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ATHEROGENIC PLASMA INDEX IN A YOUNG NON-OBESE CAUCASIAN POPULATION

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Abstract

Cardiovascular risk is based on age, gender, smoking, systolic blood pressure and total cholesterol. Although it is well documented that the atherosclerosis process starts early in life, the risk is very clearly defined only for fatal events and only for persons above 40 years old. Besides the Guidelines for the Management of Dyslipidaemias, other factors such as atherogenic plasma index (AIP) or adipokine levels have certain predictive information about this risk. The aim of our study was to assess the gender differences in AIP in a young non-obese adult population. We selected 85 young adults without a diagnosis of metabolic syndrome or related medical conditions. The metabolic syndrome components were measured and those (2 subjects) with 3 established metabolic syndrome criteria were excluded. The average AIP value on the whole group was 0.07. When stratifying the risk according to the AIP value, the majority of the participants were in the low risk range (51 participants representing 61.4% of the total), 18 (21.6%) were included in the high risk, and 15 (18%), in the medium risk category. The average AIP in women's group was 0.02, and in men's group, 0.18 ($p<0.001$). Our preliminary results suggest that, for screening purposes, the AIP threshold should be different according to gender. To confirm this finding, a large longitudinal study is needed.

Keywords: Cardiovascular risk, atherogenic plasma index, gender, young adults.

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1. Introduction

Cardiovascular events have gradually moved towards an earlier age of onset during the last decades. The proportion of cardiovascular deaths reported for the adult population aged 35 to 64 years is between 9 and 41% of all deaths around the globe, with higher prevalence in low and middle income countries (Leeder, Raymond, & Greenberg, 2004). Although the severe cardiovascular events take place after the third decade of life and increase with age, it is well documented that the atherosclerosis process starts very early in life and there is a constant trend of lowering the age of clinical manifestations. From the epidemiological perspective, a parallel between this trend and the increment of overweight and obesity in adolescents has been identified; from the pathophysiological perspective, significantly higher systolic and diastolic blood pressure, with carotid intima-media thickening comparable with the advanced vascular age or arteries more typical for adults than adolescents was found in obese children (Bridger, 2009), together with a dyslipidaemia profile (high plasma triglycerides and low HDL-cholesterol levels) (Gidding et al., 2016). A correlation between atherosclerosis and obesity in adolescents was found in many individual studies (Bridger, 2009; Fang et al., 2016) and in systematic reviews (Park et al., 2015). The discovery of adiponectin and its anti-inflammatory and vasoprotective actions was enthusiastically expected to solve an important link between obesity and cardiovascular disease, as the majority of the adiponectin pool is produced by the mature, fully differentiated adipocytes, although some other cells (hepatocytes, osteoblasts and skeletal muscle fibres) can generate a certain limited plasma amount. Up from a certain point, the increase in fat mass changes the normal adipokine profile of the adipocytes, with lower adiponectin and higher leptin plasma levels; this unbalanced secretion reduces the positive vascular effects of adiponectin and favours the pro-inflammatory actions of leptin. The cardiovascular risk characterisation in young non-obese adults is poorly defined.

2. Problem Statement

The risk for cardiovascular diseases is very well defined for people over 40 years old (Bala, Craciun, & Hancu, 2016; Gao et al., 2016). However, the atherogenic process starts much earlier, presumably in childhood. In the last decades, with the increasing trend in obesity among adolescents and young adults, the cardiovascular risk has become a very important public health topic. Obesity is not sufficient to characterise the risk, as not all the obese population is metabolically obese (Guo & Garvey, 2016; Gherman et al., 2010). Therefore, assessing the appropriate screening methods for the young non-obese persons needs further research (Srikanthan et al., 2016).

3. Research Questions

Are there specific screening tests for cardiovascular risk in young non-obese adults?

Is there a gender-specific difference in the definition of cardiovascular risk in young non-obese adults?

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4. Purpose of the Study

To better characterise the cardiovascular risk in non-obese young adults, defined by BMI criteria, taking into consideration the gender differences.

5. Research Methods

We designed a cross-sectional study involving 85 young adults (average age = 23.78, StDev = 1.31 years) without a diagnosis of metabolic syndrome or related diseases (hypertension, ischemic heart disease, diabetes, polycystic ovary syndrome). We checked for the metabolic risk factors by measuring the abdominal circumference, the blood pressure and the lipid profile. Blood was collected after minimum 8 hours of fasting, in the morning. The lipid profile was measured using standard laboratory methods.

Atherogenic plasma index was defined using the formula: log (TG/HDLc), where TG is the serum triglycerides and HDLc is the high-density lipoprotein cholesterol.

We stratified the risk, according to previously reported thresholds (Dobiasova & Frohlich, 2001), in low, medium and high. The statistical analysis was performed using StatPlus: mac v6. As the atherogenic plasma index was normally distributed, we used the ANOVA test for the analysis of variance between the women and men groups.

6. Findings

Both groups had similar ages (men's average age = 23.88, women's average age = 23.78, p = 0.79). As mentioned, none of the subjects included in the analysis met the IDF metabolic syndrome criteria.

The average AIP value on the whole group was 0.07. When stratifying the risk according to the AIP value, the majority of the participants were in the low risk range (51 participants representing 61.4% of the total); there were 18 (21.6%) that matched the inclusion category of the high risk and 15 (18%), of the medium risk. The distribution of AIP by gender is presented in Figure 01 and Figure 02.

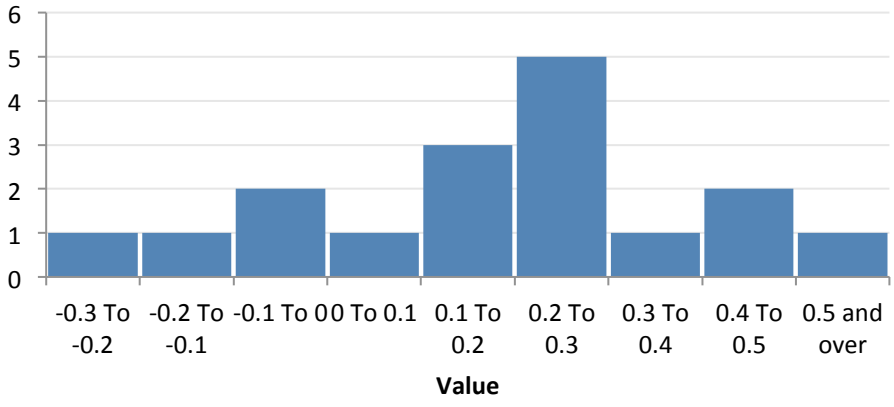

Figure 01. Atherogenic plasma index – men

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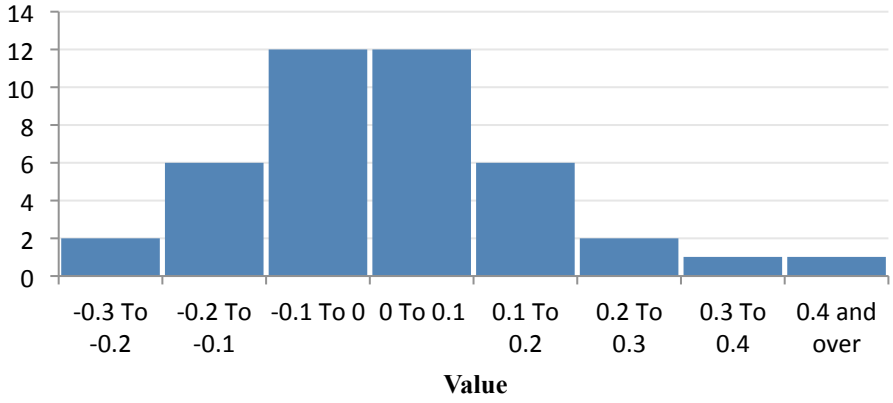

Figure 02. Atherogenic plasma index – women

The average AIP in women's group was 0.02, and in the men's group, 0.18. The comparison between the means was statistically significant ($p<0.001$).

Our result is in line not only with the previously recognized lower risk in women before menopause (Rossi et al., 2002; Pitha et al., 2014), but also with different nutrition influences related to gender (Morselli et al., 2015). Therefore, gender differences should be considered for both primary prevention and screening tests.

7. Conclusion

Our study shows highly significant differences of the average AIP in young non-obese men compared to women. This raises the question of a possible different threshold of the AIP value for risk definition according to gender. To confirm this finding, a large longitudinal study is needed.

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