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CLINICAL SIGNIFICANCE OF THYMOSIN ALPHA-1 IN IMPROVING IVF OUTCOMES

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ABSTRACT Successful IVF depends on embryo quality and endometrial receptivity within a balanced immune milieu. Immune dysregulation at the maternal–embryo interface is associated with recurrent implantation failure. Thymosin-α1, an endogenous immunomodulatory peptide, modulates T-cell and cytokine activity and may enhance immune tolerance in assisted reproduction, particularly after failed IVF cycles.

KEYWORDS : Recurrent Implantation Failure (RIF), Thymosin Alpha-1 (Tα1), Immune Modulation, Endometrial Receptivity, Maternal–Embryo Interface.

INTRODUCTION

Successful in vitro fertilization (IVF) depends on both embryo quality and endometrial receptivity, which are influenced by a finely tuned immune environment. Dysregulation of immune responses at the maternal–embryo interface, including altered T-cell activity and cytokine imbalance, is increasingly associated with recurrent implantation failure (RIF). Thymosin-Alpha-1 (Tα1), an endogenous immunomodulatory peptide, can modulate adaptive and innate immunity by enhancing regulatory T-cell function and balancing pro- and anti-inflammatory cytokines. Emerging evidence suggests that Tα1 may improve implantation rates and overall IVF outcomes, particularly in patients experiencing repeated IVF failures, although larger studies are needed to confirm efficacy [1–4].

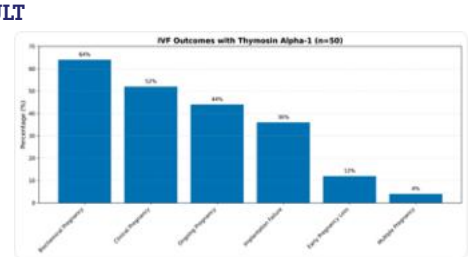
MATERIALS AND METHODS

This hospital-based prospective observational study was conducted at Delhi IVF and Research Centre, New Delhi over a period of 3 months. Fifty infertile women undergoing IVF treatment received Thymosin Alpha-1 in addition to standard IVF protocols. The study population primarily included patients with a history of recurrent implantation failure or poor IVF outcomes. Clinical endpoints evaluated included biochemical pregnancy,clinical pregnancy, ongoing pregnancy, implantation failure, pregnancy loss, and treatment tolerability.

DISCUSSION

Thymosin Alpha-1 may enhance implantation and early pregnancy by modulating immune responses critical for maternal–fetal tolerance. Case reports and small studies suggest that its addition to IVF protocols may improve clinical pregnancy outcomes in patients with recurrent implantation failure (RIF) [1,2,5]. However, current evidence remains limited, heterogeneous, and derived from small cohorts, making definitive conclusions difficult. Larger, well-designed randomized controlled trials are required to confirm efficacy, optimize dosing strategies, and establish standardized clinical protocols, thereby clarifying the role of Thymosin Alpha-1 as an adjunct immunomodulatory therapy in assisted reproduction [1,2,5].

RESULT



Among the 50 patients analyzed, biochemical pregnancy—confirmed by positive serum Beta-hCG—was observed in 32 patients (64%). Clinical pregnancy, defined by ultrasonographic visualization of a gestational sac, was achieved in 26 patients (52%). Ongoing pregnancy beyond 12 weeks of gestation was noted in 22 patients (44%). Implantation failure, despite the transfer of good-quality embryos, was observed in 18 patients (36%). Early pregnancy loss, including biochemical and early clinical miscarriage, occurred in 6 patients (12%).

Multiple pregnancies were reported in 2 patients (4%), both following double embryo transfer.

Thymosin Alpha-1 demonstrated good tolerability, with no adverse effects reported in 47 patients (94%). Mild injection-site reactions were noted in 3 patients (6%), none of which required discontinuation of treatment.

CONCLUSION

Thymosin Alpha-1 shows promise as a safe adjunct in IVF, particularly for patients experiencing recurrent implantation failure. Evidence from case reports and small studies indicates that it may enhance implantation and early pregnancy outcomes by modulating maternal immune responses and promoting tolerance at the maternal– embryo interface. However, current data are limited, heterogeneous, and insufficient to establish definitive clinical guidelines. To validate its efficacy, optimize dosing, and develop standardized protocols, larger, well-designed randomized controlled trials are essential. Until such evidence is available, Thymosin Alpha-1 should be considered an experimental immunomodulatory therapy in assisted reproduction.

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