Influence of adipose tissue mass on bone mass in an overweight or obese population: systematic review and meta-analysis

Eimear Dolan*, Paul A. Swinton*, Craig Sale, Aoife Healy, and John O'Reilly

Context: The scientific literature shows conflicting evidence about the relationship between adiposity and bone mass in overweight and obese populations.

Objective: The aim of this review was to quantify the correlation between adipose mass (absolute and relative) and bone mineral density (BMD) in overweight and obese populations.

Data Sources: Three databases were searched electronically. In addition, reference lists of relevant articles were screened.

Study Selection: A total of 16 studies, comprising 2587 participants and 75 correlation coefficients were selected for inclusion in the review.

Data Extraction: Data were extracted from each study using a standardized form.

Results: Multilevel modeling indicated opposing relationships between BMD and adiposity: absolute adiposity correlated positively, and relative adiposity negatively, with BMD. Sex and age were the primary moderators of these relationships. Strong evidence supported a negative relationship between relative adipose mass and BMD in men (R = 0.37; 95%CI, 0.57 to 0.12) and in those aged less than 25 years (R = 0.28; 95%CI, 0.45 to 0.08).

Conclusion: To prevent bone loss in overweight and obese populations, nutrition- and exercise-based interventions that focus on a controlled reduction of adipose mass with concomitant preservation of lean mass are recommended. Systematic Review Registration: PROSPERO no. CRD42015024313.

INTRODUCTION

The increasing prevalence of obesity is a global health problem, and recent statistics show that an estimated 38% of all adults are overweight, and 13% are obese. In addition to the well-documented health consequences of increasing levels of overweight and obesity, obesity also represents a substantial social and economic burden, owing to both direct (eg, increased healthcare costs) and indirect (eg, higher dependence on welfare due to premature retirement and unemployment; increased sick leave) costs. The increasing prevalence of osteoporosis is another worldwide health issue with far-reaching social and economic consequences. Osteoporosis is estimated to cause more than 8.9 million fractures per year worldwide, and, compared with 1990 statistics, the global incidence of osteoporosis-related hip fracture is predicted to increase by 310% in men and 240% in women by the year 2050.