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JOURNAL ARTICLE

Relationship between seminal white blood cell counts and oxidative stress in men treated at an infertility clinic

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In semen, granulocytes are major producers of reactive oxygen species (ROS), which can damage sperm. The diagnosis of leukocytospermia is usually based on the World Health Organization (WHO) definition of 1×10^6 white blood cells per milliliter, but controversy remains over the minimum leukocyte level that impairs fertility. The goals of this study were to clarify the relationship between leukocyte count and oxidative stress and to establish the minimum leukocyte count associated with oxidative stress. To do so, we compared oxidative stress in semen samples with different leukocyte counts (by the Endtz test) after a simple wash-and-resuspend procedure and determined the correlation between leukocyte counts and oxidative stress (expressed as ROS-TAC score, a composite score calculated from ROS levels and total antioxidant capacity (TAC), both measured with chemiluminescence assays). ROS-TAC decreases as oxidative stress rises. We compared specimens from 271 men attending an infertility clinic and 28 healthy controls. About 9% of patients had WHO-defined leukocytospermia and an additional 16% had some leukocytes. Samples with no seminal leukocytes had significantly lower ROS levels and significantly higher ROS-TAC scores than samples with any seminal leukocytes, even very low levels. Oxidative stress was correlated with rising white blood cell (WBC) count ($r = .39$; $P < .001$). Receiver operating characteristics curves showed that ROS-TAC score would be fairly accurate at distinguishing between patients with any leukocytes and those with no leukocytes (area under the curve, 75%). In conclusion, oxidative stress occurs even in patients with very low seminal WBC counts (between 0 and 1×10^6 /mL) and rises with an increase in WBC count. Therefore, we are unable to determine a safe minimum WBC count; the presence of any WBCs is associated with oxidative stress and may therefore impair fertility. Complete removal of WBCs from semen samples used for assisted reproduction may help reduce oxidative stress.

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