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Title:

OXIDATIVE REDUCTION POTENTIAL AND SPERM MOTILITY REMAIN STABLE FOR UP TO TWO HOURS POST-SEMEN COLLECTION

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Background:

There is an inverse correlation between successful outcomes following intrauterine insemination (IUI) and the time from ejaculation and semen processing. The World Health Organization recommends that male patients produce samples at the laboratory in order to expedite semen analysis (SA), while patients who produce at home are suggested to bring samples to the laboratory within one hour to accurately assess semen quality. There is evidence to suggest that increased time from collection to processing may result in impaired semen quality due to environmental exposures and a surge in reactive oxygen species (ROS) of the spermatozoa. Recent studies have evaluated the oxidative reduction potential (ORP) in SA as a measure of oxidative stress and have found a negative correlation between ORP, SA parameters, and rate of fertilization[1].

Objective:

The current study aimed to determine if there is a difference in SA parameters or oxidative stress over time following semen collection.

Materials and Methods:

All patients who were scheduled for a diagnostic SA between March and April 2018 were eligible for the prospective study. Patients with azoospermia or patients undergoing post-vasectomy SA were excluded. After collection, the sample underwent routine SA. ORP was measured in millivolts (mV) using galvanostat-based technology (MiOXSYS System) using 30µL of semen and normalized to sperm concentration. ORP measurements were taken at 4 time points following collection: 30, 60, 90, and 120 minutes. A repeat SA was performed at 60, 90, and 120 minutes following sample collection. Total concentration and percent motility were evaluated at each time point. Patient age and BMI were also recorded. Data were analyzed using an ANOVA, Chi square/Fisher's Exact test, and general estimating equation model with an exchangeable working correlation structure.

Results:

A total of 14 participants were included in the study. On average, patient age was 35.1 ± 4.6 yrs, BMI was 26.6 ± 5.1 kg/m2 and days of abstinence prior to collection were 4.8 ± 6.3 days. There was no difference in total semen count (p=0.73) and motility (p=0.90) at all time points after collection up to 120 minutes (Table 1). Oxidative reduction potential (ORP) remained the same over time (p=0.78). After adjusting for possible confounders and accounting for repeated measures, the percent motility, total sperm concentration and ORP did not change overtime.

Conclusion:

Despite current guidelines, semen quality appears to be stable up to two hours following collection. Patients preferring to produce at home may be assured that longer duration from collection to SA may not be detrimental, however environmental exposures and temperature fluctuations may still impact semen quality. The limited changes in oxidative stress may permit extended periods of time between collection and insemination, however further study of pregnancy outcomes following delayed insemination are needed. Moreover, changes in seminal oxidative stress assessed with ORP measurements could help monitor the effect of antioxidant therapy and facilitate modification of dosage and duration of treatment needed to support optimal semen production.

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Table 1:

Semen Oxidative Reduction Potential (ORP) and Total Motile Count (TMC) Over Time

	30 min after TOC	60 min after TOC	90 min after TOC	120 min after TOC	P Values
ORP	0.85 ± 0.94	0.78 ± 0.92	0.89 ± 0.84	0.78 ± 0.77	0.78
Total Count	--	108 ± 62	100 ± 66	88 ± 59	0.73
% Motility	--	54.4 ± 18.1	56.2 ± 15.1	53.1 ± 14.4	0.90

References:

1. Agarwal, A., Arafa, M., Chandrakumar, R., Majzoub, A., AlSaid, S. and Elbardisi, H. (2017), A multicenter study to evaluate oxidative stress by oxidation–reduction potential, a reliable and reproducible method. Andrology, 5: 939-945. doi:10.1111/andr.12395