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Short Communication

The Effects of Autoantibodies on *In Vitro* Fertilization

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DESCRIPTION

Infertility is described as the inability to cope after a period of 12 months of unprotected sexual intercourse, and it affects roughly 10% of birthing individuals. Ovulation problems, tubal blockage, male infertility, and unexplained infertility, often known as idiopathic infertility, are the most common causes of infertility. Over the last several years, the progression of Assisted Reproductive Technologies (ART) from traditional *In Vitro* Fertilization (IVF) and Intracytoplasmic Sperm Injection (ICSI) to the era of artificial intelligence-based prediction models has sparked a global reproductive revolution [1]. Infertility is assumed to be multifaceted, with genetic abnormalities of male and female origin, ovulatory problems, tubal blockages, uterine or peritoneal concerns connected to female infertility, and male factor relating to low sperm quality being some of the major factors.

The connection between the embryo and the uterine epithelium is crucial throughout the implantation process. During implantation, two immunologically and genetically different tissues are tested to see if they can communicate successfully. Several autoimmune variables have been linked to implantation failure outcomes in the existing literature. Certain investigations focused on connections between the autoimmune system and the IVF/ICSI outcome in order to study reproductive failure, highlighting the involvement of autoantibodies during therapy [2]. In addition, it has lately been proposed that autoimmune illnesses such systemic lupus, erythematosus, and anti-phospholipid syndrome have a key role in infertility and its treatment. This positive correlation has been found either by a direct connection between autoimmune disorders and a terrible reproductive status, or through autoimmune disorders adding another layer of difficulty to an already poor fertility status.

Anti-Phospholipid Antibodies (APL), Anti-Nuclear Antibodies (ANA), and Thyroid Auto-Antibodies (TAA) levels tend to be much higher in women who have been diagnosed with unexplained infertility. Furthermore, serum autoantibodies are related to early ovarian failure, therefore their role in infertility is still a point of contention. Furthermore, anti-sperm antibodies detected in high titers in seminal plasma are more frequently linked to fertilization failure. Although the relevance of serum autoantibodies in infertility is debatable, some evidence suggests that they have a role in idiopathic infertility. The risk of infertility is now well understood in the setting of a diagnosed auto-immune illness, particularly for Anti-Phospholipid Syndrome (APS) and Systemic Lupus Erythematosus (SLE). Apart from these specific nosologic situations, however, there is little information on serum autoantibodies and their impact on female fertility [3].

Despite clinical or biological criteria for recognised disorders, a specific auto-immunity was defined as the presence of auto-antibodies in a blood sample (SLE, Sjogren syndrome, APS, scleroderma, etc.). Both the mother and the baby take a variety of tolerance measures during implantation and pregnancy. Pre-implantation immunological events are in place to help the fetal nidation into the mother's endometrium go as well as possible. During pregnancy, for example, a Th1 to Th2 shift was seen, with increased Interleukin (IL)-10 productions and a decreased responsiveness to proinflammatory cytokines such as Tumor Necrosis Factor (TNF), IL-1, and IL-6. The presence of a broad range of autoantibodies corresponds with the pathophysiological course of the up in recent years; nevertheless, just because an antibody is linked to a disease does not suggest that it is the cause of infertility [4].

Anti-Nuclear Antibodies (ANAs) are autoantibodies associated to autoimmune disorders in general. They are a wide set of autoantibodies that attack a variety of cellular antigens, including double-strand DNA (ds-DNA), RNA molecules, mitochondrial antigens, cytoplasmic and nucleolar proteins, and their complexes. Anti-dsDNA antibodies, Anti-Centromere Antibodies (ACA), and anti-extractable nuclear antigens antibodies are examples of ANAs (anti-ANAs). It is widely known that ANAs have a role in the pathophysiology of a number of autoimmune diseases.

CONCLUSION

Thyroid autoimmunity is the most common cause of thyroid dysfunction. In women with thyroid autoimmunity, such as Grave's disease or Hashimoto thyroiditis, the prevalence of infertility was shown to be exceedingly high, reaching 47 percent and 52 percent, respectively. The function of the Hypothalamic-Pituitary-Thyroid (HPT) axis is directly influenced by the

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Hypothalamic-Pituitary-Ovarian (HPO) axis, and vice versa. As a result, the two axes work as one integrated system. The physiological connection between the HPT and HPO axes is primarily mediated by a number of thyroid hormone receptors in the ovaries. Furthermore, there is enough evidence that estrogen has a direct effect on the HPT axis' functioning at the hypothalamus-pituitary level. This is evident in the fact that both hyperthyroid and hypothyroid women experience menstrual irregularities and ovulatory cycles, which are both detrimental to fertility.

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