Editorial

What is the Most Useful Anthropometric Index for Predicting Cardiovascular Disease Risk Factors in Children?

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Obesity is related to many metabolic risks and diseases and is one of the most important public health issues. Abdominal obesity, particularly the excess accumulation of visceral fat (VAT) is highly associated with these complications even in childhood1).

Recently, Ma et al. published an interesting paper. The author examined the relation of the body mass index (BMI), waist circumference (WC), waist to height ratio (WHtR), and waist to hip ratio (WHR) with cardiovascular disease risk factors (CVRF) in Chinese children. They concluded that WC was the best predictor of CVRF compared with other anthropometric indices2). To diagnose abdominal obesity, VFA assessed by computed tomography (CT) at an umbilical level is the golden standard 3). However, abdominal CT is not available in public health field. Therefore, many anthropometric indices have been shown to be surrogate measures of fat distribution and easy to interpret for healthcare providers.

Previously we reported that WHtR is the best predictor of CVRF in Japanese school children aged 9–13 years 4). We agree with the authors that WHR was the poorest predictor of CVRF in children. As the authors described, WC and WHtR are better predictors for CVRF complications in children. Then, which is the better index in children?

WHtR was first used in the Framingham Study, and Ashwell and Hsieh presented six advantages of applying WHtR to international health promotion 5).

1) WHtR is more sensitive than BMI as an early warning of health risks.

2) A boundary value of WHtR of 0.5 indicates increased risk for men and women.

3) A boundary value of WHtR of 0.5 may indicate increased risk for individuals in different ethnic groups.

4) WHtR is cheaper and easier to measure and calculate than BMI.

5) WHtR may allow the same boundary value for children and adults.

6) WHtR boundary values can be converted into a consumer-friendly chart.

Although the differences in the results were small and depend on the type of obesity-related complication and gender, there were several reasons for the differences between our results.

First is the diversity of the measuring sites for WC. The most common WC protocol is the midpoint between the iliac crest and lower margin of the rib cage6). In this paper, the measuring point was 1 cm above the umbilicus. On the other hand, Japanese WC measuring protocol recommends measurement at umbilicus level1). The diversity of measuring sites may have substantial influence on the results, particularly in children. Next is the difference in the cut-off values of HDL-C levels. The authors applied the age- and gender-adjusted HDL-C \( \leq 10 \text{th percentile} \) that was considered to have CVRF. In contrast, our cut-off value of HDL-C was \( <40 \text{mg/dL} \) (age- and gender-adjusted Japanese reference data 5th percentile)7).

To estimate CVRF in children, the measurement of WC and WHtR were comparatively popular among Japanese pediatricians. Japanese Society for the Study of Obesity (JASSO) provided the concept of “obesity disease” (obesity as a disease) in 20028). Abdominal obese children (WS ≥80cm) or obese children with any obesity-related complications were considered to have “childhood obesity disease” in Japan1). According to the Japanese criterion for metabolic syndrome, abdominal obesity is regarded as an essential factor. Because WHtR is regarded as a useful marker for clustering CVRF, WHtR applied diagnostic criterion on Japanese children (WHtR >0.5)9).

The authors described the WHtR cut-off value of 0.5 was not appropriate for young children and
proposed lower level of boundary value. Recently, I reinvestigated the optimal cut-off value for predicting the clustering of CVRF using corrected data of 760 Japanese children aged 5–16 years. The area under the curves (AUCs) of receiver operating characteristics, threshold value, sensitivity, and specificity of WHtR were 0.796, 0.52, 76.9%, and 74.2%, respectively, in boys and 0.892, 0.48, 78.1%, and 92.3%, respectively, in girls. These results confirm the suitability of WHtR of 0.5 as a possible boundary value for WHtR in children. To make the best use of daily clinical practice and applying health promotion, simple cut-off value setting is very important. Ashwell recommended a WHtR cut-off value of 0.5 for children in “Consider Action” category.10)

The authors mentioned that AUCs for the assessment of clustering of CVRF were completely same for WC and WHtR in boys. WHtR is a more simple and convincing index than WC that reflects the same degree of obesity-related disease risk.

Further discussion will be needed regarding the measurement site of WC and the selection of WC or WHtR according to situation.

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I have nothing to declare.

References

5) Ashwell M, Hsieh SD: Six reasons why the waist-to-height ratio is a rapid and effective global indicator for health risks of obesity and how its use could simplify the international public health message on obesity. International J of Food Science and Nutrition, 2005; 56: 303-307