

The difference in bone density between Type 1 and non-obese Type 2 diabetic patients with Charcot neuroosteoarthropathy

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Background and aims: Reduced foot bone mineral density (BMD) may increase the risk of fractures and development of Charcot neuroosteoarthropathy (CNO). It is unclear if the foot BMD is dependent on type of diabetes or if it is influenced by other pathogenetic factors. The aim of our study was to compare BMD in various localizations between Type 1 and Type 2 diabetic patients with active CNO with respect to peripheral and autonomic neuropathy and renal failure. **Patients and methods:** 18 patients with active CNO (11 with Type 1 and 7 with Type 2 diabetes) from our foot clinic were included into the study. Calcaneal bone density was measured by quantitative ultrasound (QUS) methods, BMD in lumbar spine and femoral neck was measured by X-ray absorptiometry (DEXA). The peripheral diabetic neuropathy was determined by the vibration perception threshold (VPT), the presence of autonomic neuropathy was determined by Ewing's tests (grading 1-3 according to the number of abnormal tests) and by the cumulative parameter (total power) of the power spectral analysis of heart rate variability. **Results:** The group of 11 Type 1 diabetic patients with CNO (3 patients on hemodialysis) differed significantly from the group of 7 Type 2 diabetic patients with CNO in mean age (47 ± 13 and 58 ± 9 years, $p < 0.05$) and in the duration of diabetes (20 ± 5 and 10 ± 4 years, $p < 0.001$), but not in mean body mass index (BMI) - 20 ± 4 and 23 ± 3 kg/m², NS. No significant differences between the mean T-score of calcaneal BMD between group of CNO patients with Type 1 and Type 2 diabetes were found nor in the Charcot foot (-3.03 ± 1.5 and -2.9 ± 0.6 , NS), nor in the non-Charcot foot (-2.4 ± 1.3 in all patients and -1.8 ± 1.03 in patients without hemodialysis in the first group, and -1.7 ± 0.5 in patients in the second group, NS). Calcaneal osteoporosis (T-score ≤ -2.5) in the Charcot foot was similar in both group - 7/11 (64%) and 5/7 (71%), NS; it was more frequent in Type 1 than in Type 2 diabetes group (5/11 (45%) and 0/7) in the non-Charcot foot, but not significantly. Osteopenia (T-score between -1 and -2.5) in the non-Charcot foot was found in the rest of Type 1 with exception of one patient and in all Type 2 diabetic patients. No significant differences in the mean T-score of the BMD in the lumbar spine and in femoral neck between Type 1 and Type 2 diabetic patients with CNO were seen, both groups were also comparable in the severity of peripheral neuropathy and in the assessing of autonomic neuropathy by Ewing's tests and by power spectral analysis of heart variability. **Conclusion:** Results of our study showed that non-obese Type 2 diabetic patients with CNO with very severe peripheral and autonomic neuropathy did not differ significantly in the bone density of the feet, spine and femoral neck from the patients with Type 1 diabetes and that preexisting osteopenia or osteoporosis was very frequent also in the non-Charcot foot. Further studies may be required to determine the pathogenetic and risk factors for foot fractures in CNO patients. This study was supported by grant MZO 00023001.