

Abstract citation ID: bvac150.1443

Reproductive Endocrinology

PMON255

Inflammation and Oxidative Stress in Seminal Plasma: Role of Free Light Chains of Immunoglobulins and Antioxidants as Biomarkers in Male Infertility

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Oxidative and inflammatory damage are underlying mechanisms in various conditions related to male infertility, including varicocele. Free light chains of immunoglobulins (FLCs) are considered markers of low-grade inflammation in various conditions. Nowadays it is known that they may play enzymatic and proteolytic activities; they may activate complement cascade and mast cells, with crucial role in the development of contact sensibility; they may also inhibit the autonomous signaling ability of the B-cell receptor. Their detection in biological fluids may be useful as biomarker of inflammation or altered immune response. Coenzyme Q10 (CoQ10), a lipidic antioxidant and component of the mitochondrial respiratory chain, is involved in

spermatozoa energy metabolism and motility.

Therefore, we aimed to evaluate FLCs seminal levels in patients with varicocele in comparison to control subjects and to correlate them with CoQ10 and Total Antioxidant Capacity (TAC) in human semen.

A total of 65 patients were enrolled, aged 18-50 years. Semen analysis was performed; patients were divided into three groups: controls (CTRL), 12 normozoospermic patients aged 34 (33-41) years; varicocele (VAR), 29 patients aged 33 (26-37) years; idiopathic (IDIO), 24 oligo-, astheno- and oligoasthenozoospermic patients aged 37 (33.5-40.5) years. FLCs were assayed by turbidimetric method; CoQ10 by HPLC; TAC by spectrophotometric method.

Δ FLCs showed a trend towards higher levels in VAR vs CTRL and IDIO. VAR showed a trend towards lower κ FLCs levels vs the other two groups. Comparing κ/λ ratio VAR showed significantly lower levels vs CTRL and IDIO (Mean±SEM 3.18±0.75; 8.28±1.71; 8.90±2.94, respectively; $p < 0.05$). CoQ10 seminal levels showed higher levels in VAR and IDIO compared to CTRL (57.7±4.13; 65.50±6.95 and 38.30±3.35 mcg/ml, respectively; $p < 0.05$) No different TAC values were found between groups.

Our data confirm lower levels of κ/λ ratio in VAR as previously reported and suggest a possible application as clinical biomarkers for male infertility.

Presentation: Monday, June 13, 2022 12:30 p.m. - 2:30 p.m.