

Bone Strength of Students in the UAE

Sub-title: An investigation into lifestyle, bone quality and bone density of students in the United Arab Emirates (UAE)

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ABSTRACT

Bone strength in this Arab country, as in the rest of the world, is assessed by measuring bone quality with Quantitative Ultrasound (QUS) and bone quantity with Dual Energy Xray Absorptiometry (DXA), and comparing the results to reference ranges. However, in the absence of accepted Arab reference ranges for either technique, Caucasian reference ranges are used. This study aimed to discover the average male and female values for bone strength in young adults in order to determine the suitability of employing the Caucasian reference range for clinical diagnosis of bone strength. Lifestyle factors known to influence bone strength were also investigated. The study design was a cross sectional survey of student volunteers, aged 18 to 25. Bone strength was assessed for all volunteers with QUS using two techniques and, for a sub-set of students, with DXA. Lifestyle factors including calcium intake and physical exercise were examined. The study took place during the Spring semester of 2005 and included healthy Arabs.

The number of volunteers was 337 from which, due to exclusion criteria, 41 were removed leaving a total of 296; 120 males and 176 females. Although the nationalities of the students varied, almost all of them had lived most of their lives in the United Arab Emirates (UAE). Ultrasound stiffness index of the left heel showed that Arab males measured the same as Caucasian females. No male Caucasian reference was available. Arab females however, had a mean stiffness index significantly lower than Caucasian females by 6 percent, $p < 0.001$. Phalangeal QUS was found to be unreliable as it did not correlate with heel data or hip DXA. Average hip bone density for 31 males matched Caucasian male reference data, mean 1.037 g/cm^2 . Bone density of 38 females scanned was 11 percent lower than the female Caucasian reference, $p < 0.001$. This study suggests that as the difference in bone strength between Arabs and Caucasians is only seen in females it may not be an ethnic difference, as previously assumed, but instead may be due to the difference in lifestyle.

Analysis showed effects on bone strength from several risk factors. Calcium intakes were the same for both groups and were approximately half of the recommended daily amount. Odds ratios for a low DXA result were 1.264 (CI 1.038-1.496) with low calcium intake. Increased numbers of fractures correlated negatively with increased bone strength for QUS and DXA. Low body mass index (BMI) gave an odds ratio for low QUS of 1.6 and low DXA of 3.1 (CI 1.341-6.947). Most males were physically active but the females were inactive, performing 80% less exercise than their male counterparts. However, correlation of exercise to both QUS and DXA bone strength was present for females. Further research is recommended with emphasis on including larger numbers of physically active females.