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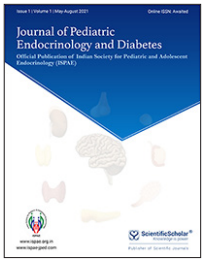

Editorial

Bone health in children with type 1 diabetes mellitus

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Type 1 diabetes mellitus (T1DM) is a condition characterized by chronic insulin deficiency due to destruction of the pancreatic beta cells. The overall prevalence of diabetes is increasing globally; the latest report by the International Diabetes Federation states that India has the second largest number of children and adolescents with T1DM in the world.[1] Various studies have demonstrated reduced bone mineral density (BMD) in children with T1DM as evaluated by dual-energy X-ray absorptiometry (DXA) or peripheral quantitative computed tomography (pQCT).[2-5]

Impairment in bone mineralization and fragility may be attributed to various factors including poor glycemic control causing urinary loss of calcium, vitamin D deficiency, long-standing diabetes, increase in advanced glycation end-products, impaired renal function, and chronic inflammation.[6] Further, compromised growth may lead to reduced height and bone area for age, resulting in short and narrow bones as diagnosed by the Mølgaard method.[7] Poor metabolic control often causes growth hormone and/or insulin-like growth factor-1 axis alterations, leading to smaller bones with reduced bone mass, which, in turn, predisposes to pathological fractures and growth faltering.[8]

Till date, very few Indian studies have evaluated bone health in children with T1DM. Two of our previous studies have demonstrated that children with diabetes from middle or lower socioeconomic class are shorter and have shorter, narrower bones, especially with increasing duration of diabetes.[9,10] In a study to assess bone health parameters in T1DM (2015), we observed that the total body bone mineral content for total body bone area Z-scores was not significantly affected by the duration of diabetes. Thus, prolonged duration of diabetes was observed to cause short, slender but not light or under-mineralized bones.[9] Our study published in 2019 revealed a significantly lower mean total body less head areal BMD (TBLH aBMD) Z-score for age as well as mean lumbar spine bone mineral apparent density among T1DM children as compared to controls. The mean TBLH aBMD for age Z-score was found to be significantly lower as the disease duration progressed. However, no relation between DXA parameters and glycemic control (HbA1c) was observed. The mean trabecular bone volumetric BMD (vBMD) and total vBMD for age Z-scores as measured at 4% site of the radius bone by pQCT were significantly lower in T1DM children, and the trabecular bone vBMD was inversely related to HbA1c concentrations.[10]

T1DM patients in developing countries like India often face a double burden due to poor glycemic control due to socioeconomic constraints, coupled with a high prevalence of vitamin D deficiency. The study by Kumar RA *et al.* published in this issue of the *Journal of Pediatric Endocrinology and Diabetes* attempts to highlight this problem and to study the magnitude of

low BMD and vitamin D deficiency among children with T1DM.[11]

Kumar RA *et al*. evaluated 37 children with a median duration of diabetes of 10 months (2–36) and did not find any significant difference in the BMD of diabetics versus controls when measured at the lumbar spine. On assessing BMD Z-scores, they found that 8% of children with diabetes had low BMD as opposed to none among the control group. The authors also found that the serum vitamin D concentrations were significantly lower in children with diabetes. In our opinion, the duration of diabetes in the study subjects may be too less to evaluate the impact of T1DM on BMD. Further, a lumbar spine DXA scan is not sufficient for the evaluation of BMD in children and a total body less head areal BMD also needs to be performed. Puberty plays an important role in bone accrual. Children with diabetes are likely to have a delayed and lower amplitude of pubertal growth spurt, due to which bone accrual may be affected negatively. Hence, assessing the effect of puberty on bone health in these children is critical.

Hopefully, results of the study conducted by Ravishankar *et al*. will further encourage the assessment of bone health and the factors having a detrimental effect on bone growth and mineralization in Indian children with type 1 diabetes.

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