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SCIENTIFIC LETTER

Bone Age Estimation by TW and GP Methods: Is It Time to Create a New Indian Reference?

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To the Editor: Even minor discrepancy in bone age (BA) estimation in children competing in age-specific sports categories can lead to bigger implications. We evaluated 144 children between 8–18 y, referred by the Sports Authority of India (SAI) to the medical appellate board (MAB) formed at our institute. The aim of the MAB was to resolve medicolegal dispute regarding BA of children, who applied in age-specific competitive sports categories, or for incentives/scholarships. It carried out a thorough evaluation of official documents, physical examination, laboratory tests, and skeletal survey in different sessions (September 2019 to February 2020). MAB report was considered final in the court of law.

Mean CA of the study population was 14.52 y (SD - 1.7) (male - 15, SD 1.1; female - 13.58, SD - 2.3). Mean estimated BA by automated software was 16.9 y (SD - 1.5) and 15.7 y (SD - 1.1), by GP and TW3 methods, respectively. BA–CA gap (both by GP and TW3 method) was calculated in 53 children. While both methods overestimated BA, discrepancy was higher with GP (2.64 y in males, range 0.82–4.1; 1.61 y in females, range 0.08–3.96) than with TW3 (1.26 y in males, range 1.08–2.49; 0.96 y in females, range 2.12–3.85).

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BA estimation can be done based on atlas, automated software (BoneXpert, Visiana), or charts. Atlas and software are developed and validated on Caucasian populations [1]. Racial differences in BA is expected. Chart-based calculation relies on studies done on Indian population, mostly old [2, 3]. Socionutritional profile in the teenagers today varies from those a few decades ago. Additional factors leading to the discrepancy can be dietary improvements, nutritional supplements, and extensive exercises [4]. It is time we revise our chart of relevant epiphyseal maturation for Indian kids.

Declarations

Conflict of Interest None.

References

1. Tanner JM, Whitehouse RH, Cameron N, et al. Assessment of skeletal maturity and prediction of adult height (TW3 method). 3rd ed. London: Saunders; 2001.
2. Shrivastav A, Saraswat PK, Agarwal SK, Gupta P. A Study of wrist ossification for age estimation in pediatric group in central Rajasthan. JIAFM. 2004;26:132–5.
3. Banerjee KK, Agarwal BB. Estimation of age from epiphyseal union at the wrist and ankle joints in the capital city of India. Forensic Sci Int. 1998;98:31–9.
4. Malina RM, Eisenmann JC, Cumming SP, Ribeiro B, Aroso J. Maturity-associated variation in the growth and functional capacities of youth football (soccer) players 13–15 years. Eur J Appl Physiol. 2004;91:555–62.