P-177 Seminal transferrin levels are linked to embryo utilization rates: a prospective observational study

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Study question: What is the impact of seminal transferrin level on intracytoplasmic sperm injection (ICSI) cycle outcomes?

Summary answer: Seminal transferrin levels were positively correlated with embryo utilization rates.

What is known already: Transferrin, a glycoprotein involved in iron transport throughout the body, is produced by various organs such as liver, central nervous system, and testicules. Particularly, Sertoli cells synthesize transferrin to regulate their phagocytotic activity and to ensure iron transportation to germ cells across the blood-testis barrier. In this context, studies have demonstrated the importance of transferrin and iron in spermatogenesis by detecting low levels of seminal transferrin in oligozoospermic men. However, the effects of low seminal transferrin levels on the functionality of spermatozoa and on their ability to maintain embryo development were neither fully investigated nor well understood.

Study design, size, duration: A prospective study was conducted at Al Hadi IVF center, Lebanon, from July 2019 until May 2020. It included 60 infertile couples who have undergone ICSI cycles. Couples were categorized into two groups based on basic semen parameters assessed according to the World Health Organization recommendations 2010: normozoospermia group (n=30 couples) and non-normozoospermia group (n= 30 couples). In this study, non-normozoospermia was defined as the presence of at least one abnormality in basic semen parameters.

Participants/materials, setting, methods: In this prospective study, the inclusion criteria were: couples where women had 38 years old or less at the time of ICSI, using fresh gametes, and using ejaculated semen. Moreover, women with premature ovarian failure, obese women, and ICSI cycles with embryo biopsy were excluded. Seminal levels of transferrin and iron were measured using Cobas 400 plus (Roche Diagnostics). Fertilization rates, embryo utilization rates, and live birth rates were calculated.

Main results and the role of chance: There were no statistically significant differences in the characteristics of the study population (maternal age, paternal age, maternal body mass index (BMI), paternal BMI, maternal and paternal tobacco intake, maternal and paternal alcohol consumption, number of collected oocytes and number of embryos transferred) ($p>0.05$) between normozoospermia and non-normozoospermia groups. A statistically significant difference was detected in seminal transferrin levels (mg/dl) (2(0-23) *vs.* 1(0-6), $p<0.02$) between the two groups. Interestingly, these transferrin levels were positively correlated with sperm concentration ($R = 0.29$; $p=0.03$). In parallel, no statistically significant difference was observed between groups concerning seminal iron levels (µg/dl) (51(21.1-100.8) *vs.* 48.6 (11-85.7); $p=0.33$). Furthermore, there was no statistically significant difference in the fertilization rates (%) between the two groups (74.2 *vs.* 74.8; $p=0.95$). Of particular interest, a statistically significant positive correlation was detected between seminal transferrin levels and embryo utilization rates ($R=0.33$; $p=0.013$). In contrast, the live birth rates (%) were not different between groups (54.54 *vs.* 58.3; $p=0.77$) and were not correlated with seminal transferrin levels ($R=-0.3$; $p=0.16$).

Limitations, reasons for caution: A prospective study with a larger sample size is required to confirm the effects of seminal transferrin levels on assisted reproductive technology outcomes.

Wider implications of the findings: Deciphering the molecular mechanism by which transferrin level may influence spermatozoa quality and subsequently embryo development will be of paramount importance. Moreover, understanding the reasons behind the altered seminal transferrin level and testing several strategies to restore it, may enhance spermatozoa quality and increase pregnancy chances.

Trial registration number: Not applicable