Carbonic Anhydrase IX Gene Polymorphism Association with Susceptibility to Gastric Cancer

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ABSTRACT

Introduction: Cancer diagnosis is changing significantly by incorporating molecular biomarkers into a diagnostic-panel that combines diagnostics and therapeutics to personalize medical-practice (Yanget al., 31). Worldwide in cancer-related deaths gastric cancer (GC) ranks' fifth leading cause (WHO, 2023). Genetic and environmental factors are risk factors for its development. The cancer rapid cellular proliferation leads hypoxia (Pastorekova and Gillies, 65) in response, HIF-1 (Hypoxia-Inducible Factor 1) is activated (Stevens et al., 323). This activates transcription of the Carbonic Anhydrase-9 (CA-IX) gene encoding CA-IX protein that is associated with tumor progression, invasion (Lee et al., 119) migration and tumor cell survival (Panisova et al., 77819).

Objectives: The objective of the study was to find the association between the CA-IX polymorphism with gastric cancer.

Methodology: Ethical approval was obtained from KIBGE, University of Karachi and JPMC, Karachi. The blood samples were collected with informed consent from cases and controls. The genomic DNA was isolated through the salting-out technique and genotyping via Tetra-primer ARMS–PCR.

Results: The study included 88 number of an equal number of controls. The correlation was positive between GC stages with histologic grade ($p < 0.01$). The H. pylori infection has a positive correlation with family history ($p < 0.05$). The correlation test shows statistically negative correlation between histologic grade and histologic type ($p<0.5$). The correlation was negative between Japan Macroscopic Classification (JMC) with gender ($p < 0.5$) and tumor bed size ($p < 0.05$). The *CA-IX* SNP significantly increase the risk of GC among studied groups ($p < 0.0001$).

Conclusion: The study provides baseline data regarding frequency of *CA-IX* polymorphism which may be utilized to develop prognostic biomarkers for GC detection.

Keywords: Biomarker, CA-IX, Gastric Cancer, Hypoxia Inducible Factor 1 (HIF-1), SNP

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