ISSN (electrónico): 1699-5198 - ISSN (papel): 0212-1611 - CODEN NUHOEQ S.V.R. 318

ARÁN

Nutrición Hospitalaria

Trabajo Original

Obesidad y síndrome metabólico

# Comparison of the energy and metabolic nutritional profile of women with central obesity of socioeconomic classes A/B *vs* C/D/E

## *Comparación del perfil nutricional energético y metabólico de las mujeres con obesidad central de las clases socioeconómicas A/B* versus *C/D/E*

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## Abstract

**Objective:** to describe the characteristics of food consumption and energy intake of women with central obesity of socioeconomic classes A/B *vs* C/D/E.

**Methodology:** a cross-sectional study in which a structured questionnaire was answered containing data on socioeconomics and physical activities. Weight and waist circumference (WC) were measured and the 24-hour recall was assessed (24hR) in relation to food consumption. Biochemical exams were analyzed. The dietary analysis was performed on the Nutwin software and statistical analysis on the SPSS 23.0.

**Results:** there were 89 women assessed in each group and no significant differences were observed in relation to age, with averages of 51.2 ± 12.2 years *vs* 49 ± 14.4 years for classes C/D/E *vs* A/B, respectively. A sedentary lifestyle was predominant for class C/D/E 82 (92.13%) *vs* 22 (24.71%) ($p < 0.001$).Significant differences were observed between the groups for variables of hypertriglyceridemia ($p < 0.001$), predominant in the C/D/E socioeconomic group, and HDL-C ($p < 0.001$), predominant in the A/B socioeconomic group. Total energy consumption of women from class C/D/E *vs* A/B presented mean values of 1,528.72 kcal (1,128.8-1,697.3) *vs* 2,267.48 kcal (1,670.3-2,625.84), respectively. Significant differences were observed in the consumption of fiber between groups C/D/E *vs* A/B ($p < 0.001$), with less consumption in class C/D/E. With reference to income and schooling levels, we observed heterogeneity in the results and emphasize the marked contrast between low and high income that could influence the choice of food, contributing in the lower income to monotonous diets, less energy consumption and, furthermore, low quality in the ingested food.

**Conclusion:** in this study, all of the women presented metabolic profiles in different manners among the groups and, also, women of class C/D/E, who presented insufficient fiber consumption, directly contributing to this condition of obesity, also presented worse lipid (total cholesterol and triglycerides) and glycemic profiles.

**Key words:**

Abdominal obesity. Women. Social class. Ingestion of food. Eating behavior.

## Resumen

**Objetivo:** describir las características del consumo alimentario e ingestión energética de mujeres con obesidad central de clase socioeconómica A/B *vs* C/D/E.

**Metodología:** estudio transversal en el que respondieron a un cuestionario estructurado que contenía datos socioeconómicos y actividad física. Se evaluaron el peso, circunferencia de la cintura (CC) y se hizo un recordatorio de 24 horas (R24h) en relación al consumo alimentario y los exámenes bioquímicos. Los análisis dietéticos se realizaron en el software Nutwin y los análisis estadísticos en el SPSS 23.0.

**Resultados:** se valoraron 89 mujeres en cada grupo y no se observó diferencia significativa para la edad, con una media de 51,2 ± 12,2 años frente a 49 ± 14,4 años clase C/D/E *vs* A/B, respectivamente. El sedentarismo fue predominante en la clase C/D/E 82 (92,13%) *vs* 22 (24,71%), ($p < 0,001$). Se observaron diferencias significativas entre los grupos para las variables de hipertrigliceridemia ($p < 0,001$), predominantes en el grupo de clase socioeconómico C/D/E y HDL-C ($p < 0,001$), predominante en el grupo de clase socioeconómico A/B. El consumo energético total de las mujeres de clase C/D/E *vs* A / B, presentó medianas de 1528,72 kcal (1128,8-1697,3) frente a 2267,48 kcal (1670,3-2625,84), respectivamente. Se observó una diferencia significativa del consumo de fibra entre los grupos C/D/E *vs* A/B ($p < 0,001$), siendo el consumo menor en la clase C / D / E. En lo que se refiere a la renta y escolaridad, observamos la heterogeneidad de los resultados y destacamos el marcado contraste entre la baja y elevada renta lo que podría influir en la elección de los alimentos, contribuyendo en la menor renta para la monotonía alimentaria, menor consumo energético y, además, baja calidad de los alimentos ingeridos.

**Conclusión:** en este estudio, todas las mujeres presentaron perfiles metabólicos de maneras distintas entre los grupos. Las mujeres de la clase C/D/E, presentaron consumo insuficiente de fibra, lo que ciertamente contribuyó al cuadro de obesidad encontrado y paralelamente presentan peor perfil lipídico (colesterol total y triglicéridos) y glucémico.

**Palabras clave:**

Obesidad abdominal. Mujeres. Clase social. Ingestión de alimentos. Conducta alimentaria.

Received: 19/08/2018 • Accepted: 11/11/2018

Ferraz IAR, Pereira IG, Monteiro ML, Silva ML, Ladeia AM, Guimaraes A. Comparison of the energy and metabolic nutritional profile of women with central obesity of socioeconomic classes A/B *vs* C/D/E. Nutr Hosp 2019;36(4):819-825

DOI: http://dx.doi.org/10.20960/nh.2246

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## INTRODUCTION

The high global prevalence of central obesity (CO) has epidemic characteristics, including countries with different degrees of socioeconomic development, requiring new public health policies. Nevertheless, in developing countries such as Brazil, anthropometric population and dietary data are still scarce, which shows the need for further investigations in this field (1,2).

Presently, evidences in literature indicate causal association of this excess adipose tissue on the abdominal region with the high consumption of saturated animal fat and simple carbohydrates, associated to low consumption of fibers, allied to genetic and behavioral factors, such as sedentary lifestyles (3,4). Further, this type of obesity creates metabolic conditions for increasing glycaemia (type II diabetes), blood lipid levels (hypercholesterolemia and hypertriglyceridemia) and blood pressure (hypertension), conditions that are responsible for the increase in the prevalence and incidence of chronic diseases.

The progress and dissemination of knowledge in the food industry after the Second World War (fifties) permitted the substitution of caloric hunger of quantity and quality of diets, observed in the Nazi concentration camps, in the droughts of the northeast of Brazil and in tropical regions with low income populations, for the hunger predominantly of quality of the diet due to excess consumption of food with higher caloric content and low nutritional value, characterized by the high level of simple carbohydrates and animal fat associated to a low content of fibers, mineral salts and vitamins. The undernourished of the past, with low weight associated to the loss of adipose and muscular tissue, was substituted by the individual with excess adipose tissue located mostly in the abdomen (3,4).

Currently, some aspects of these nutritional issues have been studied in a population of low income women attended at an Outpatient Obesity Teaching Clinic at Escola Bahiana de Medicina e Saúde Pública as part of a Research Project on Obesity of the Master's thesis by the author (5), published previously. The acquired knowledge led to an extension to the research with the purpose of comparing metabolic and clinical characteristics of the same type of obesity in women of socioeconomic class A/B, in order to better understand this apparent paradox of the coexistence of central obesity also associated to low-calorie diets, aiming also for more adequate prevention and treatment.

Thus, the objective of the present study was to describe the characteristics of food consumption and energy intake of women with central obesity of socioeconomic classes A/B *vs* C/D/E.

## METHODOLOGY

Women with central obesity treated at the Research Project on People with Excess Weight (PEPE Project), at the Outpatient Teaching Clinic of Escola Bahiana de Medicina (EBMSP) and at a private clinic of Salvador, state of Bahia. Patients that fulfilled the criteria of eligibility were included. The study protocol was approved, under number 1314942/2015, by the Research Ethics Committee of EBMSP and all of the participants signed the written informed consent form (WICF).

Inclusion criteria were: women with waist circumference (WC) over 84 cm and age over 18 years. The classification of the Brazilian Institute of Geography and Statistics (IBGE) was used as the division criteria of the groups (6). Women with difficulties in expressing themselves, pregnant or nursing, undergoing hemodialysis, using chemotherapy, anorectic agents/appetite depressants and with psychiatric disorders were excluded. Schooling level was classified and categorized as under 12 years of study or higher education to 12 years of study.

Data collection began at the moment in which the patient accepted to participate in the study. Interviews were standardized and performed by the researcher responsible, with the assistance of a structured questionnaire containing questions on socioeconomic, clinical, anthropometric and dietary information. In relation to the dietary information, the 24-hour recall (24hR) was used, consisting of defining and quantifying the intake of all the food and drinks during a determined period prior to the interview, in other words, in the preceding 24 hours (7). For this study, three 24hR were applied in non-consecutive days, one on Monday, with reference to the consumption of Sunday (weekend); another on Tuesday, with reference to the consumption on Monday; and another on Wednesday, with reference to the consumption on Tuesday, with seven day intervals. Data collection was structured in accordance with this methodology in order to contemplate the variations that can occur and thus describe the diet of this group, in order to avoid the influence of consumption of one same week and permit the correction in the distribution of the estimative of nutrients.The food was examined in quantity in household measures, converted into grams, milliliters or liters, means of preparation, seasoning used, through the aid of a table of household measures (8). In the case of industrialized food, the trademarks were also investigated for the subsequent calculation of nutrients to be more reliable. The data obtained was converted into energy and nutrients using the Nutrition Data System for Research (NDSR) program of Minnesota University (Minneapolis, United States) (9), performed through double entry in order to certify that the data was correctly included. Considering also that the software presents as its main base the table of the U.S. Department of Agriculture (10), the typical Brazilian food and those not included in the table were inserted in accordance with the national data of the Brazilian Food Database (11). Absolute intake of macronutrients and fibers was calculated. The criteria for adequacy established for the macronutrients were: 55-75% of daily total energy value (TEV) for carbohydrates, 15-30% of daily TEV for lipids, 10-15% of daily TEV for proteins, in accordance with the recommendations of the World Health Organization (WHO) (12). The consumption of fibers was assessed in accordance with the recommendations established by the Dietary Reference Intakes (DRI) Committee, in which women should consume at least 25 g of fiber/day (13). The criteria for the consumption of fat were established in accordance with the Brazilian Cardiology Society (2017) (14), consonant to the recommendations of the National Heart Lung and Blood Institute (15) of the United States, which propose the consumption of

saturated fat of less than or equal to 7% of the total daily energy consumption, less or equal to 10% of the total daily consumption of polyunsaturated fat and of less or equal to 20% of the daily consumption of monounsaturated fat.

For the biochemical assessment, participants were guided to remain fasting for 8-12 hours and sent to a laboratory, in a reserved location, with exclusive equipment for this purpose, with all the material subsequently discarded in accordance with the laboratory safety standards (16). Blood was collected in a vacutainer tube containing ethylenediamine tetraacetic acid (EDTA) (1.0 mg/dl) used in antioxidants and anticoagulants for obtaining plasma.In order to assess plasmatic glucose, thecolorimetric-enzymatic method was used with the GOD-Trinder da Labtest kit. Analyses were performed in duplicate and the results were classified in accordance with the Guidelines of the Brazilian Diabetes Society (17). Using the colorimetric-enzymatic method manual, the concentrations of total cholesterol, cholesterol associated to high-density lipoprotein (HDL) and total triglycerides in the plasma were determined. For determining the concentrations of total cholesterol, the Liquiform® Cholesterol kit was used (Labtest, Minas Gerais, Brazil), to determine HDL cholesterol the HDL Liquiform® kit (Labtest, Minas Gerais, Brazil) was used, and to determine the triglycerides, the Triglycerides Liquiform®kit (Labtest, Minas Gerais, Brazil) was used. The cholesterol associated to low density lipoprotein (LDL) was determined using the Friedwald (1972) (14) equation from the concentration of total cholesterol, cholesterol in the HDL and triglycerides. The results were classified in accordance with the IV Brazilian Guideline for Dyslipidemia (15). Glycaemia alterations were classified in accordance with the Brazilian Guideline for Diabetes (2016) as normal when < 100 mg/dl. Alterations to the lipid profile were classified when the total cholesterol (TC) ≥ 200 mg/dl; hypertriglyceridemia (TG) ,≥ 150 mg/dl; low levels of HDL-C, < 40 mg/dl; and high levels of LDL-C, > 130 mg/dl. Anthropometric measurements were obtained with patients using the minimum amount of clothing possible, barefoot, and standing in the erect position, with arms parallel to the body. Weight was measured in kilograms, on digital scales trademark InBody 520 - Biospace®, with a limited capacity for 250 kg and precision of 100 g; height was measured using an Altura Exata (TBW, São Paulo, Brazil) portable stadiometerwith a limit for 2.1 m and a precision of 1.0 cm; and body mass index (BMI) was calculated from the measures of weight and height, using the Quetelet formula: division between the weight (in kg) and height (in meters), squared ($BMI = kg/m^2$) (18). Waist circumference (WC) was measured using an extensible tape, on the smaller curve, located between the ribs and iliac curve to guarantee accurate measures. It was verified that the tape did not compress the skin and was situated parallel to the floor, with the reading of the centimeter closest to the crossing of the tape. In relation to WC, central obesity was considered as > 84 cm (19).

Physical activity was assessed in the questionnaire, including closed questions: do you practice physical activities (yes or no). In accordance with the criteria of the WHO (20), lifestyles were considered as sedentary or active for those who informed the practice of any physical activity of, at least, five times a week, 30 minutes each.

Statistical analyses were made using the SPSS 23.0 (21) software for Windows. Participants were divided into two groups based on their socioeconomic classification. The qualitative measures of the sample were described in absolute frequency and percentages and the results were expressed in mean ± SD or as median and interquartile interval. The Student's t test was used for comparison of the continuous variables with normal distribution and the Mann-Whitney test, for comparison of the non-parametric continuous variables between the groups. The Chi-square test was used for comparison of the categorical variables.

## RESULTS

The women who fulfilled the eligibility criteria were invited to participate. There were 178 women evaluated; 89 of them were attended at an outpatient clinic for obesity at EBMSP, socioeconomic class C/D/E, and 89 women of socioeconomic class A/B were attended at a private clinic of Salvador-BA. No significant differences were observed as to age, with an average age of 48.74 ± 11.38 years, considering average ages of 51.2 ± 12.2 years *vs* 49 ± 14.4 years classes C/D/E *vs* A/B, respectively. Regarding sedentary lifestyles based on the absence of regular physical activity, such as 30 minute walks or more, five days a week, in accordance with the WHO criteria (20), there was a predominance for class C/D/E, 82 (92.13%), as compared to 22 (24.71%) in class A/B ($p < 0.001$). In relation to anthropometric data, central obesity, characterized by high values of waist circumference (CC) > 84 cm (19) used as inclusion criteria, was present in 100.0% of the sample, with an average of 100.26 cm (IIQ: 100-110.75)in group C/D/E *vs* 98.2 (IIQ: 98-103) cmin group A/B ($p = 0.33$). In relation to metabolic variables, an average of 207.8 mg/dl (IIQ: 171-231.75) was observed for total cholesterol in the socioeconomic group class C/D/E. For hypercholesterolemia (total cholesterol > 200mg/dl), 28 (31.46%); forhypertriglyceridemia (Tg > 150 mg/dl), 21 (23.59%); and for HDL-c (> 60 mg/dl), 39 (43.22%). In turn, in socioeconomic class A/B, we observed total cholesterol with an average of 176 mg/dl (IIQ: 115-210), 28 (31.46%) presenting hypercholesterolemia (total cholesterol > 200 mg/dl); seven (8.3%), hypertriglyceridemia (Tg > 150 mg/dl); and 63 (73.3%), HDL-c (> 60 mg/dl). Accordingly, significant differences were observed between the groups for the variables of hypertriglyceridemia ($p < 0.001$), predominant in the group of socioeconomic class C/D/E, and HDL-C ($p < 0.001$), predominant in the group of socioeconomic class A/B (Table I).

The total energy consumption of women of classes C/D/E *vs* A/B presented averages of 1,528.72 kcal (1,128.8-1,697.3) *vs* 2,267.48 kcal (1,670.3-2,625.84), respectively. With regard to the macronutrients, in classes C/D/E *vs* A/B, an average consumption of carbohydrates was verified of 230.6 g (IIQ: 172.9-243.9) *vs* 321.67 g (243.8-344.26), lipids of 36.62 g (IIQ: 20.17-44.08) *vs* 69.36 g (IIQ: 36.23-80.44), and proteins of 69.36 g (44.08-80.44) *vs* 89.14 g (IIQ: 65.13-96.98). It should be emphasized that significant differences were observed in the consumption of macronutrients, carbohydrates and lipids between groups of socioeconomic classes C/D/E *vs* A/B ($p < 0.001$).

In both groups, insufficient consumption of fibers was observed. For the group of socioeconomic class C/D/E, an average

**Table I.** Sociodemographic, clinical and anthropometric characteristics of women with central obesity of socioeconomic classes C/D/E* *vs* A/B*, Salvador, Bahia, 2015-2016

| Variables | Group C/D/E | | | Group A/B | | | p† |
|---|---|---|---|---|---|---|---|
| | n (%) | Average (SD) | Q1- Q3 | n (%) | Average (SD) | Q1- Q3 | |
| Age | | 51.2 (12.2) | | | 49 (14.4) | | 0.08 |
| Schooling < 12 years | 86 | | | 0 | | | < 0.001 |
| Regular physical activity‡ No | 82 (92.13) | | | 22 (24.1) | | | < 0.001 |
| Body mass index | | 34.22 | 30.35-37.46 | | 30.41 | 29.9-31.92 | < 0.001 |
| Waist circumference (WC)¶ | | 100.26 | 100-110.75 | | 98.2 | 98-103 | 0.3 |
| Fasting glycaemia‖ ≥ 100 mg/dl | 29 (43.28) | 102.94 | 90-110.75 | 10 (11.23) | 87 | 81-91 | < 0.001 |
| Total cholesterol¶ > 200 mg/dl | 28 (31.46) | 207.8 | 171-231.75 | 16 (33.7) | 176 | 115-210 | 0.78 |
| Hypertriglyceridemia¶ >150 mg/dl | 21 (23.59) | 135 | 95-231.75 | 7 (8.3) | 1 | 51-96 | < 0.001 |
| HDL cholesterol¶ >40 mg/dl | 39 (43.22) | 45 | 39-53.75 | 63 (73.1) | 62 | 50-73 | < 0.001 |

**Classification in accordance with the IBGE (6).†p value: Chi-square test; p value: Mann-Whitney test. ‡Criteria from the World Health Organization (20): walks five times per week for 30 minutes.WC cut-off recommended by Barbosa & Lessa (2006) (19). ‖Guideline of the Brazilian Diabetes Society (2016) (17). ¶Brazilian Guideline on Dyslipidemia and Prevention of Atherosclerosis (2017) (14).*

consumption of 8.9 g (IIQ: 6.98-14.40) was observed, being insufficient (> 25 g/day) in 100%. In the group of class A/B, an average consumption of 18.3 g (IIQ: 17.4-31.12) was observed, with adequate frequency of consumption for only seven (8.05%). Significant differences for the consumption of fibers between the groups were observed between groups C/D/E *vs* A/B ($p < 0.001$), with lower consumption in class C/D/E. In relation to income and schooling, we observed heterogeneity in the results and emphasize the marked contrast between low and high income, which could influence the choice of food, contributing the lower income to a monotonous diet, lower energy consumption and, furthermore, low quality of the food consumed (22-30) (Table II).

## DISCUSSION

According to our knowledge, this is the first study proposing to investigate and compare clinical, metabolic and dietary profiles of women with CO presenting socioeconomic aspects as main distinctive factor, permitting mainly to contribute towards elucidating the apparent paradox of CO coexisting in antagonist social groups in relation to socioeconomic and educational levels. The results of the analysis on *sociodemographic, clinical* and *metabolic* aspects found herein demonstrate that both groups (C/D/E *vs* A/B) assessed are similar in relation to age; this similarity is important as it permits to infer that it is a homogeneous population in relation to age. Regular physical activity, such as 30 minute walks, at least five times a week, as recommended by the WHO (20), was a characteristic of the group with higher income, contrasting significantly with the low income group, occupied, mainly, in physical activities with household chores necessary for the subsistence of the family. According to Rodrigues et al. (2017), socioeconomic factors are determining for the choice of the type of physical activity, as those with higher income practice healthy physical activities guided towards their health, whereas the physical activities of those with lower income are related to household chores. Particularly, in class C/D/E, our findings corroborate the studies developed with low income women of the south of India, Africa, Salvador and of those living in the Rocinha *favela,* where a sedentary lifestyle was predominant (5,25,32,33). Nevertheless, we should consider that this type of physical activity is not yet inserted in this cultural level, in addition to the fact that the practice of physical activities may be hindered by topographical conditions, such as lack of safety in the housing location, usually on rugged terrain and full of alleyways (27,34-37). In parallel to these limitations, the financial aspect and less disposition and time are limiting factors that justify lower adhesion to the practice of physical activities towards the upkeep of their health (27). In this study, WC was defined as an inclusion criteria, once it is presently considered as the most specific and sensitive measure in relation to fat deposit on the abdominal region (visceral fat), used for the diagnosis of CO (19). Independently of the total fat (19,38,39), this parameter alone should be considered as a clinical risk factor for the development of complications (40-43). In relation to the accumulation of abdominal fat, our findings are important as we observe that, despite the women having presented different

**Table II.** Daily energy consumption, macronutrients and fibers of women with central obesity of classes C/D/E *vs* A/B*, Salvador, Bahia, 2015-2016

| Variables | Class C/D/E Average (Q1-Q3) | Class A/B Average (Q1-Q3) | p† |
|---|---|---|---|
| Calories (kcal)<br>Calories (kcal/kg) | 1,528.72 (1,128.8- 1,697.3)<br>17.78 (13.12-19.7) | 2,267.48 (1,670.3-2,625.84)<br>27.95 (20.59-32.37) | < 0.001 |
| Carbohydrates (g) | 230.6 (172.9-243.9) | 321.67 (243.8-344.2) | < 0.001 |
| *Lipids (g)*<br>Saturated fatty acids (g)<br>Polyunsaturated fatty acids (g)<br>Monounsaturated fatty acids (g) | 36.62 (20.17-44.08)<br>13.83 (9-22)<br>2.6 (2.2-9)<br>4.5 (2.5-9.0) | 69.36 (36.23-80.44)<br>12.1 (7-17)<br>16.74 (8.2-24.6)<br>12.5 (4.5-17.4) | < 0.001<br>0.37<br>< 0.001<br>< 0.001 |
| Protein (g)<br>Protein (g/kg) | 69.3 (44.08-80.44)<br>0.80 (0.51-0.93) | 89.14 (65.13-96.98)<br>1.10 (0.89-1.29) | 0.45 |
| Fiber (g) | 8.9 (6.98-14.4) | 18.3 (17.4-31.12) | < 0.001 |

**Classification in accordance with the IBGE. †p value: Chi-square test: p value: Mann-Whitney test.*

socioeconomic profiles, the degree of CO with reference to the WC measurement was not different. In relation to the *metabolic variables,* such as hyperglycemia and hypertriglyceridemia, we observed that these were around four times higher in the low income group despite the comparable similar increase in WC, suggesting that one or more risk factors characteristic of the low income group would be responsible for these variables. Particularly, it is important to emphasize the significantly higher percentage of HDL-C in the high income group, suggesting the beneficial effects of regular physical activity in most of the group.

Regarding the *daily consumption of energy,* it should be observed that the TEV of the low income group is inferior to that of the high income group, characterizing low-calorie intake considered as inferior to the daily recommended amount, unlike the high income group characterized by normocaloric intake, considered within the values established by recommendations. Nevertheless, such findings do not explain the CO of these groups (13,44). Literature exposes curious findings in relation to the energy intake of the obese. Especially in the northeast, low energy intake has always appeared as a mark of nutritional disorders, independently of the nutritional state (6,45). In this manner, in relation to the low income group, we consider the information collected in this study to be similar to the rate other research found in literature whereby energy intake considered as low-calorie is observed in obese women (6,22,46,47). Emphasis is given to a previous research, performed at the obesity outpatient clinic of EBMSP, with women with central obesity and of low income, where caloric intake similar to that of the present study was observed, reinforcing the importance of our findings. In addition, it must be highlighted the consonance of our findings with those of the research developed with women from a *favela* in Maceió, where energy intake of the group of obese women was inferior to the eutrophic group (1,145.00 kcal *vs* 1,365.83 kcal, respectively) (22). The same applies in another study with low socioeconomic class women in Rio Grande do Sul, where the energy intake observed in the groups of obese women was similar to that of the comparison groups (low weight, eutrophic) (p = 0.157) (46). We emphasize that these findings strengthen the relevance of the results obtained in this research, permitting to infer that energy intake should not be considered alone as the direct and exclusive cause of obesity, due to the complexity of the mechanisms involved. Even with some controversial studies, such complexity seems to be far from totally clarified. Nevertheless, it seems that the organism is programmed to maintain adiposity even when there is low availability of energy, what is known as adaptive thermogenesis. Such fact could be considered as one of the factors contributing to the development of obesity even with a low-calorie intake (48-50).

Analyzing the comparison of the consumption of *macronutrients* it is possible to observe similarities among the groups for the consumption of proteins, on the other hand, significant differences in carbohydrates and lipids. In particular, in this study, class C/D/E in comparison to class A/B obtained the contribution of the carbohydrates (60.2% *vs* 55%) and proteins (18% *vs* 15.7%), in contrast to lipids (21.2% *vs* 27.8%);such characteristics are similar to the dietary pattern of obese women in other regions of Brazil (51-54). Specifically with reference to carbohydrates, women of class C/D/E, in their majority, referred to consumption above the recommended amount exposing the need for changes in their diets, once the consumption of carbohydrates, mainly refined carbohydrates, favor the accumulation of body fat, as well as alterations to the metabolic, lipid and glycemic profile, which in this group was more frequent (25,46,52-59). It was verified that there was a different consumptions of lipids among the groups, whereby the higher consumption was observed in the socioeconomic class A/B. In this perspective, similar results were exposed in the latest Family Budget Survey (POP) (2008-2009) which indicated a higher consumption of fat among families of higher income, in contrast to the divergent results obtained. According to Mishraet al. (2002) (60) and Mullie et al. (2010) (61), in developed countries there is a higher consumption of fat in lower socioeconomic classes. In

relation to the consumption of *saturated fatty acids,* it demonstrated in this study to be high in both groups, corroborating other results exposed in studies developed in other regions of Brazil (25,27,36,46,56). Nevertheless, despite not reaching a significant level of difference, it is higher in the C/D/E group, in consonance with a prior research with a group of obese low income women with similar characteristics (6). The consumption of polyunsaturated fatty acids is significantly lower and the consumption of monounsaturated fatty acids is inexistent, contrasting to socioeconomic class A/B, being this point a lower atherogenic power of the diet in this class of obese women. Such findings may be attributed to the fact that the source of these (extra-virgin olive oil, oleaginous products, avocados) is not part of the reality of daily consumption of socioeconomic class C/D/E. The findings of this in relation to the intake of monounsaturated fatty acids and polyunsaturated fatty acids are unsettling, as it is known that they are associated to the decrease of cardiovascular risk, inflammation caused by obesity, total cholesterol (62) and glycaemia, which in the group of socioeconomic class are demonstrated to be higher.

With reference to *fibers,* the groups behave differently ($p < 0.001$). Fiber consumption in socioeconomic class C/D/E was totally insufficient, in contrast to that of socioeconomic class A/B. Such characteristics permitted us to infer that in this study there is an inadequate consumption of food considered as being rich in fibers, such as fruit, vegetables and whole grain in group C/D/E, a characteristic which reflects the reality of the Brazilian population and which can favor the accumulation of body fat, decrease the period of time for gastric emptying and, consequently, favor microbiota imbalance, as well as promoting various physiological effects such as the increase of inflammatory markers, which raise glycaemia, lipid profile and risk of cancer (6,25,55-58,63,64). Figueiredo et al. (2008), in a cross-sectional study in São Paulo, verified that women with a higher socioeconomic level consumed more fibers, corroborating our findings. In Brazil, the number of researches related to the consumption of fiber has increased, given the importance of adequate intake of fibers, being confirmed as having a preventive role in relation to reducing plasmatic cholesterol and its recognition as accessories in the control of overweight and obesity due to the sensation of satiety they promote (65).

It is necessary to stress that, in this study, all of the women presented metabolic profiles in different manners among the groups. In addition, the class C/D/E women, who presented insufficient consumption of fibers, which certainly contributed towards the obesity encountered, presented, in parallel, a worse profile of lipids (total cholesterol and triglycerides) and glycaemia. Thorough comparisons among the studies are hampered by possible differences among the characteristics of the sample, methods of dietary assessment and the manner in which the results are presented. In the case of the present study, the comparison of dietary characteristics among the groups presenting income as the difference makes these findings singular and relevant to elucidate the complexity of the issue and permeate future investigations.

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