OBSERVATIONS

Measuring Abdominal Obesity: Effects of Height on Distribution of Cardiometabolic Risk Factors Risk Using Waist Circumference and Waist-to-Height Ratio

Accumulating evidence suggests that measures of abdominal obesity outperform BMI in predicting diabetes and cardiovascular risk (1–3). However, it is debated which measure of obesity should be used. Currently, waist circumference (WC) is most commonly used and codefines the metabolic syndrome (4).

Unlike waist-to-height ratio (WHtR), WC does not take differences in height into account. We hypothesized that short subjects with a WC at a specified cutoff-point will have more abdominal fat and associated cardiovascular risk factors than tall subjects with a WC at the same cutoff-point and that this will not be the case if WHtR is used instead of WC. To test this hypothesis, we compared the distribution of cardiovascular risk factors according to height above and below commonly used cutoffs of WC and WHtR in a cross-sectional study.

We studied 6,971 subjects (mean age 57.6 ± 14.3 years, 4,123 women) from the Diabetes Cardiovascular Risk-Evaluation: Targets and Essential Data for Commitment of Treatment (DETECT) study, a German, nationally representative cohort of primary care patients (3,5). All subjects gave written informed consent, and the study was approved by the local ethics committee.

We divided subjects into age- and sex-specific tertiles of height and grouped them according to cutoffs for WC and WHtR as suggested in the literature (3,4). Then we compared differences in cardiovascular risk factors and the prevalence of at least two factors of the metabolic syndrome among height tertiles. We additionally adjusted for age, sex, smoking status, and physical activity.

The results are shown in the supplementary table in the online appendix available at http://care.diabetesjournals.org/cgi/content/full/dc10-1794/DC1. If grouped by WC cutoffs (102 cm in males and 88 cm in females), individuals in the lowest height tertile, compared with the highest tertile, had higher HbA1C, triglycerides, and systolic blood pressure in both the high WC group and the low WC group and additionally higher plasma glucose, and LDL cholesterol in the low WC group. After adjustment, differences in plasma glucose and LDL cholesterol became insignificant.

Grouping by WHtR (age 18–39 years, 0.50; 40–49 years, 0.55; ≥50 years, 0.60) revealed higher HDL cholesterol and triglycerides with lower height with differences in triglycerides becoming insignificant after adjustment.

In the low WC group, the prevalence of at least two factors of the metabolic syndrome was higher in the lowest tertile compared with the highest tertile (crude relative ratio 1.30 [95% CI 1.16–1.45]; adjusted relative ratio 1.16 [1.04–1.29]). There was no difference in prevalence of at least two factors of the metabolic syndrome by height in the high WC group or when subjects were grouped by WHtR.

We found that short subjects have higher levels of risk factors and a 30% higher prevalence of the metabolic syndrome than tall subjects if grouped by WC but not if grouped by WHtR. These findings support our hypothesis that risk stratification by WC is biased by height.

It is unlikely that our findings can be attributed to height itself because differences in the expected directions were only present if individuals were grouped by WC and not by WHtR.

WHtR is simple to assess. Therefore, we suggest that WHtR instead of WC should be implemented in obesity guidelines and in the definition of the metabolic syndrome.

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