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Editorial

Plea for simplicity: use of waist-to-height ratio as a primary screening tool to assess cardiometabolic risk

A constant plea from clinicians is for simplicity in any guidance, particularly when it is for a quick, simple, primary screening tool. The natural instinct of scientific researchers is to conduct and collate more research in the quest for precision and accuracy. Sometimes the time comes when a compromise must be reached. I believe the time has come regarding agreement on a proxy for central obesity, a well-recognized risk factor for cardiometabolic diseases.

During the first decade of the 21st century, I argued, with colleagues from Japan, for the 'urgency of reassessment of the role of central obesity indices for metabolic risks' (1). We suggested that waist-to-height ratio (WHtR) provides a very good screening tool for cardiometabolic risk (2) and we proposed the boundary value of 0.5 which converted into an easily remembered public health message: 'Keep your waist circumference to less than half your height' (3). Independently, Parikh and colleagues in India suggested that the Index of Central Obesity, namely the WHtR, should replace waist circumference (WC) in the definition of metabolic syndrome and also proposed a boundary value of 0.5 (4–6). Researchers in other parts of the world too, for example, Taiwan (7,8), Iran (9), Chile (10) and China (11) have also advocated the use of WHtR to predict cardiometabolic risk. Those who have had the opportunity to study different ethnic groups within large populations in USA and UK (12,13) have also proclaimed the potential of WHtR.

However, numerous screening tools for metabolic syndrome such as those produced by the World Health Organization (WHO) (14) and the National Cholesterol Education Programme Adult Treatment Panel III (NCEP ATPIII) (15,16) only include one set of cut-off values for WC as a proxy for central obesity and do not specify different values for people of different races or regions. No recommended values of WC have been suggested for children, probably because this would be virtually impossible as WC will naturally increase with age. And yet, surely, early warnings of impending health problems are the most important?

Limitations with this approach have already been acknowledged. For example the International Diabetes Federation decided to set lower cut-off values for WC for people of South Asian origin (17). Furthermore different groups have decided to set their own region- or race-specific cut-off values for WC for men and women (18). The WHO consultation held in 2008 (19) summarized many of the different cut-off values developed and used by different countries.

In the UK, when obesity guidance (20) was being developed by the National Institute for Health and Clinical Excellence (NICE) in 2006 the question of WC was considered but no recommendations were made to set separate cut-off values for WC for people of South Asian origin (20). However a new referral issued by the Department of Health has now asked NICE to review current evidence to assess whether separate cut-off values for WC are needed for black and minority ethnic groups within UK. The scope for this work is currently out for consultation (21).

This does seem to be making the problem much more complicated than it needs to be. The search for gender-, race- and region-specific cut-off values for WC could be obviated if WHtR was adopted in place of WC.

As mentioned earlier, evidence has now accumulated from many adult populations around the world to show that WHtR is as good as, and often superior to, WC in the prediction of cardiometabolic risk. Meta-analyses have supported this conclusion (22–24). Why should this be?

A recent meta-analysis (25) has confirmed that height is inversely associated with cardiovascular and all cause mortality after adjusting for all the traditional cardiometabolic risk factors. Inherited factors (26) as well as small birth weight or poor nutrition in early life (27) may explain this association. Global differences in average male height (28) show that it can vary from 1.61 m in India to 1.82 m in Sweden. It is not surprising then that WHtR can be a better predictor of cardiometabolic risk than WC alone, especially when the populations studied include a range of heights.

Many authors have suggested and/or adopted the boundary value of 0.5 for WHtR. Indeed, when mean boundary values derived from specificity and sensitivity analysis covering all cardiometabolic outcomes were collated in 14 different countries including Caucasian, Asian and Central American subjects, the mean values were 0.50 for men and for women (29). This is good justification for the first level of increased risk for WHtR to be set at 0.5. If a level of further risk is required, I have suggested that this should be WHtR 0.6 (30). This suggestion was made on a pragmatic basis, and it will be interesting to see if global data can justify this value.

Table 1 Simplicity of universal cut-off value proposed for WHtR contrasted with diversity of cut-off values proposed for WC

Action levels for increased risk:	Caucasian adults	Other Ethnic groups	Japan	Caucasian children
WC	*94 cm (M); 80 cm (F) †102 cm (M); 88 cm (F) ‡94 cm (M); 80 cm (F) §94 cm (M); 80 cm (F)	§90 cm (M), 80 cm (F)	§90 cm (M), 80 cm (F) ¶85 (M), 90 cm (F)	Based on centiles and age specific
WHtR**	0.5	0.5	0.5	0.5

*Example given by World Health Organization Expert Consultation on Obesity (2000) (14).
†Adult Treatment Panel (ATPIII) under the aegis of the National Cholesterol Education Program of the National Institute of Health's National Heart, Lung, and Blood Institute (2000) (15).
‡2006 National Institute for Health and Clinical Excellence guidance on obesity (20).
§2006 International Diabetes Federation (17).
¶Japan Society of Obesity (18).
**Proposed – see references in this paper.

The rise in childhood obesity in most countries is probably the most worrying aspect of the obesity pandemic (31). A simple screening tool to identify those who are at risk of developing central obesity with its subsequent comorbidities would allow action steps to be taken at a young age. Fortunately, it appears that WHtR could be very useful in children too. We originally proposed that a boundary value of 0.5 might work for British children (32), and this suggestion has now been supported by many authors working with different populations of children from different races and regions, for example Cyprus (33), Australia (34), Brazil (35), USA (36), Japan (37) and Pakistan (38).

Table 1 summarizes the diversity of cut-off values for WC (first level of increased risk) that are currently proposed by different authoritative bodies. In contrast, WHtR 0.5 has been proposed for all these population groups. Surely, the time has come to consider the simple approach and to adopt WHtR as screening tool where the same boundary values (0.5 and maybe 0.6) could be used by everyone? Standardized guidance on the measurement of WC has already been proposed by WHO (39). A recent study in Thailand has reported the validity of self-reported measurements of WC and height to derive WHtR (40) so that self-screening, as well as screening by health professionals is possible. This simple screening tool is not intended to diagnose a medical condition. Rather, it might flag up that other tests are needed, which might lead to a clinical diagnosis or to an intervention of substantial benefit.

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