

ORIGINAL RESEARCH COMMUNICATION

# Relation of body mass index and waist-to-height ratio to cardiovascular disease risk factors in children and adolescents: the Bogalusa Heart Study<sup>1,2,3</sup>

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**Background:** Several investigators have concluded that the waist-to-height ratio is more strongly associated with cardiovascular disease risk factors than is the body mass index (BMI; in kg/m<sup>2</sup>).

**Objectives:** We examined the relation of the BMI-for-age z score and waist-to-height ratio to risk factors (lipids, fasting insulin, and blood pressures). We also compared the abilities of these 2 indexes to identify children with adverse risk factors.

**Design:** Children aged 5–17 y (*n* = 2498) in the Bogalusa Heart Study were evaluated.

**Results:** As assessed by the ability of the 2 indexes to 1) account for the variability in each risk factor and 2) correctly identify children with adverse values, the predictive abilities of the BMI-for-age z score and waist-to-height ratio were similar. Waist-to-height ratio was slightly better (0.01–0.02 higher *R*<sup>2</sup> values, *P* < 0.05) in predicting concentrations of total-to-HDL cholesterol ratio and LDL cholesterol, but BMI was slightly better in identifying children with high systolic blood pressure (0.03 higher *R*<sup>2</sup>, *P* < 0.05) in predicting measures of fasting insulin and systolic and diastolic blood pressures. On the basis of an overall index of the 6 risk factors, no difference was observed in the predictive abilities of BMI-for-age and waist-to-height ratio, with areas under the curves of 0.85 and 0.86 (*P* = 0.30) and multiple *R*<sup>2</sup> values of 0.320 and 0.318 (*P* = 0.79). This similarity likely results from the high intercorrelation (*R*<sup>2</sup> = 0.78) between the 2 indexes.

**Conclusions:** BMI-for-age and waist-to-height ratio do not differ in their abilities to identify children with adverse risk factors. Although waist-to-height ratio may be preferred because of its simplicity, additional longitudinal data are needed to examine its relation to disease.

**Key Words:** BMI • body mass index • waist • height • waist-to-height ratio • children • lipids • blood pressure • insulin

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