

Elevated Peripheral Blood Mononuclear Cell-derived Superoxide Production in Middle-age/Older Women with Obesity and Hypertension

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Received Aug. 28, 2025; Accepted for publication Sept. 10, 2025; Published online Sept. 11, 2025
<https://doi.org/10.17161/kjm.vol18.24471>

Introduction. Obesity and hypertension among middle age/older women are associated with elevated sympathetic nerve activity and oxidative stress. However, the sources of oxidative stress in this population remain unclear. We hypothesized that peripheral blood mononuclear cell (PBMC)-derived superoxide production via norepinephrine stimulation would be augmented in middle-age/older women with obesity and hypertension compared with middle-age/older women with obesity and normal blood pressure.

Methods. Hypertension status was determined via 24-hour ambulatory blood pressure monitoring (Systolic: Obese, 115 ± 6 mmHg vs. Obese with hypertension: 137 ± 6 mmHg, $p < 0.01$; Diastolic: Obese, 68 ± 4 mmHg vs. Obese with hypertension: 78 ± 7 mmHg, $p < 0.01$). PBMCs were freshly isolated from whole blood in women with obesity and hypertension ($n = 8$, 55 ± 8) and in women with obesity without hypertension ($n = 10$, 53 ± 8 years of age) and incubated for 12 hours with norepinephrine. Intracellular superoxide production in PBMCs was measured using dihydroethidium fluorescence.

Results. Women with obesity and hypertension showed elevated superoxide production following norepinephrine incubation compared to women with obesity ($+42 \pm 42\%$ vs. $+1 \pm 16\%$, $p = 0.01$). Among a larger cohort of individuals with overweight and obesity ($n = 32$), 24-hour ambulatory blood pressure was positively correlated with superoxide production following incubation with norepinephrine while controlling for age (Systolic: $R = 0.49$, $p < 0.01$; Diastolic: $R = 0.48$, $p = 0.01$).

Conclusions. These findings suggest that adrenergic receptor-mediated superoxide production from peripheral blood mononuclear cells is augmented in hypertension among middle-age/older women with obesity.