

# Body Mass Index, Waist-to-Height Ratio, Percent Body Fat, and Conicity Index Cut-off Values to Predict Metabolic Syndrome in Lebanese Children and Adolescents

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Childhood obesity is a growing public health concern given its association with cardiometabolic risk factors and the metabolic syndrome. Although several anthropometric indicators have been proposed to assess adiposity and the risk for metabolic abnormalities in the pediatric population, recent studies have highlighted the need for ethnic-specific cut-off values for these anthropometric indicators. Research tackling Middle-Eastern youth and identifying population-specific cut-off values for adiposity indicators are lacking. This study aims at determining optimal cut-off values for body mass index (BMI), percent body fat (%BF), waist-to-height ratio (WHtR), and conicity index (CI) to predict increased risk of metabolic syndrome (MetS) in Lebanese children and adolescents.

A cross sectional study was conducted on 490 children and adolescents aged between 7 and 19 years old. Data collection included anthropometric measurements (weight, height, waist circumference (WC), and percent body fat), blood pressure and biochemical assessment of fasting serum glucose, HDL-C, TG, LDL-C, and total cholesterol. Individual metabolic abnormalities and metabolic syndrome were identified using the NCEP-ATPIII criteria. Cut-off values were determined using receiver operating characteristic (ROC) curves.

The optimal cut-off values for predicting MetS in boys and girls were, respectively, BMI Z score above +2.35 and +2.29, %BF above 32.2% and 36.45%, WHtR above 0.58 and 0.54, and CI above 1.58 and 1.45.

The best predictors of MetS were BMI and WHtR: BMI (AUC: 0.86, Sensitivity: 88.9%, Specificity: 80.7% in males; AUC: 0.86, Sensitivity: 81.8%, Specificity: 78.9% in females) and WHtR (AUC: 0.87, Sensitivity: 88.0%, Specificity: 80.2% in males; AUC: 0.81, Sensitivity: 81.8%, Specificity: 71.8% in females). These predictors were followed by %BF (AUC: 0.82, Sensitivity: 84.0%, Specificity: 71.1% in males; AUC: 0.75, Sensitivity: 78.8%, Specificity: 62.9% in females). CI was found to be the weakest predictor of MetS (AUC: 0.89, Sensitivity: 76.0%, Specificity: 71.1% in males; AUC: 0.75, Sensitivity: 72.7%, Specificity: 61.6% in females).

This study is the first to determine cut-off values for four anthropometric indicators (BMI, %BF, WHtR, and CI) to predict increased risk of the metabolic syndrome in a sample of Middle-Eastern children and adolescents. These cut-off values should assist in the screening and identification of increased cardiometabolic risk in youth.