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In women, central obesity predicts higher inflammation, higher serum hepcidin, lower absorption and hypoferremia

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Obesity is characterized by chronic low-grade inflammation. Visceral adipose tissue (VAT) is heavily infiltrated by macrophages producing pro-inflammatory cytokines (IL-6), therefore VAT predicts greater systemic inflammation compared to peripheral fat. Thus, central adiposity may cause increased serum hepcidin (SHep) and may affect iron metabolism more than peripheral adiposity. Although increased total body fat (BF) is linked to disordered iron homeostasis, the potential effects of body fat distribution on iron metabolism have not been studied. Therefore, the aim of this study was to assess the effect of BF distribution on iron and inflammation parameters, SHep and iron metabolism.

We enrolled 37 normal-weight women and 81 overweight/obese women in this cross-sectional study. Body composition was assessed using DXA and iron- and inflammation parameters and SHep were measured. The overweight/obese women were assigned to a peripheral ($n = 54$) and a central ($n = 27$) fat deposit group, according to their android fat percentage. All women received 100 mg oral iron as ferrous citrate and the change in serum iron was assessed after 2 h to determine iron absorption.

The three groups differed significantly in body weight, BMI, waist circumference, android fat, gynoid fat, total fat, android/gynoid ratio and VAT (for all $p < 0.001$). Hemoglobin, serum ferritin, body iron stores (BIS), serum iron and transferrin saturation (TSAT) were lowest and transferrin receptor was highest in central obesity. CRP was higher in central obesity compared to both, peripheral obesity ($p < 0.05$) and normal-weight ($p < 0.001$). SHep was higher in central and peripheral obesity compared to normal-weight (both $p < 0.01$), with no difference between the two overweight/obese groups. Δserum iron was ≈30% and ≈20% lower in central obesity compared to normal-weight and peripheral obesity. We performed linear regression analysis on SHep, CRP, TSAT and Δserum iron: Android fat and BIS were positive predictors of SHep ($p < 0.05$, $p < 0.001$), android fat was a positive predictor of CRP ($p < 0.001$), BIS was a positive, android fat was a negative predictor of TSAT ($p < 0.001$, $p < 0.05$) and TSAT and android fat were both negative predictors of Δserum iron ($p < 0.001$, $p < 0.05$).

Controlling for iron status, inflammation and SHep are increased in women with central obesity and predict lower iron absorption and hypoferremia compared to women with more peripheral fat distribution. Thus, women with central fat distribution may be at increased risk for iron deficiency and anemia.

Conflict of Interest

There is no conflict of interest