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DNA Fragmentation and Apoptosis in Human Colorectal Cancer Cell Lines by Sesamum indicum Dried Seeds

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Abstract : The four fractions of aqueous extract of Sesame Seeds (Sesamum indicum L.) were studied for invitro DNA fragmentation, cell migration, and cellular apoptosis on SW480 and HTC116 human colorectal cancer cell lines. The seeds of Sesamum indicum were extracted with six solvents, including Methanol, Ethanol, Aqueous, Chloroform, Acetonitrile, and Hexane. The aqueous extract (IC_{50} value 154 µg/ml) was found to be the most active in terms of cytotoxicity with SW480 human colorectal cancer cell lines. Further fractionation of this aqueous extract on flash chromatography gave four fractions. These four fractions were studied for anticancer and DNA binding studies. Cell viability was assessed by colorimetric assay (MTT). IC_{50} values for all these four fractions ranged from 137 to 548 µg/mL for the HTC116 cancer cell line and 141 to 402 µg/mL for the SW480 cancer cell line. The four fractions showed good anticancer and DNA binding properties. The DNA binding constants ranged from 10.4 $\times 10^4$ 5 to 28.7 $\times 10^4$, showing good interactions with DNA. The DNA binding interactions were due to intercalative and π-π electron forces. The results indicate that aqueous extract fractions of sesame showed inhibition of cell migration of SW480 and HTC116 human colorectal cancer cell lines and induced DNA fragmentation and apoptosis. This was demonstrated by calculating the low wound closure percentage in cells treated with these fractions as compared to the control (80%). Morphological features of nuclei of cells treated with fractions revealed chromatin compression, nuclear shrinkage, and apoptotic body formation, which indicate cell death by apoptosis. The flow cytometer of fraction-treated cells of SW480 and HTC116 human colorectal cancer cell lines revealed death due to apoptosis. The results of the study indicate that aqueous extract of sesame seeds may be used to treat colorectal cancer.

Keywords : Sesamum indicum, cell migration inhibition, apoptosis induction, anticancer activity, colorectal cancer
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