

The “fat but fit” paradigm and bone health in young adults: A cluster analysis

Torres-Costoso, A.
Garrido-Miguel, M.
Gracia-Marco, L.
López-Muñoz, P.
Reina-Gutiérrez, S.
Arenas-Arroyo, S.N.
Martínez-Vizcaíno, V.

Abstract

The fat but fit paradox has suggested that obese individuals with good fitness levels have lower cardiometabolic risk compared to individuals with normal weight but lower fitness levels. This paradigm has not been explored in the context of bone health. The aim of this study was to test whether categories of fat but fit paradigm assessed by body fat percentage and handgrip strength holds up in young adults and to analyze the relationship between fat but fit categories and bone outcomes. Cluster cross-sectional analyses of data from 499 young adults aged 18 to 30 from Toledo and Cuenca, Spain were conducted. Body fat percentage, handgrip strength, bone mineral content (BMC), bone mineral density (BMD), and dietary nutrients such as, proteins, magnesium, calcium, phosphorus, potassium, and vitamin D were assessed. Cluster analysis of body fat percentage and handgrip z scores resulted in a classification of four clusters that could be interpreted according to Fat Unfit (FU), Unfat Unfit (UU), Fat Fit (FF) and Unfat Fit (UF) categories. ANCOVA models showed that young adults in clusters with higher handgrip strength levels (FF, UF) and with higher key bone nutrients levels (UF) had significantly higher total BMC values than their peers in the UU and FU cluster categories, after controlling for sex, age and height. This study provides two novel conclusions in relation to the fat but fit paradigm: first, it confirms the construct of the four clusters of body fat percentage and handgrip strength, and second, it reinforces the predictive validity of the fat but fit paradigm categories, indicating the positive effect, although it may not just be a causal relationship, of muscular strength and key bone nutrients on counteracting the negative effect of obesity on bone health.

Author keywords

Body composition

Bone

College students

Fitness

Muscular strength

Nutrients