



EVALUATION OF ANTI-ULCER ACTIVITY OF METHANOLIC EXTRACT OF *BALANITES AEGYPTIACA* L. BARK

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ABSTRACT

Since immemorial time whole medicinal plants or their parts are being used in all types of diseases. Medicinal plants are considered as safe and effective medicines for various diseases. *Balanites aegyptiaca* L. (*Zygophyllaceae*) is spiny shrub or tree grow up to 10 m tall, widely distributed in dry land areas of Africa and South Asia mainly found on deep sandy loam and free access to water. It is a folkloric medicine for a variety of ailments including purgative, jaundice, syphilis, epilepsy, anthelmintic and antimalarial etc. Indomethacin induced model was selected for assessing antiulcer activity in rats. In this model Omeprazole was used as a standard against methanolic *Balanites aegyptiaca* L. bark extract. The parameter studied was ulcer index and percentage inhibition of ulcer index. The present work indicates that the methanolic extract of *Balanites aegyptiaca* L. bark extract shows significant anti-ulcer activity. Acute toxicity studies were conducted for the methanolic extract of *Balanites aegyptiaca* bark. The maximum tolerated dose was found to be 2000 mg/kg b.w when the extract was administered orally.

Key words: Anti-ulcer activity, Indomethacin induced ulcer, *Balanites aegyptiaca*, *Zygophyllaceae*.

INTRODUCTION

Gastric ulcer is a common disorder caused by discontinuity in the gastric mucosa (Vadivelan R *et al.*, 2010). Stress and use of NSAIDs, smoking, alcohol, coffee, tobacco leads to ulcer (Anita Gnana Kumari AV *et al.*, 2011). In the treatment of peptic ulcer gastric acid secretion is inhibited by H₂-antagonists, such as Omeprazole, antimuscarinics etc. However, one major problem is there in the treatment that, despite a healing rate of 80-100% after 4-8 weeks of therapy with proton pump inhibitors and H₂- antagonists, within one year after suspending the treatment the rate of ulcer recurrence is between 40 and 80%. The modern medicine which is used for treatment of ulcer they have several side effects, indigenous drugs are better alternative sources for the treatment of peptic ulcer with low side effects.

The plant *Balanites aegyptiaca* L. is a small evergreen thorny tree belonging to the *Zygophyllaceae* family. It is commonly called as “desert date”. Synonyms of the plant include *Agialida senegalensis* van Tiegh, *Balanites ziziphoides* Milbr. Et Schlechter, *Agialida tombuctensis* van Tiegh, It is distributed in drier parts of India (Kalpesh G *et al.*, 2008). The plant is native to Africa and found in Rajasthan, Gujarat, Madhya Pradesh, and Deccan (Daya LC and Vaghasiya HU, 2011). It contains proteins, lipids, carbohydrates, alkaloids, saponins, flavonoids, and organic acid. In folk medicine, *Balanites aegyptiaca* L. is used to treat skin disease, tape worm (Meda RNT *et al.*, 2011), jaundice, wounds, malaria, syphilis, epilepsy, dysentery, constipation, diarrhea, hemorrhoid, stomach aches, asthma, and fever. A review of the literature revealed that the anti-ulcer activity of this plant has not been subjected to scientific evaluation. Therefore, the anti-ulcer activity of this plant was taken up for the validation of its folklore use in anti-ulcer.

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MATERIALS AND METHODS

Collection and authentication of plant material

The bark of *Balanites aegyptiaca* L. were collected from local area of Vangapally village of Nalgonda District, Andhra Pradesh in November and was authenticated by Dr. S. Srinivas Rao, Dept of Botany, S.L.N.S Degree and PG College, Bhongir, Andhra Pradesh, India and specimen was deposited in the departmental herbarium.

Preparation of the bark extract

Initially this bark was washed with fresh water to remove adhering dirt and foreign particles and is washed with absolute ethanol to avoid the microbial growth, and was dried under the shade. The dried bark was crushed and grinded to get powder and weighed. The powdered material of bark of *Balanites aegyptiaca* L. was refluxed successively with methanol in a Soxhlet extractor for 72 hrs. The solution so obtained was transferred to china dish and then allowed for drying. The extract so obtained was thoroughly washed with ethyl acetate so as to remove the chlorophyll and was dried kept in a desiccator for further use.

Chemicals

All chemicals and reagents used were of analytical grade obtained from various other commercial sources.

Acute oral toxicity studies

A safe oral dose of the extract was determined by acute oral toxic class method of Organization of Economic Co-Operation and Development (OECD, 2011) as per 423 guidelines.

Experimental animal

Wister weighing 150-200 g either sex was used in this study. All the animals were housed for a week in a ventilated standard lab condition (room temperature $26 \pm 2^\circ\text{C}$ and 12 h \pm day night cycle). The animals used in this study were approved from Institutional Animal Ethical Committee (IAEC) of SASTRA University, Thanjavur, Tamilnadu. The experiments were conducted as per the guidelines of CPCSEA (Committee for the Purposes of Control Supervision of Experiments on Animals), Chennai, India. (Approval no: 86/ SASTRA/ IAEC/ RPP).

Preparation of test sample

One concentration (200 mg) of the extract was prepared by using 0.1% tween 80. Omeprazole (20 mg) suspended in 0.1% tween 80 solution used as standard drug, Indomethacin (20 mg) suspended in 0.1% tween 80 solutions.

Indomethacin-induced ulcer in rats

Wistar rats weighing between 150- 200 g were

randomly divided into four groups of six each. The ulcers were induced from group II- IV by oral administration of Indomethacin (20 mg/kg). The group I was served as Negative control. The rats were fasted for 24 hrs prior to the experiment. The different groups were assigned as described below (Vogels HG, 2002).

Group I: Negative control (0.1 % tween) p.o

Group II: Positive control, Indomethacin (20 mg/ kg) p.o

Group III: Indomethacin (20 mg/kg) + BAME (200 mg/kg) p.o

Group IV: Indomethacin (20 mg/kg) + Omeprazole (20 mg/kg) p.o

All the drug solution were prepared using 0.1 % tween 80 and given orally in the dose of 0.2 ml/ 200 g 10 min prior to Indomethacin administration. After 6 hrs rats were sacrificed by decapitation, stomachs were removed and 2 % v/v formalin saline solution injected into totally ligated stomach for overnight storage. The next day, stomach was opened along with greater curvature was treated with warmed water and the ulcers were observed.

Statistical analysis

One way ANOVA followed by NEWMAN-KEULS TEST values are mean \pm S.E.M for six rats *p < 0.001 when compared to control group.

RESULTS AND DISCUSSION

Acute toxicity studies were conducted for the methanolic extract of *Balanites aegyptiaca* L. bark. The maximum tolerated dose was found to be 2000 mg/kg b.w when the extract was administered orally. As per the OECD (International toxicity testing) guidelines the maximum therapeutic dose is 1/10th of maximum tolerated dose, hence the therapeutic dose selected for the extracts was 200 mg/kg body weight.

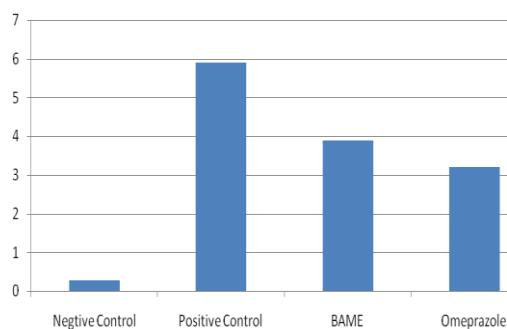
Indomethacin, Aspirin being non-steroidal anti-inflammatory (NSAIDS) drugs are known to induce ulcers during the course of action, i.e., prostaglandin synthesis inhibition through cyclogenase pathway and on production of leukotriene and other products of 5-lipoxygenase activity.

Indomethacin induced ulcer is caused by back diffusion of hydrogen ions into the mucosal cells. The results were comparable with standard antiulcer drug Omeprazole. In the Indomethacin induced ulcer model the oral administration of BAME (200 mg/kg) showed the percentage inhibition of ulcer 68.36 % compared to Omeprazole (20 mg/kg) which showed 73.22 %. Phytochemical analysis showed the presence of glycosides, flavonoids, tannins and phenolic compounds, steroids and saponins the antiulcer activity may be due to the presence of flavonoids, tannins and steroids. When compared to positive control, the methanolic extract of

Table 1. Ulcer index estimation in Indomethacin induced ulcer

Groups	Treatment	Ulcer index	Percentage inhibition
Group I	Negative control(0.1% tween 80) p.o	0.28 ± 0.05	-----
Group II	Positive control, Indomethacin (20 mg/kg) p.o	5.9 ± 0.05*	42.66
Group III	Indomethacin (20 mg/kg) + BAME (200 mg/kg) p.o	3.9 ± 0.06*	68.36
Group IV	Indomethacin (20 mg/kg) + Omeprazole (20 mg/kg) p.o	3.02 ± 0.04*	73.22

One way ANOVA followed by NEWMAN-KEULS TEST values are mean ± S.E.M for six rats *p < 0.001 when compared to control group.

Fig 1. Ulcer index of Indomethacin induced ulcer

bark of *Balanites aegyptiaca* L. showed significant activity. So the present work proves the folklore claim of the bark of *Balanites aegyptiaca* L. Further pharmacological investigations are also needed to elucidate the mechanism of the observed antiulcer activity of the plant (Datta GK *et al.*, 2002).

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CONCLUSION

The antiulcer activity of methanolic extract of *Balanites aegyptiaca* L. bark by Indomethacin induced ulceration in the Swiss albino rats. Indomethacin induced ulcer is one of the most widely used methods for studying the effect of drug on gastric secretion. In the present investigation the methanolic extract of *Balanites aegyptiaca* L. showed significant anti-ulcer activity at 200 mg/ kg by Indomethacin induced ulcer in rats. *Balanites aegyptiaca* L. may emerge as more effective therapeutic agent to counter gastric ulcer incidence. However more detailed studies have to be performed further on isolation and characterization of the chemical compound responsible for the pharmacological activity.

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