BONE MINERAL DENSITY IN CHILDREN WITH IDIOPATHIC HYPERCALCIURIA

Iwona Artemiuk, Małgorzata Pańczyk – Tomaszewska, Maria Roszkowska - Blaim

Department of Pediatrics and Nephrology, Medical University of Warsaw

INTRODUCTION

Idiopathic hypercalciuria (IH) is one of the most common metabolic disturbances in pediatric popuation, with incidence of 2.2- 6.4%. It is defined as urinary calcium excretion above 4 mg/kg/24h with normal serum calcium level. It is considered the most common cause of calcium-containing kidney stones in children and is present in 40-60% of patients with recurrent nephrolithiasis. Long duration of hypercalciuria may contribute to bone mass deficit. Each disturbance of bone mass accumulation may be a risk factor for osteopenia, osteoporosis and bone fractures during adult life. Thus, elucidation of the mechanism of osteopenia/ osteoporosis in children with IH might lead to preventive strategies reducing the risk of bone fractures during adult life.

Schwaderer Al., et al. Pediatr Nephrol. 2008;23(12):2209, Srivastava T. et al. Curr Opin Pediatr. 2009; 21:214. , Penido MG at al. Pediatr Nephrol. 2006;21(1):74, Sakhaee K. at al. Kidney Int. 2011; 79(4):393.

AIM

The aim of the study was to assess bone mineral density of the lumbar spine in children with idiopathic hypercalciuria.

PATIENTS

31 children with IH

17♀ 14♂

(mean age 9.8±4.0)

Inclusion criteria:
- **age 5 – 17 years**
- **normocalcemic diet**
- **without vitamin D supplementation**
- **without citrate supplementation**

Exlusion criteria:
- **hypercalcemia**
- **tubular acidosis**
- **nephrocalcinosis**
- **chronic renal failure**
- **bone metabolic diseases**
- **anatomic defects of lumbar spine**
- **drugs affecting bone metabolism**

METHODS

In all patients following parameters were evaluated:
- **bone mineral density of lumbar spine (L1-L4 BMD) by dual energy of X-ray absorptiometry (DXA) (Discovery A densytometry system Hologic) expressed as Z-score**
- **Biochemical studies:**
  - **serum calcium ($_S$Ca)**
  - **serum phosphorus ($_S$P)**
  - **parathormone (iPTH)**
  - **alkaline phosphatase (ALP)**
  - **25(OH)D_3 (N 11-54 ng/mL) immunoenzymatic method (Architect®)**
  - **24 hour urine calcium ($_U$Ca), phosphorus ($_U$P), sodium ($_U$Na) excretion.**

STATISTICAL METHODS

Normal distribution of variables was verified using the Shapiro-Wilk test. The Student *t* test for independent samples and the Mann-Whitney U test were used. Correlations between variables were evaluated using the Pearson linear correlation coefficient. P<0.05 was considered significant.

RESULTS

The mean value of L1 – L4 BMD Z- score was -0.27 ± 1.04 (range -2.1 – 2.2)

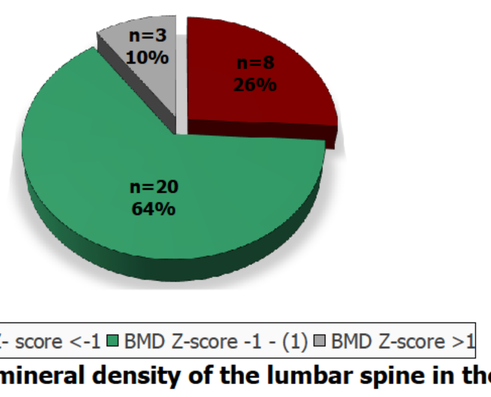


Fig. 1 Bone mineral density of the lumbar spine in the study group

In children with L1-L4 BMD zcore < (-1) 5/8 were female in the mean age of 13.8 years.

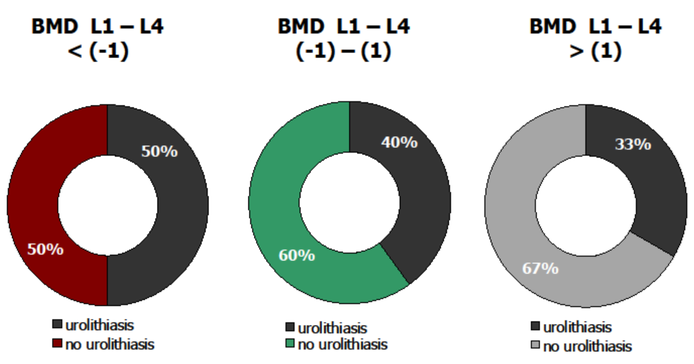


Fig. 3 Patients with urolithiasis in groups depending on BMD L1 – L4 Z- score

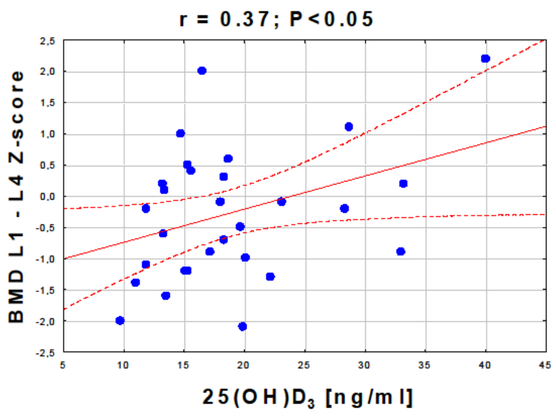
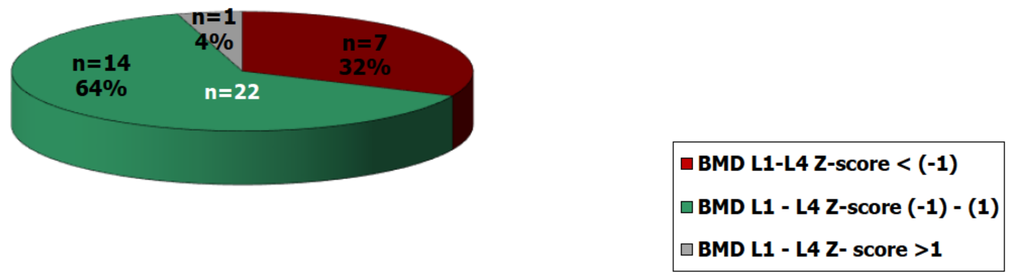


Fig. 4 Correlation between L1 – L4 BMD Z- score and 25(OH)D_3

A – children with 25(OH)D_3 < 20 ng/ml



B – children with 25(OH)D_3 ≥ 20 ng/ml

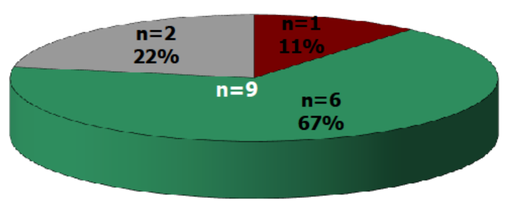


Fig. 2 Bone mineral density in children with decreased (Fig. 2A) and normal 25(OH)D_3 level (Fig. 2B)

- **Serum calcium and phosphorus levels were in normal range in all children.**
- **There were no signifficant differences in the mean Ca, P and 25(OH)D_3 serum level depends on gender.**
- **ALP was above upper limit of normal in 4 children, in 2 of them L1-L4 BMD Z-score was <-1.**
- **Raised iPTH level (85.9 pg/ml) was observed in 1 child, with normal BMD of lumbar spine.**

Table. 1 Results of biochemical parameters in the study group

Parameter	Patients with 25(OH)D_3 <20 ng/ml	Patients with 25(OH)D_3 >20 ng/ml	P
	n=22 (71%)	n=9 (29%)	
	mean ± SD (range)		
$_S$Ca (mEq/L)	5.05 ± 0.18 (4.7-5.5)	5.06 ± 0.16 (4.9-5.4)	NS
$_S$P (mEq/L)	2.94 ± 0.33 (2.5-3.7)	2.90 ± 0.34 (2.4-3.4)	NS
ALP (U/L)	199.36 ± 90.8 (64-439)	201.22 ± 92.75 (155-329)	NS
iPTH (pg/ml)	30.62 ± 18.5 (7.2-85.9)	18.18 ± 7.43 (8.9-28.2)	NS
$_U$Ca (mg/kg/24h)	4.65 ± 2.23 (1.16-10.66)	5.01 ± 1.73 (2.58-7.34)	NS
$_U$P (mg/kg/24h)	20.61 ± 7,37 (4.81-31.8)	21.13 ± 8.57 (12.61-36.8)	NS
$_U$Na (mmol/kg/24h)	3.21 ± 2.7 (1.2-6.85)	2.49 ± 1.37 (1.76-4.1)	NS

CONCLUSIONS

In children with idiopathic hypercalciuria vitamin D deficiency seems to affect lumbar spine bone mineral density.

DOI: 10.3252/pso.eu.52era.2015
ePosters supported by F. Hoffmann- La Roche Ltd.
52 ERA EDTA CONGRESS London 2015
PosterSessionOnline.com