



Gastro protective activity of *Adansonia digitata* L. in ulcer induced rats

*¹ Dhanasree Basipogu, ² Nizamuddin Basha Syed, ³ Suresh Kumar Chitta

¹ Department of Biochemistry, KVR Govt. College (w), Kurnool, Andhra Pradesh, India

^{2,3} Department of Biochemistry, Sri Krishnadevaraya University, Anantapur, Andhra Pradesh, India

Abstract

Back ground: Restorative Definition of ulcer is a break in skin or mucous layer with loss of surface tissue, deterioration and the necrosis of epithelial tissue. Ulcers are generally found in within covering of the stomach or small intestine. Stomach Ulcers are the most obvious indication of peptic ulcer illness. Ulcers happen when the thick layer of bodily fluid, which shields the stomach from the stomach related juices, gets diminished. This empowers the stomach related acids to eat the covering tissue of the stomach.

There are normally two sorts of Ulcers discovered: stomach and throat or oesophagus Ulcers. Both happen due to radically extraordinary reasons. While oesophageal Ulcer, which is uncommon in nature may occur because of liquor utilization, stomach Ulcers, then again, happen because of an assortment of reasons, for example, way of life factors like smoking, presentation to medications and pharmaceuticals alongside hereditary elements. Our present study aimed to assess the gastro protective activity of *Adansonia digitata* (Brahmamlika) which is used by the ethnic community as folklore medicine

Adansonia digitata L. (Malvaceae) is commonly known as baobab tree native to Africa. Baobab is a multi-purpose tree which offers protection and provides food, clothing and medicine as well as raw material for many useful items, locally known as "Brahmamlika", several plant parts have interesting anti-oxidant and anti-inflammatory properties, and baobab has been used extensively since ancient times in traditional medicine. (De Caluwe E *et al.*, 2010). *Adansonia digitata* is a folklore plant utilized by tribes of Kurnool district and south Indian Nallamala forest. In this study we assess antiulcer activity and evaluate the effect on the antioxidant system of experimental rats. The leaf of *Adansonia digitata* was assessed for its gastro defensive action and impact on antioxidant enzymes. Therefore, we found that the AAD¹ EAD² contain fundamentally viable gastro defensive action. It is further planned to study the antioxidant enzymatic studies of GSH, GR, GPx, GST, SOD and CAT in same ulcer incited experimental rats. Subsequently our trial study gives an indescribable imprint to the ethno botanical claims and reported ethno pharmacological actions that *Adansonia digitata* leaves have a huge restorative potential.

1. Aqueous extract of *Adansonia digitata*,

2. Ethanol extract of *Adansonia digitata*

Methods: *In vivo* analysis done in the male Wister albino rats by inducing ulcer and gastro protective studies were carried out

Results: The AAD exhibited a dose dependent inhibition percentage of 54.65 preferably at the dose of 200 mg/kg dose. The standard drug Ranitidine showed an inhibition percentage of 77.04.

Keywords: *Adansonia digitata*, Brahmamlika, gastro-protective, ranitidine, ulcer

1. Introduction

As we all realize that the Peptic Ulcer disorder is the most widely recognized gastrointestinal disease in clinical practice. Considering that the several symptoms (arrhythmias, weakness and hematopoietic changes (Akhtar *et al.*, 1992)^[1]. Notwithstanding this it likewise causes the inside harm to the cell reinforcement enzymes. To beat the reaction and to improve the adequacy and bioavailability of medication it is vital to depend on Herbal prescription. Herbal medication, a part of ethno-solution, is as old as the historical backdrop of man and traverses all societies. Therapeutic plants have been utilizing as a part of the improvement of new flexible medications and keep on assuming a urgent part in the medication revelation. (Cragg *et al.*, 1999)^[3]. The plant kingdom still holds numerous species containing substances of therapeutic quality which have yet to be found. Extensive quantities of plants are continually being screened

for their conceivable pharmacological esteem especially for their mitigating, hypertensive (Qadir, 2011)^[9], hepatoprotective (Ali *et al.*, 2013; Mallhi *et al.*, 2014; Saleem *et al.*, 2014)^[10, 11, 12]. movement. Henceforth, there is incredible enthusiasm for the utilization of actually happening cell

Reinforcements for treatment or prophylaxis of different oxidative anxiety related sicknesses (Maxwell, 1995)^[14]. It has been found that the *Adansonia digitata* which is locally known as Brahmamlika and its roots and leaves utilized as a part of the treatment of gastrointestinal inconveniences by Sugli and korkus tribes lived in Melghat of INDIA (Tambekar *et al.*, 2010)^[13]. Its leaves contain the dynamic phytochemicals, for example, sugar, flavonoids, steroids, tannins, phenols and fats and oil (Sagwan *et al.*, 2010)^[14] Phenolic compounds are the plant auxiliary metabolites known for their hostile to oxidative and anti inflammatory properties. Though is the situation of

flavonoids, in specific with Quercetin and kampferol subordinates officially portrayed for their in vitro and in vivo anti inflammatory properties (Morikawa *et al.*, 2003; Blonska *et al.*, 2004; Wang *et al.*, 2008)^[5, 6, 7] and known for common cancer prevention agents showing beneficial outcome on different catalysts connected with generation of radical oxygen species (Pietta, 2000)^[8].

By keeping all these, in our present exploratory study we have chosen the Aqueous and Ethanol extracts of *Adansonia digitata* leaf to assess the gastro defensive activity.

2. Objective of Research

Gastric ulcers influence numerous individuals around the globe and their advancement is an aftereffect of the lopsidedness in the middle of forceful and defensive components in the gastric mucosa. *Adansonia digitata*, traditional medicinal plant has pulled in light of a legitimate concern for mainstream researchers because of its pharmacological properties and its potential helpful applications. In this study, the preventive impacts of the *Adansonia digitata* against gastric ulcer instigated by 95% ethanol were assessed in male Wister rats.

3. Materials and Methods

Plant Procurement

The plant *Adansonia digitata* was procured from the Nallamala forest of Kurnool district in the month of November. The identity of the plant was confirmed by Dr. D. Swapna sri Head, Dept. of PG Botany, KVR GOVT College (W) (A) Kurnool, AP, INDIA. The voucher specimen of the plant was kept for future reference. Two hundred grams of leaves were dried at ambient temperature for 10–15 days. After drying the leaves were grinded to a coarse powder using an electric grinder.

Preparation of Extracts

The coarse powder was subjected to successive extraction in a soxhlet apparatus using different solvents such as Hexane, Ethyl acetate, Ethanol and Water. For our experimental animal study we have chosen Ethanol and Aqueous extracts for further study. The extracts were designated as AAD (for Aqueous extract), EAD (for Ethanol extract). Dried extracts of 20 mg/ml stock solution were prepared and different concentrations were used in various experiments were done for extract of *Adansonia digitata*. (Ishaq MS *et al.*, 2014)^[15].

Animal ethical clearance

Animal ethical clearance has been approved for our Research work entitled “gastro protective Activity of *Adansonia digitata* “. With Registration No: P.No: purpose of Control and Supervision of Experiments on Animals (CPCSEA) (Regd. No. 470/01/a/CPCSEA, dt.24th Aug 2001).

Ulcer induction

Male Wister albino Wister rats between 3 to 4 months of age and weighing 250-300g were obtained from ALBINO

Research & Training Institute, Hyderabad. Animals are maintained as per the guidelines of National Institute of Nutrition (NIN) Animal User’s Manual. Animals were acclimatized for 7 days to animal house, maintained at temperature of 20-24^oc. The rats were grouped into 6 groups, Group I represents the control which has received Ethanol mg/Kg bw. Group II is Standard and has received the Ranitidine 20mg/kg bw as reference drug. Group III, IV is AAD with 100mg/kg bw, 200mg/kg bw. Group V & VI is EAD with 100mg/kg bw, 200mg/kg bw. The induction of Ulcer was done as per the procedure of Dhasan and Jagadeesan, with slight modifications. (Dhasan and Jagadeesan, 2010)^[16].

Calculation of Ulcer index

The total number of ulcers were counted & calculated by using the magnifying glass. The Severity scores are as follows:

Normal coloration as 0, The red coloration 0.5, The spot ulcer 1.0, The hemorrhagic stress 1.5, The deep ulcer 2.0 and The perforations as 3.0.

The Ulcer index = (AUN + AUS+ UP) x 10-1

AUN = An Average number of ulcer per animal

AUS = An Average severity score

UP = The Percentage of animals with ulcer

Percentage of ulcer protection: The Percentage protection was Calculated by using the formula:

$$\% \text{ Protection} = \frac{\text{UI of Ulcer control} - \text{UI of Treated}}{\text{UI of Ulcer control}} \times 100$$

Animal sacrifice and Stomach tissue collection

After the trial period, the experimental rats from every one of the eight groups were yielded by method for cervical disengagement and after that quickly stomach was eviscerated out and washed altogether with super cold 0.9% NaCl (saline), and suspended in 0.15 M potassium chloride in polypropylene holders, fixed with parafilm, marked precisely and put away at - 80^o C until the further assays were done.

Oxidative stress studies of stomach

After partition of stomach, 10 % tissue homogenate was readied in 0.15 M Kcl by utilizing potter-elvehjem homogenizer at 40 C, and then centrifuged at 12,000 rpm for 45 min at 0-4oC. The obtained supernatant was disseminated into eppendorf tubes, marked and put away at - 20°C and utilized for further analysis.

4. Statistical Analysis

All the full length experiments were performed in triplicates and exploratory results were communicated as mean ± standard deviation of mean (SEM) of three repeats for different concentrations of *Adansonia digitata* Graph pad prism 6 programming was utilized for factual examination and to set up the graphical representation of results.

5. Results and Discussion

Table 1: Anova test for anti ulcer activity of ethanol induced model

Groups	Treatment	Dose(mg/kg) PR 1 ml/Kg	Ulcer Index	%Of Ulcer Protection
Group 1 (Control)	-	-	4.10± 0.153	0.00
Group 2 (Standard)	Ranitidine	20	0.93 ± 0.054	77.04 ± 1.3
Group 3 (Aqueous Extract)	I	AAD	100	3.1 ± 0.06
	II	AAD	200	1.92 ± 0.06
Group 4 (Ethanol Extract)	I	EAD	100	3.3 ± 0.03
	II	EAD	200	3.24 ± 0.04

Table 2: Anova test for anti ulcer activity

S.no.	Group	Volume of Gastric juice(ml)	pH	Free Acidity meq/l/100gm	Total Acidity meq/l/100gm
1.	Control	6.578 ± 0.063	1.73 ± 0.037	35.800 ± 0.388	84.69 ± 0.471
2.	Standard	3.937 ± 0.048	3.340 ± 0.045	22.600 ± 0.400	45.10 ± 0.603
3.	AAD100	5.500 ± 0.034	2.600 ± 0.042	33.000 ± 0.258	66.900 ± 0.585
4.	AAD200	4.60 ± 0.042	2.950 ± 0.034	27.500 ± 0.401	54.400 ± 0.498
5.	EAD100	5.870 ± 0.053	2.410 ± 0.037	34.00 ± 0.365	68.300 ± 0.472
6.	EAD200	5.624 ± 0.059	2.500 ± 0.034	33.400 ± 0.600	67.900 ± 0.378
P Value		P < 0.0001	P < 0.0001	P < 0.0001	P < 0.0001

Table 3: Common names for African baobab.

Language	Common name
English	Baobab, monkey bread tree, Ethiopian sour gourd, cream of tartar tree, senegal calabash (fruit), upside-down tree
French	Baobab, pain de singe (fruit), arbre aux calebasses, arbre de mille ans, calebassier du Sénégal
Hindi	Gorakh-imli, hathi-khatiyani
Tamil	Papparappuli, anaipuliya-marum
Gujarati	Sumpura
Telugu	Brahmamlika, Seema sintha

Other local names can be found in Burkill, 1985 and Von Maydell, 1986 [Schumann, K 1893, Perrier de la Bâthie H 1952] [22, 23].

Antiulcer effect of *Adansonia digitata*

Oral administration of methanol extract of *Adansonia digitata* leaves at a measurement dose of 200 mg/kg showed dosage dependant restraint Percentage of 54.65 contrasted with the ulcer control, demonstrating the anti-ulcer activity of extract though ranitidine (20 mg/kg) produced 77.04 % inhibition of ulcer index against Ethanol induced ulcer. AAD essentially ensured gastric mucosa against the harm actuated by ethanol. Oral administration of AAD 1 hr before the incitement of Ethanol actuated ulcers. The AAD exhibited a dose dependent inhibition percentage of 54.65 preferably at the dose of 200 mg/kg dose. The standard drug Ranitidine showed an inhibition percentage of 77.04.

Determination of ulcer index

Ethanol administration resulted in the production of gastric mucosal damage. The ulcer index in control animals was (4.100). Whereas the all dose dependant of both the Aqueous and alcoholic extracts of the ulcer index are shown in table no. 1 AAD 200 significantly reduced the ulcer index (1.92) as compared to control (4.1), Ranitidine a Standard antiulcer drug showed ulcer index (0.93), and even with that other dose dependant extracts of MEA as well as EAD.

In the Enzymatic investigations of ulcer incited models, we have push ahead with the two sorts of extracts with various measurements. Watery and Alcoholic extracts of *Adansonia digitata* leaves (AAD and EAD) demonstrated a dosage dependant antioxidant action (p<0.05) in every anti-ulcer model.

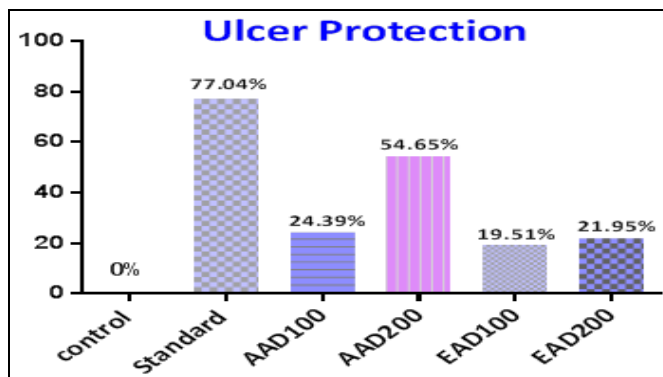


Fig 1: Graphical representation of Ulcer protection

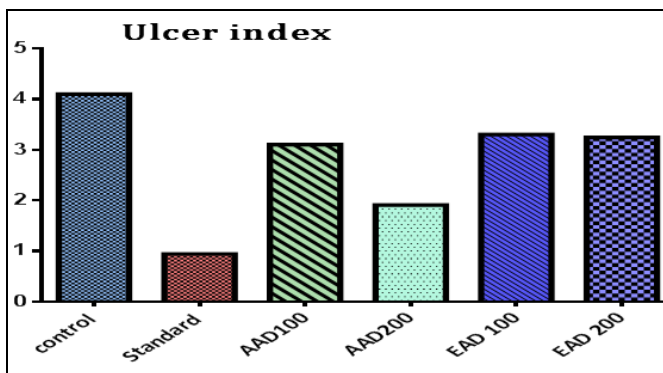


Fig 2: Graphical representation of Ulcer index

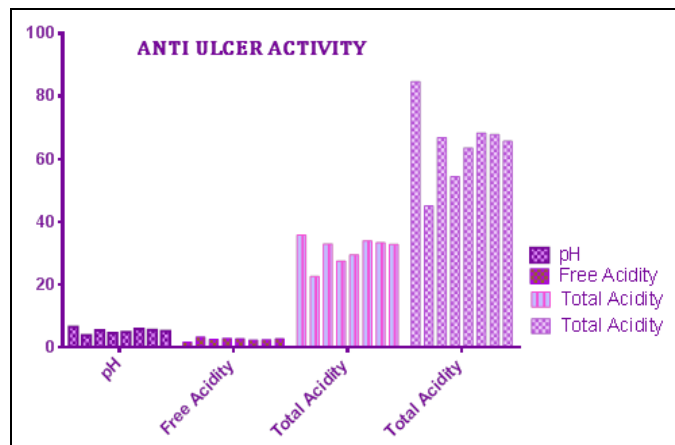


Fig 3: Consolidation Graph for Antiulcer activity of *Adansonia digitata*

6. References

- Akhtar MS, Khtar AH, Khan MA. Antiulcerogenic effects of *Ocimum basilicum* extracts, volatile oils and flavonoids glycosides in albino rats. *Int J Pharmacol.* 1992; 30:97-98.
- De Caluwe E, Halamová K, Van Damme P. *Adansonia digitata* L.-a review of traditional uses, phytochemistry and pharmacology. *Afrika Focus.* 2010; 23:11-51.
- Cragg GM, Boyd MR, Khanna R, Kneller R, Mays TD, Mazan KD, *et al.* International collaboration in drug discovery and development: the NCI experience. *Pure and Applied Chemistry.* 1999; 71(9):1619-1633.
- Maxwell SRJ. Prospects for the use of antioxidant therapies. *Drugs.* 1995; 49:345-361.
- Blonska M, Bronikowska J, Pietsz G, Czuba ZP, Scheller S, Krol W. Effects of ethanol extract of propolis (EEP) and its flavones on inducible gene expression in J774A.1 macrophages. *Journal of Ethnopharmacology.* 2004; 91:25-30.
- Morikawa K, Nonaka M, Narahara M, Torii I, Kawaguchi K, Yoshikawa T, *et al.* Inhibitory effect of quercetin on carrageenan-induced inflammation in rats. *Life Sciences.* 2003; 74:709-721.
- Wang GJ, Chen YM, Wang TM, Lee CK, Chen KJ, Lee TH. Flavonoids with iNOS inhibitory activity from *Pogonatherum crinitum*. *Journal of Ethnopharmacology.* 2008; 118:71-78.
- Pietta PG. Flavonoids as antioxidants. *Journal of Natural Products.* 2000; 63:1035-1042.
- Qadir MI. Qadirvirtide. *Pak J Pharm Sci.* 2011; 24:593-95.
- Ali M, Qadir MI, Saleem M, Janbaz KH, Gul H, Hussain L, Ahmed B. Hepatoprotective potential of *Convolvulus arvensis* against paracetamol-induced hepatotoxicity. *Bangladesh J Pharmacol.* 2013; 8:300-04.
- Mallhi TH, Qadir MI, Khan YH, Ali M. Hepatoprotective activity of aqueous methanolic extract of *Morus nigra* against paracetamol-induced hepatotoxicity in mice. *Bangladesh J Pharmacol.* 2014; 9:60-66.
- Saleem M, Ahmed B, Qadir MI, Mahrukh, Rafiq M, *et al.* Hepatoprotective effect of *Chenopodium murale* in mice. *Bangladesh J Pharmacol.* 2014; 9:124-28.
- Tambekar DH, Khante BS. Evaluation of Antibacterial Properties of Ethnomedicinal Herbs used by Korkus in Melghat of India against Enteric pathogens *International Journal of Pharma and Bio Sciences,* 2010, 5(1)
- Savita Sagwan, Rao DV, Sharma RA. Phytochemical evaluation and quantification of primary metabolites of *Maytenus emarginata* (Willd.) Ding Hou, *J Chem. Pharm. Res.* 2010; 2(6):46-50.
- Ishaq MS, Hussain MM, Afridi MS, Ali G, Khattak M, Ahmad S. *In vitro* phytochemical, antibacterial, and antifungal activities of leaf, stem, and root extracts of *Adiantum capillus veneris*. *Sci. World J,* 2014.
- Dhasan P Bharathi, Jagadeesan M. Gastro protective activity of *Momordica cymbalaria* fruits against experimentally induced gastric ulcer in rats *International Journal of Phytomedicine.* 2010; 2(4):385.
- Alfonso Pompella, Athanase Visvikisa, Aldo Paolicchib, Vincenzo De Tatab, Alessandro F Casini. The changing faces of glutathione, a cellular protagonist *Biochem Pharmacol.* 2003; 66:1499-1503.
- Pinto RE, Bartley W. The effect of age and sex on glutathione reductase and glutathione peroxidase activities and on aerobic glutathione oxidation in rat liver homogenates. *Biochem J.* 1969; 112:109-115.
- Bruce A, Freeman D, James C. Biology of disease free radicals and tissue injury. *Lab Invest.* 1982; 47:412.
- Booth J, Boyland E, Sims P. An enzyme from rat liver catalysing conjugations with glutathione. *Biochemical Journal.* 1961; 79:516-524.
- Boyland E, Chasseaud L. Role of glutathione and glutathione S-transferases in mercapturic acid biosynthesis. *Advances in Enzymology and Related Areas of Molecular Biology.* 1969; 32:173-219.
- Schumann K, Chlaenaceae. In: Engler A, Prantl K, editors. *Die natiirlichen Pflanzenfamilien.* Leipzig: W. Engelmann, 1893, 168-175.
- Perrier de la Bâthie H. [*Adansonia* of Madagascar. Keys and diagnoses]. *Notul Syst Paris.* 1952; 14:300-304.