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Association of Thrombin-Activatable Fibrinolysis Inhibitor Gene Polymorphism and Recurrent Spontaneous Abortion: A Meta-Analysis and Systematic Review

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ABSTRACT

Introduction: Recurrent spontaneous abortion (RSA) represents a significant clinical challenge, conferring substantial medical, psychological, and economic burdens. Emerging evidence suggests that genetic, epigenetic, and environmental factors contribute to this multifaceted condition. Notably, the expression levels of the thrombin-activatable fibrinolysis inhibitor (*TAFI*) gene, also known as carboxypeptidase B2, may be influenced by various single nucleotide polymorphisms (SNPs). This systematic review and meta-analysis endeavors to elucidate the relationship between the TAFI C1040T polymorphism and RSA.

Search Strategy: The search strategy was accomplished by searching PubMed, Scopus, and the Web of Sciences until April 2024. The NOS Checklist assessed the quality of case-control studies. Statistical analysis was conducted using the MetaGenyo tool.

Results: In the investigation of *TAFI* gene polymorphisms, specifically the SNPs, and their correlation with RSA, a comprehensive review of 627 references was conducted. This review facilitated the extraction and subsequent analysis of all pertinent SNPs, particularly the +1040T/C (rs1926447) SNP. The current meta-analysis incorporated data from three case-control studies focusing on the +1040T/C (rs1926447) polymorphism. Sub-group meta-analysis revealed a protective association of the +1040T/C (rs1926447) polymorphism in the over-dominant model, comparing the heterozygous genotype to the combined homozygous genotypes (Aa vs. AA + aa; OR = 0.6597; 95% CI = 0.4503-0.9664; p = 0.032). Conversely, a negative association was observed when comparing the homozygous dominant genotype to the heterozygous genotype (AA vs. Aa; OR = 1.5054; 95% CI = 1.0118-2.2399; p = 0.043), indicating an increased risk of RSA. Additional SNPs were subjected to rigorous examination and analysis within the scope of this study.

Conclusion and Discussion: The over-dominant model may contribute to a decreased risk of RSA. However, the homozygous dominant genotype appears to correlate with an increased risk. These insights underscore the potential of SNP analysis in predicting RSA risk and pave the way for further research into the genetic factors influencing this condition.

Keywords: Meta-analysis, Spontaneous abortion, Fibrinolysis inhibitor

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