

Bone Mineral Density in Children with Type 1 Diabetes Mellitus (T1DM) and Analysis of Possible Factors Affecting Their Bone Health; A controlled study

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Introduction

- Type 1 diabetes mellitus (T1DM) maybe associated with reduced bone mineral density (BMD).
- Possible pathogenic mechanisms include impaired bone anabolic effect due to decreased insulin and insulin-like growth factor 1 (IGF-I). In addition, hyperglycemia can impair osteoblast function.
- Early identification of reduced BMD is useful in reducing the bone loss and fracture risk. We can get a quick, non-invasive, and accurate quantitation of bone mass by using dual energy X-ray absorptiometry (DEXA scan).

Objectives

- To study BMD in children and adolescents with T1DM of 5 years duration or more and to evaluate the possible factors affecting their bone health.

Methods

- We measured anthropometric data, glycemic control (HbA1C), insulin dose /kg, calcium, PO4 and alkaline phosphatase and BMD by (DEXA scan at the spine (L2–L4) and at the Femur) in 25 children and adolescents with T1DM on insulin therapy for > 5 years and poor glycemic control (HbA1C > 8.5%) attending the diabetic clinic in Alexandria University Children's Hospital, Egypt.
- Their data were compared with 5 children with IDDM with good glycemic control and 30 apparently healthy children of matched age and sex.

Results

- BMD was significantly lower in children with T1DM compared to controls and spine BMD was lower in T1DM with high HbA1C versus those in good control.
- Serum ALP level was higher and phosphate was lower in children with bad control versus other groups.
- BMD was correlated with HtSDS ($r = 0.34$, $p = 0.056$) but not with age of patients, HbA1c, duration of disease, age or insulin dose.

Biochemical data of T1DM versus controls

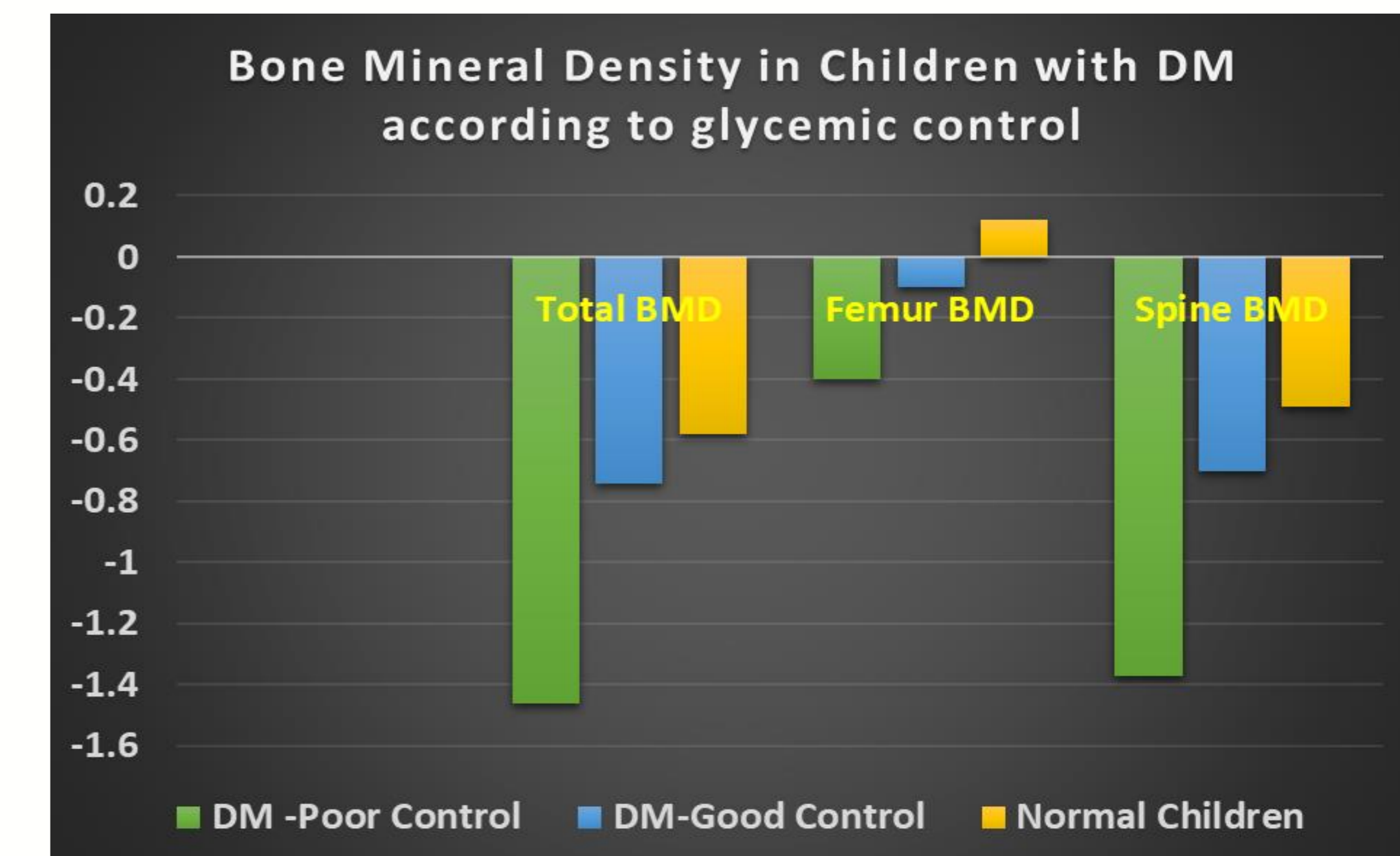
	Ca	PO4	ALP
IDDM-Bad Control	9.44	4.07	268
IDDM-Good control	9.38	3.60	232
Normal Children	9.20	4.29	176
ANOVA- P value	0.45	0.07	0.001*

BMD data of T1DM versus controls

	BMD Total	Femur	Spine
IDDM-Bad Control	-1.46	-0.41	-1.37
IDDM-Good control	-0.74	-0.14	-0.70
Normal Children	-0.58	0.12	-0.49
ANOVA- P value	0.02*	0.29	0.03*

Comparison of BMD in cases of T1DM with good control versus bad control

	HbA1c	HtSDS	BMD-SD	BMD-Femur	BMD-Spine
Bad control	11.15	-0.93	0.27	-0.41	-1.37
Good control	7.80	-0.80	0.49	-0.14	-0.70
M-W-P	0.0002*	0.78	0.27	0.08	0.05*



Conclusions

- Decreased BMD is common in children with T1DM especially those with bad control.
- We recommend the assessment of BMD in children with T1DM on long term insulin therapy for the early management of their bone health.

