Abstract

Objective. Genetic factors determine bone mineral density (BMD) and peak bone density between 20 and 30 years of age, as well as bone mineral loss after menopause. BMD is a predictor of fractures due to osteoporosis and the impact of genetic factors on osteoporosis. The variation in BMD for each individual is determined by an underlying genetic structure, common genetic effects, particularly with respect to compact bones as compared to those that are primarily trabecular. This article presents the correlation of BMD by anatomical site among different samples of Mexican grandmothers, mothers and granddaughters of mixed race.

Material and Methods. The present analysis was performed of healthy employees and their healthy relatives from three different health and academic institutions: the Instituto Mexicano del Seguro Social and the Instituto Nacional de Salud Pública, both located in Cuernavaca, Morelos, as well as the Universidad Autónoma del Estado de México. We selected family-related female participants in order to obtain pairs of mothers and daughters and, whenever possible, grandmother-mother-daughter groups. We were able to match 591 mother-daughter pairs for analysis. Additionally, we were able to include grandmothers to create grandmother-mother-daughter triads for further analysis. Bone density measurements were performed of the non-dominant proximal femur, the lumbar spine (L1-L4) and the whole body using a dual X-ray absorptiometry (DXA) Lunar DPX NT instrument.

Results. This study included 591 granddaughters, 591 mothers and 69 grandmothers; mean ages were 20, 47 and 72 years old, respectively. A close relationship existed with respect to body mass index (BMI) between mothers and grandmothers (27.9 vs. 27.3). The largest proportion of body fat mass was observed in the group of mothers (28.5%), but was also high in grandmothers (25.7%) and granddaughters (21.1%). The percentage of lean body mass was similar among the three family groups. The correlation of BMD between mothers and grandmothers was greatest for subtotal BMD (0.44) and was very high for the hips (0.39). Using predictive models for hip BMD among grandmothers, mothers and grandchildren, we observed that hip BMD of grandmothers is a predictor of BMD in mothers, with a beta of 0.46 (p 0.001, CI95% 0.19-0.73); (R2: 0.41). A predictor of BMD of the lumbar spine in grandchildren is BMD of the lumbar spine in mothers (beta 0.30 CI95% 0.07-0.53). Conclusions. The results obtained in this study suggest that daughters whose mothers have a low BMD for their age will tend to develop the same condition. This indicates the importance of monitoring for girls and adolescent females whose mothers have problems related to osteopenia or osteoporosis. It will therefore be necessary to conduct studies to identify the most significant genes and specific anatomical sites among our population for the purpose of establishing the polymorphic variants for high-risk in the Mexican population.
Keywords
Bone mineral density, familiar predisposition, mixed-race, Mexico.