**Title:** Assessing the association between obesity and bone mineral density using dual-energy x-ray absorptiometry (DEXA)

**Abstract:**

**Background/Objectives:** Obesity was related to low fracture risk and high bone mineral density (BMD) worldwide. While BMI and waist circumference are commonly used, dual energy x-ray absorptiometry (DEXA) is found to measure body fat more accurately. We aim to assess the relationship between the three measurements and BMD and fracture to understand which are most strongly associated with BMD and fracture.

**Method:** Data was obtained from the National Health and Nutrition Examination Survey (NHANES, 1999-2006) for adults aged 20 to 69 that did not lose weight last year. Regression models were used to examine the relationship between obesity measurements quintiles with BMD and fracture.

**Results:** Higher BMI, waist circumference, and DEXA measures were all associated with greater BMD. Comparing Q5 to Q2 (reference), BMI has the largest effect size (β=0.055) among males. Among females, BMI and body fat had similar effect size (β=0.047 and 0.049, respectively). The effect of high BMI on fracture is not significant (OR=1.059, 95%CI (0.446, 2.515) in males, 0.876 (0.272, 2.824) in females). Low body fat seemed to be related to fracture (OR=1.488 (0.533, 4.155) in males, 1.535 (0.475, 4.959) in females) with confidence interval across null.

**Conclusion:** Results indicate that obesity is positively related to BMD in both genders, but the effect sizes are small. BMI rather than body fat has a stronger association to BMD. The results also suggest that low BMI in females and low body fat in both genders are related to higher fracture odds, but the results are not significant.