ABSTRACT

Introduction: Multiple sclerosis (MS) is associated with impaired bone health in comparison to an equally healthy population, even already in patients at the onset of this disease. The main risk factors for development of osteoporosis in MS patients are known. The aim of the study was to find the relationship of the decrease in bone mineral density (BMD) to the administered cumulative dose of steroids and to other risk factors in MS, mainly to the degree of motor deficit. Further goal was to evaluate the occurence of the risk of low-trauma fractures in multiple sclerosis patients.. The BMD and muscle mass was compared in MS patients (women and men) and control subjects, to examine the effect of main ones – physical disability and long-term glucocorticoid (GC) therapy on BMD. Clinical values of bone remodeling markers were evaluated in assessment of rate of bone loss in patients with multiple sclerosis long term treated with low dose of GC.

Patients and methods: We used dual –energy X-ray absorptiometry for a measurement of BMD in 591 MS patients (455 females and 136 males) in 2004 and in cross-sectional longitudinal study published in 2014 with 474 patients (353 women and 121 men). Out of the whole study group body composition was evaluated in 250 MS females, 104 males and 247 healthy controls (193 women and 54 men). In a smaller patient group samples for detection of markers of bone remodeling were taken.

Results: Osteopenia was found in 46,5 % and osteoporosis in 26,4 % patients with MS. Cumulative dose of glucocorticoids and disability both have an influence on reduced bone density. Correlation with the total received dose of GC was significant but not very high whereas correlation with the degree of immobility was very high ($p < 0{,}001$). Number of osteoporotic fractures was also more dependent on immobility than on the amount of administered GC. The effect of severely impaired gait was more apparent in weight-bearing bones (hip) ($p \leq 10^{-15}$) than in spine ($p = 0.007$). We have also found other risk factors: low calcium intake, low body mass index and high consumption of alcohol. Patients with MS had significantly lower amount of total muscle mass as well as total leg muscle mass when compared to the control group. The EDSS score was negatively associated with BMD at the proximal femur in both premenopausal and postmenopausal women, while the deficit of total body muscle mass was significantly associated with a loss of BMD at the lumbar spine and whole body BMD in premenopausal women only. GC treatment was negatively associated with BMD at the lumbar spine in premenopausal women. The plasma βCTX concentration was the most significant parameter of bone remodeling which correlated with the rate of bone loss and with the EDSS.

Conclusions: Study confirmed gait and prolonged steroid therapy impact negatively on bone health (especially on weight-bearing bones than on spine) and on the incidence of low-trauma fractures, but it is more related to impaired gait than to prolonged GC therapy. The total body muscle mass was an important predictive factor for the total body BMD and lumbar spine BMD in MS patients. Patients having plasma βCTX higher as compared to controls were confirmed as bone loosers 2 years later.

Key words: multiple sclerosis, Kurtzke EDSS, glucocorticoids, bone mineral density, body composition, osteoporosis