The influence of glycemic control on bone mineral density and bone metabolism in patients with Type 2 Diabetes Mellitus

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OBJECTIVES

Although patients with type 2 diabetes (T2D) have normal or higher bone mineral density (BMD) comparing to healthy subjects, they appear to have high risk of osteoporotic fractures. Factors that contribute to bone fragility are not clearly understood. The aim of this study was to evaluate the influence of glycemic control on bones

METHODS

We studied 40 patients with T2DM (mean age: 54.3+3.2 years, M/F: 24/16) at baseline and after one year follow-up (FU)

We measured:

- Glycated hemoglobin (HbA1c)
- Lumbar spine (LS) and femoral neck (FN) were determined by dual energy X-ray absorptiometry (DXA)
  (Hologic Discovery QDR Series Densitometer, Hologic Inc., Bedford, MA)
- Bone resorption assessed by β-crosslaps
- Bone formation assessed by serum levels of type 1 procollagen total N-terminal propeptide (TP1NP)
  (Elecsys 1010/2010/MODULAR ANALYTICS E170)
- Patients who were on thiazolidinediones and insulin treatment were excluded from the study and these with renal or chronic disease, as well
- BMD changes at LS more than 3% and at FN more than 6% were considered to be significant

RESULTS

Results at baseline and after one year follow-up (FU)

Anthropometric characteristics

	Baseline	1 year FU	p-value
N	40	40	
M/W	17/23		
Age (y)	54,3±3,2		
Duration of DM (y)	6,7±1,3		
BMI (kg/m²)	27,8±3,4	27,1±3,2	0,09

Blood tests

	Baseline	1 year FU	p-value
HbA1c (%)	7,7±0,6	6,8±0,3	0,034
β-crosslaps	371,9±10,8	364±6,8	0,047
TP1NP	46,6±5,3	41,1±2,3	0,045

LS BMD by DXA

	Baseline	1 year FU	p-value
BMD (g/cm²)	1.074 0.104	1.071 0.113	0,067
Z-score	0.9±0.5	0.8±0.7	0.071
T-score	0.9±0.6	0.8±0.5	0.061

FN BMD by DXA

	Baseline	1 year FU	p-value
BMD (g/cm²)	0,897 0,121	0,893 0,111	0,072
Z-score	0.4±0.3	0.4±0.4	0,068
T-score	0.4±0.5	0.4±0.6	0,066

After one year at FU:

- There were no significant changes at BMI (kg/m²) (p=0.09)
- Was observed significant changes at mean HbA1c (p=0.034)
- BMD at LS and FN was similar at baseline and at FU (LS: p=0.067) (FN: p=0.072)
- TP1NP and β-crosslaps had a significant decrease in parallel with HbA1c levels (TP1NP: p=0.045 and β-crosslaps: p=0.047)
- No corelation was observed between the improvement of HbA1c and BMD at LS and FM at FU (p=0.082, p=0.091, respectively)

CONCLUSIONS

✓ Effective management of hyperglycemia in patients with T2D appears to have a positive contribution on bone turnover improvement.

✓ Although, more patients are needed to be studied to confirm this result.

References

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