

C Reactive Protein Can Be a Marker of Metabolic Syndrome in Girls from Childhood to Adolescence

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Abstract

As inflammation is a hallmark of most chronic diseases, this article presents a unique condition in two aspects: age and sex. From a population of students aged from two to 19 years old a subgroup with total cholesterol above 150 mg/dl was selected so as to study the C Reactive Protein levels and correlate them with factors that can be risk markers for Metabolic Syndrome. Most trials and scientific publications did not focus in the female sex nor on younger age groups and its specific characteristics. Nowadays these aspects are gaining relevance. This paper aim is to study the levels of C Reactive Protein as an inflammatory marker, prioritizing its role in Metabolic Syndrome in girls from childhood to adolescence. It is noteworthy to study the effect of Total Cholesterol in values superior to 150 mg/dl as to the inflammation marker C Reactive Protein and its correlation to Metabolic Syndrome risk markers in a special group of female children and adolescent students. The participants were all above the 80th percentile for Total Cholesterol values. Statistical significances and tendencies were found in the sedentary group aswell as in the higher Non HDL, the higher Triglycerides also, Blood Pressure and Abdominal Circumference. In this analysis neither lower HDL Cholesterol nor smoking habit in their parents were relevant. With the increasing epidemics of overweight and obesity there must be a main focus in prevention. In this paper, the data point to an early start, because of the risk of Metabolic Syndrome. The results in girls as early as childhood to teenage is alarming and claim for public and personal interventions, specifically through healthy lifestyle modifications.

Keywords: metabolic syndrome; c reactive protein; inflammation; risk factors; girls; adolescents

Abbreviations

CRP : C Reactive Protein

usCRP : ultra sensitive C Reactive Protein

Introduction

Metabolic Syndrome is an inflammatory condition that can be evaluated by several laboratory tests, being the most assayed the ultra sensitive C Reactive Protein (usCRP). [1-4]

C-reactive protein (CRP) is an annular (ring-shaped) pentameric protein found in blood plasma, whose circulating concentrations rise in response to inflammation. It is an acute-phase protein of hepatic origin that increases following interleukin-6 secretion by macrophages and T cells. Its physiological role is to bind to lysophosphatidylcholine expressed on

the surface of dead or dying cells (and some types of bacteria) in order to activate the complement system.

Objective

As in adults, Metabolic Syndrome increases systemic immunoinflammatory activity in children from early childhood. In this paper, the aim was to compare inflammatory marker CRP levels in this

age group to the main risk factors for Metabolic Syndrome in young public schools children and adolescents.

Method

From a total of 10.000 public school students in a city on the outskirts of São Paulo that had their risk factors for cardiovascular disease assessed, the female subgroup that presented Total Cholesterol over 150 mg/dl were studied for associations that can be markers of future presentation of Metabolic Syndrome.

Student paired tTest was performed for each of the variables versus the usCRP. Depending on the “p” values the interpretation was discriminated as significant, tendency or non significant.

Evaluation of cardiovascular risk factors in 2500 individuals between 2 and 19 years old, randomly selected from 89 public schools in São Paulo. Of these, 502 individuals who presented Total Cholesterol > 80th percentile at fingertip dosage (Accutrend-R, Roche) were selected. Of these, 177 female children and adolescents were the case series of this study. usCRP determined in serum by immunonephelometry (Behring Nephelometer, Cardio Phase hsCRP), with detection limit of 0.16 mg/L.

Results

These results are presented in the tables and figures below.

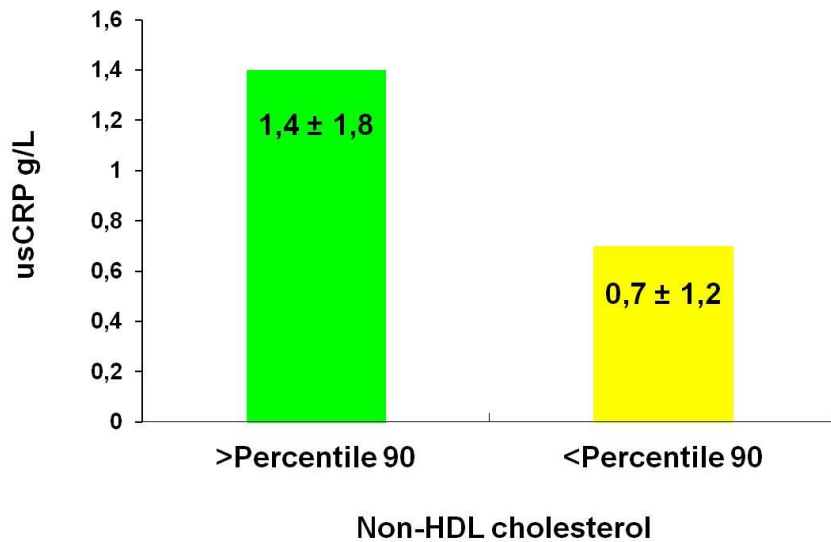


Figure 1: Differences between ultra sensitive C Reactive Protein and non-HDL cholesterol.

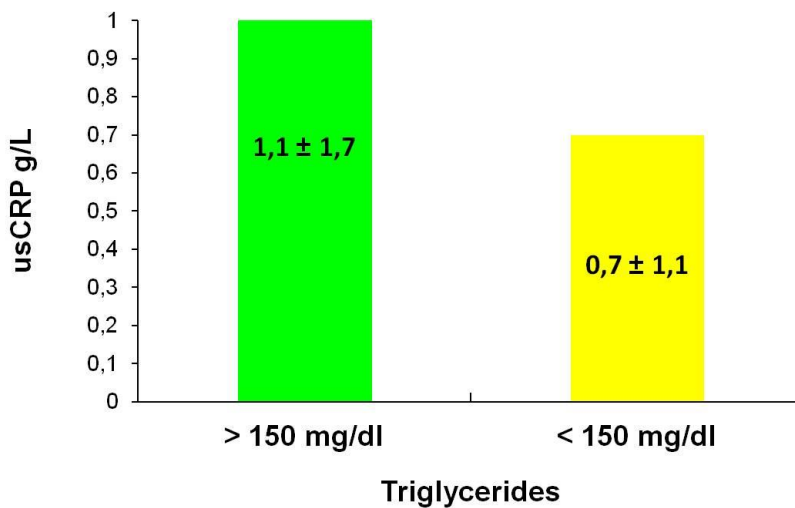


Figure 2: Differences between ultra sensitive C Reactive Protein and triglycerides level ranges.

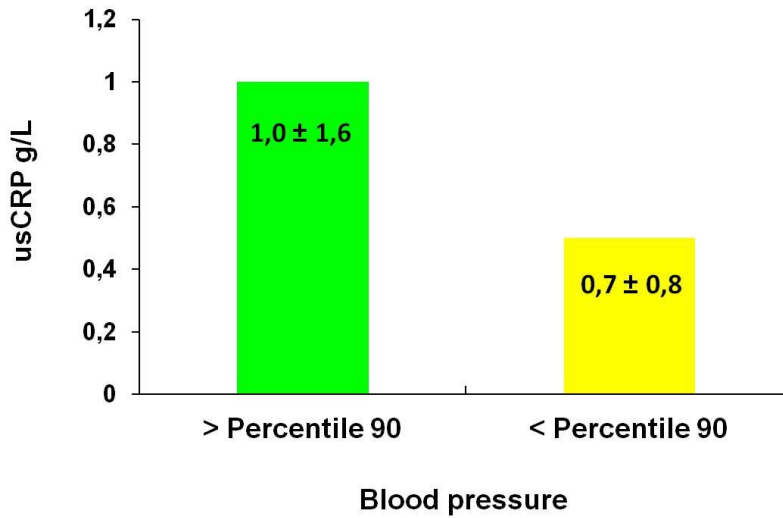


Figure 3: Differences between ultra sensitive C Reactive Protein and blood pressure.

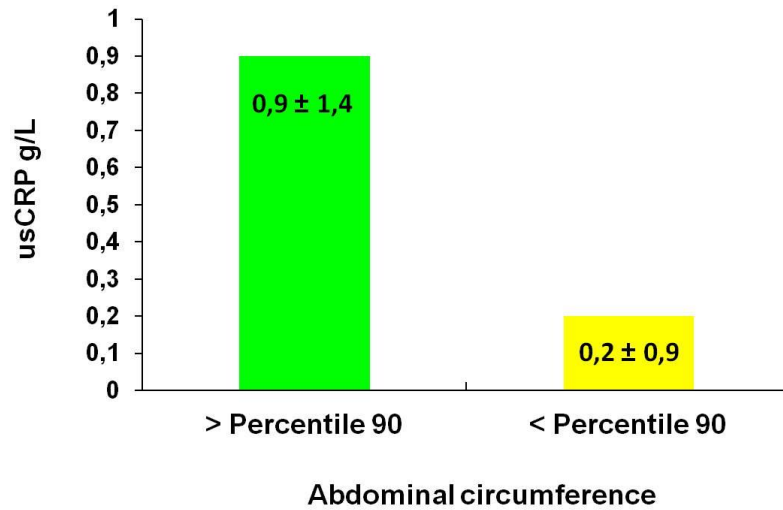


Figure 4: Differences between ultra sensitive C Reactive Protein and abdominal circumference.

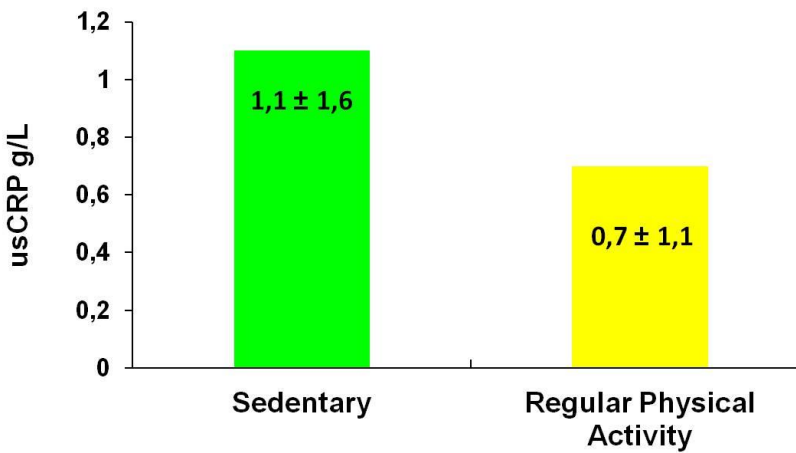


Figure 5: Differences between ultra sensitive C Reactive Protein and physical activity ranges.

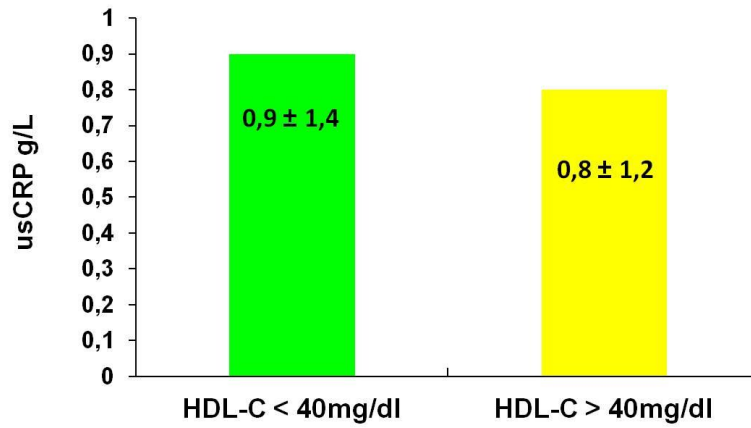


Figure 6: Differences between ultra sensitive C Reactive Protein and HDL Cholesterol.

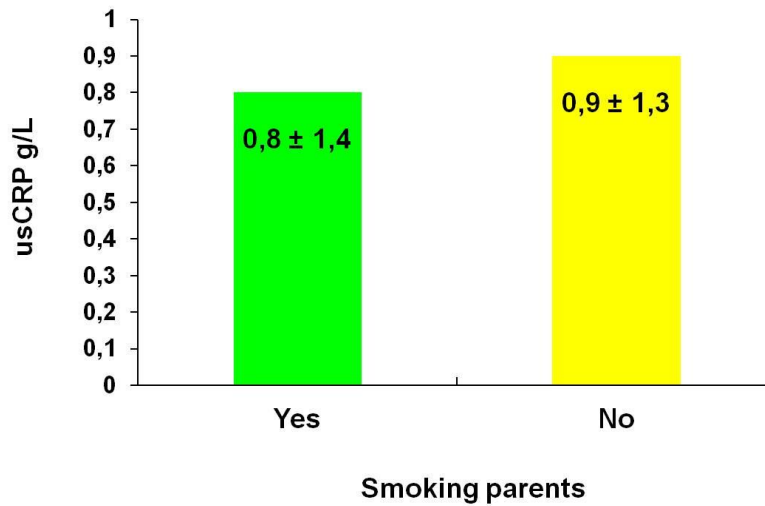


Figure 7: Differences between ultra sensitive C Reactive Protein and smoking parents.

Conclusion

Attention must be paid for Total Cholesterol above expected values for each age group as one of the probable causes of C Reactive Protein increase that contribute to and belong to the risk markers for Metabolic Syndrome. In female children, aged 2 to 19 years, with total cholesterol above the 80th percentile, plasma usCRP levels tended to be higher in sedentary children (p=0.17) or with increased non-HDL cholesterol (p=0.06), Triglycerides (p= 0.1), blood pressure (p= 0.1) and abdominal circumference (p=0.1). It did not seem to be influenced by the presence of low HDL-C or by the smoking habit among parents.

Acknowledgments

None.

Conflicts of interest

No conflict of interest.

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