Oxidative stress and their relationship with semen parameters and reproductive outcome of in vitro fertilization (IVF) cycles with donor eggs: A retrospective study.

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Introduction

Mammalian sperm are characterized by their ability to generate reactive oxygen species (ROS), the toxic effect of these free radicals on sperm has been described in numerous publications, e.g. sperm DNA damage. The imbalance between antioxidant defense mechanisms and generation of ROS produces oxidative stress, which can alter numerous processes including spermatogenesis, fertilization and embryo development.

Objectives

- To relate seminal parameters with the level of ROS and DNA damage.
- To assess the impact of oxidative stress and DNA damage on reproductive outcome of IVF cycles with donated oocytes.

Material and Methods

A total of 156 eggs donated-IVF cycles carried out between 2016 and 2017 at CEM were analyzed. Historical records of patients, who underwent semen analysis at Fertilab were reviewed for the analysis. The TUNEL technique (Terminal dUTP Nick End Labeling) was used to determine sperm DNA damage. ROS were assessed by reducing the nitroblue reagent from tetrazolium to formazan and then staining with Wright's dye. A non-parametric correlation test was performed among the variables studied. A value of $p < 0.05$ was considered significant.

Results

Table I. Correlation values between semen parameters and fertilization rate.

Variables	Concentration (x 10^6/ml)	Total Motility (%)	Total sperm count (x 10^6)	Total Motile sperm(x 10^6)	Normal forms (%)	Fertilization rate (%)
Concentration (x 10^6/ml)	-	**0,228**	**0,853**	**0,801**	**0,349**	**0,055**
Total Motility (%)	**0,228**	-	**0,288**	**0,487**	**0,461**	**0,127**
Total sperm count (x 10^6)	**0,853**	**0,288**	-	**0,964**	**0,395**	**0,134**
Total Motile sperm (x 10^6)	**0,801**	**0,487**	**0,964**	-	**0,465**	**0,152**
Normal forms (%)	**0,349**	**0,461**	**0,395**	**0,465**	**-**	**0,310**
Fertilization rate (%)	0,055	0,127	0,134	0,152	**0,310**	**-**

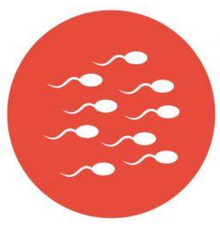
Values in bold are different from 0 with a significance level alpha=0.05

Table II. Correlation values between morphology, ROS, DNA fragmentation and fertilization rate.

Variables	Normal forms (%)	DNA fragmentation (%)	ROS (%)	Fertilization rate (%)
Normal forms (%)	-	**-0,411**	**-0,430**	**0,367**
DNA fragmentation (%)	**-0,411**	-	0,245	**-0,354**
ROS (%)	**-0,430**	0,245	-	0,137
Fertilization rate (%)	**0,367**	**-0,354**	0,137	-

Values in bold are different from 0 with a significance level alpha=0.05

Total sperm count and total motile sperm correlated positively with ongoing pregnancy rate (Total Group; p=0.006; 0.016).



Conclusion

- Oxidative stress relates to semen quality.
- Poor semen quality samples correlate with greater oxidative damage.
- The preliminary results indicate that sperm DNA fragmentation and percentage of normal forms impact fertilization rate but might not affect pregnancy rates.