Longitudinal Changes in Waist Circumference and Waist-to-Height Ratio in Children and Adolescents in Southern India

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Objectives: Waist-to-height ratio has been proposed as a surrogate indicator to screen for abdominal obesity in children. The objective of this analysis was to examine longitudinal changes in waist circumference and waist-to-height ratio in school-aged children and adolescents in Southern India.

Methods: Participants were 3,955 children and adolescents (6–16 y) participating in a prospective school-based study in Bangalore, India (PEACH-II and III). Anthropometry, including weight, height, and waist circumference (WC), were collected at baseline and endline, with a median follow up of 2.9 years [IQR: 2.0–4.0 y]. Elevated waist circumference was defined as $\geq 75^{th}$ percentile, based on age- and sex-specific percentile curves developed for this population. Waist-to-height ratio (WHtR) was calculated as waist circumference (cm) divided by height (cm), and elevated WHtR was defined as ≥ 0.5. Body mass index (BMI)-for-age z-scores were calculated using the World Health Organization (WHO) Child Growth Standards, to define overweight ($\geq +1$ to $< +2$ SD) and obesity ($\geq +2$ SD). Paired t-tests and McNemar test were used to examine changes in WC and WHtR during follow-up.

Results: At baseline, a total of 11.4% participants were overweight and 4.1% were obese. The prevalence of elevated WC increased from 15.4% to 27.1% during follow-up (P < 0.001), with an average increase of 9.92 [SD: 8.46] cm. The prevalence of elevated WC increased from 9.2% to 26.3% (P < 0.001) among children who were normal weight at baseline, and 60.0% to 75.3% (P < 0.001) among children who were overweight. The prevalence of elevated WHtR increased from 9.6% to 20.5% during follow-up (P < 0.001), with the greatest increases in children who were normal weight (2.9% to 17.6% [P < 0.001]) or overweight (42.0% to 62.5% [P < 0.001]) at baseline.

Conclusions: The prevalence of elevated WC and WHtR was substantial in this population and increased over time. Findings suggest that WHtR, which is easy to measure and interpret, could be used in addition to WC during routine school-based examination to screen for risk of overweight and central adiposity.