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Evaluation of Bone Geometry, Quality and Bone Markers in Children with Type 1 Diabetes

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Background: Several studies have examined the relationship between type 1 diabetes and bone mass, which reported contradictory data on BMD, bone remodelling markers and bone quality. Nevertheless an incresead prevalence of osteopenia was observed among patients with duration of disease of >6 years. **Objective and hypotheses:** The aim of the study was to investigate the potential negative impact of type 1 diabetes on bone status in a group of children with type 1 diabetes, by evaluating bone geometry, quality and bone markers. **Method:** 82 children (47 males, 35 females), mean age 10.7 ± 3.0 years, height SDS 0.05 ± 0.94, BMI SDS -0.49 ± 0.87 with a mean duration of type 1 diabetes of 4.4 ± 2.9 years were studied. Bone geometry was evaluated on digitalized x-rays at the level of the 2nd metacarpal bone. The following parameters were investigated: outer diameter (D), inner diameter (d), cortical area (CA) and medullary area (MA), meanwhile bone quality was evaluated by ultrasound and expressed as amplitude dependent speed of sound (Ad-Sos) and bone transmission time (BTT). Data were converted to SDS and evaluated according to bone age. Bone markers (P1NP, CTX and BAP), sclerostin, Dkk-1, PTH and 25OHD were also assessed. Differences in bone geometry and quality were evaluated against zero, while the biochemical values of the patients were compared with a control group of 40 subjects of normal weight and height, which did not suffer of any chronic diseases. **Results:** D ($-0.99\pm$ 1,03), d (-0.42 ± 0.92), CA (-0.87 ± 0.82) and MA ($-0.46\pm$ 0.82) were all significantly smaller than in controls ($P<0.01$) while Ad-Sos (0.40 ± 1.22) and BTT (0.05 ± 0.92) were not significantly reduced. The bone markers were similar in children with type 1 diabetes and controls. When the patients were subdivided according to the HbA1c value ($<7.5\%$ and $>7.5\%$) no differences where found except for a BAP (106.43 ± 35.12 µg/l vs $84.99\pm$ 39.84 µg/l; $P<0.01$) which is a marker of bone formation. **Conclusion:** Type 1 diabetic children show a bone of reduced size but with conserved proportion and quality. Bone neoformation seems to be negatively affected by a suboptimal metabolic control.

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Comparison of Treatment Alternatives for Hypercalcemia due to Vitamin D Intoxication in Children

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Background: No large study comparing efficiency of prednisolone, alendronate and pamidronate has been conducted so far in children with hypercalcemia due to vitamin D intoxication. **Objective and hypotheses:** To perform a multicentre, retrospective study assessing clinical characteristics and treatment results. **Method:** A standard questionnaire was uploaded to an online national database system (www.favorsci.org) to collect data of children with hypercalcemia (serum calcium, >10.5 mg/dl) due to vitamin D intoxication (serum vitamin D, $>$ 150 ng/ml) who were treated in paediatric endocrinology clinics. **Results:** 74 children (mean age 1.4 ± 1.3 years, 45 males (60.8%)) from 11 canters were included. High doses of vitamin D intake was obvious in 77% of the cases. At diagnosis, mean calcium, vitamin D, and PTH levels were 15 ± 3.2 mg/dl, 400 ± 290 ng/ml, and 7.9 ± 7.8 pg/ml respectively. Calcium levels showed only mild correlation with vitamin D levels ($r=0.332$, $P=0.004$). Patients were designated into five groups according to the initial treatment regimens (See Table). During follow-up, pamidronate and calcitonin treatments were also given in three and four cases, respectively, in group 2. Initial median calcium levels were similar ($P=0.244$) among groups 2, 3, and 4 allowing comparison for treatment efficiency. The time to achieve normocalcaemia was comparable ($P=0.099$) among groups 2, 3, and 4. However, recurrence rate of hypercalcemia was significantly lower in group 4 compared to groups 2 and 3 (0 (0%), 2 (25%), and 3 (30%) respectively, $P=0.02$). **Conclusion:** In mild cases, hydration and furosemide are sufficient. For moderate cases, some of the patients given prednisolone require additional interventions (namely, pamidronate and calcitonin) to restore normocalcaemia. Pamidronate use is associated with a similar time to achieve normocalcaemia but with a lower recurrence rate. In severe hypercalcemia, physicians tended to start combination of treatments thus no comparison could be done with this group. **Funding:** This work was supported by a grant from the Pediatric Endocrinology and Diabetes Society, Turkey (2014-000522).