

APPLICATION OF NANOMATERIALS IN OVARIAN TISSUE ENGINEERING

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Infertility is a global health issue affecting millions of people of reproductive age worldwide. Infertility in women may be caused by a range of abnormalities in the ovary, uterus, fallopian tubes, and endocrine system along with general health conditions, inherited traits, lifestyle choices, and age in the female reproductive system. Ovaries play a central role in the reproductive function of females and any defect in the normal functioning of these endocrine organs can cause severe health issues and reproductive challenges extending beyond infertility, as the hormones interact with other tissues in the body. The pathophysiology of ovarian disorders is linked to idiopathic, iatrogenic, hormonal imbalance, and oxidative stress-related etiology making it a multifactorial and complex disease. Oxidative stress is one of the major factors that can damage the ovarian reserve further affecting the quality and quantity of oocytes and embryos.

The choice of treatment for ovarian disorders varies from person to person based on various factors. They are commonly underdiagnosed which leads to further complications that require surgical interventions. Tissue engineering could be a sustainable and safe alternative to address the challenges associated with current treatment methods. Furthermore, the addition of nanomaterials to develop a nanocomposite hydrogel could be a novel promising approach to restoring fertility. Cerium oxide nanoparticles are included in the priority list of nanomaterials that necessitate evaluation. This review introduces an overview of incorporating antioxidant nanomaterials into the hydrogels to reduce oxidative stress and disease recurrence in ovarian disorders. In conclusion, the review explores the possible application of cerium oxide nanoparticles to develop scaffolds for ovarian tissue engineering.