Influence of Body Composition on Bone Mineral Content in Elderly Women

A Preliminary Report

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INTRODUCTION

The bone mineral content (BMC) of the body has been shown to be influenced by both lean tissue mass (LTM) and fat mass (FM) in adults and children.[1,2] However, fewer data are available for elderly people. In this study we tested whether LTM and FM are associated with BMC in a large sample of elderly and young women.

SUBJECTS AND METHODS

The sample consisted of 2051 women recruited at the Geriatric Evaluation and Research Center of Modena University during a larger study on nutritional status and osteoporosis. All women were free of disease other than (primary) osteoporosis. LTM, FM, and BMC were measured by dual-energy X-ray absorptiometry (DXA).[3]

RESULTS

We studied 713 elderly (>65 years old) and 1338 young (≤65 years old) women. TABLE 1 gives their characteristics. (No difference was seen in BMC, in bone mineral density, and in the relationships between BMC, LTM, and FM in women taking estrogens or other antiosteoporotic drugs vs. those not taking them [p = ns, ANOVA and ANCOVA]). Body weight (Wt) and height were significantly lower ($p < 0.05$ and $p < 0.0001$, respectively) in elderly versus young women, whereas BMI was similar. FM was similar, whereas LTM was lower ($p < 0.001$) in elderly versus young women. However, when standardized on DXA-determined body mass, both LTM and FM were similar between groups (p = ns; data not shown). BMC was significantly lower in elderly versus young women ($p < 0.0001$). Log-transformed (lt) age

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TABLE 1. Characteristics of the study subjects

	Elderly (n = 713)	Young (n = 1338)
Age (years)	70.8 ± 4.1***	58.7 ± 4.8
Weight (kg)	64.1 ± 9.4*	65.0 ± 9.7
Height (m)	1.56 ± 0.63***	1.58 ± 0.62
BMI (kg/m^2)	26.3 ± 3.6	26.1 ± 3.6
FM (kg)	23.5 ± 6.7	23.7 ± 6.6
LTM (kg)	37.9 ± 3.9**	38.6 ± 4.2
BMC (kg)	2.0[a]***	2.2[a]

NOTE: Data are given as the mean ± SD unless stated otherwise. Terms: * $p < 0.05$, ** $p < 0.001$, *** $p < 0.0001$ vs. young.

ABBREVIATIONS: BMI = body mass index; FM = fat mass; LTM = lean tissue mass; BMC = bone mineral content.

[a]geometric mean.

explained 7% of lt-BMC variance ($p < 0.0001$), 0.4% of lt-LTM variance ($p < 0.005$), and no variance of lt-FM in the pooled sample (p = ns; n = 2051). Lt-LTM explained 14% more of the variance of lt-BMC than did lt-FM (adj $R^2 = 0.40$ vs. 0.26, $p < 0.0001$). However, lt-Wt was the best single predictor of BMC, explaining 44% of its variance ($p < 0.0001$). The association between lt-LTM and lt-FM explained 2% more variance of BMC compared to the model with lt-Wt alone (adj $R^2 = 0.46$, $p < 0.0001$). Adding age to the predictive model with lt-LTM and lt-FM resulted in an increase in 7% of the explained BMC variance (adj $R^2 = 0.53$, $p < 0.0001$).

CONCLUSIONS

We conclude that (1) BMC is associated more with LTM than FM in both young and elderly women and (2) there is a high unexplained variance (47%) associated with the prediction of BMC from LTM, FM, and age.

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