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Evaluation of Serum microRNA-21 as a Diagnostic Biomarker for Early-Stage Hepatocellular Carcinoma in Egyptian Patients

Mariam El-Sayed
Cairo University's Faculty of Medicine, Egypt

Statement of the Problem: Hepatocellular carcinoma (HCC) remains a leading cause of cancer-related deaths globally, particularly in regions with high prevalence of chronic hepatitis C, such as Egypt. Early detection remains challenging, and conventional biomarkers like AFP lack sensitivity and specificity. This study investigates serum microRNA-21 (miR-21) as a potential diagnostic biomarker for early-stage HCC.

Methodology : A total of 120 Egyptian patients were enrolled, including 60 patients diagnosed with early-stage HCC, 30 with chronic liver disease (CLD), and 30 healthy controls. Serum levels of miR-21 were quantified using quantitative real-time PCR. Statistical analyses included ROC curve, ANOVA, and correlation tests with clinical parameters such as AFP levels, liver function tests, and imaging data.

Results : Serum miR-21 expression was significantly elevated in early-stage HCC patients compared to both CLD patients and healthy controls ($p < 0.001$). ROC curve analysis showed an AUC of 0.89 for miR-21, indicating strong diagnostic performance. Combining miR-21 with AFP improved diagnostic sensitivity from 71% (AFP alone) to 91%. No significant correlation was found between miR-21 levels and tumor size or liver enzyme levels, supporting its role as an independent marker.

Conclusion : Serum miR-21 demonstrates high diagnostic potential for early detection of HCC and outperforms traditional markers when used alone or in combination with AFP. Its non-invasive nature supports future clinical application in HCC screening programs in high-risk populations like Egypt. Further large-scale studies are recommended to validate these findings.

Biography

Mariam El-Sayed, MD, PhD, is a molecular pathologist and associate professor at Cairo University's Faculty of Medicine, Egypt. With over 12 years of experience in clinical biochemistry and molecular diagnostics, she has led several research projects focused on non-coding RNAs and their clinical applications in oncology. Her work has been published in leading peer-reviewed journals and presented at international scientific forums. Dr. El-Sayed is a recipient of the Egyptian Young Investigator Award and actively mentors postgraduate students in translational biomarker research. Her current research focuses on integrating novel RNA-based biomarkers into routine diagnostic workflows for early cancer detection in resource-limited settings.

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