



OPINION ARTICLE

## Significant Role of Antioxidants in the Treatment of Infertility

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### Description

Infertility, a disease of the male or female reproductive system, is defined as failure to conceive within one year of regular, unprotected intercourse. About 15% of couples worldwide are affected by infertility. During normal cellular metabolism, Reactive Oxygen Species (ROS) are continuously generated, either from endogenous sources or from exogenous sources. ROS are essential for many processes in the human body, including essential intracellular signaling pathways. Regardless, increasing ROS eventually leads to Oxidative Stress (OS), defined as the imbalance between oxidants and antioxidants. Oxidative stress can lead to subfertility by negatively affecting multiple processes in the male and female reproductive systems.

In the heterogeneous aetiology of male infertility, the association between poor semen quality and Oxidative Stress (OS) is well known. Oxidative Stress is defined as the result of an imbalance between Reactive Oxygen Species (ROS) and antioxidant defences. The first evidence for the role of ROS as a potential factor in male infertility was discovered in the 1940s. Since then, great progress has been made in understanding the effects of ROS on infertility and sperm functions.

Sperm cells are extremely sensitive to damage caused by high levels of ROS due to the large amounts of unsaturated fatty acids in their membranes, which are essential for sperm capacitation, acrosome reaction, and sperm-oocyte interaction. ROS-mediated oxidative peroxidation of unsaturated fatty acids represents the main mechanism of ROS-induced sperm damage leading to infertility. In sperm, due to the high concentration of plasma membrane polyunsaturated fatty acids and the lack of cytoplasmic defense mechanisms, high levels of ROS can increase oxidative stress by triggering the oxidation of sperm DNA, proteins and lipids and altering sperm vitality and motility, and

morphology.

The growing interest in ROS-mediated damage is related to the increasingly recognized role of environmental influences on sperm production. Spermatozoa are exposed to several environmental factors that can increase ROS-induced oxidative stress. Currently, the association of several natural antioxidants such as inositol, alpha lipoic acid, zinc, folic acid, coenzyme Q10, selenium and vitamins with improving sperm quality by acting as a defense mechanism against oxidative stress is well documented. Oxidative stress is increased in men with abnormal semen parameters. Antioxidant therapy improves sperm concentration and motility and reduces oxidative stress in seminal plasma.

Antioxidants help reverse the effects of too many free radicals. This allows them to improve egg quality and make your cycles more regular. However, some supplements such as selenium, zinc, carthinine, arginine, and vitamin B-12 have been shown to increase sperm count and motility. However, antioxidants such as vitamin C, coenzyme Q, vitamin E and glutathione have been reported to be beneficial in treating male infertility.

### Causes

A variety of different etiologic factors, including intratesticular, post-testicular, and external factors, such as alcohol, cigarette smoking, varicocele, diabetes, etc., have been associated with elevated levels of ROS and sperm DNA damage, and in turn may impact male fertility potential.

### Treatment

Balance of oxidants and antioxidants affects overall sperm quality. In a system with high levels of oxidants, sperm quality will be poor overall. Conversely, a system with increased antioxidant capacity can balance oxidants, resulting in improved sperm quality.