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Preventive effect of *Shemamruthaa* - an indigenous herbal formulation against 7, 12-dimethylbenz (a) anthracene induced breast cancer in female Sprague Dawley rats

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Background: Cancer is the leading cause of morbidity and mortality worldwide, with approximately 18.1 million new cases and 9.6 million deaths in 2018. The major type of cancer among females is breast cancer, accounting for 24.2% of the total cancer cases. In the last decades, phytochemicals have attracted a growing attention as anti-cancer agents and the study of herbal formulations from traditional medicine represents a challenging research field.

Objectives: *Shemamruthaa* (SM), an indigenous herbal formulation constituting petals of *Hibiscus rosa-sinensis* and fruits of *Emblica officinalis* and honey was evaluated for anticancer property.

Methods: Adult female Sprague-Dawley rats (8-week-old) were used for the study and were divided into 4 groups. Group I, normal control animals received a single oral dose of olive oil (1 ml) at the age of eight weeks (Control); Group II animals induced for mammary carcinoma with a single oral dose of 25 mg of 7, 12- dimethylbenz (a) anthracene DMBA dissolved in one ml of olive oil after overnight fasting. Group III mammary carcinoma was induced as in Group II, in addition, after three months;

animals were treated with SM at the dose of 400 mg/ kg body weight/day by gastric intubation (DMBA+ SM treated). Group IV Animals received 400 mg/kg body weight of SM alone and served as SM control. The experimental design was performed in accordance with the current ethical norms approved by the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), and Institutional Animal Ethics Committee Guidelines (IAEC. No. 01/030/2011). The tumour markers and the mRNA expression of pro-apoptotic genes/anti-apoptotic genes were examined by RT-PCR analysis in mammary tissues of control and experimental animals.

Results: Results of the study revealed that SM treatment significantly ($p < 0.05$) abridged the levels of tumour markers *viz.* carcinoembryonic antigen (CEA) and breast cancer specific marker (CA-15-3) when compared to DMBA-induced rats. SM treatment significantly induced mRNA levels of p⁵³ and Bax. Meanwhile, the cell proliferative (PCNA) and anti-apoptotic gene, Bcl-2 were down-regulated by SM treatment.

Conclusion: The expression pattern of breast cancer markers and apoptotic signaling molecules analyzed in the present study signifies the therapeutic efficacy of SM against breast cancer.

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