The supraphysiological levels of Oxidation Reduction Potential (ORP) present in the human embryo culture media affects blastocysts formation and ongoing pregnancies in IVF cycles. Does the adjustment of the supraphysiological ORP levels in embryo culture system improves the blastocyst formation, pregnancy and ongoing pregnancy in in vitro fertilization cycles?

Summary answer:
The adjustment of the supraphysiological ORP levels in embryo culture to physiological ORP levels found in follicular fluid of oocyte donors improves the clinical outcomes.

What is known already:
The oxidative stress in embryos can be induced by means of atmospheric oxygen concentration, culture media, cell manipulation, cryopreservation etc. This results in cell membrane damage, DNA damage, delayed development and reduced their viability. The supraphysiological levels of ORP measured using MIOXSYS system in culture media affects the development of 3PN human embryos. The overall levels of ORP found in follicular fluid from oocyte donor is 250% lower than Hepes media and 175% lower than embryo culture media. Hence ORP is the best indicator of oxidative stress in embryo culture media compared to other parameters.

Study design, size, duration:
This prospective cohort study was performed from May to December 2018. 104 patients less than 37 years old with at least one transferred blastocysts or without embryo transfer due to all embryos of the cohort were arrested in embryo development (no blastocysts formation) were selected for this study, 52 cases used adjusted ORP media, Group 1, and other 52 used non adjusted ORP media, Group 2. Each patient was asked to sign an informed consent.

Participants/materials, setting, methods:
The ORP levels were determined in culture media (Global total, Life Global Group, USA), and in the Hepes media. Further, the ORP levels were adjusted to 60 -80 mV using EmbryORPâ (combination of antioxidants). The addition of the EmbryORPâ to both media was done 3 hours before either oocyte collection or the observation of the oocyte fertilization. After fertilization, normal fertilized zygotes were transferred to the ORP adjusted culture media up to blastocyst stage.

Main results and the role of chance:
The total blastocyst formation and ongoing pregnancy per each cycle with at least one oocyte with normal fertilization were significantly higher in the group 1 vs group 2. [(63% vs 42%) P(<0.005) and (67% vs 39%) P (0.021)], respectively. The pregnancy rate was comparable between two groups (75% vs. 54%) P (0.0863). In addition no differences were found between groups in terms of mean patient’s age (31.96 ±5.7 vs. 33.17±5.76) (p=0.4285), blastocysts formation at day 5 (79% vs. 83%), and at day 6 (21% vs 16%) respectively. The significant difference in the ongoing pregnancy between the two groups suggest that the adjustment of ORP levels in embryo culture media helps in reduced miscarriages in these patients.

Limitations, reasons for caution:
Small cohort of patients is a limitation of the study. More studies are necessary to corroborate our
The result from the current study indicate that the EmbyORP® can be used to scavenge the supraphysiological levels of ORP found in the embryo culture media. Adjustment of ORP levels in human embryo culture media increased the blastocyst formation and ongoing pregnancy rate in IVF cycles.

**Keywords:**
- oxidation reduction potential
- EmbryORP
- supraphysiological ORP
- Blastocyst
- pregnancy

**Wider implications of the findings:**
Trial registration number:
Not Applicable