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Letter to the Editor

Can Waist Circumference Be a Reliable Anthropometric Parameter in Healthy Normal Weight and Overweight Adolescents?

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Dear Editor-in-Chief

Abdominal obesity as determined by increased waist circumference (WC) is an established risk factor for metabolic syndrome (MS), diabetes mellitus and cardiovascular disease (CVD) in adults (1). However, it is often ignored as a potential cardiovascular risk factor in metabolically obese or non-obese children and adolescents (2). WC is reported to be associated with visceral fat, whereas body mass index (BMI) is more associated with subcutaneous fat in children. WC has also been associated with high inflammatory biomarker levels, such as C-reactive protein (CRP) and is reported to be an independent predictor of insulin resistance, an underlying determinant of MS (3). Recently the International Diabetes Federation (IDF) published definition of the MS in children and adolescents (1), including WC as a 'sine qua non' for MS.

We examined the association of WC and cardiometabolic risk factors enrolling a total of 100 randomly selected healthy normal weight and overweight Montenegrin adolescents between the ages of 16-19 years (72.0% girls) who volunteered to participate in the study. Increased WC was defined using IDF criteria for metabolic syndrome in adolescents older than 16 years (≥ 94 cm for males, and ≥ 80 cm for females) and the participants were divided into two groups: group of adolescents without abdominal obesity (67.0%), and group of adolescents with abdominal obesity (33.0%). We measured serum CRP, glucose, uric acid (UA), total cholesterol, high density lipoprotein cholesterol (HDL-c), low density lipoprotein cholesterol (LDL-c) and triglycerides (TG) using standardized biochemical procedures.

Compared to those without abdominal obesity, adolescents with abdominal obesity had higher serum UA ($P<0.001$, $P=0.015$, for girls and boys, respectively), and lower HDL-c ($P=0.050$, $P=0.002$, for girls and boys, respectively). WC correlated positively with serum UA (r=0.593, $P<0.001$), CRP (r=0.352, $P<0.001$), TG (r=0.295, $P=0.003$), systolic blood pressure (r=0.198, $P=0.048$), and negatively with HDL-c level (r= -0.413, $P<0.001$). These correlations were weaker between BMI and BMI z-score and the same cardiometabolic markers.

Although BMI is widely considered as a simple anthropometric measure to assess obesity alongside evidence of good correlation between BMI

with adverse metabolic outcomes, there are individuals with normal body weight and BMI, but who display metabolic disturbances typical of obese persons. They are first described three decades ago (4) and are defined as metabolically obese normal weight individuals. They are insulin-resistant (5) and represent a high risk group of developing cardiometabolic diseases. It is shown that abdominal visceral fat is a critical denominator for this adverse metabolic profile but there are only a few studies on this topic in children and adolescents (6).

The main finding of our study is that WC correlates better than BMI with cardiometabolic markers in healthy normal weight and overweight adolescents. Of great concern is the fact that we found 20.7% of normal weight adolescents with increased WC thus fulfilling the criteria for diagnosis of abdominal obesity that would not be identified using only BMI.

Taken all these together, WC in adolescents can be useful parameter for screening of metabolic disorders and should be included in routine clinical practice, together with the traditional BMI scale, but unlike BMI, takes into account the amount of visceral fat.

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