

Human Upper Limbs (Distal Radius) Show Direct Dependency on Vitamin D as Osteogenic Factor but it is not seen for The Lower Limbs (Midshaft Tibia) - Evolutionary Insights for Human Bipedalism

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ABSTRACT Lower limbs bear the entire body weight under the influence of gravity in various activities of daily living like walking. Upper limbs are not having any comparable weight bearing role in modern bipedal human beings. Thus, there may be evolutionary differences in limbs for their dependency on osteogenic factors like nutrition, weight bearing, and environmental aspects. The level of vitamin D may be predominantly important for the non-weight bearing upper extremity skeletal mineralization during winters as compared to lower limbs in modern bipedal humans. Vitamin D's association with quantitative ultrasound derived T and Z scores were checked and its osteogenic role explored in this study. Vitamin D level using enzyme - linked immunoassay (ELISA) and ultrasound derived T and Z scores of radius and tibia were checked during winters for a correlational study on 20 participants. Present study results show significant positive correlation ($r=+0.491$; $p=.038$) and significant positive linear regression analysis for quantitative ultrasound derived T score of distal radius ($p=0.033^*$, $R^2=.241$, $b_0=-1.51$, $b_1=0.053$) with vitamin D levels; whereas the correlation of vitamin D was not significantly positive for midshaft tibia's T score ($r=+0.298$; $p=.229$). Thus, a direct dependency of vitamin D for only the upper limb has been seen, for osteogenic function.