PRECLINICAL ASSESSMENT OF WATER SOLUBLE GARLIC EXTRACT-INDUCED OXIDATIVE STRESS AND APOPTOSIS OF HUMAN LEUKEMIA (HL-60) CELLS.

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Abstract: Garlic supplementation in diet has been shown to benefit patients with leukemia. However, the mechanisms by which water soluble garlic extract-induced oxidative stress and apoptosis in cancer cell remain largely unknown. In this research, we hypothesized that oxidative stress may play a key role in water soluble garlic extract-induced apoptosis of HL-60 cells. To test this hypothesis, we performed lipid peroxidation assay and flow cytometric analysis, respectively. Human leukemia (HL-60) cells were treated with different doses of water soluble garlic extract for 12 h. We detected a significant increase in lipid peroxidation (malondialdehyde) concentrations in water soluble garlic extract-treated HL-60 cells compared to the control. The flow cytometric assessment (Annexin V) showed a strong dose-response relationship between water soluble garlic extract exposure and annexin V positive cells as evidence that garlic exposure causes apoptosis of HL-60 cells. Upon 12 hr of exposure, the results of annexin V/PI staining showed that the percentages of HL-60 cells undergoing apoptosis were 5 ± 0%, 13 ± 0.7%, 17 ± 5.7%, 22 ± 4.6, and 18 ± 0% in 0, 2, 4, 6, and 8 mM of water soluble garlic extract, respectively. Taken together, this experiment demonstrates that water soluble garlic extract represents an apoptosis-inducing agent in HL-60 promyelocytic leukemia cells. The apoptosis of HL-60 cells caused by water soluble garlic extract exposure was found to be mediated, at least in part, through the formation of malondialdehyde, a biomarker of oxidative stress. Based on this in vitro finding, we conclude that the pharmacotherapy of garlic may be associated with phosphatidylserine externalization that is mediated by oxidative stress.

Key words: Water soluble garlic extract, HL-60 cells, annexin V, flow cytometry

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