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High Sensitivity C-Reactive Protein, Tumor Necrosis Factor-α, Interleukin-6, and Vascular Cell Adhesion Molecule-1 Levels in Asian Indians with Metabolic Syndrome and Insulin Resistance (CURES-105)

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Abstract

Aim:

The aim of this study was to assess levels of high-sensitivity C-reactive protein (hs-CRP), tumor necrosis factor-α (TNF-α), interleukin-6 (IL-6), and vascular cell adhesion molecule-1 (VCAM-1) in South Indian subjects with and without MS and among MS subjects with and without insulin resistance (IR).

Methodology:

From the population-based Chennai Urban Rural Epidemiology Study, 334 subjects with MS and 342 subjects without MS were selected. Metabolic syndrome was diagnosed based on modified National Cholesterol Education Program criteria. High-sensitivity C-reactive protein, TNF-α, IL-6, and VCAM-1 were measured by enzyme-linked immunosorbent assay. Insulin resistance was calculated using the homeostasis model assessment (HOMA-IR) using the following formula: fasting insulin (μIU/ml) × fasting glucose (mmol/liter)/22.5.

Results:

Subjects with MS had significantly higher levels of all four inflammatory markers compared to those without MS: hs-CRP (2.57 vs 2.19 mg/liter) ($p < .05$), TNF-α (4.47 vs 3.89 pg/ml) ($p < .05$), IL-6 (16.22 vs 10.96 pg/ml) ($p < .05$), and VCAM-1 (13.8 vs 7.94 pg/ml) ($p < .05$). In the total study subjects, hs-CRP ($r = 0.089$, $p = .047$), TNF-α ($r = 0.113$, $p = .040$), IL-6 ($r = 0.176$, $p = .042$), and VCAM-1 ($r = 0.230$, $p = .06$) were significantly correlated with MS. With increasing quartiles of IR, mean levels of hs-CRP (p for trend <.001) and TNF-α (p for trend <.05) increased linearly. MS subjects with IR had higher levels of hs-CRP ($p < .001$) and TNF-α ($p < .05$) compared to MS subjects without IR.

Conclusion:

In Asian Indians, inflammatory cytokines hs-CRP, TNF-α, IL-6, and VCAM-1 are elevated in subjects with MS while hs-CRP and TNF-α are further elevated in those with MS and IR.

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Abbreviations: (CURES) Chennai Urban Rural Epidemiological Study, (CV) coefficient of variation, (CVD) cardiovascular disease, (CI) confidence interval, (HbA1c) hemoglobin A1c, (HDL-C) high-density lipoprotein cholesterol, (HOMA-IR) homeostasis model assessment of insulin resistance, (hs-CRP) high-sensitivity C-reactive protein, (IL-6) interleukin-6, (IR) insulin resistance, (LDL-C) low-density lipoprotein cholesterol, (MS) metabolic syndrome, (NCEP) National Cholesterol Education Program, (OR) odds ratio, (TNF-α) tumor necrosis factor-α, (VCAM-1) vascular cell adhesion molecule-1

Keywords: Asian Indians, hs-CRP, IL-6, inflammation, metabolic syndrome, South Asians, TNF-α, type 2 diabetes, VCAM-1

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