PREDICTION OF SPERM DNA DAMAGE IN HUMAN SEMEN BY A NOVEL REACTIVE OXYGEN SPECIES-TOTAL ANTIOXIDANT CAPACITY SCORE

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The fertility potential of a semen sample may be impaired if more than 30% of the sperm cells show evidence of DNA damage. Oxidative stress (OS) occurs as a result of an imbalance between reactive oxygen species (ROS) and total antioxidant capacity (TAC) in seminal fluid, and is implicated in DNA strand breaks. The ROS-TAC score is calculated from the values of ROS and TAC and is an accurate measure of seminal OS. Our objective was to assess if ROS-TAC score can predict sperm DNA damage with greater sensitivity than other sperm parameters. Data were collected from 122 patients with male factor infertility and 56 normal donors. ROS and TAC were measured using chemiluminescence and enhanced chemiluminescence assay, respectively. ROS-TAC score was calculated using principal component analysis. Sperm DNA damage was evaluated using sperm chromatin structure assay (SCSA) and results were expressed as percentage DNA fragmentation index (%DFI). Results show that in both donor and patient groups, ROS-TAC score was negatively correlated with %DFI (r = -0.24, P < 0.007), while there was no significant correlation when ROS (r = 0.07, P = 0.32) and TAC (r = 0.02, P = 0.72) were examined individually. Using a cut-off of 35, ROS-TAC score predicted DNA damage (%DFI > 30%) with a sensitivity of 91.8%, specificity of 72.13%, positive predictive value of 76.71%, and a negative predictive value of 89.8%. Semen samples with ROS-TAC score < 35 had significantly higher %DFI compared to those with a score > 35 (31.28 ± 18.41 vs. 22.71 ± 12.6, P = 0.04). In conclusion, ROS-TAC score is a novel predictor of the extent of sperm DNA damage. Semen samples with a ROS-TAC score of < 35 may have low fertility potential.