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Research paper

Analysis of relationship of high fat mass and low muscle mass with lipid profile in Brazilians aged 80 years or over

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ABSTRACT

Aim: To analyze the lipid profile of older people aged ≥80 years according to body composition (high fat mass, low muscle mass and both).
Material and method: : The sample consisted of 113 older people aged ≥80 years. The assessment of body composition was made using Dual Energy X-ray Absorptiometry (DXA) and the lipid profile analysis using an enzymatic colorimetric kit. We used Analysis of Variance (ANOVA) test to compare the mean of lipid profile according to body composition and were constructed logistic regression models to verify the association between these two variables.
Results: It was found that older people with high fat had higher mean values of TG compared to normal and low muscle mass group. Older people with low muscle mass showed mean values of LDL-c lower than other groups. It was observed that older people with high fat is more likely to have (OR 2.70; 95%CI 1.14-6.37) high blood concentration of TG.
Conclusion: Thus, it appears that high fat is related to the high blood concentration of TG in older people aged ≥80 years, especially those with Asian origin and diabetes besides those with low muscle mass shows lower mean values of LDL-c.

1. Introduction

In recent decades, studies investigating changes in components of body composition during the aging process and their implications on health have increased considerably. However, this issue still needs further investigation, particularly with regard to subjects aged 80 years or over [1] due to the rapidly rising population in this age group [2], and their higher risk of developing diseases related to the aging process.

High body fat is related to several chronic diseases [3–5]. One example is dyslipidemia that is usually associated with excess body fat [6] and is highly prevalent in the older people [7]. Recent studies have pointed out that in addition to high fat, low muscle mass is also a condition that predisposes people to a dyslipidemia [8,9].

In subjects who present high fat and low muscle mass concomitantly [10,11] metabolic complications may be higher [12], increasing the public health care cost [13]. Thus, the aim of this study was to analyze possible differences in the lipid profile of Brazilian subjects aged 80 years or over, classified with high fat, low muscle mass and both condition.

2. Material and methods

2.1. Sampling

Subjects aged 80 years or over, of both gender, residents of Presidente Prudente, HDI = 0.806 [2], located in the west of Sao Paulo state, Brazil, were invited to participate in the present study. The invitation to participate was made by telephone to those who were attended by the public health service of the city.

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Individuals who were; bedridden; residents of rural areas; institutionalized; had a pacemaker; had difficulty walking and/or incomplete data in the database, were excluded from the present sample. A total of 113 individuals of both genders fulfilled the inclusion criteria and took part in the study.

The eligible individuals were informed about the objectives and methodology for data collection and advised they could withdraw at any time. Only those who signed the consent form were included in the sample. All protocols were reviewed and approved by the Research Ethics Committee of the University Estadual Paulista (Protocol number 26/2009).

2.2. Lipid profile

Blood samples were collected in a private laboratory, after 12-h of fasting. Samples were collected in vacuum tubes containing gel with anticoagulant. After collection, blood was centrifuged for 10 min at 3000 rpm to separate the serum from other blood components, allowing the use of serum for the analysis. To measure total cholesterol (TC) and its fractions (HDL-cholesterol (HDL-c) and LDL-cholesterol (LDL-c), and triglycerides (TG) an enzymatic colorimetric kit was used, processed in an Autohumalyzer A5 [14]. The reference values adopted for characterization of dyslipidemia were TG >150 mg/dl TC >200 mg/dl,
LDL-c >130 mg/dl and HDL-c < 40 mg/dl for male and <50 mg/dl for female [15].

2.3. Body composition

Body composition was estimated using Dual Energy X-ray Absorptiometry (DXA) equipment (Lunar DPX-NT; General Electric Healthcare, Little Chalfont, Buckinghamshire [software version 4.7]). The measurement lasted for approximately 15 min during which time the subjects remained immobile in a supine position, wearing light clothing, with their arms by their sides. The results were transmitted to a computer connected to the device and the results were recorded in grams, and analysed by a single reviewer.

For body fat, the percentage values of total fat measured were recorded, while for the muscle mass the values of two components, the lower and upper limbs from the right and left hemisphere were recorded to get appendicular skeletal muscle mass (ASM) variable. The skeletal muscle mass index (SMI) was obtained by dividing the appendicular skeletal muscle mass by the square of height (kg/m2).

2.4. Definition of groups

After assessment of the lipid profile and body composition, the individuals were divided into four groups: **High fat** – men and women with fat percentage greater than 27% and 38%, respectively [16]; **Low muscle mass** – men and women with SMI lower than 7.59 kg/m^2 and 5.57 kg/m^2, respectively (the adoption of these cutoffs was based on 2 standard deviations below the mean of a

Table 1
General characteristics of the subjects according to blood concentration of total cholesterol and triglycerides.

Characteristics	TC			TG		
	Normal n (%)	High n (%)	p	Normal n (%)	High n (%)	p
Age (years)						
80–84	44 (50.6)	43 (49.4)	0.459	62 (71.3)	25 (28.7)	0.570
≥ 85	11 (42.3)	15 (57.7)		20 (76.9)	06 (23.1)	
Gender						
Male	29 (70.7)	12 (29.3)	≤0.001	31 (75.6)	10 (24.4)	0.584
Female	26 (36.1)	46 (63.9)		51 (70.8)	21 (29.2)	
Ethnicity						
White	29 (46.0)	34 (54.0)	0.026	46 (73.0)	17 (27.0)	0.057
Black/brown	22 (64.7)	12 (35.3)		28 (82.4)	06 (17.6)	
Asian	04 (25.0)	12 (75.0)		08 (50.0)	08 (50.0)	
Educational level						
No education	18 (54.5)	15 (45.5)	0.322	26 (78.8)	07 (21.2)	0.486
Elementary school	30 (51.7	28 (48.3)		43 (74.1)	15 (25.9)	
High school/higher education	04 (30.8)	09 (69.2)		08 (61.5)	05 (38.5)	
Marital status						
Single/separated	6 (66.7)	3 (33.3)	≤0.001	08 (88.9)	01 (11.1)	0.018
Married/has partner	26 (70.3)	11 (29.7)		32 (86.5)	05 (13.5)	
Widowed	23 (34.3)	44 (65.7)		42 (62.7)	25 (37.3)	
Smoking						
Never	30 (41.3)	41 (57.7)	0.203	49 (69.0)	22 (31.0)	0.448
Current	5 (62.5)	3 (37.5)		07 (87.5)	01 (12.5)	
Former	20 (58.8)	14 (41.2)		26 (76.5)	08 (23.5)	
BMI (Kg/m^2)						
Eutrophic	19 (39.6)	29 (60.4)	0.247	34 (70.8)	14 (29.2)	0.024
Underweigth	17 (56.7)	13 (43.3)		27 (90.0)	03 (10.0)	
Obese	19 (54.3)	16 (45.7)		21 (60.0)	14 (40.0)	
Waist (cm)						
Normal	31 (48.4)	33 (51.6)	0.954	54 (84.4)	10 (15.6)	≤0.001
High	24 (49.0)	25 (51.0)		28 (57.1)	21 (42.9)	
Diabetes						
No	43 (46.2)	50 (53.8)	0.177	72 (76.6)	22 (23.4)	0.033
Yes	12 (63.2)	07 (36.8)		10 (52.6)	09 (47.4)	
Hypothyroidism						
No	53 (50.0)	53 (50.0)	0.427	78 (72.9)	29 (27.1)	0.739
Yes	02 (33.3)	04 (66.7)		04 (66.7)	02 (33.3)	

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