Oxidative stress in normospermic men undergoing infertility evaluation

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Objectives: Chronic exposure to elevated levels of reactive oxygen species (ROS) in semen can result in oxidative stress and male infertility. The role of oxidative stress in normospermic men with infertility is unclear. We measured the levels of ROS, total antioxidant capacity (TAC), and a composite ROS-TAC score in an attempt to examine the ability of these variables to detect oxidative stress in normospermic men attending our infertility clinic.

Design: Prospective study

Material and Methods: Semen specimens from 299 subfertile men were examined between 1997 to 1998, according to the World Health Organization criteria. Of these, 34 patients were considered as normospermic. Volunteers with normal semen characteristics served as controls (n = 19). Patients were divided into three groups: group I, varicocele and no female factor (n = 12); group II, only female factor (n = 16); group III, idiopathic infertility (n = 6). ROS production in the semen specimens was measured by the chemiluminescence assay and the results were expressed as Log (ROS + 1) X 10^6 counted photons/minute/20 X 10^6 sperm. Total antioxidant capacity was measured in the seminal plasma by an enhanced chemiluminescence assay and results were expressed as molar Trolox equivalent. A composite ROS-TAC score was generated to examine the oxidative stress. An ROS-TAC score lower than 45 were considered abnormal.

Results: The higher levels of ROS were seen in group III (2.33 ± 0.3), followed by group II (1.62 ± 0.2), and group I (1.51 ± 0.2), compared to controls (1.3 ± 0.2) (p = 0.03). Compared to controls (1653.98 ± 105.03), lower TAC levels were seen in groups I (877.73 ± 144.35), followed by group II (951.87 ± 111.81), and group III (1033.06 ± 176.8) (p <0.001). Similarly, compared to controls (50.0 ± 3.0), lower ROS-TAC score were seen in group III (29.1 ± 4.7), followed by group II (36.0 ± 3.3), and group I (37.7 ± 4.4) (p = 0.002).

Conclusions: The etiology of infertility in some couples with pure female factor (based on normospermic semen characteristics of the male partner), or idiopathic infertility may involve oxidative stress as it’s underlying cause. Normospermic men who are evaluated for infertility should also be tested for the ROS and TAC levels in semen as oxidative stress may play an important role in their infertility. Antioxidant supplementation can be a potential treatment strategy in these men.

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