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Investigation of Ximenia Americana leaf extract for anti-ulcer effects using ethanol-induced gastric ulcer model in rats

[*1] P Vasanth Kumar, [1] K vijaya, [2] M Siddaiah

[1] Pacific University Udaipur Rajasthan, India.

[2] P. Rami Reddy Memorial College of Pharmacy Kadapa, Andhra Pradesh, India.

Abstract
The antiulcer effects of the aqueous extract of *ximenia americana* leaves were investigated using ethanol-induced gastric ulcer model in rats. The extract was prepared by refluxed successively with ethanol in soxhlet extractor for 72 hrs. A yield of 15.30% w/w dry extract was obtained. *ximenia americana* extract (AEXA) exhibited a more gastro-protective effect against ethanol-induced stomach ulcers at 150,300 and 600 mg/kg than Ranitidine (50mg) and solvent treated (control) rats. AEXA had 66.73%, 47.22% while Ranitidine produced 79.71%. lesions were observed to deviate from massive severe lesions with marked disorientation of the gastric epithelium in the control to fairly protected mucosa with Ranitidine and a better protected mucosa with intact epithelium in AEXA (150,300 mg/kg) treated rats. AEXA extract was found to be significantly protective against ethanol-induced gastric ulcers in the experimental rats.

Keywords: ximenia americana Ethanol, Antiulcer, Preventive index, Gastric ulcer

Introduction

Peptic ulcer is a chronic, non-malignant inflammatory disease characterised by ulceration in the upper gastro-intestinal tract (stomach and duodenum) where parietal cells are found (AlKofahi *et al*., 1999) [1]. The etiology of gastric ulceration is multi factorial and not clearly defined, but some predisposing factors have been implicated. This include duration of starvation, nature of food ingested, bile reflux, lessened mucosal resistance, alteration of gastric mucosal blood flow, disruption of gastric mucosal barrier by stress, decrease in alkaline mucosal bicarbonate and mucus secretion(Kirtikar *et al*., 1935) [2], over dosage and or prolonged administration of non-steroidal anti-inflammatory drugs, persistent infection with *Helicobacter pylori*, and genetic factors as suggested by a higher incidence of duodenal ulcers in patients with positive family history of this disorder. Pathophysiology of ulcer is due to an imbalance between aggressive factors (acid, pepsin, H.*pylori* and non-steroidal anti-inflammatory agents) and local mucosal defensive factors (mucus bicarbonate, blood flow and prostaglandins). Oxidative stress-induced tissue damage with reactive oxygen species (ROS) is implicated as a cause and consequence of a variety of disorders, (K.Narayana rao *et al*., 1991) [3]. including coronary heart disease, neurodegenerative disorders, autoimmune pathologies, cancer, apoptosis etc. (Kulkarni SK., 1999) [4].Exposure of gastric mucosa to damaging factors such as ethanol, thermal stress or various irritants that are commonly named 'breakers' of gastric mucosal barrier produces pathological changes. Histamine is regarded as the critical regulator of gastric acid secretion. Most antiulcer drugs require prolong period of intake, yet ulcer relapse is a common occurrence. Many have various adverse effects and no drug

Proves solely effective in treating peptic ulcer (Dhuley *et al*., 1999) [5]. Leaf *ximenia americana* is noted for being effective in the treatment of different ulcer cases by the treatment of herbal medicine in this region (Soll. AH, 1990) [6]. A scientific investigation of this plant based on its folkloric use has not been done before. The aim of this study was to investigate the antiulcer effects of leaves *ximenia americana* using ethanol gastric ulcer induction model in rats.

Materials and methods

Solutions, reagents, drugs and chemicals

Freshly prepared solutions and analytical grade chemicals were used in all the experiments. Ethanol were obtained from local suppliers, Ranitidine was the gift sample from (vimala analytical Labs, Hyderabad).

Animals

Wister albino rates of either sex weighing 180-220gms were used for the present study. They were procured from Sri Venkateswara enterprises Bangalore. They were acclimatized for one week under laboratory conditions they were housed in polypropylene cages and maintained at $25^0C \pm 2^0C$ under 12 hours dark/ light cycle and 65% humidity. The rats were allowed standard rat feed pallets supplied by Hindustan lever co. Mumbai. The litter in the cages was removed thrice a week to ensure hygenicity and Maximum comfort for animals.

Preparation of the plant extract

The leaves were washed with fresh water to remove dirt and foreign particles and are washes with absolute ethanol to avoid the microbial growth, and were dried under the shade (Surendra *et al*., 1999) [7]. The dried leaves were crushed and grinded to get powder and weighed. The powdered material of leaves of *L. ximenia americana*, was refluxed successively with ethanol in soxhlet extractor for 72 hrs. (Mukaherjee PK *et al*., 2002) [8]. 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 desiccators for further use. (Toma W *et al*., 2005) [9].

Acute toxicity test

An attempt was made to identify LD_{50} by using OPPTS 870.1100 guidelines (up and down procedure) AEXA. It has been found that these extracts are safe to use in animals even at a dose 5 gm/kg orally body weight before and after administration of both the extracts as per schedule were noted and any changes in skin, fur, eyes, mucous membranes, behavior pattern etc. were observed. No sign of tremors, convulsions, salivation, diarrhea and coma were seen. However remarkable reduction of spontaneous locomotor activity and drowsiness were found after drug administration (Borelli F *et al*., 2000) [10]. This result promotes us to evaluate CNS depressant activity for both plants. But there was no mortality observed at 5000mg/kg b.w. Therefore, 150mg/kg, 300mg/kg, and 600mg/kg b.w. doses were selected for all studies (Khadelwal KR *et al*., 2008) [12].

Effect of extra *ximenia americana* act on ethanol-induced gastric ulcers in rats

ximenia americana AEXA produced a significant reduction in the mean ulcer index of 1.24 +0.20 and 1.23 + 0.28 at 150 and 300 mg/kg respectively when compared with 2.96 + 0.13 in solvent treated rats (Kokate CK *et al*., 1995) [11]. The extract had an equally better gastro-protective effect with the same preventive index of 59% at 250 and 750 mg/kg over 55% with Ranitidine (Table 1).

Table 1: Effect of extr *ximenia americana* act on ethanol-induced gastric ulcers in rats

Treatment mg/kg	No. of animal	Mean ulcer index ± SE	Preventive index (%)
Control	6	0.64±0.04	0
Ranitidine	6	0.48±0.45	79.71
AEXA150mg/kg	6	0.44±0.12*	66.73
AEXA300mg/kg	6	0.38±0.32*	47.22
AEXA600mg/kg	6	0.35±0.34	40.10

*Superscript indicates significant difference at $p<0.05$ when compared with the control.

Macroscopical view of Alcohol induced gastric ulcer in Rats

AEXA150mg Control

AEXA150mg AEXA*300mg* AEXA600mg

Discussion

ximenia americana (AEXA) was safe, up to a dose of 5000mg/kg b.w did not cause mortality in the rats (Mukarjee PK,2005) [13]. Preliminary *in vivo* studies with extract doses above 600 mg/kg did not show appreciable difference between treated and normal rats. In the experimental rats, the extract exhibited maximal protective effect at 150,300mg/kg against ethanol-Induced gastric ulcers over Ranitidine (100 mg/kg) and control (Stephen *et al*., 2011) [14]. This is evidenced in the ulcer index (150 mg/kg300mg/kg AEXA =0.44±0.12, 0.38±0.32 Ranitidine = 0.48±0.45 and Control=0.64±10.04), percentage ulcer preventive index (150 mg/kg, 300 mg/kg AEXA =66.73, 47.22; Ranitidine =79.71% and Control=0%). EETP suppressed ulcerogenic tendencies of ethanol in the experimental rats at doses 150 and 300mg/kg, an effect suggestive of antioxidant potential (Rajkapoor B *et al*., 2003) [15]. Antioxidants consist of vitamins, polyphenols, flavonoids, minerals and Antioxidants disrupt the chain reaction in which

free radicals turn other molecules into free radicals like themselves, a process of chain breaking or stabilization (Harshada T. *et al*., 2011) [16].

Conclusion and recommendation

The results of the investigation of leaves fo *ximenia americana* r antiulcer effects using ethanol-induced gastric ulcer model in rats laid credence to traditional use of the plant leaves in ulcer treatment. The crude aqueous extract of *ximenia americana leaves* at 150,300 mg/kg demonstrated preventive index compared to Ranitidine treated rats. Further studies on *ximenia americana* extract are however, recommended to evaluate its antioxidant power.

References

1. AlKofahi A, Atta AH. Pharmacological screening of the antiulcerogenic effects of some Jordanian Mecicinal Plants in rats, J Ethnopharmacol. 1999, 65:341-5.
2. Kirtikar KR, Basu BD. Terminalia chebula. In: Indian Medicinal Plants,Lolit Mohan Basu Publication, Allahabad, India, 1935, 1020-23.
3. Narayana rao K, Nagaraju N, Vedavati S. Use of medicinal plants in Chittoor district of Andhrapradesh,recent advances in medicinal,aromatic and spice crops. 1991; 1:135-141.
4. Kulkarni SK. Hand book of experimental pharmacology, Vallabh Prakashan, New Delhi, 1999, 148-50.
5. Dhuley JN. Protective effect of Rhinax, an herbal formation against physical and chemical factors induced gastric and duodenal ulcers in rats. Indian J Pharmacol. 1999; 31:128-32.
6. Soll AH. Pathogenesis of peptic ulcers and implication for therapy. New Eng J Med. 1990; 322:909- 16.
7. Surendra S. Evaluation of gastric antiulcer activity of fixed oil of tulsi and possible mechanism. Indian J Exp Biol. 1999; 36(3):253-57.
8. Mukaherjee PK, Quality control of herbal drugs (an approach to evaluation of botanicals), Business Horizon's, New Delhi, 2002, 380-421.
9. Toma W, Hiruma-Lima CA, Guerrer RO, Souza AR. Preliminary studies of Mammea Americana L (Guttiferae) bark/latex extract point to an effective antiulcer effect on gastric ulcer models in mice,Phytomedicine, 2005; 12:345-50.
10. Borelli F, Izzo AA. The plant kingdom as a source of anti-ulcer remedies, Phytother Res, 2000; 14:581-91.
11. Kokate CK, Purohit AP, Gokhale SB. Phamacognosy Nirali Prakasham Publishers, Pune. 3rd edn. 1995, 317.
12. Khadelwal KR, Practical Phamacognosy, 19th edn. Niraliprakasham publshers, Pune, 2008, 150.
13. Mukarjee PK. quality control of Herbal drugs an approach of evaluation of Botanicals, 2nd edn. Pharmaceutical publishers, New Delhi. 2005, 538.
14. Stephen OO, Fidelis PC, Buniyamin AA, Onajite OU, Peter OA, Gerald OE. Gastroprotective effects of the ethyl acetate fraction of Anchomanes difformis (Engl). Int J Health Res. 2011; 4(4):155-161.
15. Rajkapoor B, Jayakar B, Anandan R, Kavimani S. Anti-ulcer effect of Bauhinia variegatelinn in rats. J Natural Rem. 2003; 3(2):215-217.
16. Harshada T, Vaishali M, Deorao A, Hukkeri VI, Preeti M, Pallavi V. Screening of antiulcer activity of Caesalpinia pulcherrima L.Bark against aspirin induced ulcer in rats. World J Med Sci. 2011; 6(4):168-172.