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In vitro antiproliferative, antioxidant, and apoptosis-inducing activities of dried flower buds of clove extract on human gastric carcinoma

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Cancer cell resistance to widely used chemotherapeutic agents is gradually developed. Natural products, mainly isolated from medicinal plants, have been considered as valuable sources for herbal anticancer drugs. The present study aimed to evaluate in vitro antiproliferative, antioxidant, and apoptosis-inducing activities of the crude ethyl alcohol extract of dried flower buds of clove (*Syzygium aromaticum* L.) extract on human gastric carcinoma (AGS). Crude ethyl alcohol extract of dried flower buds of S. *aromaticum* was prepared. In vitro antiproliferative activity of the extract in AGS and normal (HDFs) cell lines was evaluated using MTT assay. To determine the induction of apoptosis, AGS cells were incubated with one time IC_{50} concentrations of the extract, stained with both propidium iodide (PI) and Annexin V-fluorescein isothiocyanate (FITC), and analyzed by flow cytometry. Antioxidant activity, total phenolic, and flavonoids content was evaluated with 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay, Folin-Ciocalteu method and aluminum chloride colorimetric method, respectively. Our results showed that the IC_{50} of DPPH radical, total phenolic and flavonoid amounts of the extract was 10.05±0.8µg/ml, 225.6±4 mgGAE/g and 29.3±2.35mgRUT/g, respectively. The extract inhibited the proliferation of AGS cells, with IC_{50} values of 118.7 µg/ml at 48 h after treatment. The results of flow cytometric analysis showed that the extract induced cell apoptosis, with the apoptosis ratio of 21.61% in AGS cell line. In conclusion, the crude ethyl alcohol extract of clove had the best antioxidant activity and the highest total phenolic content and suppresses the proliferation of human gastric cancer cells due to induction of apoptosis.

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