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Unravelling the Relationship Between Maternal and Fetal ACE2 Gene Polymorphism and Preeclampsia Risk

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Abstract : Background: Preeclampsia (PE), a pregnancy-specific hypertensive disorder, significantly impacts maternal and fetal health. It is particularly prevalent in underdeveloped countries and is linked to preterm delivery and fetal growth. The renin-angiotensin system (RAS) plays a crucial role in ensuring a successful pregnancy outcome, with Angiotensin-Converting Enzyme 2 (ACE2) being a key component. ACE2 converts ANG II to Ang-(1-7), offering protection against ANG II-induced stress and inflammation while regulating blood pressure and osmotic balance during pregnancy. The reduced maternal plasma angiotensin-converting enzyme 2 (ACE2) seen in preeclampsia might contribute to its pathogenesis. However, there has been a dearth of comprehensive research into the association between ACE2 gene polymorphism and preeclampsia. In the South Asian population, hypertension is strongly linked to two SNPs: rs2285666 and rs879922. This genotype was therefore considered, and the possible association of maternal and fetal ACE2 gene polymorphism with preeclampsia within the Bangladeshi population was evaluated. Method: DNA was extracted from peripheral white blood cells (WBCs) using the organic method, and SNP genotyping was done via PCR-RFLP. Odds ratios (OR) with 95% confidence intervals (95% CI) were calculated using logistic regression to determine relative risk. Result: A comprehensive case-control study was conducted on 51 PE patients and their infants, along with 56 control subjects and their infants. Maternal single nuvleotide polymorphisms (SNP) (rs2285666) analysis revealed a strong association between the TT genotype and preeclampsia, with a four-fold increased risk in mothers (P=0.024, OR=4.00, 95% CI=1.36-11.37) compared to their ancestral genotype CC. However, the CT genotype (rs2285666) showed no significant difference (P=0.46, OR=1.54, 95% CI=0.57-4.14). Notably, no significant correlation was found in infants, regardless of their gender. For rs879922, no significant association was observed in both mothers and infants. This pioneering study suggests that mothers carrying the ACE2 gene variant rs2285666 (TT allele) may be at higher risk for preeclampsia, potentially influencing hypertension characteristics, whereas rs879922 does not appear to be associated with developing preeclampsia. Conclusion: This study sheds light on the role of ACE2 gene polymorphism, particularly the rs2285666 TT allele, in maternal susceptibility to preeclampsia. However, rs879922 does not appear to be linked to the risk of PE. This research contributes to our understanding of the genetic underpinnings of preeclampsia, offering insights into potential avenues for prevention and management.

Keywords : ACE2, PCR-RFLP, preeclampsia, single nuvleotide polymorphisms (SNPs)
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