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EXPLORATION OF THE UNDERLYING INFLAMMATORY AND OXIDATIVE STRESS PATHOLOGICAL MECHANISMS IN PREECLAMPSIA USING PRINCIPAL COMPONENT ANALYSIS

Charles Bitamazire Businge[1,2], Benjamin Longo-Mbenza[3], and Andre Pascal Kengne[1,4]

[1]University of Cape Town, Cape Town, South Africa
[2]Walter Sisulu University, Mthatha, South Africa
[3]University of Kinshasa, Democratic Republic of Congo
[4]NCDRU- South African Medical Research Council, Cape Town, South Africa

Introduction: Normal pregnancy is characterised by progressive increase in serum inflammatory cytokines that peak in the third trimester. This normal pregnancy related physiological inflammatory in women with pre-existing inflammatory conditions, or oxidative stress arising from the placenta of a previously normal woman, can trigger intense systemic responses that lead to endothelial activation, dysfunction and preeclampsia. The aim of the study was to identify the principal oxidative and inflammatory pathways that trigger the clinical manifestation of preeclampsia.

Methods: This case-control study included participants recruited at the Lomo Medical centre, Democratic Republic of Congo (DRC). The cases were 250 participants with preeclampsia and the controls were 150 age-matched pregnant women without preeclampsia. Serum levels of hs-CRP, Ferritin, GGT, Rheumatoid factor, CRP, TSH, Selenium, NO and urinary Iodine concentration were measured and compared between cases and controls using ANOVA. Principal component analysis was carried out to delineate the patterns of association between the inflammatory and oxidative markers which had significant association with preeclampsia.

Results: The mean values of the biomarkers for cases and controls respectively were: hs-CRP 6.0±3.1 and 4.1±2.1 mg/dL; Ferritin 258.8±123.8 and 168.8±92.8 mg/dL; GGT 91.2±36.3 and 51.9±43.5 mg/dL; Rheumatoid factor 48.9±40.3 and 24.0±31.5 mg/dL; CRP 49.3±18.0 and 30.0±19.1 mg/dL; TSH 6.0±2.6 and 2.8±2.3 miU/L; Selenium 19.04±24.8 and 62.7±54.8 µg/L; NO 4.7±6.6 and 23.0±18.9 µmol/L; urinary Iodine excretion 145.9±119.1 and 423.9±159.3 µg/L; T3/T4 ratio 0.131±0.160 and 0.118±0.120 ($p<0.0001$ for all biomarkers). The main pathophysiology pathways identified were the interactions between selenium and iodine deficiency, and elevated serum TSH (endothelial dysfunction); elevated serum Ferritin, GGT, CRP and low urinary iodine excretion (inflammatory oxidative stress); elevated serum hs-CRP and Rheumatoid factor (sub-clinical inflammation and immune cell activation) and high T3/T4 ratio (acute TSH stimulation of thyroid with low thyroid iodine stores)

Conclusion: Combined selenium and iodine deficiency resulting into elevated TSH, low NO and preferential T3 secretion; acute inflammatory conditions associated with elevated CRP, serum Ferritin and GGT and subclinical inflammatory conditions characterised by autoimmunity are some of the major oxidant and inflammatory pathways associated with increased risk of preeclampsia.

cbusingae@gmail.com