SCANT INTERACTIONS OF OXIDATIVE STRESS AND ANTI-OXIDATION DEFENSE WITH THOSE OF THE INFAMMATORY RESPONSE AMONG PRESCHOOL CHILDREN FORM THE WESTERN HIGHLANDS OF GUATEMALA

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BACKGROUND

All organisms are constantly subjected to external (environmental, dietary) or endogenous (metabolic, pathological) influences that can incite an inflammatory response in the immune system or an excess generation of oxidative free radicals. What are the associations would be for biomarkers of the respective classes of stress/response in free-living humans is minimally explored.

OBJECTIVE

To explore the presence and magnitude of paired associations between diagnostic biomarkers of oxidation and inflammation from the same or different anatomical compartments.

METHODS

Setting: Three government-subsidized daycare centers in a semi-urban (center A), a marginal-urban (center B) and a rural (center C) settings of Quetzaltenango, in the Western Highlands of Guatemala.

Subjects: A total of 82 preschool children, 38 girls and 44 boys (median age 66 months), enrolled in the study.

Sample collection: We spent 8 weeks at each daycare center to observe the delivery of the 40-day rotating menu of the Secretariat of the Beneficial Meals of the First Lady System (SOSSEP), and during the last 3 weeks of the process, each child delivered single samples of blood, 24-h urine, feces and saliva.

Studies variables: A total of 23 biomarker variables from whole blood, plasma, saliva, urine and feces were measured, distributed as follows: 11 from an oxidation/anti-oxidation domain (F2-isoprostane (F2-iso) and β-hydroxy-β-oxo-decanoic acid (HBOA) in urine; activities of catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (Gpx) and glutathione reductase (Gsr) in red blood cells; and circulating retinol, β-carotene, tocopherol, and coenzyme Q-09 and Q-10) and 12 from the inflammatory domain [white blood cells (Wbc), fcal calprotectin and IL-1β, IL-6, IL-8 and TNF-α in both plasma and saliva].

Ethical considerations: The Human Subjects Committee of CeSSIAM granted the study protocol ethical approbation, written consent form was signed by a parent or guardian. This study was registered at clinicaltrials.gov as NCT02203860.

Data analysis: Spearman rank-order correlation coefficient, and goodness-of-fit models were determined in order to associations between variables of the two domains using the IBM, SPSS version 20 software.

RESULTS

Both oxidative and inflammatory stress biomarkers show wide variation – but relative elevation – in low-income and deprived preschoolers of predominantly Mayan asent sharing a highly uniform dietary offering. As compared to our previous work with interactions among the biomarkers within the domains of oxidation or of inflammation, the findings here are nowhere as robust or harmonic when examined across the two domains. Beta-carotene and SOD, on the oxidation side, and salivary IL-8 and IL-10 and plasmatic TNF-α, on the inflammation side, stand out for the consistency in their associations.

Finally, the salivary cytokines have the great advantage of children in their non-invasive collection procedure.

REFERENCES


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