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Age -Associated Variations in Body Height, Weight and Seven Bony Diameters among Pre-Adolescent Boys 6-12 Years

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Abstract

Background: Anthropometric assessment of linear growth and skeletal breadths is essential for evaluating physical development in children. While height and weight are commonly monitored, bony diameters provide additional insight into frame size and maturation. This study aimed to examine age-related changes in body height, weight, and seven bony diameters among pre-adolescent boys. **Materials and Methods**: A cross-sectional study was conducted on 1040 boys aged 6–12 years (divided into seven age groups) from different private schools situated at Nabha, Punjab, India. Body height, weight, and seven bony diameters — biacromial, bicristal, bitrochanteric, humerus bicondylar, wrist bistyloid, femur bicondylar, and ankle bimalleolar — were measured using standard anthropometric techniques. One-way ANOVA followed by Scheffe's post-hoc test was used to determine age-group differences. **Results**: All variables increased significantly with age ($p < .001$). Mean height increased from 112.24 ± 6.2 cm at 6 years to 143.59 ± 7.3 cm at 12 years, and mean weight from 19.10 ± 1.6 kg to 42.79 ± 6.0 kg. ANOVA revealed significant differences for height [$F(6, 1033) = 457.33$], weight [$F(6, 1033) = 564.45$], and all bony diameters, with wrist diameter showing the highest F-value [$F(6, 1033) = 1083.38$]. Scheffe's analysis indicated that height increased significantly until 11 years but plateaued at 11–12 years, whereas weight continued increasing through 12 years except at 9–10 years. Wrist and femur bicondylar diameters increased significantly at every consecutive age interval. Axial diameters exhibited brief plateaus: biacromial at 6–7 years, bicristal and bitrochanteric at 7–8 years, and bicristal again at 11–12 years. **Conclusion**: Body height, weight, and bony diameters increase significantly from 6 to 12 years in boys, but growth continuity differs by site. Appendicular breadths, particularly wrist diameter, provide the most consistent age-related increments and may serve as reliable markers of skeletal maturation. The observed plateaus in axial breadths and stature highlight the non-linear nature of pre-adolescent growth. These findings support the use of multiple anthropometric dimensions for comprehensive growth assessment.

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Key words: Anthropometry; Bony diameters; Pre-adolescent boys; Growth patterns; Skeletal maturation; Wrist diameter

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