Lipid peroxidation, Superoxide dismutase, catalase levels and sperm motility: protective role of vitamin C and resveratrol prior to sperm cryopreservation

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Objective: It is estimated that the sperm motility decreases by 25% to 75% after cryopreservation. The reasons for the decline observed in sperm motion characteristics after cryopreservation is not clear, but seems to be related to factors such as sperm membrane stress induced during the freeze-thaw process. Vitamin C and resveratrol (a red wine antioxidant) are considered important antioxidants that may prevent the oxidative stress during the freeze-thaw process. Also, Superoxide dismutase (SOD) and catalase are important antioxidant enzymes that can quench excess free radicals such as: superoxide anion and hydrogen peroxide respectively. The goal of our study was to evaluate two seminal antioxidants (SOD and catalase levels), the lipid peroxidation (LPO) levels and sperm motility in infertile men undergoing sperm cryopreservation with Vitamin C and resveratrol.

Design: Prospective study in a tertiary care hospital

Materials and Methods: This study was approved by our review board and the patients involved granted their informed consent. All patients were evaluated with a complete medical history, physical examination, and semen analyses. Ten patients were included in our preliminary analysis. Semen samples were obtained by masturbation after at least 48 hours of abstinence. Samples were analyzed for sperm concentration and percent motility. Samples were split into 5 and we added: 1, (0.1mM of resveratrol); 2, (1mM of resveratrol); 3, (10mM of resveratrol); 4, (10mM of Vitamin C); and 5, (nothing). Samples were cryopreserved by using a liquid nitrogen vapor freezing method with a Test yolk buffer with 20% egg yolk and 12% glycerol as the medium for cryopreservation. SOD, Catalase and LPO levels were determined with a spectrophotometer before and after sperm cryopreservation.

Results: Compared to the levels found before sperm cryopreservation, Vitamin C decreased the LPO (13.45 ± 5.6 vs. 9.45 ± 3.1; p = 0.02) and increased the catalase levels (11.1 ± 4.43 vs. 23.67 ± 5.16; P = 0.03), without affecting SOD levels (17.7 ± 4.2 vs 20.13 ± 5.8; P = 0.08). Also, sperm motility increased when the sperm was cryopreserved with Vitamin C compared to samples cryopreserved without antioxidant (58.2 ± 11.6 vs. 35.03 ± 7.2; P = 0.04) or cryopreserved with resveratrol (58.2 ± 11.6 vs. 38.2 ± 5.8; P = 0.043). Irrespective the resveratrol dosage, LPO levels decreased (13.45 ± 5.6 vs. 10.1 ± 2.8; p = 0.04) without affecting SOD levels levels (17.7 ± 4.2 vs 19.6 ± 4.7; P = 0.07) when the sperm was cryopreserved with resveratrol. In addition, catalase levels increased in the sperm cryopreserved with the three different dosages of resveratrol (11.1 ± 4.43 vs. 24.3 ± 4.1; P = 0.04). However, sperm motility diminished in the three samples cryopreserved with resveratrol (72.1 ± 11.43 vs. 38.2 ± 5.8; P = 0.03) in a similar way of the sperm cryopreserved without antioxidant (72.11 ± 11.43 vs. 35.03 ± 7.2; P = 0.03).
Conclusion: Even though LPO levels decreased and catalase levels increased with both Vitamin C and resveratrol, sperm motility did not decrease after sperm cryopreservation only with Vitamin C. More patients are needed for a better evaluation the role of resveratrol as an antioxidant to be used in samples before sperm cryopreservation.

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