**Cytotoxic and Apoptotic Roles of Resveratrol, Gallic Acid, and Piperine on the Human Acute Myeloid Leukemia Cells**

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Abstract

**Introduction:** MicroRNAs (miRs) play a crucial role in the leukemogenesis and the prognosis of acute myeloid leukemia (AML). This study investigated the therapeutic effects of resveratrol, gallic acid, and piperine as natural anticancer agents on the HL-60 cell line and their roles in apoptosis.

**Methods:** In this experimental study, quantitative analysis of miRs, including miR-17, miR-92b, miR-181a, and miR-222, were performed in 150 newly diagnosed patients with AML by real-time PCR assay. HL-60 cell viability as well as the expression of miRs, BAX, BCL-2, MCL-1, WT1, c-Kit, and CEBPA, were also assessed after transfection with the LNA-miRs and treatment with resveratrol, gallic acid, and piperine.

**Results:** The expression of miR-17 and miR-181a decreased significantly in LNA-anti-miRs. Although HL-60 cell viability decreased in LNA-anti-miR-222, miR-17, and miR-92b, blockade of miR-181a increased the cell viability. Besides, the cell viability increased merely in the piperine-treated group. Compared to untreated cells, miR-17 and miR-92b expression significantly increased in gallic acid- and resveratrol-treated cells. In HL-60 cells treated with resveratrol, gallic acid, and piperine, the expression of miR-181a was also increased significantly. The expression of BAX was also increased in resveratrol and piperine-treated groups. Compared to untreated cells, the expression of c-Kit increased significantly in the piperine-treated group; however, it decreased in the resveratrol treated group.

**Conclusion:** LNA-anti-miRs are a new therapeutic agent that may be promising in treating AML. All three compounds (resveratrol, gallic acid, and piperine) have anticancer effects that exert the desired effects in AML. Considering the role of c-Kit, it seems that resveratrol may reduce leukemia’s pathogenesis by reducing this gene’s expression. However, further intensive studies with larger sample sizes and longer follow-ups are warranted to better understand these compounds’ role in AML.

**Keywords:** Acute myeloid leukemia, Cytogenetics, Apoptosis, Resveratrol, Gallic acid, Piperine

***Biography***

Dr. Nastaran Fooladivanda, is one of the young researchers in the field of oncology and cancer. She was born in 1995 in Shiraz and has many articles in various medical fields. She is currently a resident of Pathology at Shiraz University of Medical Sciences.