

Prevalence of the metabolic syndrome in Caucasian obese children and adolescents: comparison between three different definition criteria

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Childhood and adolescent obesity is an important world reality, due to its progressively increasing prevalence and associated morbidities. Several studies showed that severe obesity is strictly associated with the metabolic syndrome (MS), which represents the major risk factor for cardiovascular diseases and type 2 diabetes. The MS encompasses the clustering of several anthropometric and metabolic parameters (BMI, waist circumference, blood pressure, total- and HDL-cholesterol, triglycerides, fasting glucose, etc.), variously combined in-between.

We evaluated the prevalence of MS in Caucasian obese children and adolescents by comparing three different definitions of MS for children, which were characterized by the use of international -Weiss's et al. and Cook's et al. - or nationwide-specific cut-off points recently defined by the Italian Society for Pediatrics (ISP).

Four hundred-thirty nine (191 boys and 248 girls) obese children and adolescent (BMI above 99th centile for gender and chronological age, mean BMI z-score: 3.3 ± 0.1), aged 8-18 years, participated in the study.

Subjects were divided into two subgroups as far as pubertal stage is concerned: early-mid pubertal stage (EPS), corresponding to Tanner stages 2 and 3 and late pubertal stage (LPS), corresponding to Tanner stages 4 and 5.

Age, body weight, height, BMI and BMI z-score, waist circumference and SBP, triglycerides and FPG concentrations were significantly higher in boys than in girls, both in EPS and LPS ($P < 0.001$). On the contrary, DBP, HDL-cholesterol and IGT were not significantly different between boys and girls of different pubertal stages.

By using the Cook's et al. definition, the prevalence of MS increased with the advancement of pubertal stage, from a value of 29.9% (EPS males) to 52.1% (LPS males) and from 19.2% (EPS females) to 28.9% (LPS females).

In the whole study group the prevalence of MS was significantly higher in boys than in girls (40.8% versus 24.8%, $P < 0.001$), this difference being also present in the two subgroups considered separately.

Considering the cut-off points used by the ISP criteria, the prevalence of MS was comparable to that observed with Cook's et al. in both genders and throughout the pubertal stages, in line with our previous observations obtained using the WHO-derived definition and Caucasian child-specific criteria. By contrast, the use of Weiss's et al. definition showed markedly different values of MS prevalence in both genders and different pubertal stages, these discrepancies being particularly evident in EPS males and females and LPS females.

Among all the obese children and adolescents MS+, the more frequently altered parameters were BP, triglycerides and HDL-cholesterol, this finding being traceable in both genders and pubertal stages. In fact, altered BP levels were recorded in 87% of children MS+ using the Cook's et al. definition, this percentage being similar using the ISP and Weiss's et al. criteria (85 and 87%, respectively). By

contrast, the prevalence of the other two more frequently altered parameters, i.e. high levels of triglycerides and low-levels of HDL-cholesterol, were comparable when Cook's et al. and ISP criteria were used (71-64 and 72-78%, respectively), while they were remarkably different when Weiss's et al. criteria were applied (25-43%). FPG concentrations, used in Cook's et al. and ISP definitions, were not significantly relevant to determine MS, because only 2% of subjects MS+ showed altered FPG levels. Among all the obese children and adolescents MS- the more frequently altered parameters were SBP and DBP, with a prevalence lower than 50%; a not relevant prevalence (lower than 10%) of altered HDL cholesterol, triglycerides, FPG or IGT was present among these subjects. In conclusion, the prevalence of MS in children and adolescents depends strongly on the parameters chosen and their respective cut-off points. In order to avoid possible relevant under- or over-estimation of this prevalence, it seems advisable the use of nation wide specific cut-off values which seems to be more appropriate to give more reliable results.

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