

Influence of birth weight on peripheral bone in young Gambian adults: A pQCT study

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Birth weight has been shown to predict adult skeletal size and bone mineral content independently of postnatal factors. However, it is not known whether birth weight and current weight influence adult cortical and trabecular bone differently. We have previously reported that birth weight predicts bone area in both males and females at peripheral skeletal sites rich in cortical bone, in a Gambian population¹. In this abstract, we report the influence of birth weight and current weight respectively on bone size and mineral content at peripheral skeletal sites rich in trabecular bone.

Total cross-sectional bone area (BA), total volumetric bone mineral density (vBMD), trabecular vBMD, cortical/subcortical vBMD, trabecular bone mineral content (BMC) and cortical/subcortical BMC were determined at three sites (4% from distal radius, ulna and tibia) using peripheral quantitative computed tomography (pQCT) (Stratec, XCT 2000). Forty-six women and 64 men, aged 17-21 years, from a rural village in The Gambia were measured. Birth weight (BWt) was obtained from clinical records (mean±SD; BWt 3.00±0.37 kg), and current weight (Wt) measured at the time of scanning (mean±SD; Wt 54.0±6.40 kg). In univariate and stepwise multiple regression analysis, pQCT measurements were the dependent variables, and BWt and current weight were independent variables.

At all three trabecular sites, total BA was positively predicted by BWt in females ($p \leq 0.01$) but not in males. In contrast, BA was positively predicted by Wt in males ($p \leq 0.05$) but not females. BWt did not predict trabecular or cortical/subcortical BMC in either sex. In consequence, in

females only, BWt negatively predicted total vBMD ($p \leq 0.05$) and cortical/subcortical vBMD at the radius and ulna ($p \leq 0.05$). Wt positively predicted cortical/subcortical BMC ($p \leq 0.001$), cortical/subcortical vBMD ($p \leq 0.01$) and total vBMD ($p \leq 0.05$) in both males and females. Trabecular BMC at the radius and tibia was positively predicted by Wt ($p \leq 0.01$) in males only. Trabecular vBMD was not predicted by either BWt or Wt, except at the tibia in females ($p \leq 0.05$).

Our findings suggest that pre-natal factors and factors in early adulthood may influence different aspects of long-term bone growth, such as cross-sectional area or mineral content. Furthermore, our findings indicate that there may be differences between determinants of trabecular bone in men and women, as birth weight is an independent positive predictor of bone area at trabecular skeletal sites only in females. This contrasts to our studies at cortical sites where birth weight predicts bone area in both sexes¹. This work is in keeping with studies on Caucasian populations, where growth in utero and size at birth have been shown to influence bone status and health later in life.

Reference

1. de Bono S, Laskey MA, Ceesay M, Mendy M, Prentice A. Influence of birth weight on pQCT measurements of cortical bone sites in young Gambian adults. *J Bone Miner Res* 2006; 21:1146-1172 (Bone Research Society 2006 Meeting Abstracts).

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