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Aqueous cinnamon extract (ACE-c) from the bark of Cinnamomum cassia causes apoptosis in human cervical cancer cell line (SiHa) through loss of mitochondrial membrane potential.

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Abstract

BACKGROUND: Chemoprevention, which includes the use of synthetic or natural agents (alone or in combination) to block the development of cancer in human beings, is an extremely promising strategy for cancer prevention. Cinnamon is one of the most widely used herbal medicines with diverse biological activities including anti-tumor activity. In the present study, we have reported the anti-neoplastic activity of cinnamon in cervical cancer cell line, SiHa.

METHODS: The aqueous cinnamon extract (ACE-c) was analyzed for its cinnamaldehyde content by HPTLC analysis. The polyphenol content of ACE-c was measured by Folin-Ciocalteau method. Cytotoxicity analysis was performed by MTT assay. We studied the effect of cinnamon on growth kinetics by performing growth curve, colony formation and soft agar assays. The cells treated with ACE-c were analyzed for wound healing assay as well as for matrix metalloproteinase-2 (MMP-2) expression at mRNA and protein level by RT-PCR and zymography, respectively. Her-2 protein expression was analyzed in the control and ACE-c treated samples by immunoblotting as well as confocal microscopy. Apoptosis studies and calcium signaling assays were analyzed by FACS. Loss of mitochondrial membrane potential (Deltapsim) in cinnamon treated cells was studied by JC-1 staining and analyzed by confocal microscopy as well as FACS.

RESULTS: Cinnamon alters the growth kinetics of SiHa cells in a dose-dependent manner. Cells treated with ACE-c exhibited reduced number of colonies compared to the control cells. The treated cells exhibited reduced migration potential that could be explained due to downregulation of MMP-2 expression. Interestingly, the expression of Her-2 oncoprotein was significantly reduced in the presence of ACE-c. Cinnamon extract induced apoptosis in the cervical cancer cells through increase in intracellular calcium signaling as well as loss of mitochondrial membrane potential.

CONCLUSION: Cinnamon could be used as a potent chemopreventive drug in cervical cancer.

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