Associations between serum 25-hydroxyvitamin D and bone turnover markers in a population based sample of German children.

Severe vitamin D deficiency is known to cause rickets, however epidemiological studies and RCTs did not reveal conclusive associations for other parameters of bone health. In our study, we aimed to investigate the association between serum levels of 25(OH) vitamin D and bone turnover markers in a population-based sample of children. 25(OH)D, calcium (Ca), osteocalcin (OC), and ß-Crosslaps (ß-CTx) were measured in 2798 ten-year-old children from the German birth cohorts GINIplus and LISAplus. Linear regression was used to determine the association between bone turnover markers and 25(OH)D levels. 25(OH)D, OC, and ß-CTx showed a clear seasonal variation. A 10 nmol/l increase in 25(OH)D was significantly associated with a 10.5 ng/l decrease (p< 0.001) in ß-CTx after adjustment for design, sex, fasting status, time of blood drawn, BMI, growth rate, and detectable testosterone/estradiol. For OC alone no significant association with 25(OH)D was observed, whereas the ß-CTx-to-OC ratio was inversely associated with 25(OH)D (-1.7% change, p< 0.001). When stratifying the analyses by serum calcium levels, associations were stronger in children with Ca levels below the median. This study in school-aged children showed a seasonal variation of 25(OH)D and the bone turnover markers OC and ß-CTx. Furthermore a negative
association between 25(OH)D and the bone resorption marker ?-CTx was observed.