Original Article

Lipidic Profile of Individuals without Cardiopathy with Overweight and Obesity

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Objective

To assess the lipidic profile of overweight and obese individuals submitted to cardiologic assessment and who did not show evidences of cardiopathy.

Methods

Sample with 684 individuals, 389 (56.9%) women and 295 (43.1%) men, with age ranging from 14 to 74 (average of 40.6) years old, without evidences of cardiopathy after clinical assessment and analysis of electrocardiogram, thorax radiography, ergometric test on treadmill and two-dimensional Doppler echocardiogram. The serum profile of lipids and glucose regarding sex and ranges of body mass index (BMI) - eutrophic up to 24.9 Kg/m^2, overweight 25-29.9 Kg/m^2 and obese > 30 Kg/m^2, was studied.

Results

The following means showed a significant statistic difference between the sexes: glucose (mg/dL) in women 90.21±23.13 and men 95.28±28.64 (p<0.001); triglycerides (mg/dL) in women 97.27±55.24 and men 141.47±57.06 (p<0.001) and HDL-C (mg/dL) in women 52.63±13.92 and men 43±10.88 (p<0.001). The average BMI in women was 26.15 and in men 26.33 (p=ns). In the analysis through BMI ranges there was a significant difference between the sexes (p=0.037). In the categories of overweight and obesity, only the means of triglycerides in women showed a significant statistic difference: overweight women with 102.25±60.68 mg/dL and obese 121.64±63.57 mg/dL (p=0.034).

Conclusion

Women without cardiopathy showed serum levels of glucose, triglycerides and HDL-cholesterol lower than men's. In both sexes, the means are lower in the comparison with eutrophic and overweight, and only the triglycerides average of women with overweight and obesity showed significant statistic difference.

Key words

lipids, obesity, overweight, epidemiology, body mass index

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The excess of weight and dyslipidemia increase the risk of atherosclerotic cardiovascular disease[1,2], which represent and important cause of morbidity and mortality in Brazil[3]. Interventions to maintain a healthy weight and normal values of lipids are part of prevention measures for the prevention of cardiovascular diseases, also in individuals without cardiopathy evidences[4].

The concept of excess of weight includes individuals with overweight (body mass index from 25 to 29.9 kg/m^2) and obesity (body mass index ≥ 30 kg/m^2); it is acknowledged the correlation between the increases of body mass index with the increase of risk of cardiovascular diseases[5,6].

The association between excess of weight and dyslipidemia was verified in different studies[1]. In individuals with overweight and obesity, we frequently find little to moderate increases in the serum levels of triglycerides, lower serum levels of HDL-cholesterol; however, the serum levels of LDL-cholesterol may or may not be increased[7].

The population studies that identified the association between excess of weight and dyslipidemia were based on atherosclerotic disease carriers[8-11]. That association was less studied in individuals with those risk factors, but without cardiopathy, and that frequently seek cardiologic medical assistance with preventive objectives or health examination.

There are many mechanisms by which the weight increase contributes for the increase of incidence of cardiovascular diseases. Among those we can mention the changes in the metabolism of glucose and lipids[12-14]. We formulated the hypothesis that the serum rates of glucose and lipids differ among the individuals without cardiopathy classified as under overweight and obesity condition.

We carried out this study to compare the serum rates of glucose and lipids in asymptomatic individuals without evidence of cardiopathy, regarding the body mass index, categorized as eutrophic, overweight and obesity conditions.

Methods

We carried out a cross-section study in a cohort of asymptomatic individuals and without evidences of cardiopathy of Clinical Unit of General Ambulatory of Instituto do Coração of Hospital das Clínicas of Medicine College of Universidade de São Paulo. That Unit provides medical attendance in three different levels of complexity – primary, secondary and tertiary. The cohort was developed from patients submitted to medical assessment (*check up*) in the scope of Cardiologic Assessment project.

Asymptomatic individuals eligible for the protocol, in accordance to the criteria of inclusion and exclusion described below, were invited to participate in the protocol, and those who agreed, signed a free and clarified consent term.

The inclusion criteria were as follows: a) individuals from both sexes, of any race and with age ≥ 14 years old, asymptomatic and without previous cardiopathy; b) regular general and special physical examinations performed by a physician; c) regular electrocardiogram; d) thorax radiography with normal cardiac area and pleuropulmonary fields. The exclusion criteria were: a) previous or current history of cardiovascular disease or cardiologic symptoms; b) antecedents of: systemic hypertension, diabetes mellitus, Chagas' disease, hyperthyroidism, hypothyroidism, chronic obstructive pulmonary disease, asthma, renal insufficiency, chronic inflammatory diseases, anemia, neoplasias and osteo-articular diseases, as those affections can unleash cardiopathies or make impossible the correct cardiologic assessment; c) laboratory exams compatible with diabetes mellitus, tireopathies, anemia, Chagas' disease and renal insufficiency; d) ergometric test compatible with myocardial ischemia or hypertensive behavior of blood pressure; e) two-dimensional Doppler echocardiogram with dilatation of cardiac chambers, systolic or diastolic dysfunctions and valvopathies.

Six hundred and eighty-four individuals were studied, 389 (56.9%) women and 295 (43.1%) men, with ages varying from 14 to 74 (average of 40.6) years old. The average age of women was 40.85±11.61 years old and men's was 40.29±11.37 years old. The ethnic distribution was: 516 (75%) whites, 117 (17.1%) mulattos, 32 (4.7%) far eastern individuals and 22 (3.2%) blacks.

The correlations of serum levels of glucose, triglycerides, total cholesterol total, HDL-cholesterol, LDL-cholesterol, VLDL-cholesterol, total cholesterol /HDL-cholesterol relation and LDL-cholesterol/HDL-cholesterol relation with the body mass index of women and men were studied, and categorized as follows: ≤24.9 Kg/m^2 eutrophic individual, 25 to 29.9 Kg/m^2 overweight individual and > 30 Kg/m^2 obese individual.

The descriptive analysis was carried out through percentages, means, standard deviations and minimum and maximum values. The normality of distributions was assessed through the test of Komolgorov-Smirnov. The comparison of the means of body mass indexes, of smokers and non-smokers, according to the sex, was done by the test of Mann-Whitney. The comparison of the means of laboratory variables (glucose and lipids) regarding sex and the body mass index were done through the test of Tukey Honest Significant Differences (Tukey-HSD). Significant values of p < 5% were considered. The statistic program SPSS for Windows (version 10.0) was used.

The project was approved by the Ethics Commission for Analysis of Projects of the Hospital. All participants signed a free and clarified consent term.

Results

One hundred and sixty participants (23.4%) were smokers and 524 (76.6%) non-smokers. The body mass indexes of women and men did not differ significantly regarding smoking (tab. I).

The means of total cholesterol and LDL-cholesterol did not differ significantly as for the sex, but the means of the total cholesterol /HDL-cholesterol rate and LDL-cholesterol/HDL-cholesterol rate showed a significant statistic difference between the sexes. The distribution of other sex-related variables are on table II.

The average of body mass index of women (average of 26.15± 4.72) Kg/m^2 and men's (average of 26.33±4.04) Kg/m^2 did not show statistically significant difference. For the following out of the analysis 9 women with body mass index lower than 18.5 kg/m^2, and who did not show evidences of clinical abnormality, were gathered with eutrophic individuals (BMI up to 24.9 kg/m^2). The distribution of participants of the casuistry regarding sex and the categories of body mass index showed a difference (p=0.037) (tab. III).

We analyzed the glycemia and serum lipids rate regarding the categories of body mass index (eutrophy, overweight, obesity) and concerning sex (women on table IV and men on table V).

The means of glucose showed statistically significant differences among eutrophic women and those with overweight and obesity; there was no significant statistic difference among men. Lipidic values showed statistically significant difference both in eutrophic women and men, comparing with the overweight and obese. In the comparative analysis between the group with overweight and obesity only among women, the means of triglycerides showed significant statistic difference.

Table I - Comparison of means of the body mass index (BMI) per sex and smoking

Sex	Non-Smokers n (mean of BMI±sd)	Smokers n (mean of BMI±sd)	p(1)
Female	304 (26.31 Kg/m^2±4.94)	85 (25.55 Kg/m^2±3.81)	0.362
Male	220 (26.53 Kg/m^2±4.13)	75 (25.74 Kg/m^2±3.74)	0.093

(1) - Test of Mann-Whitney; sd = standard deviation.

Table II - Descriptive statistics of laboratory variables according to sex

Laboratory variables	389 women mean (±sd)	295 men mean (±sd)	p
Glycemia (mg/dL)	90.21 (±23.13)	95.28 (±28.64)	<0.001
Triglycerides (mg/dL)	97.27 (±55.24)	141,47 (±57.06)	<0.001
Total Cholesterol (mg/dL)	195.69 (±38.05)	199.39 (±40.87)	0.175
HDL-cholesterol (mg/dL)	52.63 (±13.92)	43.00 (±10.88)	<0.001
LDL-cholesterol (mg/dL)	123.76 (±33.89)	128.51 (±34.79)	0.056
VLDL-cholesterol (mg/dL)	19.69 (±11.22)	26.64 (±15.12)	<0.001
Total Cholesterol/ HDL-cholesterol rate	3.94 (±1.22)	4.91 (±1.56)	<0.001
LDL-cholesterol/ HDL-cholesterol rate	2.52 (±0.99)	3.16 (±1.15)	<0.001

sd = standard deviation.

Table III - Grouping of body mass index and sex

Body mass index	Female n (%)	Male n (%)
Up to 24.9 Kg/m^2	183 (47.0)	117 (39.8)
25 - 29.9 Kg/m^2	130 (33.6)	128 (43.2)
Higher or equal to 30 Kg/m^2	76 (19.4)	50 (17.0)
Total	389 (56.8)	295 (43.2)

p=0.037 (test of association through chi-square).

Discussion

The sample consisted of 56.1% of individuals with excess of weight (BMI ≥ 25Kg/m²), from which 60.2% were men and 43% were women. In a study of prevalence of individuals with overweight and obesity in the northeast and southeast regions in Brazil[15], with average age of 29 years and 5 months old, the overweight prevalence was 30% for men and 26.6% for women, and the obesity prevalence was 6.7% for men and 12.7% for women. Our study showed a greater prevalence of obesity and overweight, probably due to a higher average age of individuals involved in the study (40.6 years old). For 2005, the forecast is 57.5% of men and 44.9% of women with some level of overweight or obesity[16]. Our results already suggest that growing increase of individual with excess of weight.

In the analysis of obesity (BMI ≥ 30Kg/m²), we verified a greater percentage of women (17% of men and 19.4% of women). In the study by Gigante et al.[17], the obesity prevalence was 21%,

Table IV - Comparison of means of glucose and lipids with body mass index (BMI in Kg/m²) of female sex

Variables	BMI categories	BMI mean (±sd)	p(1) normal and overweight	p normal and obese	p overweight and obese
Glucose	Normal	85.73 (±8.47)	0.040	<0.001	0.182
	Overweight	92.07 (±17.38)			
	Obese	97.88 (±44.50)			
Triglycerides	Normal	84.11 (±42.45)	0.009	<0.001	0.034
	Overweight	102.25 (±60.68)			
	Obese	121.64 (±63.57)			
Total Cholesterol	Normal	189.68 (±36.60)	0.006	0.217	0.677
	Overweight	202.91 (±39.84)			
	Obese	198.31 (±36.33)			
HDL-Cholesterol	Normal	55.79 (±14.05)	0.014	<0.001	0.069
	Overweight	51.43 (±13.11)			
	Obese	47.08 (±13.15)			
LDL-Cholesterol	Normal	116.63 (±32.23)	<0.001	0.031	0.769
	Overweight	131.50 (±35.46)			
	Obese	128.16 (±31.84)			
VLDL-Cholesterol	Normal	17.71 (±10.57)	0.179	<0.001	0.022
	Overweight	19.96 (±10.66)			
	Obese	24.20 (±12.48)			
Total Cholesterol /HDL-C	Normal	3.57 (±1.02)	<0.001	<0.001	0.171
	Overweight	4.17 (±1.29)			
	Obese	4.47 (±1.29)			
LDL-C/HDL-C	Normal	2.23 (±0.89)	<0.001	<0.001	0.316
	Overweight	2.71 (±0.99)			
	Obese	2.91 (±1.03)			

sd = standard deviation; (1) Tukey-HSD test.

Table V - Comparison of means of glucose and lipids with body mass index (BMI in Kg/m²) of male sex

Variables	BMI categories	BMI mean (±sd)	p(1) normal and overweight	p normal and obese	p overweight and obese
Glucose	Normal	92.66 (±24.66)	0.610	0.384	0.816
	Overweight	96.15 (±29.80)			
	Obese	99.06 (±34.09)			
Triglycerides	Normal	104.01 (±54.63)	<0.001	<0.001	0.820
	Overweight	163.63(±128.63)			
	Obese	173.94(±116.49)			
Total Cholesterol	Normal	187.65 (±40.84)	<0.001	0.027	0.838
	Overweight	208.66 (±38.42)			
	Obese	204.92 (±39.58)			
HDL-Cholesterol	Normal	45.64 (±11.01)	0.029	0.001	0.246
	Overweight	42.17 (±10.98)			
	Obese	39.34 (±8.50)			
LDL-Cholesterol	Normal	121.36 (±34.75)	0.007	0.213	0.825
	Overweight	134.67 (±34.77)			
	Obese	131.23 (±31.65)			
VLDL-Cholesterol	Normal	20.82 (±10.98)	<0.001	<0.001	0.788
	Overweight	30.22 (±15.73)			
	Obese	31.83 (±17.76)			
Total Cholesterol /HDL-C	Normal	4.32 (±1.33)	<0.001	<0.001	0.539
	Overweight	5.22 (±1.50)			
	Obese	5.48 (±1.78)			
LDL-C/HDL-C	Normal	2.82 (±1.11)	0.001	0.003	0.842
	Overweight	3.35 (±1.13)			
	Obese	3.46 (±1.16)			

sd= standard deviation; (1) Tukey-HSD test.

25% among women and 15% among men. In the study by Schieri et al.[18], obesity was also more prevalent in women than in men. Those findings did not differ when the population from the northeast of Brazil was analyzed[19]. The results from our study reproduce the tendency of difference regarding the excess of weight between the sexes (p=0,037), with prevalence of women in obesity category and men in overweight category.

When we only analyzed hypercholesterolemia (cholesterolemia ≥ 200 mg/dL) we observed a frequency of 46% from the population in our study, and we did not see significant difference between the sexes. Other studies, with identical value of reference, showed prevalence of hypercholesterolemia of 37%, in employees from a metallurgical industry in São Bernardo do Campo, (SP)[20] and 35% in a study with adults in the city of Cotia[21]. A study for determining cholesterol involving 81,262 individuals from other Brazilian cities, besides São Paulo[22], showed that 40% of them showed cholesterol rate over 200 mg/dL, and as in the finding in our study, there was not statistically significant difference between the sexes either.

The values of cholesterolemia presented a significant statistic difference among eutrophic and overweight individuals. Curiously that finding did not occur in the comparison between eutrophic and obese individuals. The study by Souza et al.[23], which assessed the prevalence of dyslipidemia in other region of Brazil, showed a significant statistic difference in the prevalence among individuals with and without overweight. However, the same was not seen in relation to obesity.

Regarding the means of LDL-cholesterol, men and women did not show statistically significant difference (128 and 123 mg/dL respectively). Curiously, eutrophic men did not show means of LDL-cholesterol with significant statistic difference in relation to the obese ones, but there was difference in the relation of eutrophic with overweight. Obese and overweight individuals did not show statistically different means. The means of LDL-cholesterol among eutrophic and overweight women were different, as well as between eutrophic and obese. We noted that 44% from the population in the present study showed serum levels of such lipoprotein ≥ 130mg/dL, above those recommended by the 3rd Brazilian Guidelines on Dyslipidemia[1]. Studies that used the reference point [3] 130mg/dL observed lower prevalences than that found in our study, as the one carried out by Bertolami et al.[20] with metal sheet employees from São Bernardo do Campo (SP), that found 37% of individuals with high levels of LDL-cholesterol, and the study by Cardoso et al.[24], in Cotia, observed a prevalence of 34% of that dyslipidemia. The study by Cercato et al.[25] did not show any association among the increase in levels of total cholesterol and LDL-cholesterol and obesity.

We observed in the present casuistry that 14% of women and 19% of men showed levels of HDL-cholesterol ≤40 mg/dL. The average values of HDL-cholesterol were higher to women, which was also noted in other Brazilian studies[21,26]. The statistically significant difference between the means of HDL-cholesterol in women and men probably explains the finding of different rates of total cholesterol/HDL-cholesterol and LDL-cholesterol/HDL-cholesterol, as the total cholesterol and LDL-cholesterol did not show significant different between the sexes.

The values of triglycerides differed concerning sex (p<0,001), the levels of triglycerides were higher in men. In women, the means of triglycerides differed between eutrophic with overweight and obese. In overweight and obese men a significant difference of the means of serum lipids rates was not seen. Other Brazilian studies also found higher prevalences in the levels of serum triglycerides in male individuals[27,28]. In that casuistry, we observed 6% of women and 22% of men with levels of triglycerides higher than 150mg/dL, a reference point from which preventive measures must be instituted.

Our results concerning HDL-cholesterol and triglycerides are in accordance to the findings in other studies, which means that with the increment of body mass index there is a discreet to moderate increase of triglycerides and reduction of HDL-cholesterol[29-31]. However, by comparing individuals with overweight and obesity, the significant statistic differences only occurred in the serum means of triglycerides in women.

The glucose means differed between the sexes and were higher in men. The prevalence of hyperglycemia in our population was much lower than those reported by Gus et al.[32]. The fact that individuals with diagnosis of diabetes mellitus were excluded from the present study would be contributing for the reduction of the prevalence of hyperglycemia in our population in the study.

The casuistry consisted of 684 adult individuals, selected from the clients that the Clinical Unit of General Ambulatory of Instituto do Coração demanded for cardiologic assessment, limiting the study. A random and thoughtful population sample in the city of São Paulo would need the inclusion of individuals from many regions in the city and in accordance to the representativeness of the population in that region. However, that information was not possible, which made this type of analysis impossible. Besides, other risk factors, such as familial history of cardiopathy, were not quantified.

The body mass index has the limitation of being little descriptive concerning the distribution of muscular adipose tissue of a single patient. The assessment methods of body fat distribution, although efficient, were not sufficiently assessed as indicators of cardiovascular risk, and they are not being used in clinical practice[7].

Concluding, the casuistic population sample under study, without cardiopathy evidences, women showed lower means of serum levels of glucose, HDL-cholesterol and triglycerides than men. In both sexes, those means are lower in comparison between eutrophic and with excess of weight, and only the triglycerides means in women with overweight and obesity showed significant statistic difference.

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