ORIGINAL ARTICLE

Consumption of animal-based and processed food associated with cardiovascular risk factors and subclinical atherosclerosis biomarkers in men

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SUMMARY

OBJECTIVE: *To evaluate the frequency of food consumption in apparently healthy men and their association with cardiovascular risk factors and biomarkers of subclinical atherosclerosis.*

METHODS: *In this observational study, 88 men had their food standard obtained through the food frequency questionnaire (FFQ). Associations of dietary patterns with cardiovascular risk factors, such as anthropometric data, laboratory and clinical evaluations, carotid-femoral arterial stiffness (IMT) and pulse wave velocity were evaluated.*

RESULTS: *The highest values were observed, for most of the risk factors evaluated, with the highest frequency of weekly consumption of dairy products, meats, sweets, fats, cold meats, sodas, milk and white chocolate; and lower frequency of weekly consumption of fruits, cereals, vegetables, legumes, oilseeds, and soy. There was no significant difference for coffee and dark chocolate*

CONCLUSIONS: *A diet with high consumption of animal products has a higher correlation with cardiovascular risk factors; the opposite is true for the consumption of plant-based food, associated with the profile of more favorable biomarkers for cardiovascular health and better biochemical and structural parameters.*

KEYWORDS: *Atherosclerosis. Food Consumption. Pulse Wave Analysis. Vascular Stiffness.*

INTRODUCTION

Chronic non-communicable diseases (CNCD) are the leading cause of disability. Among them are included cardiovascular disease, responsible for 30% of deaths worldwide. Epidemiological data suggest that individuals who follow diets rich in fruits and vegetables have a lower risk of CNCD and mortality than those who follow diets poor in vegetables[1]. Several studies have shown a connection between the consumption of meat and hypertension, risk of heart disease, metabolic disorders, and mortality[2-9]. The relationship between food and diseases in groups who follow specific diets, such as vegetarians, have required the attention of scholars. In the past, the fo-

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cus was on evidencing the problems caused by the deficiency of certain nutrients; now, it is evident a tendency to study the possible health benefits of a diet completely or partially plant-based, such as the ovo-lacto vegetarian diet[10].

Recent studies show the link between diet and nutritional state with the occurrence of CNCD[10,11]. Despite vast clinical and epidemiological evidence that diet has a direct effect on the onset of chronic diseases, the mechanisms of action are not yet clearly understood, especially regarding cardiovascular risk[12,13]. Furthermore, some studies have investigated the relationship between the consumption of certain nutrients or food and the intima-media thickness[14,15] and the pulse wave velocity[16].

Due to the scientific interest in food consumption, healthy diet, cardiovascular health, and the scarcity of studies that carry out that analysis, the objective of this study was to assess the frequency of food consumption in men who were apparently healthy and its link with cardiovascular risk.

METHODS

Study population

In this cross-sectional observational study, 745 adult volunteers were recruited in the city of São Paulo, Brazil, through social activities and internet publicity, initially between October 2012 and June 2013. The participants filled out questionnaires on family and personal medical history, diet preferences, physical activity, formal education, and personal data. The exclusion criteria were: 1) female; 2) under 35 years old; 3) history of diabetes; 4) history of dyslipidemia; 5) history of cardiovascular or cerebrovascular diseases; 6) history of hypertension or of use of antihypertensive medication; and 7) smoking. All individuals that declared to be smokers or "occasional smokers," or who had quit smoking one month before the interview were considered smokers. The sample consisted of men who were apparently healthy in order to prevent confounding risk factors for subclinical atherosclerosis.

Healthy participants who were ≥35 years old were allocated into two groups – VEG and OMNI –, according to their diets. VEG men were defined as having had a vegetarian diet free of meat, fish, and poultry for at least four years; these men could be ovo-lacto vegetarian (consumption of eggs, milk and dairy), lacto-vegetarians (consumption of milk and dairy), or vegan (no consumption of eggs, milk, or dairy). OMNI men were defined as those who consume any type of meat, at least five portions or more per week. During the period from July 2013 to January 2014, after the inclusion and exclusion criteria were applied, 88 men, ≥35 years old, apparently healthy were included in the study (44 vegetarians and 44 omnivores). The original study design had the intention of studying the link between a vegetarian and omnivore diet on cardiovascular risk factors; however, in this study, our strategy was to consider both groups as a whole. The research committee of the Heart Institute (InCor) of the Hospital of the Faculty of Medicine of the University of São Paulo approved the protocol of the study, and all participants signed an Informed Consent Form to participate in the study.

Laboratory and clinical analysis, ultrasonography of the carotid, pulse wave velocity (PWV)

The methodology of these variables is described in the previous publication of the CARVOS Study[17].

Anthropometric assessment

For the anthropometric assessment, we used the Body Mass Index (BMI) and the bioelectrical impedance analysis (BIA). To assess the level of physical activity we used the International Physical Activity Questionnaire-Short Form (Ipaq). The methodology is described in the CARVOS[18] study on body composition.

The assessment of the frequency of food consumption

The individuals were interviewed, and a food frequency questionnaire (FFQ) was applied to assess the pattern of consumption of food groups.

Each individual was asked: Over the last seven days, in how many days did you consume the following food or beverages? The following alternatives were possible: Did not eat over the last seven days; 1 day over the last seven days; 2 days over the last seven days; 3 days over the last seven days; 4 days over the last seven days; 5 days over the last seven days; 6 days over the last seven days; and all seven days.

The food groups assessed were: 1. Grains, tubers, and roots (rice, corn, bread, cookies, pasta, pastry, potato, manioc); 2. Leafy greens (chard, lettuce, broccoli, collard greens, kale, spinach, cabbage, arugula, etc.); 3. Vegetables (pumpkins, beet, carrot, chayote, cucumbers, tomato, etc.); 4. Fresh fruits (pineap-

ple, banana, apple, papaya, strawberry, grape, fruit salad, etc.); 5. Legumes (beans, peas, lentils, chick-peas, soy); 6. Oilseeds (nuts, almonds, pistachios, linseed, sunflower seeds); 7. Dairy products (milk, yogurt, and cheese); 8. Meat (poultry, beef, pork, game – such as rabbit and pheasant, etc.); 9. Fish and seafood (shrimp, crab, lobster, etc.); 10. Eggs (fried, boiled, poached, etc.). 11. Cold meats (sausage, salami, hamburger, bologna, ham, turkey breast, etc.); 12. Soy-based food and drinks (soy-based drinks, textured vegetable protein, etc.); 13. Fats (fried food, such as potato or manioc, croquettes, hand pies); 14. Sweets (candy, gum, candied fruit, etc.); 15. Soda (not including diet or light ones); 16. Milk Chocolate; 17. Dark chocolate; 18. White chocolate; and 19. Coffee.

The instrument of food consumption frequency used was based on Sisvan, which according to the Ministry of Health[19] is similar to versions used in research for monitoring practices that pose a risk to health, such as the North-American Youth Risk Behavior Survey - YRBS, carried out by the Center for Disease Control and Prevention - CDC. Moreover, we considered the questionnaire used in Vigitel (Vigilance of Chronic Diseases through Phone Survey), conducted by the Department of Health Vigilance of the Ministry of Health in Brazil.

In this study, the frequency of food consumption was categorized in 0-3 times per week and 4-7 times per week; and the tables and images were divided in plant-based, animal-based, and processed/homemade food.

Statistical analysis

The variables analyzed in this study were: systolic blood pressure (SBP), diastolic blood pressure (DBP), thickness of the intima-media thickness (IMT), pulse wave velocity (PWV), Framingham risk score, percentage of lean body mass (%LBM), percentage of body fat (%BF), percentage of total body water (%TBW), total cholesterol (TC), low-density lipoprotein (LDL), TC/HDL ratio, triglycerides (TG), glucose (GL), measurement of glycated hemoglobin (Glyc-Hb), apolipoprotein B (ApoB), C-reactive protein (CRP).

The continuous variables are presented as Standard Deviation (SD) ± Means. T-tests and chi-square tests were used to test differences in numeric and nominal variables.

All the calculations were made using the Stata software, version 10.0.

TABLE 1. Mean values of cardiovascular risk factors, according to the frequency of consumption of products of plant origin.

Frequency of consumption			
Variable	0 to 3x/week	4 to 7x/week	P value
Fruits			
	n=18	n=70	
Diastolic blood pressure	85.5 (±11.49)	78.40 (±9.63)	0.004
Glycaemia	102.94 (±20.33)	97.90 (±7.56)	0.049
PCR	4.56 (±9.55)	1.74 (±2.72)	0.016
Cereals			
	n=3	n=85	
Total cholesterol	243.67 (±37.81)	189.60 (±38.42)	0.009
LDL	163.00 (±29.82)	117.73 (± 33.14)	0.011
Percentage of lean mass	71.80 (±7.92)	78.94 (±5.73)	0.019
Percentage of fat mass	28.20 (±7.92)	21.12 (±5.97)	0.024
Percentage of water	51.88 (±5.99)	57.42 (±4.65)	0.024
Framingham score	8.33 (±6.81)	3.74 (±4.45)	0.043
Vegetables			
	n=22	n=66	
Diastolic blood pressure	83.41 (±11.75)	78.67 (±9.68)	0.031
Total cholesterol/HDL	4.83 (±1.45)	4.17 (±1.28)	0.021
Triglycerides	160.77 (±77.79)	117.15 (±63.73)	0.005
Glycated haemoglobin	5,57 (±0.48)	5.39 (±0.34)	0.029
Percentage of lean mass	76.76 (±6.26)	79.32 (±5.69)	0.041
Greens			
	n=20	n=68	
Diastolic blood pressure	83.30 (±11.79)	78.84 (±9.79)	0.045
Total cholesterol/HDL	4.88 (±1.42)	4.17 (±1.29)	0.019
LDL	43.05 (±10.47)	47.54 (±10.37)	0.046
Triglycerides	157.70 (±77.39)	119.34 (±65.33)	0.014
Glycaemia	103.10 (±18.67)	97.63 (±7.61)	0.028
Glycated haemoglobin	5.60 (±0.51)	5.39 (±0.33)	0.013
Percentage of fat mass	23.85 (±6.64)	20.66 (±5.84)	0.022
Percentage of water	55.48 (±3.48)	57.73 (±5.00)	0.035
Legumes			
	n=19	n=69	
Total cholesterol/HDL	4.79 (±1.54)	4.21 (±1.27)	0.046
LDL	131.32 (±28.57)	115.96 (±34.68)	0.04
Oilseeds			
	n=54	n=34	
Systolic blood pressure	126.37 (±15.12)	121.15 (±10.87)	0.042
Diastolic blood pressure	81.57 (±10.57)	77.12 (±9.57)	0.024
Total cholesterol	197.54 (±35.94)	181.76 (±43.23)	0.033
Total cholesterol/HDL	4.58 (±1.24)	3.94 (±1.42)	0.013
LDL	124.11 (±29.73)	110.79 (±38.58)	0.031
Triglycerides	138.67 (±65.43)	111.21 (±73.82)	0.035
Glycated haemoglobin	5.50 (±0.43)	5.33 (±0.28)	0.021
IMT	662.04 (±114.88)	572.35 (±98.35)	0
VOP	7.62 (±0.85)	7.04 (±0.75)	0
Framingham score	4.68 (±5.34)	2.65 (±2.58)	0.02
Soy and derivatives			
	n=73	n=15	
Total cholesterol/HDL	4.48 (±1.35)	3.64 (±1.13)	0.013
LDL	122.04 (3±3.24)	105.80 (±34.97)	0.045

RESULTS

In the present study, we analyzed 88 individuals, with a mean age of 46.1 (±8.68). According the body mass index, 54.5% (n=48) had adequate weight and 29.5% (n=26) presented risk of obesity. Regarding the level of formal education, 47.7% (n=42) had higher education, and 33% secondary education. Most individuals, 69.3% (n=61) had a high level of physical activity.

In Table 1, which shows the variables with plant-based food, we can see that those who eat fruits 4-7 times a week have lower glucose, CRP, and DBP values. For grains, those who consume it more times per week have lower values for LDL, TC, and Framingham risk score. Individuals who eat vegetables more times per week have lower TG, glyc-Hb, TC/HDL, DBP. Those who eat leafy greens more times per week have lower values for DBP, TC/HDL, TG, GL, glyc-Hb, and higher HDL for legumes, those who consume them more times per week have lower TC/HDL and LDL. As for oilseeds, those who consume them more times per week have lower SBP, DBP, TC, TC/HDL, LDL, TG, Glyc-Hb, IMT, PWV, and Framingham score. For soy, lower TC/HDL and LDL.

TABLE 2. Mean values of cardiovascular risk factors, according to frequency of consumption of products of animal origin.

Frequency of consumption			
Variable	0 to 3x/week	4 to 7x/week	P value
	Dairy		
	n=36	n=52	
HDL	49.19 (±11.35)	44.67 (±9.56)	0.023
Triglycerides	109.86 (±63.41)	140.65 (±71.62)	0.02
Glycated haemoglobin	5.34 (±0.33)	5.51 (±0.41)	0.02
Haemoglobin	15.89 (0.96)	15.45 (±0.95)	0.022
Framingham score	2.92 (±3.89)	4.58 (±4.90)	0.046
	Meats		
	n=50	n=38	
Total Cholesterol/HDL	3.98 (±1.27)	4.80 (±1.31)	0.002
Triglycerides	114.66 (±71.06)	145.68 (±64.57)	0.018
Glycaemia	95.71 (±7.36)	102.97 (±13.92)	0.001
Glycated haemoglobin	5.34 (±0.28)	5.57 (±0.47)	0.002
Systolic blood pressure	120.28 (±11.56)	129.71 (±14.81)	0
Diastolic blood pressure	76.20 (±8.43)	84.66 (±10.83)	0
Percent of fat mass	19.73 (±4.74)	23.61 (±7.11)	0.001
Water percentage	58.17 (±4.75)	55.95 (±4.57)	0.017
IMT	596.10 (±97.10)	668.55 (±128.52)	0.001
VOP	7.21 (±0.85)	7.64 (±0.83)	0.009
	Eggs		
	n=74	n=11	
Percentage of fat mass	20.91 (±5.76)	24.44 (±7.84)	0.037

The group of individuals that indicated the highest frequency of consumption of dairy products presented lower values for HDL, and HB; and higher values for TG, Glyc-Hb, and Framingham score. In the category of greater frequency of consumption of meats, we found higher values for TC/HDL, TG, GL, Glyc-Hb, SBP, DBP, PWV, and IMT. It was not possible to carry out the analysis of fish consumption for only two men in the sample indicated a regular consumption of the item from 4-7 times per week (Table 2).

For the consumption of sweets, higher TC/HDL, TG, ApoB; and lower HDL. For fat, higher DBP, SBP, TC, TC/HDL, TG, GL, Glyc-Hb, HB, Apo B, CRP. For cold meats, higher GL and CRP. For sodas, higher DBP, TC/HDL, LDL, TG, GL, Apo B, CRP, IMT. For milk chocolate, higher SBP and Glyc-Hb. For white chocolate, higher Glyc-Hb.

The pattern observed in most risk factors assessed was of higher values for higher weekly consumption of sweets, fats/fried foods, cold meats, sodas, white and milk chocolate. There was no significant difference for coffee and dark chocolate (Table 3).

Regarding body composition, we found that those who consume more grains more times per week have lower %BF and higher %LBM and water; those who eat vegetables more often have higher %LBM; and those who consume more leafy greens have lower %BF and higher %water (Figure 1). As for animal-based products, for a more often consumption of meat we found a higher %BF and lower water; for eggs, higher %BF (Figure 2). The group of individuals the indicated a higher frequency for the consumption of sweets presented higher %BF; for fats/fried food, sodas, milk, and white chocolate, we found higher %BF, and lower %LBM and water (Figure 3).

DISCUSSION/CONCLUSION

There are many clinical and epidemiological studies on the influence of diet energy and nutrients over the health state and incidence of diseases. However, individuals do not consume nutrients in isolation but combined in the food that makes up their diet patterns[19]. In the combination of macro and micronutrients, antioxidants and bioactive substances present in food can have a synergy effect in the organism, with a different effect from isolated nutrients. In this context, the present study on the influence of the

TABLE 3. Mean values of cardiovascular risk factors, according to frequency of consumption of sweets, fats and ultraprocessed foods.

	Frequency of consumption		
Variable	0 to 3x/weeks	4 to 7x/week	P Value
	Sweets		
	n=60	n=28	
Total Cholesterol/HDL	4.13 (±1.20)	4.77 (±1.54)	0.018
HDL	48.27 (±10.76)	42.79 (±9.04)	0.01
Triglycerides	119.17 (±66.36)	147.11 (±73.98)	0.039
Apob	0.91 (±0.27)	1.03 (±0.29)	0.028
Percentage of fat mass	20.62 (±5.96)	23.00 (±6.28)	0.047
	Fats/Fried		
	n=74	n=14	
Systolic blood pressure	123.09 (±13.39)	131. 00 (±14.56)	0.024
Diastolic blood pressure	78.05 (±8.55)	89.36 (±13.95)	0
Total cholesterol	187.66 (±39.93)	211. 43 (±30.74)	0.019
Total Cholesterol/HDL	4.18 (±1.27)	5.13 (±1.47)	0.007
Triglycerides	119.45 (±64.25)	173. 57 (±81.62)	0.003
Glycaemia	97. 85 (±7.51)	104. 29 (±22.10)	0.024
Glycated haemoglobin	5.40 (±0.34)	5.61 (±0.57)	0.031
Haemoglobin	15.53 (±0.97)	16.27 (±0.77)	0.01
Apob	0.92 (±0.28)	1.09 (±0.19)	0.019
PCR	1.87 (±2.79)	4.65 (±10.81)	0.028
Percentage of lean mass	79.16 (±5. 84)	75. 82 (±5.74)	0.034
Percentage of fat mass	20.91 (±6.11)	24.18 (±5.74)	0.043
Percentage of water	57.65 (4.82)	54. 62 (±3.69)	0.02
	Sausages		
	n=76	n=11	
Glycaemia	98. 05 (±7.70)	104. 64 (±24.58)	0.034
PCR	1.93 (±2.79)	5.05 (±12.21)	0.026
	Soft Drinks		
	n=79	n=9	
Diastolic blood pressure	78.78 (±9.66)	89.22 (±12.30)	0.001
Total cholesterol/HDL	4.23 (±1.32)	5.24 (±1.27)	0.016
LDL	116.77 (±33.43)	141.22 (±31.55)	0.019
Triglycerides	121. 20 (±66.14)	188.22 (±75.01)	0.002
Glycaemia	98.15 (±7.57)	105. 22 (±27.59)	0.037
Apob	0.92 (±0.27)	1.20 (±0.21)	0.001
PCR	1.84 (±2.74)	6.50 (±13.31)	0.003
Percentage of lean mass	79.14 (±5.71)	74. 32 (±6.33)	0.013
Percentage of fat mass	20.93 (±5.98)	25.67 (±6.33)	0.018
Percentage of water	57.57 (±4.72)	53.86 (±4.17)	0.017
IMT	618.26 (±114.05)	707.50 (±115. 97)	0.014
	Milk Chocolate		
	n=79	n=9	
Systolic blood pressure	123.53 (±13.57)	131.56 (±14.61)	0.049
Glycated haemoglobin	5.4 (0.37)	5.72 (0.40)	0.009
Percentage of lean mass	79.20 (±5.68)	74.38 (±6.40)	0.009
Percentage of fat mass	20.87 (±5.95)	25.61 (±6.39)	0.013
Percentage of water	57.62 (±4.70)	53.90 (±4.29)	0.013
	White Chocolate		
	n=83	n=2	
Glycated haemoglobin	5.42 (±0.38)	5.95 (±0.21)	0.029
Percentage of lean mass	78. 92 (±5.79)	69.35 (±2.33)	0.011
Percentage of fat mass	21.15 (±6.03)	30.60 (±2.40)	0.015
Percentage of water	57.38 (±4.72)	50.69 (±0.37)	0.024

consumption of food groups over cardiovascular risk factors can be considered promising.

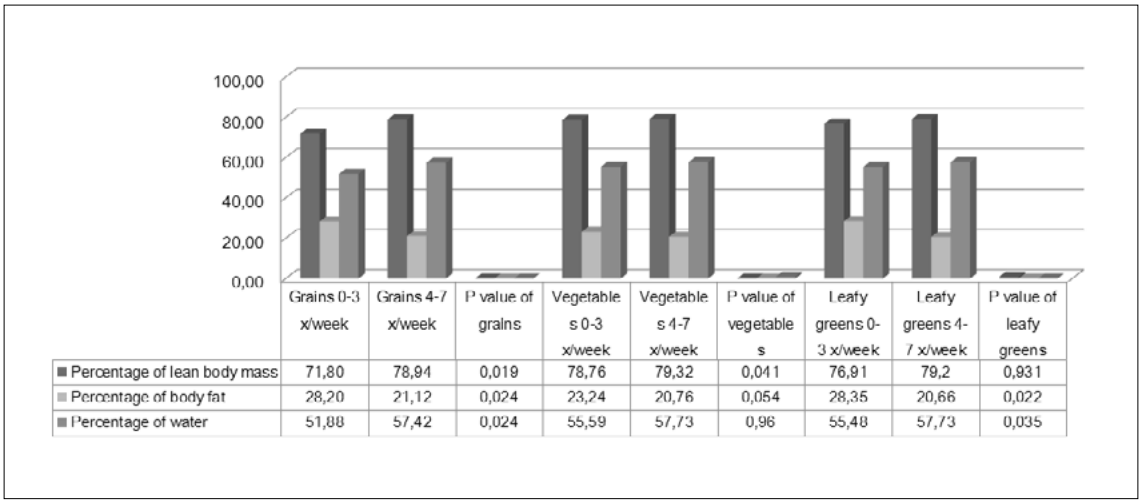
This way, some studies have verified an association between diet patterns and chronic diseases, such as obesity[20], endothelial function, and inflammation[21], and some types of cancer, amongst them oral[22], gastric[23], and cerebral[24].

In the present study, we found significant differences in the cardiovascular risk factors assessed according to the frequency of consumption of specific food items, with the exception of fish, coffee, and dark chocolate. Some studies have investigated food consumption and cardiovascular risk factors. Kerver et al.[25] found that the food pattern named "Western," characterized by the high consumption of processed meats, eggs, red meat, and dairy products with high fat levels, is positively associated with serum levels of insulin, C-peptide, and glycated hemoglobin. As for the pattern know as "Healthy American" (high amounts of leafy green vegetables, salad dressing, tomatoes, and other vegetables, and tea), there was no correlation found with the biomarkers analyzed.

In the study by Centritto et al.[26], three patterns of diet were categorized. The "Olive Oil and Vegetables" pattern, characterized by the high intake of olive oil, vegetables, soup, fruit, and fish, was associated with relatively low values of glucose, fats, CRP, arterial pressure, and individual cardiovascular risk scores. The "Meats and Pasta" pattern, characterized by a high intake of pasta, tomato sauce, red meat, animal fat, and alcohol, was positively associated with blood glucose, fats, CRP, and cardiovascular risk scores. The "Eggs and Sweets" pattern, characterized by positive loads of eggs, processed meats, margarine, butter, sugar, and sweets, was associated with high CRP values.

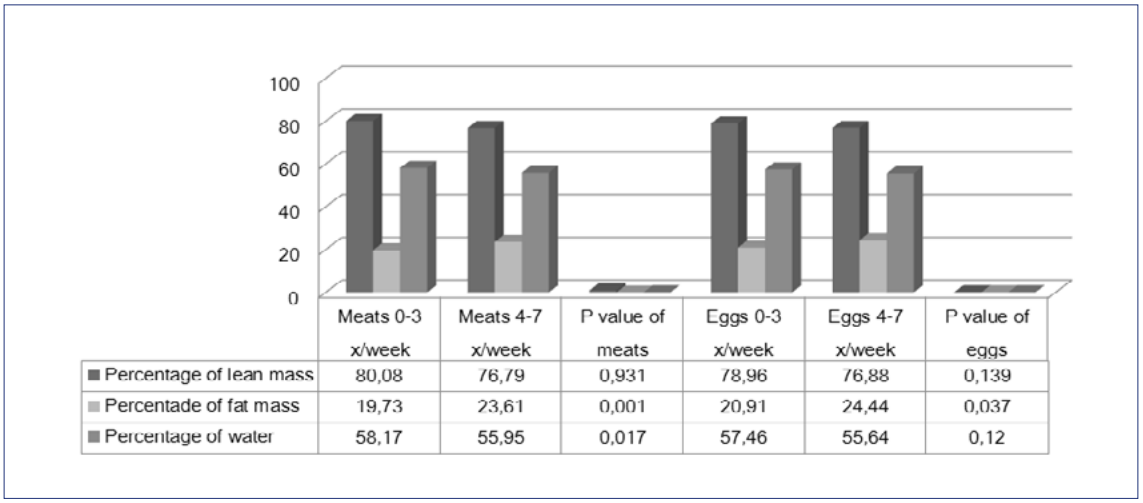
There was also a study conducted with the Brazilian population. Olinto et al.[27] classified the food consumption into two patterns: the first one, the Average Brazilian, characterized by sugar, white bread, coffee, margarine/butter, rice, and black beans. The second, the Processed Food, was characterized by red and processed meats, salty snacks, french fries, beer, soda, and other processed food. The Average Brazilian was inversely associated with values of LDL, HDL, and total cholesterol in men. Amongst women, they found tendencies of an inverse association with SBP, DBP, LDL, HDL, and TC. The patter of Processed Food was positively associated with values of LDL, HDL, and TC amongst men. Amongst wom-

FIGURE 1. MEAN VALUES OF BODY COMPOSITION ACCORDING TO THE FREQUENCY OF CONSUMPTION OF PLANT-BASED FOOD.



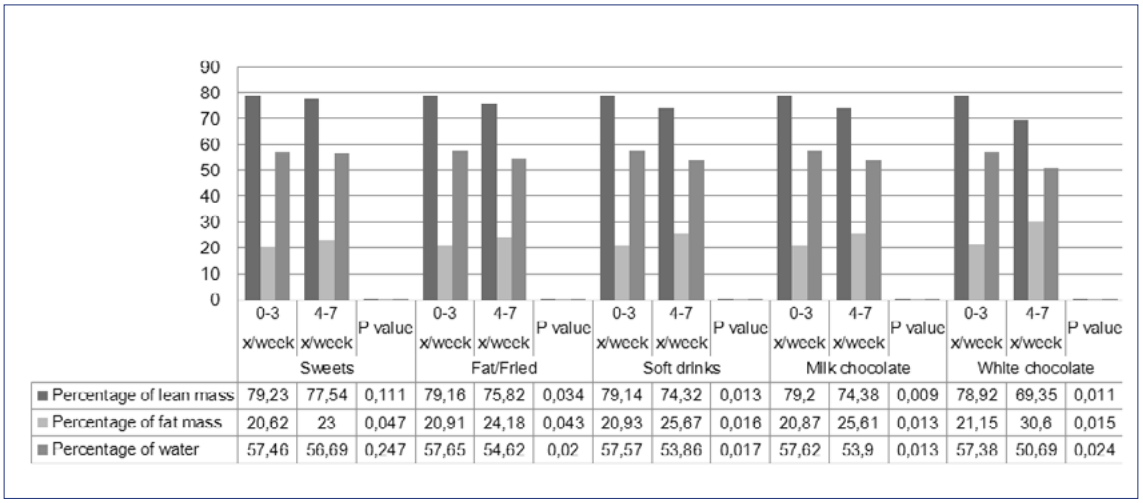
	Grains 0-3 x/week	Grains 4-7 x/week	P value of grains	Vegetables 0-3 x/week	Vegetables 4-7 x/week	P value of vegetables	Leafy greens 0-3 x/week	Leafy greens 4-7 x/week	P value of leafy greens
Percentage of lean body mass	71,80	78,94	0,019	78,76	79,32	0,041	76,91	79,2	0,931
Percentage of body fat	28,20	21,12	0,024	23,24	20,76	0,054	28,35	20,66	0,022
Percentage of water	51,88	57,42	0,024	55,59	57,73	0,96	55,48	57,73	0,035

FIGURE 2. MEAN VALUES OF BODY COMPOSITION, ACCORDING TO FREQUENCY OF CONSUMPTION OF PRODUCTS OF ANIMAL ORIGIN.



	Meats 0-3 x/week	Meats 4-7 x/week	P value of meats	Eggs 0-3 x/week	Eggs 4-7 x/week	P value of eggs
Percentage of lean mass	80,08	76,79	0,931	78,96	76,88	0,139
Percentade of fat mass	19,73	23,61	0,001	20,91	24,44	0,037
Percentage of water	58,17	55,95	0,017	57,46	55,64	0,12

FIGURE 3. MEAN VALUES OF BODY COMPOSITION, ACCORTDING TO FREQUENCY OF ULTRAPROCESSED FOOD.



	Sweets			Fat/Fried			Soft drinks			Milk chocolate			White chocolate		
	0-3 x/week	4-7 x/week	P value	0-3 x/week	4-7 x/week	P value	0-3 x/week	4-7 x/week	P value	0-3 x/week	4-7 x/week	P value	0-3 x/week	4-7 x/week	P value
Percentage of lean mass	79,23	77,54	0,111	79,16	75,82	0,034	79,14	74,32	0,013	79,2	74,38	0,009	78,92	69,35	0,011
Percentage of fat mass	20,62	23	0,047	20,91	24,18	0,043	20,93	25,67	0,016	20,87	25,61	0,013	21,15	30,6	0,015
Percentage of water	57,46	56,69	0,247	57,65	54,62	0,02	57,57	53,86	0,017	57,62	53,9	0,013	57,38	50,69	0,024

en, the Processed Food pattern was not significantly associated with cardiovascular risk factors.

In the clinical practice, the assessment of food consumption has the purpose of helping with the development and implementation of nutritional planning[28]. There are several methods for assessing food intake and nutrient consumption, and it is important to choose the one that aims at promoting health, preventing injuries, and adjusting the nutritional state of the patient. In this sense, the method of food consumption or food groups is the food frequency questionnaire (FFQ)[28].

The FFQ is considered to be the most practical and informative method for assessment in studies that investigate the connection between diet and clinical outcomes, usually associated with CNCD[28].

The fact that this is a cross-sectional study compromises its causality proof. In addition, there is a restricted number of individuals. However, the sample is highly homogenized in sex and age, and reproducible methods were used.

The present study was conducted with a sample of apparently healthy men who make up a large portion of the population and which is of great interest in terms of prevention of chronic diseases since these are associated with inadequate food consumption parameters.

CONCLUSION

In the present study, higher consumption of plant-based food was less associated with cardiovascular risk factors; the contrary was found for animal-based food, sweets, fats, and ultra-processed food, with a higher association to cardiovascular risk factors, the higher the weekly frequency of their consumption.

RESUMO

OBJETIVO: *Avaliar a frequência do consumo alimentar de indivíduos homens aparentemente saudáveis e a associação desta com fatores de risco cardiovascular e biomarcadores de aterosclerose subclínica.*

MÉTODOS: *Neste estudo observacional, 88 homens tiveram o padrão alimentar obtido por meio do questionário de frequência alimentar (QFA). Foram avaliadas as associações dos padrões alimentares com os fatores de risco cardiovascular, como dados antropométricos, avaliações laboratoriais e clínica, rigidez arterial determinada pela carótida-femoral (IMT) e velocidade da onda de pulso (VOP).*

RESULTADOS: *O padrão observado para a maioria dos fatores de risco avaliados foi de valores mais altos, segundo maior frequência de consumo semanal de lácteos, carnes, doces, gorduras/frituras, embutidos, refrigerantes, chocolates ao leite e branco; e de menor frequência de consumo semanal de frutas, cereais, legumes, verduras, leguminosas, oleaginosas e soja. Não houve diferença significativa para café e chocolate amargo.*

CONCLUSÕES: *Uma dieta com alto consumo de produtos animais apresenta maior correlação com fatores de risco cardiovascular, sendo o oposto para o consumo de alimentos de origem vegetal, associado ao perfil de biomarcadores de saúde cardiovascular mais favorável e melhores parâmetros bioquímicos e estruturais.*

PALAVRAS-CHAVE: *Aterosclerose. Consumo de alimentos. Análise de onda de pulso. Rigidez vascular.*

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