The effect of follicular fluid reactive oxygen species on the outcome of *in vitro* fertilization

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Objectives: To quantify follicular fluid reactive oxygen species (ROS) and total antioxidant capacity (TAC) in patients undergoing *in vitro* fertilization (IVF) and compare these with the pregnancy outcome.

Design: Prospective, blinded, pilot study.

Materials and Methods: Fifty-three women undergoing ART procedure at the IVF center were enrolled in the study. Following ovarian stimulation protocol, oocytes were retrieved, and clear follicular fluid (FF) from each follicle was obtained. Conventional IVF was performed in women with female factor only (n = 30), and ICSI in male-factor cases (n = 23). We examined the number of oocytes recovered, number of oocytes fertilized, and the presence of white blood cells in FF. The clear FF specimens were analyzed for the presence of reactive oxygen species (ROS) measured by the chemiluminescence method using luminol as the probe. Total antioxidant capacity (TAC) was determined from aliquots of frozen seminal plasma by the enhanced chemiluminescence method. Patients were categorized according to their diagnosis (endometriosis, tubal infertility, and male factor). Levels of ROS and TAC were compared for an association between patients who achieved pregnancy to those who did not.

Results: ROS levels were significantly lower (0.69 ± 0.08) in patients who failed to establish a pregnancy compared to those who did (1.01 ± 0.14; $p = 0.03$). When overall comparisons were made, the groups did not differ in age, number of oocytes recovered, percentage of oocytes fertilized, or TAC levels. However, when grouped according to clinical diagnosis, women with endometriosis, who became pregnant had significantly depressed level of ROS (0.60 ± 0.17) compared to those who established pregnancies (1.31 ± 0.19; and $P < 0.01$). Similarly, in women whose partners were severely oligospermic, low ROS levels were seen in those women who did not get pregnant (0.67 ± 0.17) compared to those who had successful pregnancies (1.31 ± 0.19; $P < 0.01$).

Conclusion: Follicular fluid ROS may be an important indicator of oocyte quality and may be utilized as a potential marker in predicting success in IVF patients.

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