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Increased bone resorption markers in young patients with inflammatory bowel disease

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INTRODUCTION

Children and adolescents with inflammatory bowel disease (IBD) have defects in bone mineral density (BMD) and bone structure that do not completely normalize with IBD remission.

The objective of the study was to determine bone turnover marker (BTM) concentrations and factors behind altered bone metabolism in adolescents and young adults with IBD in a case-control setting.

METHODS

This study involved 42 adolescents and young adults (age range from 10.7 to 25.0 yr) with ulcerative colitis (n=28) or Crohn's disease (n=14) and in 42 age and sex-matched control subjects. We measured their bone formation marker PINP and bone resorption markers CTX and TRACP5b. Study protocol was approved by Research Ethics Committee.

In patients, bone mineral density (BMD) Z-scores were corrected for bone age when they differed >1 yr from calendar age.

PINP and CTX were measured from serum samples with automated methods using the IDS-iSYS automated analyzer (IDS Ltd) and TRACP5b using a manual assay (BoneTRAP(R); IDS Ltd).

Student's *t* test and univariate linear model with age and BMI as covariates were used for normally distributed parameters. Mann Whitney U-test was used for non-parametric testing.

RESULTS

Half of the patients had disease duration over 8.5 yrs and 62% of patients were in clinical remission. Patients with IBD were shorter and had lower BMI than controls. Whole body bone area and bone mineral content were lower in them. BMD Z-scores were decreased for lumbar spine and whole body in comparison to controls (Table 1).

TABLE 1. Characteristics of the 42 patients with inflammatory bowel disease and their controls.

Characteristic Mean (95% CI)	IBD patients	Control subjects	P value
Age (yr)	18.8 (17.6 – 20.1)	19.2 (18.4 – 19.9)	0.7
Gender (male / female)	20/22	20/22	
Height (cm)	167 (163-170)	173 (170 – 177)	0.012
BMI (kg/m^2)	20.8 (19.8 – 21.7)	22.4 (21.4 – 23.4)	0.025
Whole body BA (cm^2)	2125 (2029 – 2220)	2336 (2244 – 2428)	0.002
Whole body BMC (g)	2024 (1875 – 2173)	2719 (2251 – 2887)	<0.001
Lumbar spine BMD Z-score	-0.7 (-1.0 – -0.4)	-0.2 (-0.5 – 0.1)	0.040
Whole body BMD Z-score	-0.5 (-0.8 - -0.2)	0.1 (-0.3 – 0.4)	0.011

IBD, inflammatory bowel disease; BA, bone area; BMC, bone mineral content; BMD, bone mineral density. P values are from Student's *t* test.

TRACP5b was higher in patients with IBD [geometric mean, (95% CI), 5.6 U/L (4.6 – 6.7) vs. 4.4 (3.9 – 5.0), p=0.001, Figure 1], when adjusting for age and whole-body bone area, but no significant difference in PINP [median (IQR) 106 ng/mL (53 – 403) vs. 92 (60 – 159), p=0.6] or CTX [geometric mean (95% CI) 1.02 ng/mL (0.82 – 1.27) vs. 0.97 (0.83 – 1.14), p=0.4] was observed.

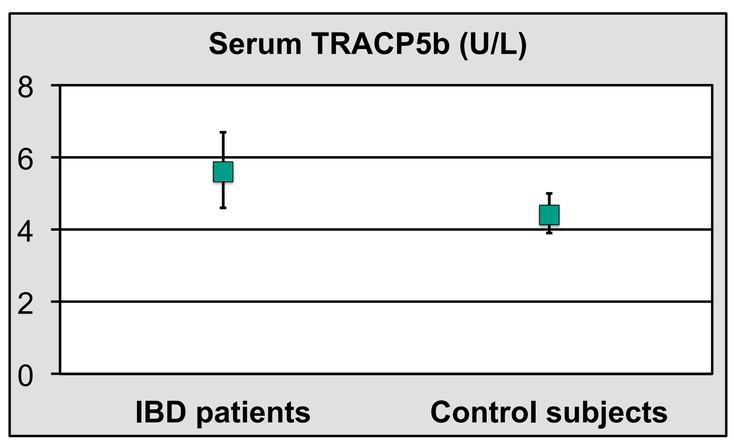

FIGURE 1. Serum TRACP5b concentration in 42 IBD patients and 42 age- and gender-matched control subjects [geometric mean (95% CI for mean), p=0.001].

In the patient group, all BTMs were significantly lower in postpubertal subjects when compared to prepubertal and pubertal subjects as expected (p<0.05).

Current use of contraceptive pills associated with lower PINP [n=6 vs. n=12; 39 ng/mL (33–47) vs. 94 (73–121, p<0.001] and CTX [0.47 ng/mL (0.32–0.69) vs. 0.80 (0.61–1.06), p=0.014] concentrations in patients with IBD.

Clinical remission of IBD did not associate with any statistically significant difference in BTM concentrations.

CONCLUSIONS

Based on the BTM concentrations, bone health is compromised in young patients with IBD, though in clinical remission. BTMs reflect increased bone resorption, which could contribute to lower BMD.

The authors have no conflicts of interest to report.