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Bone mineral density of young boy soccer players at different pubertal stages: Relationships with hormonal concentration

Author links open overlay panelAmmarNebigh[a]HaithemRebai[a]MohamedElloumi[ad]AfefBahlous[b]MohamedZouch[c]MoniaZaouali[a]ChristianAlexandre[c]SlahedineSellami[b]ZouhairTabka[a]
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Abstract

Objectives

To examine the effects of soccer in relation with the hormonal concentration, on the bone mass of young Tunisian players at different pubertal stages.

Methods

Two groups of 152 young boys (age: 13.3 ± 0.9 years) participated in this study: (1) 91 soccer players, and (2) 61 non-athletic boys used as control subjects. The bone mineral density (BMD) and the bone mineral content (BMC) were measured by dual-energy X-ray absorptiometry (DXA). Pubertal stages were assessed, and serum concentrations of insulin-like growth factor-1 (IGF-1), insulin-like growth factor binding protein-3 (IGFBP-3), growth hormone (GH) and the total testosterone were measured.

Results

The BMD and BMC for whole body, lumbar spine, femoral neck, pelvis and lower limbs were higher in soccer players than in controls ($p < 0.001$). In early puberty, the soccer players also exhibited significantly greater BMD and BMC in the whole body and in weight-bearing bones compared with the controls ($p < 0.001$). However, there was no intersubject variability due to puberty in either BMD or

BMC. The pubescent soccer players had significantly higher hormonal concentrations of IGF-1 and IGFBP-3 than their counterpart controls ($p < 0.05$). Moreover, the whole body BMD was significantly ($p < 0.001$) correlated with GH, IGF-1 and IGFBP-3 but not with the testosterone concentrations.

Conclusion

The soccer participation of boys is generally associated with the improvement of their bone mass which is mainly marked at early and late puberty. The relationships between somatotropic axis hormones and BMD of the players may be linked to the parallel development of these two parameters during puberty.