Osteoporosis in older black South African women and relationships with body composition, dietary intake and physical activity

Amy Mendham[1,2], Naomi E. Brooks[3], Lisa K. Micklesfield[4], Mieke Faber[2], Dirk L. Christensen[5], Iain J. Gallagher[3], Lillemor Lundin-Olsson[6], Kathryn H. Myburgh[7], Sebastiana Kalula[1], Feyisayo Odunitan-Wayas[1], Estelle V. Lambert[1], Julia H. Goedecke[2] and Angus M Hunter[3]

[1]*University of Cape Town, Cape Town, South Africa,*
[2]*South African Medical Research Council, Cape Town, South Africa,*
[3]*University of Stirling, Stirling, United Kingdom,*
[4]*University of Witswatersrand, Johannesburg, South Africa,*
[5]*University of Copenhagen, Copenhagen, Denmark,*
[6]*Umea University, Umea, Sweden and*
[7]*Stellenbosch University, Cape Town, South Africa*

Abstract

Introduction: Osteoporosis was not a public health concern in black South African (SA) women, until recently when it was reported that the prevalence of vertebral fractures was 9.1% in black compared to 5.0% in white SA women. Accordingly, this study aimed to measure bone mineral density (BMD) of older black SA women and to investigate its association with risk factors for osteoporosis, including strength, muscle and fat mass, dietary intake and objectively measured physical activity (PA).

Methods and materials: Older black SA women (age, 68 (range; 60–85 years) n = 122) completed sociodemographic and quantitative food frequency questionnaires (QFFQ), fasting venous blood samples (25-hydroxycholecalciferol: Vitamin D-25), 24 h urine collection (estimate protein intake), grip strength and PA monitoring (activPAL). Dual-energy x-ray absorptiometry (DXA) scans of the hip (femoral neck and total) and lumbar spine determined BMD and whole-body scans for fat and fat-free soft tissue mass (FFSTM). WHO classifications were used to determine osteopenia (t-score -2.5 to -1), and osteoporosis (t-score < -2.5).

Results: At the lumbar spine 34.4% of the women (n = 42) had osteopenia and 19.7% (n = 24) had osteoporosis. Osteopenia at the left femoral neck was 32% (n = 40) and osteoporosis was 13.1% (n = 16) of participants. The total left hip BMD indicated osteopenia in 27.9% (n = 34) and osteoporosis in 13.1% (n = 16) of participants. Multinomial regression revealed no differences in age (y) or frequency of falls in the past year between all groups (p = 0.727). Compared to those with normal BMD, participants with osteoporosis at the hip neck and lumbar spine were shorter, weighed less and had a lower body mass index (BMI) (all p < 0.05). When adjusted for height, the osteoporotic group (hip neck and lumbar spine) had lower trunk fat (% whole body), FFSTM (kg) and grip strength (kg), compared to those with normal BMD (p < 0.05). Only protein intake (g; 24 h urine analyses) was lower in women with osteoporosis (all sites) compared to those with normal BMD. Fat, carbohydrate and micronutrient intakes (relative to total daily energy intake), and vitamin D concentrations were not associated with BMD (all sites). Number of daily step count and stepping time (min) were inversely associated with BMI (p < 0.05), but not with BMD (all sites; p > 0.05).

Discussion: A high prevalence of osteopenia and osteoporosis was evident at the lumbar spine and hip in older black SA women. This study highlights the importance of strength, body composition, and protein intake in maintaining BMD and preventing the development of osteoporosis in older women.

Conflict of Interest

There is no conflict of interest