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## Gastroprotective action of amlapittaghna arka

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**Abstract**

Now a days gastro intestinal problems are increasing day by day. 10% of world population are affected. It is caused due to etiology of H pylori infection, utilization of anti inflammatory drugs, cigarette smoking, chronic alcohol consumption, stress and altered prostaglandin synthesis, E metabolism. The symptoms of gastric ulcer almost resembles to that of Amlapitta. There are many formulations are mentioned for the treatment of Amlapitta in Ayurveda classics. There are different dosage forms mentioned in the treatment of amlapitta like Churna, Kwatha, Asavaarishta, Rasayoga, Arka. Arka kalpana is one of the potent kalpana mentioned by arka prakasha. Amlapittaghna Arka is mentioned for treatment of Amlapitta in Arka Prakash which contains Guduci (*Tinospora cordifolia*), Nimba (*Azadiaracta indica*), Patola (*Trichosanthes dioica*) as ingredients. Recent researches done on individual drugs proved anti-ulcer activity of the three drugs. Gastro protective activity of Amlapittaghna Arka was assessed by aspirin induced gastric ulcer on wistar albino rats in experimental study. Biochemical parameters like increase in gastric pH, volume, total acidity, carbohydrate, decrease in free acidity, ulcer index, protein content was observed.

**Keywords:** Gastric ulcer, arka Kalpana, amlapittaghna arka, Gastroprotective, biochemical parameters

**Introduction**

Now a days gastro intestinal problems are increasing day by day. 10% of world population are affected. It is caused due to etiology of H pylori infection, utilization of anti-inflammatory drugs, cigarette smoking, chronic alcohol consumption, stress and altered prostaglandin synthesis, E metabolism<sup>[1]</sup>. Aspirin is one of the NSAIDs harms the intestinal mucosa & its permeability or suppression of prostaglandin synthesis. The synthetic drugs such antacids, H2 receptor blockers, proton pump inhibitors are most commonly used. It causes side effects like headache, constipation and nausea<sup>[2]</sup>. Because of side effects usage of ayurvedic drugs was increasing. The symptoms of gastric ulcer resembles to that of amlapitta. There are different dosage forms mentioned in Ayurveda for the treatment like Churna, Kwatha, Asavaarishta, Rasayoga, Arka etc. Arka kalpana is the potent kalpana according to arka prakasha<sup>[3]</sup>. Dosage can be reduced by using Arka, highly sterile also<sup>[4]</sup>. Amlapittaghna arka is one of the Arka mentioned for Amlapitta, Guduchi, Nimba, Patola are the ingredients.

**Material and Methods**

**Table 1:** Drugs & Chemicals used for the study

Drugs	Chemicals
1. Amlapittaghna Arka-Guduchi, Nimba, Patola	Pentobarbitone
2. Reference standard drug(Ranitidine)	Saline (9%)
3. Aspirin (ulcer inducing agent)	Formalin (10%)
4.	Ether

**Dose calculation**

The dose for experimental study was calculated by extrapolating the human dose to animal dose based on the body surface area ratio (Paget's and Barnes-1964)<sup>[5]</sup>

Conversion of human dose to rat: Human adult dose x body surface area convertible Factor

Rat dose=Human dose xbody surface area constant of ratx5 =Dosex0.018x5/kg body wt

Amlapittaghna Arka

Human dose = 24ml/day

Rat dose =24mlx0.018x5

=2.16ml/kg body wt

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Ranitidine Tablet =20mg/kg body wt  
 Aspirin =200mg/kg body wt

**Preparation of the drug**

Amlapittaghna Arka: It was prepared at the Department of Rasashastra & Bhaishajya kalpana S.D.M College Hassan.1 part of the drug is added to 10 parts of water reduced to 60%. This was taken for dosing.

**Route of drug administration**

The test drugs, reference standard drug, toxicant drug were administered according to the body weight by oral route with the help of rat feeding needle attached to syringe.

**Experimental procedure:**

Wistar strain albino rats weighing between 160 to 250g of either sex were used for the study. The animals were obtained from the animal house attached to S.D.M. Centre for Research in Ayurveda and Allied Science, Kuthpady, Udupi. Thirty six albino rats were selected and allotted to six groups of six rats each. Six animals were housed in each cage made up of poly-propylene with stainless steel top grill. The dry paddy husk was used as bedding material and was changed frequently to protect from infections. The animals were exposed to 12 hour light and 12 hour dark cycles with the relative humidity of 50-70% and the ambient temperature during the period of experimentation were 22±0.30

Animals were fed with standard laboratory rat pellet feed supplied by Sai Durga feeds, Bengaluru and water ad libitum. All experimental protocols were approved by the Institutional Animal Ethical Committee in accordance with the guideline formulated by CPCSEA (IEC No: SDM/IEC/60/2017-2018) and Approval No. (SDMCRA/IAEC/HSN-RS-09)

Gastric ulcer was induced by Aspirin plus Pyloric ligation in Wistar albino rats with a modified protocol of Shay H *et*

*al.*1945, Jainu M *et al.* 2006 [6, 7].

A day prior to dosing the selected animals were randomly divided into six different groups comprising of six animals in each group. The test drugs were administered orally for ten consecutive days to respective groups. Ranitidine administration and vehicle to the control group were started from the fifth day of drug administration. Gastric ulceration in rats was induced as described by Jainu M *et al.* (2006) in a modified form. At the end of the dosing period i.e. on 10<sup>th</sup> day after dosing animals were transferred singly into metabolic cage to avoid coprophagy. During 24 hours fasting animals were deprived from food but allowed free access to water.

On 11<sup>th</sup> day pylorus was ligated as per the method of Shay *et al.* (1945). Rats were anaesthetized with Pentobarbitone (20mg/kg body wt, IP) and the portion of abdomen was opened in layer by a small midline incision just below and lateral to the xiphoid process. Pyloric portion of the stomach was slightly lifted out avoiding traction to the pylorus or damage to its blood supply. The pylorus was ligated with cotton thread and stomach was replaced carefully. The incision was closed with interrupted sutures in layers. The animals were deprived of both food and water during the post-operative period. Aspirin was administered orally (200mg/kg body wt) to the animals except of group 2 after six hours of pyloric ligation.

Animals are sacrificed by an over dose of ether after 4 hours of aspirin administration. Abdominal cavity was reopened carefully and the stomach was excised after tying the oesophageal end to prevent loss of gastric contents during excision. Gastric contents were drained into tubes and centrifuged at 2000 rpm for 10 min. The Volume and pH of gastric juice was noted and used for biochemical estimation. After assessment of ulcer score, the glandular portion of stomach is used for various biochemical parameters

**Table 2:** Grouping of animals

S. No:	Grouping of animals	
1	Normal control	Normal tap water +diet+ fasting
2	Pyloric ligation control	Normal tap water+diet+pyloric ligation
3.	Aspirin +Pyloric ligation control	0.5%CMC(5days)Aspirin 200mg/kg +pyloric ligation
4.	Reference standard	Ranitidine(20mg/kg 5days),Aspirin(200mg/kg)+pyloric ligation
5	Amlapittaghna Arka	Test drug(2.16ml/10 days)+Aspirin(200mg/kg)+Pyloric ligation

Biochemical parameters in gastric juice

- Volume of gastric juice
- pH of gastric juice
- Total and free acid [8]
- Total protein [9]
- Total Carbohydrates [10, 11]
- Assessment of Stomach Ulcer [12]

The stomach was excised, cleaned and opened along its greater curvature and the inner surface gently washed with cold saline solution and fixed on the wax board and examined for ulceration with a magnifying lens. Severity of ulcer and

total number of ulcer in each rat was recorded for calculating the ulcer index. Ulcer index was determined by following the scoring method of Suzuki *et al.* (1976).

0-No visible ulcer

1-Maximum diameter of 1mm

2-Maximum diameter of 1-2mm

3-Maximum diameter of 2-3mm

4-Maximum diameter of 3-4mm The severity of ulcer score is calculated by multiply the ulcer score with maximum diameter. The mean number of ulcer in each group is also recorded for calculating the ulcer index.

**Table 3:** Results of biochemical parameters

Grouping	pH	Volume	Ulcer index	Free acidity	Total acidity	Carbohydrate	Protein
Pyloric ligation group	1.71±0.28	3.5±0.85	35±10.06	2.04±0.13	3.44±1.28	350.57±63.84	7922.85±1160.0
Aspirin pyloric ligation	2.5±0.34	2.91±0.63	16.66±2.62*	1.14±0.10	2.42±0.20	549.4±63.701	11134.2±981.31
Reference standard	3.83±0.65	2.66±1.10	5.66±1.80	0.8±0.15	2.12±0.25	720.4±162.06	9264±1230.4
Amlapittaghna Arka	4.83±0.30**	4.41±0.67	8.66±1.66	1.05±0.39	4.18±1.72	574.71±4.60	10983.42±971.15

## Discussion

In pyloric ligated model the digestive effect of accumulated gastric juice and interference with gastric blood circulation are responsible for the induction of gastric ulcer [13]. Elevated secretion of acid pepsin leads to auto digestion of gastric mucosa and break down of mucosal barrier is also responsible for gastric ulcers [14]. Stimulation of pepsin secretion with or without secretion of acid is the major factor in development of gastric ulcers [15]. Aspirin causes mucosal damage by inhibiting prostaglandin synthesis and interferes with protective mechanisms, such as mucus and bicarbonate secretion, surface epithelial hydrophobicity and mucosal blood flow [16]. Aspirin was administered to pyloric ligated rats; here aspirin further enhances the acidity and shorten the resistance of the gastric mucosa by causing the extensive damage to the glandular region of the stomach [17].

Gastric juice-pH There was very significant increase in gastric pH in Amlapittaghna Arka (93.2%) compared to that of Aspirin plus pyloric ligation group. Increase in pH show increase of bicarbonate secretion which is contributed for antiulcer activity [18]. Increase in gastric pH in Amlapittaghna Arka group indicates stimulation of gastric mucosa to secrete bicarbonate which is beneficial in antiulcer activity.

## Gastric juice volume

There was non significant increase in gastric volume in Amlapittaghna Arka (51.5456%) compared to that of Aspirin plus pyloric ligation (16.85%). Volume of secretion of gastric juice is an important factor in the formation of ulcer due to the exposure of the unprotected lumen of the stomach to the accumulating acid. It also represents as a marker of gastric juice secretion through secretory mechanisms.

## Free acidity

There was non-significant decrease of free acidity in Amlapittaghna Arka (7.895%) compared to that of Aspirin plus pyloric ligation group. To have effective against the gastric ulcer drug should have acidity reducing property. Acidity can be decreased by either anti-secretory effect or drug should neutralise the gastric acidity.

In the study Amlapittaghna Arka shown decrease in free acidity which indicates antiulcer activity but it was statically non-significant.

## Total acidity

There was no significant increase of total acidity in Amlapittaghna Arka (72.72%) compared to that of Aspirin plus pyloric ligation group (29.65%). The Standard drug Ranitidine (12.39%) shows non-significant decrease compared to that of Aspirin plus pyloric ligation group.

## Ulcer index

There was non-significant decrease of ulcer in Amlapittaghna Arka (48.01%) compared to that of Aspirin plus pyloric ligation group. There was non-significant decrease in Ranitidine (66.02%) compared to that of Aspirin plus pyloric ligation group. Amlapittaghna Arka having antiulcer activity

## Protein estimation

There was non-significant decrease in Amlapittaghna Arka (1.35%) compared to that of Aspirin plus pyloric ligation group. Decrease in protein content of the gastric juice can be taken as an index of decreased leakage hence decreased ulceration.

## Carbohydrate Estimation

There was non-significant increase in Amlapittaghna Arka (4.60%) compared to that of Aspirin plus pyloric ligation group. Pylorus-ligation-induced gastric ulcers occur because of an increase in acid-pepsin accumulation due to pyloric obstruction and subsequent mucosal digestion. A copious amount of mucus is secreted during superficial damage and provides favourable microenvironment in repair. Mucin is a viscous glycoprotein producing, relatively resistant, acid barrier. It makes up a major part of the mucus, an important pre-epithelial factor that acts as a first line of defence against ulcerogens. Increase in the mucin is due to a significant increase in the individual mucopolysaccharide-like sialic acid and total hexoses, leading to a significant increase in total carbohydrates.

## Conclusion

In Amlapittaghna Arka, very significant increase in Gastric pH, Non-significant increase in gastric volume & total acidity, carbohydrate and non-significant decrease in ulcer index, free acidity, protein content was observed. In Amlapittaghna Arka group, absence of ulcer, erosion, inflammation and presence of regeneration was observed. Considering the biochemical parameters like pH, ulcer index, protein & carbohydrate content Arka having anti-ulcer activity.

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