

Bone Mass and Bone Markers in Spanish adolescents

by

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Objectives: To describe the effects of pubertal status on the concentration of osteocalcin (OC), aminoterminal propeptide of type I procollagen (P1NP) and beta crosslaps in male and female Spanish adolescents.

Methods: Blood (n=101; 47 males and 54 females) and urine (n=226; 105 males and 121 females) samples were obtained in Spanish adolescents aged 12.5-17.49 yr, within the framework of the HELENA study. Serum osteocalcin, P1NP and beta crosslaps concentrations were determined by electrochemiluminescence immunoassay "ECLIA". Urine betacrosslaps were also determined. Dual energy X-ray absorptiometry was used to determine the total and regional bone mineral content (BMC) (g) and bone mineral density (BMD) (g/cm²). Adolescents were categorized by Tanner stage assessed by direct observation. ANOVA analysis was used to determine differences on the outcome variables between Tanner groups. Independent samples t-Test was applied to determine gender differences.

Results: Males showed higher values of bone mass than females, mainly in Tanner 3 (whole body, hip and mean legs) and Tanner 5 stages (pelvis, hip mean arms and mean legs) (all p<0.05) and an increased bone turnover compared to females. Males showed higher median levels of formation biomarkers: OC [115.7 (70.36-149.1) vs 49.16 (38.01-75.31) respectively] and PINP [592.3 (353.95-1046.5) vs 193.6 (145.2-403.4) respectively] than females, in the full sample, as well as in Tanner stages 3 and 5 (all p<0.05). Males also showed higher levels of resorption markers than females except for urine betacrosslaps (Tanner 3; p=0.058 and Tanner 4; p=0.629). Bone formation and resorption was lower in late puberty compared to early puberty in both males and females (p<0.05).

Conclusions: Male adolescents showed higher concentrations of formation and resorption bone markers than females. Bone turnover is negatively associated with sexual maturation.

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