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BREAST CANCER Original Article

Evaluation of protective effect of myricetin, a bioflavonoid in dimethyl benzanthracene-induced breast cancer in female Wistar rats

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Abstract

Background: Breast cancer is one of the most common cancers worldwide. Alarmingly, the incidence of breast cancer is rising rapidly in India. **Aim:** The present research was focused to assess the role of myricetin; a bioflavonoid in 7,12-dimethylbenzanthracene (DMBA)-induced breast cancer in female Wistar rats. **Materials and Methods:** A total of 36 female Wistar rats (total 6 groups, n = 6 per group) 6 - 8 weeks old, weighing 150 gm were used in the study. DMBA was given at the dose of 7.5 mg/kg subcutaneously in the mammary region once a week for 4 consecutive weeks in group 2. Vincristine was given in the dose of 500 µg/kg intraperitonially every week for 4 consecutive weeks in group 3. Myricetin was given orally in a dose of 50, 100, and 200 mg/kg in group 4, 5, and 6 respectively. The statistical significance of the data was determined using one way analysis of variance and Duncan's multiple range test. **Results:** The result showed that myricetin increased the antioxidant levels in plasma, erythrocyte lysate, and breast tissue and was effective in preventing the oxidative damage induced by the carcinogen DMBA. Myricetin 50, 100, and 200 mg/kg/oral for 120 days treated animal resulted comparable results to that of standard vincristine and control groups. **Conclusions:** Myricetin was found to be either equieffective or more effective than vincristine in all the parameters studied. Myricetin proved the capacity of flavonols to act as antioxidant in cells represents a potential treatment in the field of oncology.

Keywords: Anti oxidants, breast cancer, dimethyl benzanthracene, 7,12-dimethylbenzanthracene, myricetin, vincristine

Introduction

Breast cancer is one of the leading causes of morbidity and mortality among women. Worldwide, it is the second most common type of cancer. The incidence of breast cancer is lowest in less developed countries.[1,2] The higher incidence is attributed to delayed first child birth, shorter duration of breast feeding, family history of breast cancer, early menarche, and late menopause. Westernization of lifestyle, changes in dietary habits, indiscriminate exposures to exogenous estrogens are often considered to be reasons for the higher incidence reported in developing countries. Breast cancer originates from breast tissue most commonly from inner lining of milk ducts or lobules that supply the ducts with milk. The primary route of metastasis is the lymphatic system or blood stream.[3]

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Breast cancer can be induced by 7,12-dimethyl benzanthracene (DMBA), a procarcinogen with selectivity for breast cancer in experimental female Wistar rats. It undergoes metabolic activation to carcinogen dihydrodiolepoxide.[4] The carcinogenic and mutagenic activity of DMBA requires metabolic activation by mixed function oxidases located in rat liver microsomes. The dihydrodiolepoxide binds with adenine residues of deoxyribonucleic acid, resulting in mutagenesis and carcinogenesis.[5,6]

The aim of the present study was to evaluate the effect of myricetin on lipid peroxidation in plasma and breast tissue the antioxidant enzymes like thiobarbituric acid reactive substances (TBARS), superoxide dismutase (SOD) and to compare its efficacy with vincristine a well-known anticancer agent used in the treatment of breast cancer.

Myricetin is a major flavonol distributed ubiquitously in edible plants and is one of the most potent antioxidants of plant origin.[7] The daily intake of myricetin in western diet is estimated to range between 0 and 30 mg with a median of 10 mg.[8] It is abundantly found in *Allium cepa, Solanum lycopersicum, Vitis vinifera, Olea europa, Morus alba, Thea sinesis,* and *Crataegus cuneata*. Myricetin is claimed to have antioxidant antiallergic, antiatherogenic, anti-inflammatory, and antiangiogenic actions.[9-13]

Materials and Methods

Chemicals and carcinogen

DMBA was purchased from Sigma chemical company (St. Louis, MO, USA) and myricetin from allergic research

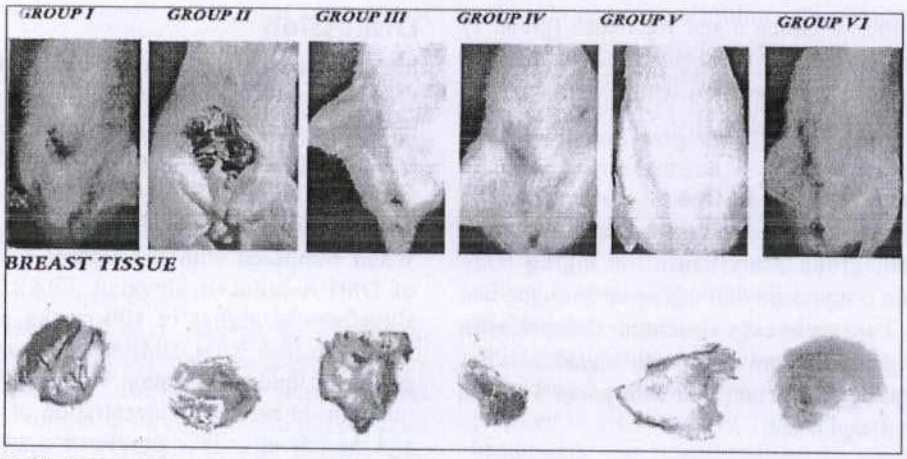

Figure 1: Macroscopic changes

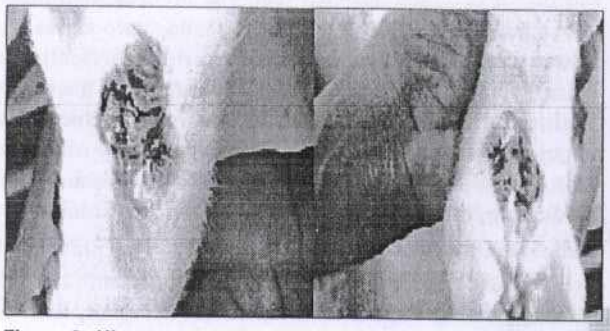

Figure 2: Ulcer produced in the rat treated with 7,12-dimethyl benzanthracene

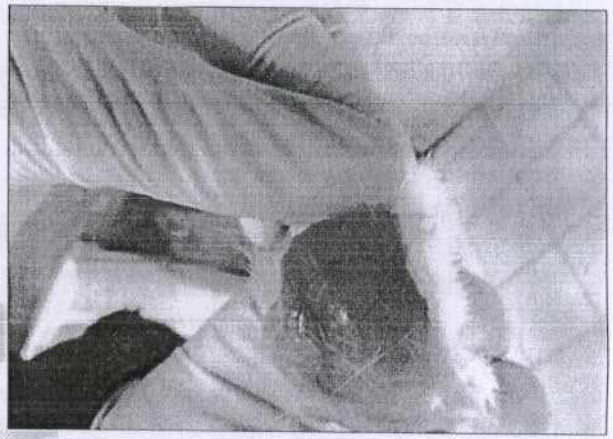

Figure 3: Tumors produced in the rat treated with 7,12-dimethyl benzanthracene

Although basic research in cancer biology has provided new targets into a sharp focus, new and novel approaches to cancer prevention and treatment are needed. Myricetin is given orally while vincristine can be given only through parenteral route. In this preclinical study orally administered myricetin on DMBA-induced breast cancer was evaluated and compared with vincristine. Myricetin increased the level of plasma erythrocyte lysate, breast superoxide dismutase, and inhibited the plasma lipid peroxidation. The effect was either comparable or superior to the action of vincristine.

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News

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