

Phytochemical Screening and Evaluation of the Phytoestrogenic, Hypocholesterolemic and Antioxidant activity of Ethanolic Extract of Sour Sop (*Annona muricata*) Seeds in DMBA-Treated Female Wistar Rats

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: *Annona muricata*; commonly known as sour sop has been reported to possess ethno medicinal values including anti-tumor and antioxidant activities. Odugmeg5ong5o201 BDC BT0 Tw 8 0u TJETEMC /Span 4 Lang (en-US)/MCID 1

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: The results obtained in the study suggest the phytoestrogenic, hypocholesterolemic and antioxidant activity of *A. muricata* extract in DMBA-treated rats.

Keywords: Phytoestrogen; DMBA; Antioxidant; Hypocholesterolemic; *Annona muricata*

Introduction

Cancer has been defined as a multi-step process in which cells undergo alterations due to accumulation of modifications in the genes that control cell proliferation which then results into the formation of a mass of deregulated cells [1]. Breast cancer has been known to be initiated in the luminal epithelial cells of the mammary gland and various endogenous factors have been implicated in its etiology and progression [2]. Studies have revealed that the cumulative exposure to endogenous estrogen all through a woman's lifespan contributes to and may be an etiologic factor in breast cancer [3,4]. Estrogen replacement therapy or hormone replacement therapy using synthetic estrogen has been employed in the management of some types of breast cancer but this has led to a relatively increased risk of breast cancer as reported by Fournier et al. [4]. As an addendum, high cholesterol levels have also been linked to increased endogenous estrogen production as estradiol which is the most potent form of estrogen in females is synthesized from cholesterol. Studies have implicated cholesterol in the initiation and progression of tumors [5]. Exposure of humans to contaminants like 7,12-dimethylbenzanthracene (DMBA) can lead to the accumulation of free radicals; resulting in oxidative stress which inevitably leads to depletion of the endogenous antioxidant parameters

in the body system and this further promotes the progression of cancer. (m)4 (e

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November 24, 2017; April 16, 2018; April 24, 2018

Abiola T, Kings AT, Akinosho O (2018) Phytochemical Screening and Evaluation of the Phytoestrogenic, Hypocholesterolemic and Antioxidant activity of Ethanolic Extract of Sour Sop (*Annona muricata*) Seeds in DMBA-Treated Female Wistar Rats. *Biochem Physiol* 7: 232. doi: [10.4172/2168-9652.1000232](https://doi.org/10.4172/2168-9652.1000232)

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dependent cancers like breast cancer [6]. Phytoestrogens refer to a varied group of plant substances with semblance to the structure of 17 estradiol which also mimics estrogenic actions by binding to estradiol receptors [7,8]. Examples of compounds categorized as phytoestrogens include iso avonones, lignans, coumestans and stilbens [9,10]. They have been found to regulate the cell cycle and apoptosis [11].

Annona muricata popularly called sour sop; a member of the Annonaceae family is an evergreen, terrestrial, erect tree (5-8 m) in height with the fruits large, oval shaped which contains smooth hard, black seed [12]. Extracts of sour sop has been employed in allopathy and

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each. The experimental groups received different concentration of ethanolic extract of *A. muricata* seed with respect to the LD₅₀ results.

Group I (Positive control): Rats treated with distilled water only.

Group II: Rats treated with 200 mg/kg per body weight *Annona muricata* (A.M) extract only.

Group III (Negative control): Rats treated with 20 mg/kg per body weight (pbw) 7, 12-dimethylbenzanthracene (DMBA), twice a week for 2 weeks only.

Group IV: Rats treated with 20 mg/kg pbw of DMBA twice a week for 2 weeks+Tamoxifen 20 mg/kg pbw

Group V: Rats treated with 20 mg/kg pbw DMBA, twice a week for 2 weeks+100 mg/kg pbw A.M extract.

Group VI: Rats treated with 20 mg/kg pbw DMBA, twice a week for 2 weeks+200 mg/kg pbw A.M extract.

DMBA and extract were given subcutaneously by intraperitoneal injection. The experiment lasted for ten weeks. The experimental and control animals were carefully checked daily and their weight taken weekly.

The results of the quantitative phytochemical screening of selected phytochemicals present in the ethanol extract of *Annona muricata* seeds is shown in Table 2. It revealed that flavonoids was present in the highest amount (27.52 mg/100 g), followed by phenol (26.74 mg/100 g), tannin (21.95 mg/100 g), steroid (20.23 mg/100 g), while alkaloid was found to be in the lowest amount (19.25 mg/100 g).

Effect of *Annona muricata* seed extract on estradiol and cholesterol levels in DMBA-treated rats

As shown in Table 3, there was a significant ($P < 0.05$) increase in the estradiol levels of all the DMBA-treated groups that received the extract as compared to the DMBA only group and the control group. However, the highest significant estradiol level was observed in the group that received the 200 mg/kg per body weight *A. muricata* seed extract. Also, there was a significant ($P < 0.05$) decrease in the cholesterol levels in all the groups as compared to the control group. The lowest cholesterol level was recorded in the DMBA-treated group that received 100 mg/kg per body weight of *A. muricata* seed extract.

Effect of *A. muricata* extract on serum levels of superoxide dismutase (SOD), catalase (CAT) and malondialdehyde (MDA) in DMBA treated rats

As shown in Table 4, there was a significant ($P < 0.05$) higher level of SOD in group VI (20 mg/kg DMBA followed by 200 mg/kg A.M seed extract) when compared to the other groups, followed by the group that received extract only while the lowest SOD value was observed in group IV. There was a significant ($P < 0.05$) decrease in the catalase level of all the groups as compared to that of the control but there was a significant ($P < 0.05$) increase in the CAT level of the group that received DMBA followed by 200 mg/kg A.M extract as compared to the DMBA only group.

Also, a significant ($P < 0.05$) increase in the MDA level was observed in the DMBA only group (Group III) when compared to that of the normal control rats. However, there was a significant ($P < 0.05$) decrease in the MDA level of the groups that were treated with DMBA followed by A.M seed extract had a significant ($P < 0.05$) decrease in MDA level as compared to the DMBA positive control group with the group that received 100 mg/kg per body weight of the extract having a much more lower MDA level.

Discussion

known to be beneficial for the prevention of cancer as well as treatment of inflamed or ulcerated tissues [33-35].

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