POTENTIAL MECHANISMS OF ACTION OF WATER SOLUBLE GARLIC EXTRACT (WSGE) IN THE MANAGEMENT OF ACUTE PROMYELOCYTIC LEUKEMIA

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Abstract: Garlic (*Allium sativum*) is one of the oldest cultivated plants, used in spices, food, and herbal medicine for over 4000 years. The therapeutic efficacy of garlic has a wide variety of ailments, including cardiovascular, cancer, hepatic and microbial infections. Although the therapeutic efficacy of garlic in the prevention of cancer and other diseases has received increasing attention in recent years, little is known about its mechanism for therapeutic action. In this research, we hypothesize that the pharmacological effect of garlic may be mediated through oxidative stress, DNA damage, modulation of annexin-5 and caspase-3 in human leukemia (HL-60) cells. To test this hypothesis, HL-60 cells were treated with various doses of water soluble garlic extract (WSGE) for 12 h. Cell survival was determined by MTT-assay. The extent of oxidative cell/tissue damage was determined by measuring the level of malonaldehyde (MDA) concentrations. Cell apoptosis was measured by flow cytometry using annexin V and caspase-3 kits, respectively. MTT assay indicated a strong dose-response relationship with regard to the cytotoxic efficacy of WSGE in HL-60 cells. There was slight increase in MDA concentrations in WSGE-treated cells compared to the control, but this was not statistically significant (P > 0.05) probably due to the antioxidant property of garlic. WSGE-induced apoptosis was characterized by a significant (P < 0.05) increase in the percentages of annexin-5 and caspase-3 positive cells. In summary, the pharmacotherapy of WSGE may be associated through induction of moderate toxicity, induction of DNA damage, phosphatidylserine externalization and caspase-3 activation characteristic of apoptosis.

Keywords: Garlic, HL-60 cells, cell death, oxidative stress, DNA damage, apoptosis

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