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Radius-Stage-Adjusted Height-for-Age and Weight-for-Age Percentile Charts for Chinese Children and Adolescents

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Abstract

Background: Height-for-age and weight-for-age charts are commonly used in child health screening and paediatric clinical examinations. However, for children at different levels of maturity, the use of such charts may produce different degrees of bias. Therefore, height and weight percentile distributions were calculated for children of different chronological ages with the same bone maturity and were superimposed on height-for-age and weight-for-age charts. Radius-stage-adjusted height-for-age and weight-for-age charts were generated for children with "advanced" and "delayed" bone development.

Methods: A sample of 15598 healthy children (7733 boys, 7865 girls) aged 3-19 years was obtained from the "The Skeletal Development Standards of Hand and Wrist for Chinese Children-China 05" study. The radius stage (RS) was evaluated by the Rating System of the TW3 . The correlation coefficients between height and weight and the RS, as well as between chronological age and height and weight in the RS groups, were calculated. The Box–Cox power exponential distribution model in GAMLSS was used to calculate the radius-stage-adjusted (RSA) height-for-age and weight-for-age percentile curves. The RSA height-for-age and weight-for-age percentile curves were superimposed on the height and weight standardized growth charts for Chinese children and adolescents aged 0 to 18 years.

Results: During the growth period, the height and weight of the children were significantly correlated with the developmental stage of the radius (RS). Within the RS groups, the chronological age of the children was significantly correlated with their height and weight, but the correlation coefficient decreased with increasing RS. Twenty-eight RSA height-for-age and weight-for-age growth charts were obtained by calculating the percentile curves of height and weight within the radius stage groups. The adjustments for height and weight were smaller for the RSA charts during childhood and larger for the RSA charts during adolescence.

Conclusion: RSA height-for-age and weight-for-age growth charts provide useful tools for adjusting the results of assessments indicating "advanced" and "delayed" bone development in children and adolescents.

Keywords: Child; Adolescent; Height; Weight; Radius Stage; Chart

Abbreviations

RS: Radius Stage

RSA: Radius Stage Adjusted

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