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Impact of diabetic microvascular complications on bone structure in type 1 diabetes mellitus

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Aim: While most studies have consistently shown that patients with type 1 diabetes mellitus (T1DM) have an increased risk of osteoporosis and fracture, the structural basis for this is unclear. The aim of this cross-sectional *in-vivo* study was to gain insight into bone geometry, volumetric BMD (vBMD), microarchitecture and estimated bone strength in adult patients with T1DM with particular emphasis on those with and without micro-vascular complications using high-resolution peripheral quantitative computed tomography (HR-pQCT).

Materials and Methods: Forty-four patients with T1DM (mean age 45.5±12.1 years; 19 females, 25 males) were recruited from the "Fyn Diabetes Database" and matched with respect to age, gender and height with 44 healthy subjects (mean age 46.1±12.0 years). Twenty patients with T1DM had evidence of diabetic microvascular complications. HR-pQCT at the distal radius and distal tibia was performed in all participants.

Preliminary results: In weight-adjusted models, HR-pQCT revealed significantly lower total, trabecular (Tb) and cortical (Ct)vBMD ($p<0.01$, 0.03 and 0.03, respectively), and thinner cortex ($p=0.03$) at the radiusin T1DM patients in comparison to healthy controls. In multiple regression analysis, the presence of diabetic microvascular complications correlated negatively with Tb vBMD and Tb thickness at the radius and tibia and total vBMD at the tibia independent of age, weight, duration of diabetes and glycemic control.

Conclusions: This study showed that T1DM patients had compromised volumetric densities and microarchitecture predominantly at non-weight bearing bones like the radius. However, the presence of diabetic microvascular complications was an independent risk factor associated with a compromised trabecular compartment at both, the radius, as well as the tibia.

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