Determination of Therapeutic Potential of Apigenin on Philadelphia Negative Acute Lymphoblastic Leukemia

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Acute lymphoblastic leukemia (ALL) is one of the most common types of cancer in children. This study investigates a natural product that can be used as a possible agent for the treatment of ALL. For this purpose, three different plant-derived agents that have no harm to healthy cells while possessing anticancer properties on various cancer types were selected to examine their therapeutic potential on human ALL cells. The antiproliferative effects of Apigenin, Hesperetin, and Chlorogenic Acid on MOLT-4 (Ph- ALL cell line) were investigated and compared by MTT Cell Viability Assay with gradually increasing doses and a control group. After selecting the most effective agent, Annexin V/PI Double Staining, JC-1 Assay, and Caspase-3 Activity Assay were used to determine the apoptotic effects, and Cell Cycle Analysis was performed to investigate the cytostatic effects of Apigenin on MOLT-4 cells. Compared to Hesperetin (IC50 = 138.05 μM) and Chlorogenic Acid (IC50 > 200 μM); Apigenin (IC50 = 38.46 μM) was found to be the most cytotoxic agent. Apoptosis rates of MOLT-4 cells significantly increased when exposed to Apigenin (68.8% at IC50 and 89.1% at IC75), shown by Annexin V/PI Double Staining. Moreover, an increment in the loss of mitochondrial membrane potential and the increase in Caspase-3 activity correlated with the data obtained from Annexin V/PI; as the concentration of the Apigenin increases, the rate of apoptosis increases. Lastly, the changes in the cell cycle profile of MOLT-4 cells when exposed to both IC50 and IC75 doses of Apigenin were found to be non-significant ($p>0.5$). Overall, the study showed that Apigenin has antiproliferative and proapoptotic, thus, possible anticancer effects on MOLT-4, and suggests that Apigenin has therapeutic potential on ALL.