

DETERMINATION AND CHARACTERIZATION OF ATHEROGENIC RISK PREDICTORS IN ADOLESCENTS FROM THE CITY OF LAGARTO, SE, BRAZIL.

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Abstract:

The lipid profile of 342 adolescents from Lagarto-SE was determined with the objective of characterizing the predictors of atherogenic risk in this population.

Hypercholesterolemia (total cholesterol-TC) was observed in 28.7% of the students, while reduction of HDL-cholesterol, in 48.5%. However, there was no association (chi-square / Odds Ratio) with socio-demographic variables, economic variables, lifestyle and family history of atherogenesis related diseases. On the other hand, students with high BMI presented about three times more chances of changes in Castelli I ($p = 0.0032^*$, OR = 2,833 CI: 1,449-5,539) and Castelli II ($p = 0.0039^*$, OR = : 1,423-5,347). Similar results were obtained in adolescents with high abdominal circumference (AC).

The results show that the reduction of HDL, overweight / obesity and elevated AC are the main predictors of atherogenic risk in adolescents of Lagarto-SE.

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Introduction:

Atherosclerosis is an inflammatory disease that attacks the innermost layer of the arteries, commonly called the intima, and is triggered by the oxidation of low-density lipoproteins (LDL). As a consequence, there is the formation of the atheroma plaque whose rupture generates thrombotic events such as acute myocardial infarction and stroke (MONTECUCCO; LIBERALE; BONAVENTURA et al., 2017). Although a higher prevalence of diagnosis has been reported in adulthood, atherogenesis begins in childhood and adolescence (ZIESKE; MALCON; STRONG, 2002).

Although a multifactorial origin, atherosclerosis has as main risk factors dyslipidemias, diabetes mellitus, arterial hypertension, drug use and the lifestyle characterized by smoking, sedentary lifestyle, inadequate diet and alcoholism (LEE; YOUN; JUNG et al. al., 2017).

Dyslipidemias directly associated with atherogenesis are those characterized by the reduction of high-density lipoprotein (HDL) and the increase of low-density lipoprotein (LDL). Very low-density lipoprotein (VLDL) has been shown to be associated with the formation of less dense LDL particles and more susceptible to the oxidation process (JELLINGER, HANDELSMAN, ROSENBLIT et al., 2017).

The relationships between atherogenic (LDL and VLDL) and antiatherogenic (HDL) lipoproteins have been widely used in clinical practice and in epidemiological studies as predictors of cardiovascular risk. Among the main relationships are the Castelli I index (total cholesterol / HDL), the Castelli II index (LDL / HDL) and the non-HDL cholesterol (difference between total cholesterol and HDL-cholesterol), (SBC, 2014; RUBENFIRE; BROOK, 2013).

Considering that dyslipidemias are important in atherogenesis and that it begins in early stages of life, the laboratory determination of the lipid profile in children and adolescents

has been the object of several studies. In this context, the main objective of this study was to determine the indexes of Castelli I and II and non-HDL cholesterol levels in adolescents in the town of Lagarto-SE, in order to determine the prevalence of dyslipidemias and predictors of atherogenic risk in this population. As a specific objective, this work investigated the association between the laboratory abnormalities found and the sociodemographic, economic, lifestyle-related, anthropometric variables and family history of cardiovascular diseases (CVD) (SBC, 2014; RUBENFIRE; BROOK, 2013).

Methodology:

In partnership with the Department of Education of the municipality of Lagarto-SE, the project was presented to students of 4 public schools through interactive lectures. Those who met the inclusion criteria (between 12 and 18 years old) and who accepted to participate in the study through the signing of the Informed Consent Form (ICF) by the parents or legal guardians were asked to attend, in a fast of 10 to 12 hours, at the Laboratory of Clinical Analysis of the Nucleus of Research and Attention to the Health of the Worker (NUPAST) of the Federal University of Sergipe, Campus of Lagarto-SE. Venous blood samples were collected and processed to obtain serum used for biochemical measurements. 342 adolescents participated in the project.

After obtaining the blood samples, the adolescents answered a questionnaire to collect socio-demographic variables (sex, skin color and social class), related to lifestyle variables (sedentary lifestyle, alcohol consumption and smoking) and family history of CVD, Diabetes and obesity. Stratification of social class was performed according to the Brazilian Association of Research Companies (ABEP).

Then, anthropometric measures such as weight, height and abdominal and hip circumference measurements were collected using the G-Tech BALG4FB Digit® scale and tape measure. From these measurements, the waist-to-hip ratio (WHR) and body mass index (BMI) were calculated. In addition, abdominal circumference (AC) was also considered.

Blood samples were centrifuged (CentriBio® centrifuge) to obtain serum used for total cholesterol (TC), LDL-cholesterol, HDL-cholesterol and triglyceride (TG). The analysis were performed in the laboratory of clinical analysis of the University Hospital of Aracaju by means of a colorimetric enzymatic methodology whose readings were done in an automated way (Wiener Lab CT600i autoanalyzer®). VLDL cholesterol was calculated using the Friedwald

formula ($TG / 5$) provided that the TG values were less than 400 mg / dL. LDL-cholesterol and HDL-cholesterol were measured by direct methodology. From the values determined in the lipid profile, the values of non-HDL cholesterol (non-HDL) and the indexes of Castelli I and Castelli II were calculated. The interpretation of the results was performed based on the V Brazilian Directive on Dyslipidemias and Prevention of Atherosclerosis (2013).

The results were quantitatively described as absolute (n) and percentage (%) of subjects with or without changes in laboratory parameters and indexes as a function of the variables investigated. The chi-square or Fisher exact test was used for statistical analysis of distribution frequencies ($p < 0.05$ *). The relative risk was estimated with Odds Ratio (OR), with a 95% confidence interval (CI).

Results and Discussion:

Most of the participating adolescents are female (74%), self-declared browns (67%), belonging to social class C1 / C2 (61.1%) and family history of diseases associated with atherosclerosis (59.4%). No subjects reported smoking. Alcoholism and sedentary lifestyle were found in 27.7% and 56.1% of students, respectively. Increased values of BMI (12%), WHR (16.7%) and AC (15.8%) were found.

The alterations in the lipid profile were elevation of CT (28.7%) and LDL-cholesterol (7.9%) and reduction of HDL-cholesterol (48.5%). The prevalence of changes in non-HDL cholesterol, Castelli I index and Castelli II index were, respectively, 3.2%, 38.6% and 32.5%.

Overweight / obese students were about three times more likely to have changes in Castelli I ($p = 0.0032$ *, OR = 2.833 CI: 1.449-5.539) and Castelli II ($p = 0.0039$ *, OR = 2,756 CI: 1,423-5,347) and approximately twice the reduction of HDL-cholesterol ($p = 0.046$ *, OR = 1.993 CI: 1.015-3.914). Likewise, adolescents with elevated AC were three times more likely to have changes in the Castelli I ($p = 0.0032$ *, OR = 2.833 CI: 1.449-5.539) and Castelli II ($p = 0.0002$ * OR = 3.194 CI: 1.762-5.793).

Conclusions:

The results show that the target population of this study presents as the most prevalent risk predictors for atherogenesis the reduction of HDL-cholesterol, hypercholesterolemia (TC), sedentary lifestyle and family history of diseases associated with atherosclerosis. Due to its diverse functions in

lipoprotein metabolism and its antiatherogenic actions, the high prevalence of HDL-cholesterol reduction should be considered as an important predictor of risk for atherosclerosis in the studied population. In addition to its isolated analysis, the ratio of HDL-cholesterol to atherogenic lipoproteins through the Castelli I and II indexes showed that more than one-third of the students had atherogenic lipid profile, which in turn was significantly associated with increased BMI and AC values.

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