Bone Mineral Density in Weight-Bearing and Aquatic Athletes

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ABSTRACT

Bone mineral density (BMD) is a measure of mineral deposit within the bone that can be used as an early-adulthood predictor for onset of osteoporosis. Type of exercise induces a stress-response which builds BMD. **PURPOSE:** Non-weight-bearing-athletes were compared to weight-bearing-athletes and controls to identify differences in bone health among groups. The participants were compared longitudinally to measure change in BMD overtime. This study was modeled after work by Taaffe et al. (1995) which concluded that female athletes who do not engage in weight-bearing-activities had lower BMD. **METHODS:** Height, weight, and calcium intake was collected for female students (20.0±1.3 years); 23 runners (R), 9 swimmers (S), 15 water polo players (WP), and 24 controls (C). BMD (g/cm^2) and lean body mass (kg) were measured on a dual-energy x-ray absorptiometer (DXA). The measures were taken at the anterior-posterior (AP) spine, lateral spine, femoral neck (FN), trochanter, total hip, and whole body (WB) at baseline and again about 5-months later. Eighteen R, 11 WP, 8 S, and 24 C returned for follow-up. **RESULTS:** SPSS analysis at the spine reported no statistical difference between groups ($p > 0.05$). At the total hip (1.023±0.015 vs. 0.904±0.032 g/cm^2, $p=0.01$) and trochanter (0.795±0.014 vs. 0.692±0.029 g/cm^2, $p=0.01$), R>S. In the whole-body scan, R>C (1.102±0.012 vs. 1.048±0.016 g/cm^2, $p=0.031$) and R>S (1.102±0.012 vs. 1.004±0.025 g/cm^2, $p=0.005$). C, WP, and R had higher BMD at the FN than S (0.767±0.031(S) vs. 0.888±0.021(C), 0.906±0.029(WP), 0.899±0.015(R) g/cm^2, $p=0.019$, $p=0.002$, $p=0.004$). Repeated-measures tests reported that S increased in BMD over time at the AP spine (1.8%), lateral spine (3.7%), FN (4.2%), and trochanter (2.1%) ($p<0.05$) and that C significantly increased at WB (1.1%) ($p<0.05$). **CONCLUSION:** Bone health has improved in non-weight-bearing-athletes since original analyses by Taaffe. However, S still show BMD 14.7% lower than R, 15.3% lower than WP, and 13.6% lower than C at the FN. Longitudinally, S increased from baseline measures, yet the final BMD does not exceed the value of any other group. While there is progress in BMD being made between different types of athletes with modern training methods, weight-bearing-athletes still have greater bone health at the FN.