Serum Osteocalcin Is an Important Predictor of Central and Total Adiposity and Insulin Resistance

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Objectives: Osteocalcin (OC) is a non-collagenous protein expressed by osteoblasts and has gained immense attention due to its endocrine role in modulating glucose homeostasis and fat mass. However, the relationship of this bone turnover marker with adipose tissue distribution and alternative methods of insulin resistance (IR) risk evaluation have not been fully explored. Considering that a better understanding of OC hormone role may be a possible pathway to improve cardiometabolic health, the objective of this study was to investigate the association of OC with central and total adiposity and IR risk.

Methods: This is a cross-sectional study with 154 non-osteoporotic men (57.1%) and women (42.9%), mean age and BMI were 37.3 $\pm$ 13.1 years and 29.1 $\pm$ 5.5 kg/m^2, respectively. Weight, height and waist circumference (WC) were measured to calculate BMI and waist-height ratio (WhR). Body composition was assessed by dual energy x-ray absorptiometry (DXA). Blood samples were obtained to analyze serum OC, fasting glucose, insulin, adiponectin, and triglycerides. IR was evaluated using traditional (Homeostatic Model Assessment for Insulin Resistance, HOMA-IR) and alternatives methods (HOMA-adiponectin, HOMA-AD; triglyceride-glucose (TyG) index; quantitative insulin-sensitivity check index, QUICKI). Multivariable linear regression models were performed to determine the association between OC and outcomes.

Results: The sample mean OC concentration was 20.7 $\pm$ 17.1 ng/mL. After adjustments of potential covariates, OC was positively associated with free fat mass ($\beta = 5.54$, $p = 0.013$) and lean mass ($\beta = 5.41$, $p = 0.012$), and inversely associated with WC ($\beta = -11.39$, $p = 0.004$), WhR ($\beta = -0.06$, $p = 0.004$), visceral abdominal tissue (-1.16, $p = 0.015$), android fat ($\beta = -3.01$, $p = 0.001$), trunk fat ($\beta = -0.08$, $p = 0.001$), total region fat ($\beta = -53.57$, $p = 0.015$), and total fat mass ($\beta = -5.32$, $p = 0.016$). Moreover, OC was inversely associated to HOMA-AD ($\beta = -0.43$, $p = 0.026$) and QUICKI ($\beta = -0.38$, $p = 0.020$).

Conclusions: These results suggests that OC is an important predictor of central and total adiposity, as well as IR. Whether or not improvements in OC will be associated with improvements in body composition and glucose metabolism should be examined in future interventional studies.

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