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Antiangiogenic and Pro-Apoptotic Properties of Shemamruthaa: An Herbal Preparation in Experimental Mammary Carcinoma-Bearing Rats and Breast Cancer Cell Line In vitro

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Abstract : Background: Understanding the basic mechanisms and factors underlying the tumor growth and invasion has gained attention in recent times. The processes of angiogenesis and apoptosis are known to play a vital role in various stages of cancer. The vascular endothelial growth factor (VEGF) is well established as one of the key regulators of tumor angiogenesis while MMPs are known for their exclusive ability to degrade ECM. Objective: The present study was designed to evaluate the pro apoptotic and anti angiogenic activity of the herbal formulation Shemamruthaa. The anticancer activity of Shemamruthaa was tested in breast cancer cell line (MCF-7). Results of MTT, trypan blue and flow cytometric analysis of apoptotis suggested that Shemamruthaa can induce cytotoxicity in cancer cells, in a concentration- and time dependent manner and induce apoptosis. With these results, we further evaluated the antiangiogenic and pro-apoptotic activities of Shemamruthaa in DMBA induced mammary carcinoma in Sprague Dawley rats. Flavono tumour was induced in 8-week-old Sprague-Dawley rats by gastric intubation of 25 mg DMBA in 1ml olive oil. After 90 days of induction period, the rats were orally administered with Shemamruthaa (400 mg/kg body wt) for 45 days. Treatment with the drug SM significantly modulated the expression of p53, MMP-2, MMP-3, MMP-9 and VEGF by means of its anti angiogenic and protease inhibiting activity. Conclusion: Based on these results, it might be concluded that the formulation, Shemamruthaa, constituted of dried flowers of Hibiscus rosa-sinensis, fruits of Emblica officinalis, and honey has been found to exhibit pronounced antiproliferative and apoptotic effects. This enhanced anticancer effect of Shemamruthaa might be attributed to the synergistic action of polyphenols such as flavonoids, tannins, alkaloids, glycosides, saponins, steroids, terpenoids, vitamin C, niacin, pyrogallol, hydroxymethylfurfural, trilinolein, and other compounds present in the formulation. Collectively, these results demonstrate that Shemamruthaa holds potential to be developed as a potent chemotherapeutic agent against mammary carcinoma.

Keywords : Shemamruthaa, flavonoids, MCF-7 cell line, mammary cancer
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