Effect of oxidative stress in follicular fluid and serum on the outcome of assisted reproductive procedures

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Objective: 1) To measure levels of lipid peroxidation (LPO) and superoxide dismutase (SOD) and catalase (CAT) in the serum and follicular fluid from patients undergoing IVF; 2) to examine the association among LPO, SOD and CAT with oocyte maturity, embryo quality, fertilization, cleavage, and pregnancy rates. Design: Prospective study at a tertiary care medical center Materials and Methods: The Institutional Review Board approved this study. Seventy-three patients undergoing IVF participated in this study. Clear follicular fluid and blood serum samples were collected at oocyte retrieval. Follicular fluid LPO levels were measured by the thiobarbituric acid method and SOD and CAT were determined with a spectrophotometer. The activity of the SOD was based on the adrenocromo concentration, resulting from the adrenaline oxidation by the radical superoxide. Catalase activity was determined by the velocity of hydrogen peroxide consumed. Results: The mean and the standard error for SOD (4.45 ± 1.4) and CAT (1.7 ± 0.28) in the follicular fluid were higher than the levels in the blood serum (3.6 ± 0.5; p = 0.04, and 1.1 ± 0.13; p = 0.03, respectively). The mean and standard error for the LPO levels were lower in the follicular fluid (2.4 ± 0.15) than the blood serum (4.2 ± 0.4; P = 0.04). The SOD enzymatic activity had a significant correlation with the oocyte fertilization rates (r = 3.69; p = 0.013). There were no correlations between the LPO, SOD and CAT with the cleavage and embryo quality. Pregnant patients were significantly younger than the patients who did not become pregnant (33.5 ± 4.2 years vs. 37.9 ± 5.2 years). After adjusting for age, a statistical significant correlation was detected between the LPO levels in the blood serum (r = 7.3; p = 0.01) and follicular fluid (r = 3.6; p = 0.05) with the pregnancy rates. There were no correlations between the SOD and CAT with the pregnancy outcome. Conclusion: SOD levels had a significant correlation with the fertilization rate and the levels of levels were positively correlated with the pregnancy rate. Markers of oxidative stress may represent metabolic activity within the follicle, and some amounts may be necessary to establish a pregnancy. Support: None

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