Venkatanarayana D et al. / International Journal of Pharmacy & Therapeutics, 7(3), 2016, 101-105.

e- ISSN 0976-0342
Print ISSN 2229-7456

International Journal of Pharmacy & Therapeutics

Journal homepage: www.ijptjournal.com

IJPT

ANTIULCER ACTIVITY OF *BUCHANANIA ANGUSTIFOLIA*, (ANACARDIACEAE)

Venkatanarayana D[1], Mohana Lakshmi S[2], Chandra Sekhar KB[3]

[1]Research Scholar, Jawaharlal Nehru Institute of Advanced Studies (JNIAS), Hyderabad, Telangana, India.
[2]Professor, Department of Pharmacognosy, Sree Vidyanikethan College of Pharmacy, Tirupati, Andhra Pradesh, India.
[3]Director, JNTUA Oil Technological Research Institute, Ananthapuramu, Andhra Pradesh, India.

ABSTRACT

Peptic ulcer is one of the most prevalent gastrointestinal disorders, which affects approximately 5-10% of people during their life. In recent years, screening on herbal medicine to clarify their potential efficacy in peptic ulcer prevention or management. Here, present study was carried out to investigate antiulcer activity of methanol extract of *Buchanania Angustifolia* (Anacardiaceae) leaves in pylorus ligated, ethanol and indomethacin induced ulceration in the albino rats. In pylorus ligation induced ulcer model, ethanol induced ulcer model and indomethacin induced ulcer model ulcer index and percentage inhibition of ulceration was determined. Omeprazole (20 mg/kg) was used as the standard drug. The methanol extract of *Buchanania Angustifolia* (Anacardiaceae) leaves possess significant antiulcer properties in a dose dependent manner. Mainly the MEBA 400mg/kg shows significant action ($P<0.05$) compared to dose MEBA 200mg/kg. But when compared to control group MEBA 200mg/kg shows significant antiulcer property. The methanol extract of *Buchanania Angustifolia* leaves possess significant antiulcer properties may be attributed to the presence of phytochemicals like flavonoids (quercetin), tannins present in the plant extract with various biological activities.

Key Words:- Peptic ulcer, ethanol, Omeprazole, MEBA, Indomethacin.

INTRODUCTION

Peptic ulcer disease is a serious gastrointestinal disorder. The formation of peptic ulcers depends on the presence of acid and peptic activity in gastric juice plus a breakdown in mucosal defenses. There are two major factors that can disrupt the mucosal resistance to injury: non-steroidal anti-inflammatory drugs NSAID like e.g. aspirin and Helicobacter pylori (H. pylori) infection (Jyoti Gupta *et al.,* 2012). Number of drugs including proton pump inhibitors, prostaglandins analogs, histamine receptor antagonists and cytoprotective agents are available for the treatment of peptic ulcer (Ariyphisi *et al.,* 1986). But most of these drugs exhibit serious side effects like arrhythmias, gynaecomastia, impotence, arthralgia, hypergastrinemia and haemopoeitic changes (Akthar *et al.,* 1992). Hence, herbal medicines are generally used in such cases when drugs are to be used for chronic periods. Several natural drugs have been reported to possess anti-ulcerogenic activity by virtue of their predominant effect on mucosal defensive factors(Sairam *et al.,* 2001).

The plant *Buchanania Angustifolia* belongs to family Anacardiaceae it is very common plant in dried parts of India. This plant grows in deciduous forests in north western India. This tree is upto 10 metre tall, hairless branches stout, bark rough, deeply fissured, leaves are linear oblong, elliptic, lanceolate rounded or narrow at

Corresponding Author

Venkata narayana D
Email:- venkatanarayana1978@gmail.com

base, entire at margin, blunt, rounded or notched at tip, flowers are 3-6 mm across in axiallary and terminal hairless branched panicles, sepals are 5 semicircular. Petals are 5, oblong or ovate. Fruits are obliquely globose, slightly compressed. Wound healing, Cardio tonic, CNS depressant**,** Diarrhea, Dysuria, poly urea, Aphrodisiac, Skin disease**,** the plant seed and bark is used in the form of decoction to treat intrinsic haemorrhage, diarrhoea with blood and tonic. (Madhavachetty *et al.*, 2008).

MATERIALS AND METHODS

Plant material:

The whole plant of *Buchanania Angustifolia*, Anacardiaceae was collected from Talakona forest, Chittoor dist of Andhra Pradesh, India, during September 2011. The plant was authenticated by Prof. P. Jayaraman, Director of National Institute of Herbal Science, W.Tambaram Chennai. The voucher specimen (PARC/2011/1004) of the plant was deposited at the college for further reference.

Preparation of the extract:

Leaves and seeds of. *Buchanania Angustifolia*, Anacardiaceae were washed under running tap water and dried in shade for two weeks. Dried leaves were powdered, sieved and stored in an air tight container at room temperature. Dried powder (400 g) was extracted sequentially with petroleum ether and hydro-alcohol (30:70) by using soxhlation method. The extracts were concentrated to dryness using rotary evaporator. The extracts were preserved in refrigerator at 4ºC.

Animals used

Experimental animals Albino wistar rats of both sex weighing between 150-250 g were used. The experimental protocol was approved from Institutional Animal Ethics Committee. Animals were housed under standard conditions of temperature (24±2ºC) and relative humidity (30-70%) with a 12:12 light: dark cycle

Treatments:

Animals were divided into four groups, each consisting of six rats.

Group- I, served as control group, received distilled water (1 mL) orally.

Group -II received omeprazole (20 mg/kg) reference drug for ulcer protective.

Group - III and IV received MEBA at doses of 200 and 400 mg/kg

Pyloric ligation in rats:

Animals were divided into four groups, each consisting of six rats. Rats in group I, served as control group, received distilled water (1 mL) orally. Rats in group II received omeprazole (20 mg/kg) which was used as a reference drug for ulcer protective studies. Rats in group III and IV received MEBA at doses of 250 and 500 mg/kg, respectively. After 45 min of MEBA and omeprazole treatment, pyloric ligation was done by ligating the pyloric end of stomach of rats of respective groups under ether anaesthesia at a dose of 35 mg/kg bw. Ligation was done without causing any damage to the blood supply of the stomach. Animals were allowed to recover and stabilize in individual cages and were deprived of water during postoperative period. After 4 h of surgery, rats were sacrificed and ulcer scoring was done. Gastric juice was collected and gastric secretion studies were performed (Shay *et al.*, 1945. Kulkarni., 1999).

Ethanol induced ulcer:

The animals were divided into four groups as described above that omeprazole (20 mg/kg) was used as standard. The gastric ulcers were induced in rats by administrating absolute ethanol (99%) (1 ml/200g) orally, after 45 min of formulations or omeprazole treatment). They were kept in specially constructed cages to prevent coprophagia during and after the experiment. The animals were anaesthetized one hour later with anesthetic ether and stomach was incised along the greater curvature and ulceration was scored. A score for the ulcer was studied (Brzozowski *et al.*, 1998).

Indomethacin induced ulcer:

The animals were divided into four groups as described in the above sections. After 45 min of formulations (6 ml/kg, p.o.) or omeprazole (20 mg/kg) treatment to different groups, the animals were administered with Indomethacin 20 mg/kg. The animals were sacrificed after 4 h and the stomach was then excised and cut along the greater curvature, rinsed gently with saline to remove the gastric contents and blood clots. Ulcer index was then calculated by adding the total number of ulcers(Kannappan *et al.*, 2008, Parmar *et al.*, 1991,)

Scoring of ulcer will be made as follows:

Normal stomach.....(0)
Red coloration.....(0.5)
Spot ulcer.....(1)
Hemorrhagic streak..(1.5)
Ulcers.....(2)
Perforation.....(3)

Mean ulcer score for each animal will be expressed as ulcer index.

Percentage protection:
Percentage protection= (Control mean ulcer index - Testmean ulcer index) /control mean ulcer index X 100

Calculation of ulcer index [15]:
$U1 = (UN + US + UP) X 10^{-1}$
U1 = Ulcer index
UN = Average of number of ulcer per animal
US = Average of severity score
UP = Percentage of animal with ulcer

RESULTS:
Pyloric ligation induced gastric ulcer:

Table 1. Effect of Methanolic extract of *Buchanania Angustifolia* on various parameters in pyloric ligation induced gastric ulcer.

Groups	Treatments	Dose(mg/kg)	Ulcer index	% Protection
I	Control	1mL/Animal	15.61±1.50	-
II	Omeprazole	20	2.21±0.51*	85
III	MEBA	200	3.50±0.51	74
IV	MEBA	400	2.52±0.58*	82

*: P<0.05 as compared to control group.

Table 2. Effect of Methanolic extract of *Buchanania Angustifolia* on various parameters in ethanol induced gastric ulcer.

Groups	Treatments	Dose(mg/kg)	Ulcer index	% Protection
I	Control	1mL/Animal	8.61±0.08	-
II	Omeprazole	20	3.02±0.26*	72
III	MEBA	200	4.20±0.04*	55
IV	MEBA	400	3.70±0.60*	68

*: P<0.05 as compared to control group.

Table 3. Effect of Methanolic extract of *Buchanania Angustifolia* on various parameters in Indomethacin induced gastric ulcer.

Groups	Treatments	Dose(mg/kg)	Ulcer index	% Protection
I	Control	1mL/Animal	14.61±1.52	-
II	Omeprazole	20	11.6±0.80*	60
III	MEBA	200	17.8±1.53*	38
IV	MEBA	400	9.16±3.1*	69

*: P<0.05 as compared to control group.

Figure 1. Effect of Methanolic extract of *Buchanania Angustifolia* on various parameters in pyloric ligation induced gastric ulcer

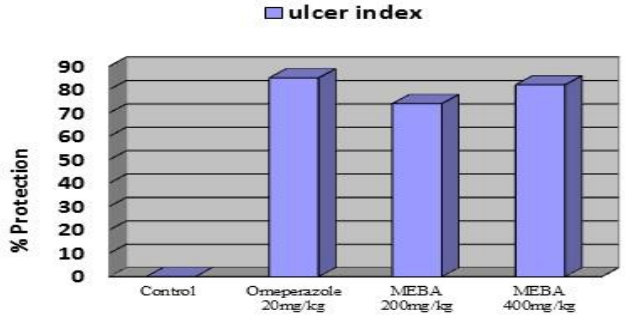


Figure 2. Effect of Methanolic extract of *Buchanania Angustifolia* on various parameters in ethanol induced gastric ulcer.

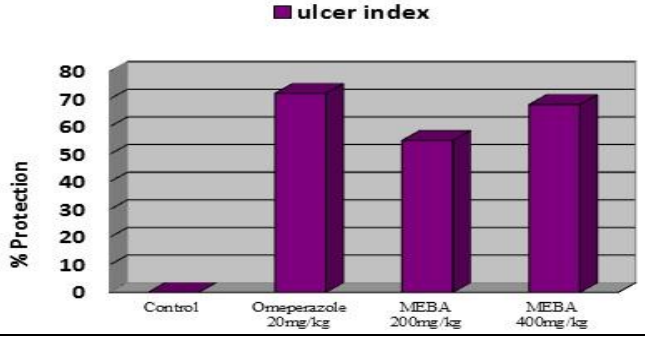
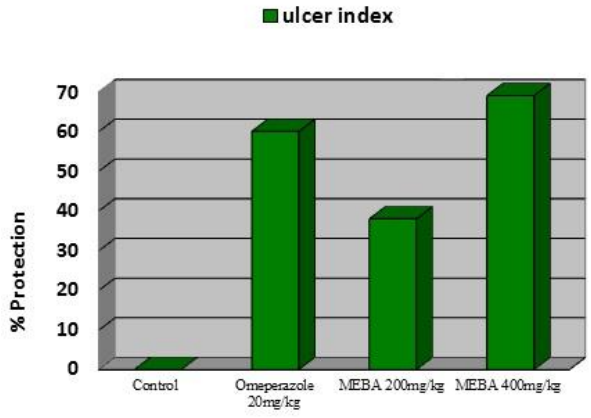


Figure 3. Effect of Methanolic extract of *Buchanania Angustifolia* on various parameters in Indomethacin induced gastric ulcer.



DISCUSSION AND CONCLUSION

In this present study the methanol extract of whole plant *Buchanania Angustifolia,* Anacardiaceae Were investigated for antiulcer activity by using Pyloric ligation in rats, ethanol induced gastric ulcer in rats and Indomethacin induced gastric ulcer in rats.

Peptic ulcer is one of the major ailments effecting humans and develops because of imbalance between aggressive factors (acid, pepsin, *H. pylori*, bile salts) and defensive factors (mucous, bicarbo-nate, blood flow, epithelial cell restoration and prostaglandins)(Tripathi., 1999).

There are several risk factors that may contribute to formation of ulcer in human beings such as stress, chronic use of anti-inflammatory drugs, continuous alcohol ingestion, H. pylori infection, Zollinger Ellison syndrome, etc. Although in most cases the etiology of ulcer is unknown. An effective anti-ulcer drug should act either by reducing the aggressive factors on gastroduodenal mucosa or by increasing mucosal resistance against them. The critical factors which maintain defense and integrity of gastric and intestinal mucosa include normal mucosal blood flow, local prostaglandins, mucous and bicarbonate secretion, epithelial proliferation and repair (Khaja Zeeyauddin *et al.*, 2011).

The treatment of peptic ulcer is mainly aimed at reducing the hydrochloric acid secretion, increas-ing gastric cytoprotection, eradication of *H. pylori* or curing Zollinger Ellison syndrome. The discovery of potential antiulcer agent from plants is a devel-oping area. So far, several plants have been screened for antiulcer activity and many formulations have been developed by combining extracts of these plants.

Pylorus ligation induced ulcer was used to study the effect of leaves extracts on gastric acid secretion and mucus secretion. The ligation of the pyloric end of the stomach causes accumulation of gastric acid in the stomach (Raju *et al.,* 2009.) this increase in the gastric acid secretion causes ulcers in the stomach. The original Shay rat model involves fasting of rats for 36 h followed by ligation of pyloric end of the stomach. The ulcer index is determined 5 h after pylorus ligation. The lesions produced by this method are located in the lumen region of the stomach.

Ethanol induced gastric ulcer was employed to study the cytoprotective effect of the extracts. Ethanol induced gastric lesion formation may be due to stasis in gastric blood flow which contributes to the development of the haemorrhage and necrotic aspects of tissue injury. Alcohol rapidly penetrates the gastric mucosa apparently causing cell and plasma membrane damage leading to increased intracellular membrane permeability to sodium and water. The massive intracellular accumulation of calcium represents a major step in the pathogenesis of gastric mucosal injury. This leads to cell death and exfoliation in the surface epithelium (Soll., 1990, Surendra., 1999).

The indomethacin induced ulcer model represents a form of gastric irritation resulting from the inhibition of prostaglandins synthase. Indomethacin is an example of non steroidal anti-inflammatory drugs which produces their effects by inhibiting prostaglandins synthesis (Steinmeyer, 2000). Acute toxic doses indomethacin (*e.g.* 20mg/kg) or lower chronic doses can produce gastric irritation (Goulart *et al*., 2005). Increase in prostaglandins especially PGE2 andPGI2 has been associated with cytoprotection (Neal, 1991; Deshpande *et al*., 2003). Therefore, agents that inhibit the effects of non-steroidal

anti-inflammatory drugs (NSAIDs) *e.g.* indomethacin will exhibit cytoprotection. The results obtained from using the indomethacin ulcer model showed that the extract can significantly inhibit the gastric effect of indomethacin (20mg/kg) and therefore further exhibiting cytoprotection.

It may act by multiple mechanisms. The activity might be due to increasing the gastric mucosal resistance, local synthesis of cytoprotective prostaglandins and inhibiting the leukotriene synthesis.

It has also been reported that the presence of phyto-constituents tannins, terpenoids, sterols and flavonoids may be responsible for antiulcer activity.

Recent reports and extensive literature review indicated that flavonoids and tannins showed cytoprotective action by increasing mucosal content of prostaglandins and mucous in gastric mucosa.

The methanolic extract of *Buchanania Angustifolia*, Anacardiaceae showed significant anti-ulcer activity which is evident by the data obtained. However further studies required to elucidate the exact mechanism of action for develop its as potent antiulcer drug. These herbal drugs will help to develop new drug molecules for antiulcer therapy.

REFERENCES

Akthar MS, Akthar AH and Khan MA. *Int. J Pharmacog*, 30, 1992, 97-104.

Ariyphisi I, Toshiharu A, Sugimura F, Abe M, Matsuo Y, Honda T. Recurrence during maintenance therapy with histamine H2 receptors antagonist in cases of gastric ulcers, *Nikon University J Medical*, 28, 1986, 69-74.

Brzozowski T, Konturek SJ, Kwiecien S, Pajdo R, Brzozowski I, Hahn EG, et al. Involvement of endogenous cholecystokinin and somatostatin in gastro protection induced by intra duodenal fat, *J Clin Gastroenterol*, 27, 1998, 125-137.

Deshpande SS, Shah GB and Parmar NS. Anti-ulcer activity of *Tephrosia purpurea* in rats. *Indian Journal of Pharmacology*, 35, 2003, 168-172.

Goulart YCF, Sela VR, Obici S, Martins JVC, Otobone F, Cortez DA and Audi EA. Evaluation of gastric anti-ulcer activity in a hydroethanolic extract from *Kilmeyera coracea. Brazilian Archives of Biology and Technology*, 48, 2005, 211-216.

Jyoti Gupta, Dinesh Kumar, Ankit Gupta. Evaluation of gastric anti-ulcer activity of methanolic extract of *Cayratia trifolia* in experimental animals, *Asian Pacific Journal of Tropical Disease*, 2012, 99-102.

Kannappan NS, Jaikumar Manavalan R, Kottai Muthu A. Antiulcer activity of methanolic extract of Jatropha curcas on Aspirin-induced gastric lesions in Wistar rats. *Pharmacologyonline*, 1, 2008, 279-293.

Kulkarni SK. Hand book of experimental pharmacology. New Delhi: Vallabh Prakashan; 1999, 148-150.

Khaja Zeeyauddin, Mangamoori Lakshmi Narsu, Muna Abid, Mohammed Ibrahim3, Evaluation of antiulcer activity of Boswellia serrata bark extracts using aspirin induced ulcer model in albino rats, *J Med Allied Sci*, 1(1), 2011, 14 -20.

Madhavachetty K, Sivaj JK, Tulasi Rao K, Flowering plants of Chittoor district, Andhra Pradesh, India, Student offset printers, Tirupati, 1st edition, 2008, 75.

Neal MJ. (1991). Medical Pharmacology at a Glance. Blackwell series, 62-67.

Parmar NS. Effect of nalaxone and morphine on the experimentally induced Gastric ulers in rats. *Indian Drugs*, 29(7), 1991, 299-302.

Raju D. *et al.* Evaluation of Anti-ulcer activity of methanolic extract of *Terminalia chebula* fruits in experimental rats, *J. Pharm. Sci. & Res.* 3, 2009, 101-107.

Shay H, Komarov SA, Fele SS, Meranze D, Gruenstein H, Siplet H. A simple method for uniform production of gastric ulceration in rat. *Gastroenterology*, 5, 1945, 43-61.

Sairam K, Rao CV, Goel RK. Effect of *Centella asiatica linn* on physical and chemical factors induced gastric ulceration and secretion. *Indian J Exp. Biol*, 39, 2001, 137-142.

Soll AH. Pathogenesis of peptic ulcers and implication for therapy. *N Engl J Med*, 322, 1990, 909-916.

Surendra S. Evaluation of gastric antiulcer activity of fixed oil of tulsi and possible mechanism, *Indian J Exp Biol*, 36(3), 1999, 253-257.

Steinmeyer J. Pharmacological basis for the therapy of pain and inflammation with non steroidal anti-inflammatory drugs. *Arthritis Research*, 2, 2000, 379-385.

Tripathi KD, Essentials of Medical Pharmacology, Jaypee Brothers Medical Publishers (P) Ltd. New Delhi, 1999, 628- 642.