 – 3.05)		1.67 (0.89 – 3.11)
Internet usage (n = 594)		< 0.001			0.622	
Yes	1		1	1		1
No	14.78 (4.27 – 51.03)		10.62 (1.83 – 61.78)	0.90 (0.60 – 1.36)		1.77 (0.96 – 3.29)

continue

Variables	Low weight			Excess weight		
	Gross analysis		Adjusted analysis	Gross analysis		Adjusted analysis
	OR (95% CI)	P value	OR (95% CI)	OR (95% CI)	P value	OR (95% CI)
Number of morbidities (n = 589)		0.775			0.090	
0 to 2 morbidities	1		–	1		–
3 or more morbidities	1.13 (0.48 – 2.64)		–	1.52 (0.93 – 2.46)		–
Disability in the ADL (n = 594)		0.044			0.073	
Absence	1		1	1		1
Light	1.38 (0.63 – 3.05)		1.30 (0.49 – 3.47)	1.32 (0.80 – 2.17)		1.33 (0.79 – 2.25)
Moderate/severe	2.42 (1.07 – 5.48)		0.89 (0.18 – 4.50)	1.76 (0.95 – 3.25)		3.37 (1.65 – 6.87)
Self-perception of health status (n = 593)		0.500			0.442	
Very good/good	1		1	1		1
Fair	1.30 (0.59 – 2.84)		1.26 (0.51 – 3.13)	1.28 (0.81 – 2.04)		0.95 (0.64 – 1.41)
Bad/very bad	1.29 (0.38 – 4.40)		0.42 (0.10 – 1.71)	0.38 (0.17 – 0.84)		0.30 (0.64 – 0.70)

For the women, in the adjusted analysis, no independent variable had a significant association with low weight. With regard to overweight, the adjusted analysis shows that the probability was 1.74 times higher in women who were insufficiently active in leisure compared to those who were active enough. It was also observed that the probability was 1.86 times higher in women with three or more morbidities compared to their peers. In addition, there was an increase in the probability of outcome in 59% and 94% in those with mild and moderate disability in ADL, respectively, compared to those without disability (Table 2).

For males, in the adjusted analysis the probability of low weight was 6.35 times higher in the elderly being 80 years old or older and 2.73 times higher in individuals without companions when compared to their peers. Older people who do not use the Internet were 10.62 times more likely to be underweight when compared to those using the Internet. As for those in the 3rd quartile of income, 0.12 times the probability of low weight. With regard to overweight, men with moderate/severe ADL disability showed a 3.37 higher probability of presenting the outcome when compared to their peers. It was also observed that the probability of overweight was 68% lower in the elderly being 80 years old or older, 52% lower in the third quartile, 59% lower in the second quartile and 69% lower in the ones with income in the first quartile. In relation to smoking habits, the probability of being overweight is 41% and 70% lower in former smokers and current smokers,

respectively, when compared to their peers. Just as the elderly with poor/very poor self-perception of health status were 30% less likely to be overweight.

Discussion

Females

Excess weight was associated with reduced physical activity for women, who usually practice less exercise when compared to men,[27] which results in lower energy expenditure[28] and may result in excess weight. Adding to women's lower physical activity practice, they tend to accumulate more fat during menopause, with central body fat distribution, which would be aggravated by lack of physical activity.[29] Results by Meneguci et al.[30] are in agreement with the present study, in which weight gain was associated with the presence of chronic diseases such as hypertension and diabetes mellitus. Machado et al.[31] reinforce the hypothesis that the presence of these diseases reflects BMI increase when they observed that the probability of multimorbidity increases 3% with each increase of 1 point in BMI. Obesity may be the consequence of the presence of chronic diseases and may also be associated with chronic inflammation, which leads to increased recurrent diseases. Relationship with overweight may predispose the development of other comorbidities[32] and increase the risk of mortality, thus generating an impact on the health system.[4,31]

Regarding functional disability, in overweight women there was an association with mild and moderate/severe disability for ADL performance, as found by Lisko et al.[6] Obesity is associated with increased disability among the elderly as it affects mobility.[9] Barbosa et al.[7] suggest that the presence of disability may reduce the level of physical activity performed and, consequently, increase body weight.

Males

In the present study, a positive association was found between low weight and negative one with overweight in 80-year-old or older elderly males, as verified by other authors.[4,5,12] This association may be due nutritional deficiencies susceptibility and the greater number of health problems that elderly men may present.[12] In the present study, we have found reduction in excess weight with decrease in income quartile. Low weight presented reduction only in the third income quartile. Campos et al.[4] have observed an increase in excess weight related to increase in income and income between 2 and 5 minimum wages associated with low weight. Monteiro et al.[33] have noted that increasing household income raises the risk of obesity in men. Silva et al.,[34] when analyzing data from the 2002-2003 Household Budget Survey (HBS), have found overweight in high-income elderly, although they reportedly had more access to health services and healthy living habits.

Both former smokers and current smokers had an inverse association with overweight, corroborating previous studies,[5,35] possibly explained by the higher metabolic expenditure presented by smokers in relation to the other categories. Findings show that the higher the amount of cigarettes smoked, the lower the BMI, and in this process nicotine seems to play a critical role because it acts in control and regulation of appetite and satiety.[36]

Low weight was associated with elderly without companions, contradicting findings from previous studies.[4,30] For males, having no companion has a negative impact on life, especially in this age group, in which women are usually shown as caregivers in the relationship.[37] Lack of a companion can lead to social isolation, lack of self-care and, as observed by the study, higher likelihood to be underweight.[38] According to an American cohort of 1,000 individuals, elderly with high levels of social isolation had some motor decline 80% faster than those who did not feel alone. Similarly, declining social activity can lead to reduced physical capacity and changes in eating habits, such as loss of appetite and weight loss.[8]

With regard to the Internet, non-use was associated with low weight. This may be related to these elderlies' lack of social contact and support network, since they are not connected by this means of communication.[8,39] In addition, the use of technologies has contributed to the elderlies' well-being, giving them greater capacity, autonomy and pleasure.[39] It has been shown to be an important factor in reducing the prevalence of moderate to severe functional dependence,[23] cognitive decline, lifestyle improvement, such as physical activity, eating habits and smoking habits.[40]

In relation to functional capacity, the presence of mild/moderate disability was associated with overweight, an effect observed in other studies.[10,13,41] It is known that aging predisposes changes in body composition, which can compromise strength, and also weakness and/or fragility, making elderly more incapable.[7] Overweight is also associated with increased development of comorbidities, loss of mobility, disability and poorer quality of life.[7,10]

Overweight men were less likely to perceive their health status in a bad/very bad way, unlike what was observed by Arnold et al.,[13] for whom weight loss and intermittent weight gain/loss were associated with poorer health status self-perception. Overweight is some known risk factor for depression in the elderly.[11] Moreover, a sedentary lifestyle and the presence of multimorbidities, common among those who are overweight, can deteriorate the quality of life, increase the probability of presenting disability and worsen poor health status self-perception.[7,16]

Among the study limitations, it is possible to cite the cross-sectional design and self-reported information. Although it is not possible to establish a causal relationship, the associations observed are supported by the literature. Self-reported information, as well as the use of a Respondent Proxy, may have an effect on misinterpreting the information by the respondent and/or omission

of legitimate answers when the elderly has received assistance from caregivers/escorts. However, it is noted that the use of validated instruments and extensive field team training were performed to reduce bias.

As a strong point of the study, nutritional status evaluation, as well as the application of the questionnaire, carried out by means of validated instruments and procedures used in studies of different populations of the elderly, stand out. In addition, the research involved population-based data, with a representative elderly population sample in the Brazilian municipality of Florianópolis, SC.

Conclusion

Being insufficiently active at leisure, reporting three or more morbidities and presenting mild and moderate/severe disability in ADL were associated with overweight in elderly women in the Brazilian municipality of Florianópolis. As for men, living without a companion, lower education and not using the Internet, to low weight, while income (first and second quartiles) and presenting moderate/severe disability in ADL, to overweight. Being a former smoker, current smoker and reporting poor/very poor health status self-perception had an inverse association with overweight. Also in men, being 80 years old or older and having an income in the third quartile was associated with both low weight and overweight.

These findings shall allow the development of strategies for health prevention and promotion with the aim of maintaining independence, autonomy and quality of life for the elderly.

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