More Attention Should Be Paid to Monitoring of Abdominal Obesity among Children and Adolescents

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Dear Editor,

During the past decades, childhood obesity has increased dramatically both in developing and developed countries [1, 2]. In 2009–2010, 18.2% of US children and adolescents aged 6–19 years (19.8% of boys and 16.5% of girls) were found to be obese [3]. In 2013, it was found that 23.8% of boys and 22.6% of girls in developed countries, and 12.9% of boys and 13.4% of girls in developing countries were overweight or obese [4]. Since childhood obesity is associated with many health risks and also because it progresses into adulthood, the widespread prevalence of obesity in children and adolescents has become an important public health concern challenging the world today [5, 6].

Body mass index (BMI) is perhaps the most commonly used measure for defining general obesity (GOB) in clinical practice and while conducting population surveys. However, BMI cannot distinguish between fat and fat-free mass; it provides no information on body fat distribution. Also, elevated BMI need not necessarily reflect increased adiposity. Individuals with excessive muscle growth can show a large BMI without having an unhealthy level of fat, and may be misjudged to be obese; health

risks of such people would be overestimated if screening is done by BMI alone. Waist circumference (WC), on the other hand, provides relevant information about fat distribution and reflects the degree of abdominal adiposity. Evidence reveals that WC provides information beyond BMI in the assessment of obesity-related health risks in clinical settings [7]. It has been recognized that individuals with a similar BMI can vary considerably in their abdominal fat mass; a few individuals may exhibit a 'normal' BMI but may have a disproportionately large WC. In other words, children and adolescents in the normal BMI category may suffer from abdominal obesity (AOB) and their health risks could be missed out on oversight if screening is done only by BMI.

Several studies have examined the secular trend in measuring WC and BMI among children and adolescents; they have consistently showed that WC is being increasingly accepted as a standard measure than BMI [8–10]. Based on 2 cross-sectional surveys of students aged 7–18 years, carried out in 2010 and 2014 in Shandong Province ($n = 72,755$), we examined the recent trends in BMI and WC. An increasing trend in

BMI and WC was observed in both boys and girls between 2010 and 2014 ($p < 0.01$), BMI Z-scores increased by 0.11 (boys) and 0.13 (girls) units, and WC Z-scores increased by 0.22 (boys) and 0.28 (girls) units; WC has increased more than BMI (fig. 1). Similarly, the prevalence of GOB (defined by BMI cut-offs recommended by the International Obesity Task Force [11]) increased from 7.35% (boys) and 2.72% (girls) in 2010 to 9.33% (boys) and 3.89% (girls) in 2014 by 1.98 (boys) and 1.17 (girls) percentage points, while AOB (defined by waist-to-height ratio ≥ 0.5 [12]) increased from 15.97% (boys) and 7.63% (girls) to 19.73% (boys) and 10.91% (girls), by 3.76 (boys) and 3.28 (girls) percentage points (fig. 2). Values of WC and AOB increased faster than BMI and GOB among children and adolescents between 2010 and 2014.

The current International Diabetes Federation definition of metabolic syndrome in pediatrics recommends the use of WC as a mandatory diagnostic component [13]. Evidence suggested that compared to GOB, AOB is associated with greater cardiovascular risks [14]. Recently, the use of

Fig. 1. The increments of BMI and WC Z-score between 2010 and 2014.

Fig. 2. Prevalence of general and abdominal obesity among children and adolescents (2010–2014).

BMI as a cardiovascular risk factor has been questioned and WC received increasing attention in clinical practice. Considering the rapid increase observed in the values of WC and AOB, we suggest that more attention should be paid to the monitoring aspects of AOB among children and adolescents and that prevention strategies should be more focused on AOB.

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