Bone density in axial and appendicular skeleton in patients with lactose intolerance: influence of calcium intake and vitamin D status.

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BACKGROUND
Lactose intolerance (LI) is a common enzymatic insufficiency, manifesting by poor tolerance of dairy products, leading to low calcium intake and poor calcium absorption from dairy products. These changes might lead to an impairment of bone metabolism [1].

OBJECTIVES
To evaluate the impact of LI on quantitative bone parameters in axial and appendicular skeletal sites. To assess the impact of calcium intake from dairy and non-dairy nutritional sources, calcium regulating hormones and bone turnover on quantitative bone parameters in LI patients.

METHODS
We evaluated calcium intake and bone status in sixty-six patients with LI, 49 women and 17 men, aged 20 to 78. Bone mass was assessed at the lumbar spine (LS), total hip (TH) and femoral neck (FN) by dual-energy x-ray absorptiometry (DEXA) and at the radius, tibia, phalanx by quantitative ultrasound. Serum calcium, albumin, inorganic phosphate, calcium regulating hormones and markers of bone turnover were evaluated.

RESULTS
Total daily calcium intake was below the recommended by the American Dietetic Association [2] in all study participants (mean 692 mg/day +/- 162). Elevated level of urinary deoxypyridinoline crosslinks (DPD) was observed in 63 (96%) patients and was negatively correlated with total daily calcium intake (r = -0.998, p = 0.025) and with nondairy calcium intake (r = -0.34, p = 0.015). Parathyroid hormone (PTH) level in the upper third of normal range (45-65 ng/L) was observed in 11 (17%) patients. Parathyroid hormone (PTH) was inversely correlated with total calcium intake (r = -0.4, p = 0.001), dairy calcium intake (r = -0.83, p = 0.05), non-dairy calcium intake (r = -0.29, p = 0.043), 25OHD(3) serum level (r = -0.3, p = 0.007) and positively correlated with bone turnover markers (deoxypyridinoline crosslinks [DPD], r = 0.36, p = 0.01 and bone specific alkaline phosphatase [BSAP] r = 0.36, p = 0.01). Decrease in quantitative bone parameters compared to age-matched controls was
observed in the axial and in the appendicular skeleton in men and in postmenopausal women: mean z-score for LS: -0.87 +/- 0.22 and -1.32 +/- 0.65, p = 0.004 and 0.015, tibia: -1.15 +/- 0.53 and -0.44 +/- 0.044, p < 0.001 and 0.27, phalanx: -0.98 +/- 0.22 and -0.52 +/- 0.98, p < 0.001. We observed decrease in bone mass in patients with serum PTH in the upper tertile of normal range in the FN (z-score: -0.57 +/- 0.6 versus -0.03 +/- 0.9, p = 0.025), TH (-0.51 +/- 0.96 versus 0.04 +/- 0.9, p = 0.05) and radius (-1.84 +/- 0.27 versus -0.07 +/- 1.61, p = 0.025, respectively). z-scores in FN and TH positively correlated with serum 25OHD(3) level (r = 0.31, 0.29; p = 0.014, 0.019). In postmenopausal women serum 25OHD(3) level correlated also with LS z-scores (r = 0.52, p = 0.004); FN and TH z-scores negatively correlated with DPD level (r = -0.51, p = 0.02 and r = -0.55, p = 0.04).

CONCLUSION
LI state may lead to increased bone turnover and decreased bone mass especially in men and postmenopausal women. Impaired vitamin D status and low calcium intake may be deleterious to bone in this condition.