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Presidential oration: diabetes - osteoporosis

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ABSTRACT

Osteoporosis is defined by low bone mass, increased fragility, decreased bone quality and an increased fracture risk. The metabolic abnormalities of diabetes potentially affect bone metabolism, structure and mineral density. Osteocalcin, a hormone derived from bone is an insulin secretagogue.

Bone mineral density (BMD) measurement by Dual Energy X-ray Absorptiometry (DEXA) is the reference standard for diagnosis of osteoporosis. Incidence of osteoporotic fractures increases with age, increasing sharply after 60 years of age in both the sexes. Z-score compares the BMD to age matched controls, while T-score compares it to peak BMD at age of 30 years, both being standard deviation scores. However, bone strength depends upon both, BMD and bone quality. Bone turnover markers reflect dynamics of bone remodeling.

Diabetes mellitus is associated with decreased bone mass, increased fracture risk and delayed fracture healing. Decreased serum markers of bone formation suggest decreased bone turnover. Various associations and complications of diabetes, which affect bone, are obesity, hyperinsulinemia, advanced glycation end product formation in collagen, decreased circulating serum IGF-1, hypercalciuria, renal dysfunction, microangiopathy and chronic inflammation. Bone turnover is suppressed in patients with poor glycemic control, which returns to normal with attainment of euglycemia.

On the other hand, type 1 diabetes mellitus, characterised by absolute insulin deficiency is associated with high bone turnover, negative protein balance and high fracture risk. Other comorbidities of type 1 diabetes mellitus, like Graves' disease, Celiac disease and hypogonadism also worsen the risk of osteoporosis.

Episodes of hypoglycemia, nocturia, poor vision, poor balance, orthostatic hypotension and impaired joint mobility predispose to frequent falls and thus increase the risk for fragility fractures.

In post-menopausal women, the prevalence of osteopenia and osteoporosis is seen similar in subgroup of patients with and without diabetes (Osteopenia: 50.94% vs. 50.53%, respectively, Osteoporosis: 39.62% vs. 43.16%, respectively). However, in premenopausal women, osteoporosis is seen more commonly in subgroup of patients with diabetes when compared to those without diabetes (66.67% vs. 14.29%, respectively). However, BMD is comparable in men with and without diabetes mellitus.

Conclusions: Osteoporosis is more prevalent in premenopausal women with diabetes. Routine screening is recommended in all postmenopausal women. All patients with fractures and those with one or more risk factors for osteoporosis need BMD measurements at younger age.