



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203




Human Journals

Research Article


December 2022 Vol.:26, Issue:1

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## Comparative Experimental Evaluation of Chinnodbhavadi Arka in Peptic Ulcer



IJPPR  
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals



ISSN 2349-7203  
HUMAN

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**Submitted:** 24 November 2022  
**Accepted:** 30 November 2022  
**Published:** 30 December 2022

**Keywords:** Chinnodbhavadi arka, Guduchyadi Kashaya, Peptic ulcer

### ABSTRACT

Ayurveda, the holistic system of medicine primarily utilizes the herbal kingdom for the management of many dreadful health conditions. Peptic ulcer disorders are now considered as most common ailment caused by the improper food, and lifestyle habits of mankind. The diseases pertaining to the gastrointestinal tract require urgent medical and healthcare attention to come out of the condition with minimal morbidity. Though most of the herbal combinations mentioned in Ayurveda are time-tested medicine still an experimental analysis further fortifies its scientific base. Most of the effective Ayurvedic combinations are having a bitter taste and unpleasant odours which prevent their popularity among sensitive people. Arka Kalpana is a distillate preparation which is devoid of unpleasant smell and taste and can be consumed by all types of people. Chinnodbhavadi Arka mentioned in Arka Prakash contains Guduchi, Nimba Patra and patola Patra, all are thikta rasa pradahana dravyas which are most effective in amlapitha. Hence it was selected to evaluate the antiulcer property by comparing it with guduchyadi kashaya. The study showed that the trial drug is more ulcer protective than guduchyadi kashaya.



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## INTRODUCTION:

A peptic ulcer is defined as disruption of the mucosal integrity of the stomach or duodenum leading to active inflammation. It is one of the predominant gastrointestinal diseases<sup>1</sup> with a worldwide prevalence of about 40% and 80% in developed and developing countries respectively. Generally, peptic ulcer is caused by a lack of equilibrium between gastric aggressive factors and the mucosal defensive factors. According to the site of attack peptic ulcer may be classified as oesophagal duodenal or gastric. In Ayurveda, there are lot of herbal drugs which are good for peptic ulcers but need to be proven scientifically.

Chinnodbhavadi Arka<sup>2</sup> told in Arkaprakasha includes Guduchi (*Tinospora cordifolia*), Nimba patra (*Azadirachta indica*) and Patola patra (*Trichosanthes cucumerina*). Hence to prove antiulcer activity of Chinnodbhavadi arka was prepared pharmaceutically for the trial, with modern parameters a comparative study with guduchyadi kashayam is carried out experimentally by the pyloric ligation method.

## Methodology:

**Collection of drugs:** The raw drugs of Chinnodbhavadi arka are guduchi, nimba patra and patola patra were collected and identified according to Ayurvedic standards and are certified by the botanist.

**Method of preparation:** Three different drugs of Chinnodbhavadi arka were collected cleaned and weighed. Each drug of 500gm were taken and pounded in a pounding machine to coarse powder which pass through sieve number 44 and added with 10 times of water soaked well and kept it for one day (24hrs). The next day the well-soaked drug is transferred to the distillation apparatus<sup>3</sup>. The mixture is continuously heated till 60% of the distillate was obtained. First and last portion of distillate was discarded remaining portion is used after proper mixing and cooling.

**Observation:** The Arka was liquid in consistency and colourless with characteristic odour.

## Experimental study:

Experimental models to evaluate ulcer protective effect.

Peptic ulcer is defined as disruption of the mucosal integrity of stomach or duodenum leading to local defect or excavation due to active inflammation. Generally peptic ulcer is caused by

lack of equilibrium between gastric aggressive factor and the mucosal defensive factors. The main etiological factors for peptic ulcer are improper dietary habits excessive intake of non-steroidal anti-inflammatory agents stress, hereditary predisposition and helicobacter pylori infection.

In the present study Chinnodbhavadi arka has been evaluated for anti-ulcer property in pyloric ligated ulcer in Wister albino rats by comparing it with Guduchyadi kashayam.

#### **MATERIALS AND METHODS:**

The present study was aimed to compare the efficacy of Chinnodbhavadi Arka with guduchyadi kashaya in Wister albino rats by following method- Pyloric ligation method developed by shay et al. 1945<sup>4</sup>.

##### a) Experimental animals.

Experiment have been carried out in 18 healthy albino rats weighing between 150-200 gm, of either sex were used for pyloric ligation method. The animals were procured from the animal house in the SDM Centre for Research in Ayurveda and allied sciences, Kuthpady, Udupi. The animals were fed as per standard requirements and they are kept in well-ventilated rooms under hygienic conditions.

##### b) Inclusion criteria:

- i) Healthy Wister albino rats of either sex.
- ii) Wister albino rats weighing between 150-200 gm.

##### c) Exclusion criteria:

- i) Wister albino rats with signs of infection or injury and pregnant ones were excluded from the study.
- ii) Wister albino rats that exhibited abnormal behavior.
- iii) Wister albino rats weighing less than 150 gm. and more than 200gm. were excluded.

##### d) Dose fixing:

$$\text{Rat dose} = \text{human dose} \times 0.018 \times 5$$

Chinnodbhavadi Arka dose:  $48 \times 0.018 \times 5 = 4.32$  ml /kg body wt.

Guduchyadi kashayam dose:  $96 \times 0.018 \times 5 = 8.64$  ml/kg body wt.

e) Grouping:

The selected animals were randomly divided into 3 groups with 6 rats in each group.

Group1- Normal/Ulcerative control

Group2- Standard group (Guduchyadi kashayam)

Group3- Trial drug group (Chinnodbhavadi Arka)

f) Procedure:

\* The trial drug and standard drug were fed orally to all the rats of respective groups for 10 days.

\* Animals were fasted for 36 hrs. by placing them in metabolic cages to prevent coprophagy but provided free access to water prior to pyloric ligation.

\* On the 10<sup>th</sup> day, one hour after drug administration pylorus was ligated by following the method of Shay et al.1945.<sup>4</sup>

i) Pre-procedure:

Animals were anesthetized with inj. Pentobarbital (P) at a dosage of 1ml/100gm body wt. IP (Dilution 20mgP in 90 ml distilled water).<sup>5</sup>

ii) Operative Procedure:

\*Ventral portion of the abdomen was opened in layer by a small midline incision just below and lateral to the Xyheid process.

\* The pyloric portion of the stomach was slightly lifted out avoiding traction to the pylorus or damage to its blood supply.

\* Pylorus is ligated with cotton thread and the stomach was replaced carefully.

\* The incision was closed with interrupted sutures in layers.

iii) Post-operative procedure:

- \*The animal were deprived of both food and water during this period.
- \* Each animal is kept in separate metabolic cages.
- \* After 6 hrs. of the Pyloric Ligation the animals were sacrificed by an over dose of ether.
- \* The abdomen was opened and a ligature was placed around the esophagus, the stomach was removed and the contents were collected into a graduated centrifuge tube after making a small puncture along the greater curvature adjacent to the pyloric ligation.
- \* Gastric content were collected into tubes and centrifuge at 3000rpm for 15min.
- \* Volume of gastric juice was noted the volume of the supernatant was expressed as ml/100gm body weight and used for biochemical estimation.
- \* Further the stomach was carefully collected for assessment of ulcer index.

g) Parameters for assessment of anti-ulcer activity of drug:

- i) Ulcer index.
- ii) Volume of gastric juice.
- iii) p H of gastric Juice.
- iv) Biochemical estimation in gastric juice.
  - a) Free acidity.
  - b) Total acidity.
  - c) Total protein.
  - d) Total carbohydrates.
- h) Assessment of ulcer index:

The stomach was excised, cleaned and opened along its greater curvature. The inner surface was cleaned and spread on a wax board with the mucous surface upwards avoiding corrugation and examined for ulceration with magnifying lens. The ulcer index was calculated by the following method.

Scoring of ulcer (method by Kulkarni)<sup>6</sup>

0.0 = Normal coloured stomach

0.5 = Red colouration

1.0 = Spot ulcers

1.5 = Hemorrhagic streaks

2.0 = Ulcer with area >3 but ≤5mm<sup>2</sup>

3.0 = Ulcer >5mm<sup>2</sup>

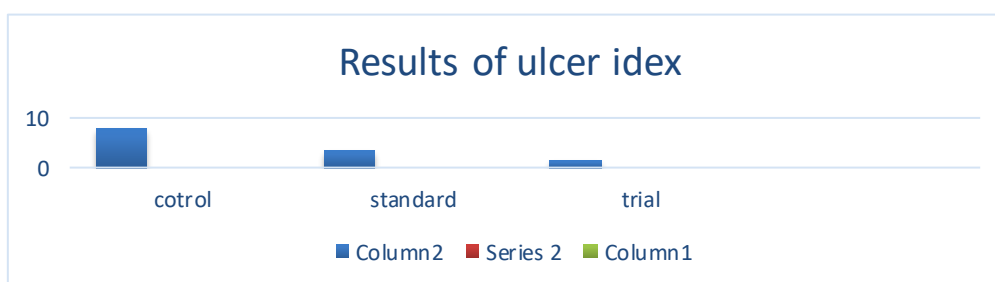
**RESULTS:**

**a) Anti-ulcer study**

Effect of Test drug *Chinnodbhavadi arka* on Ulcer index in albino rats

Group	Ulcer index score	% change
Positive control	7.83± 1.45	
Standard	3.33± 0.56	57.47
Trial	1.5± 0.29	80.84

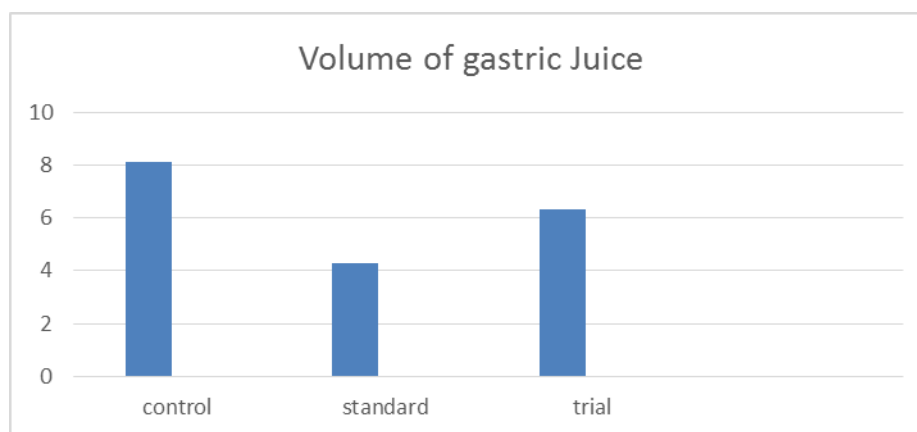
Data shows there was a decrease in ulcer index in standard group and Test group when compared to the positive control group, the observed decrease was found to be statistically highly significant.



**b) Volume of Gastric juice.**

Group	Volume of Gastric juice	% change
Positive control	8.13 ± 1.96	--
Standard	4.3 ± 0.55	47
Trial	6.33 ± 0.55	22

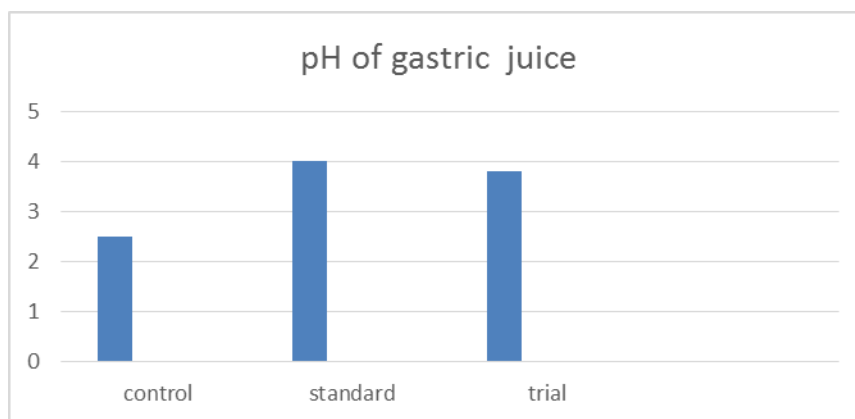
Data shows there was a decrease in gastric volume in standard group and the therapeutic group compared to positive control group. The observed decrease was found to be statistically non-significant. But there was an increase in gastric volume in trial group when compared to the standard group. The observed increase was found to be statistically non-significant.



**c) pH of gastric juice.**

Group	pH of Gastric juice	% change
Positive control	2.5 ± 0.85	--
Standard	4 ± 0.73	60
Trial	3.81 ± 0.44	52.4

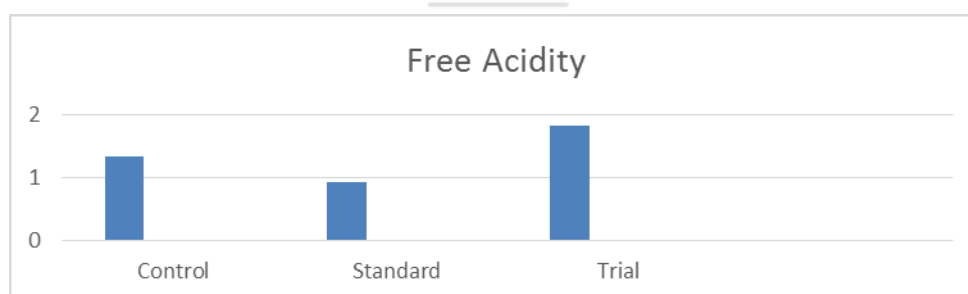
Data shows there was an increase in gastric pH in standard group and the therapeutic group when compared to positive control group. The observed increase was found to be statistically significant. But there was a decrease in gastric pH in trial group when compared to the standard group. The observed decrease was found to be statistically non-significant.



**d) Free Acidity.**

Group	Free Acidity	% change
Positive control	1.33 ± 0.48	--
Standard	0.93 ± 0.04	30
Trial	1.83 ± 0.47	37

Data shows there was a decrease in free acidity in standard group and increase in free acidity in therapeutic group when compared to the positive control group. The observed changes was found to be statistically non-significant.

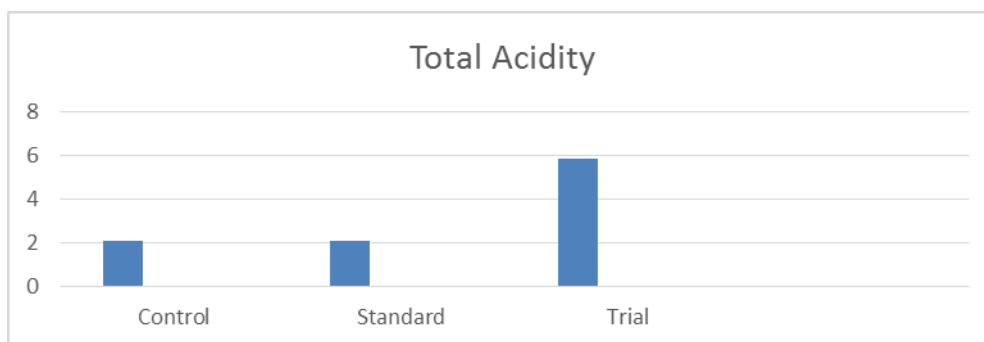


**e) Total Acidity.**

Group	Total Acidity	% change
Positive control	2.1 ± 0.60	--
Standard	2.08 ± 0.22	0.95
Trial	5.83 ± 0.70	177

The data shows there was an increase of total acidity in trial group when compared to control group. The observed increase was found to be statistically highly significant ( $P < 0.01$ ).

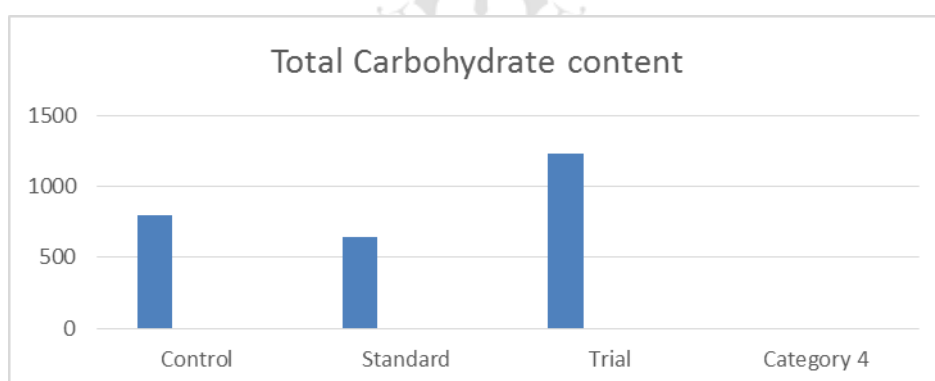




**f) Total carbohydrate content.**

Group	Total carbohydrate	% change
Positive control	793.66 ± 36.02	--
Standard	646.83 ± 57.20	18.5
Trial	1234.5 ± 106.29	55.55

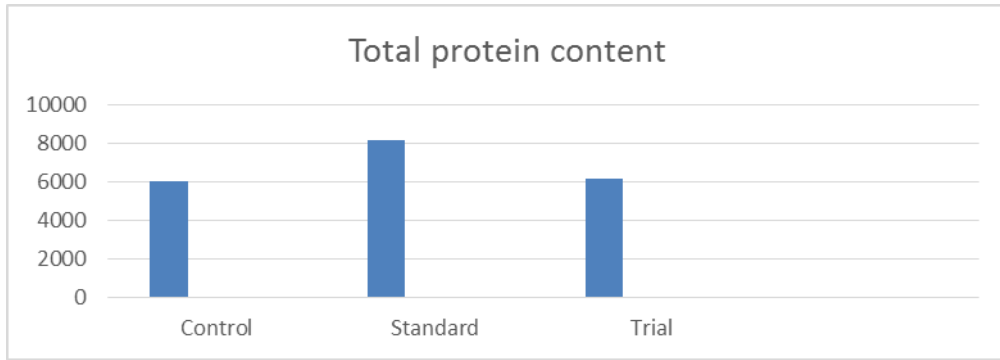
The data shows there was an increase of total carbohydrate in trial group compared to positive control and standard group. The observed increase was found to be statistically highly significant-act as ulcer protective.



**g) Total protein content**

Group	Total protein	% change
Positive control	6028.33 ± 778.25	--
Standard	8182.33 ± 1076.6	35.73
Trial	6125 ± 785.35	1.61

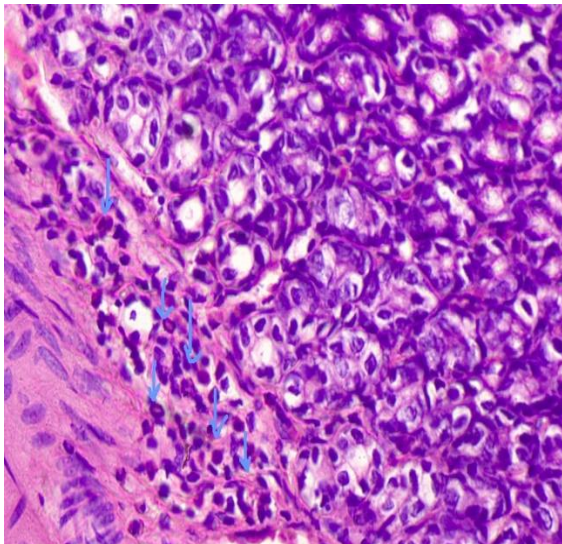
The data shows there was an increase of total protein content in trial group and standard group compared to positive control. The observed increase was found to be statistically non-significant.



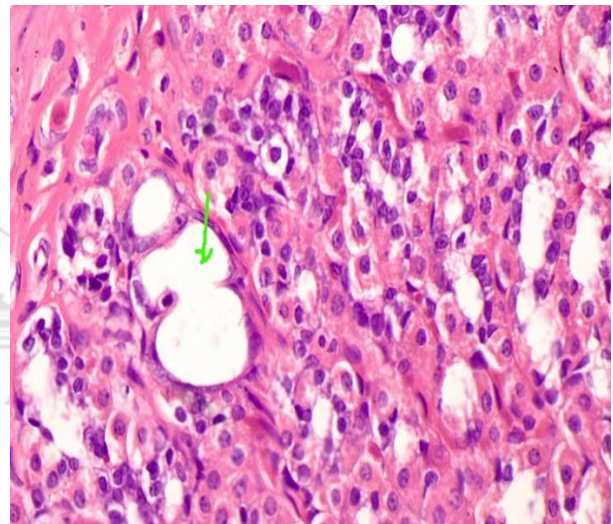
**Histopathology:**

**Positive Control group:**

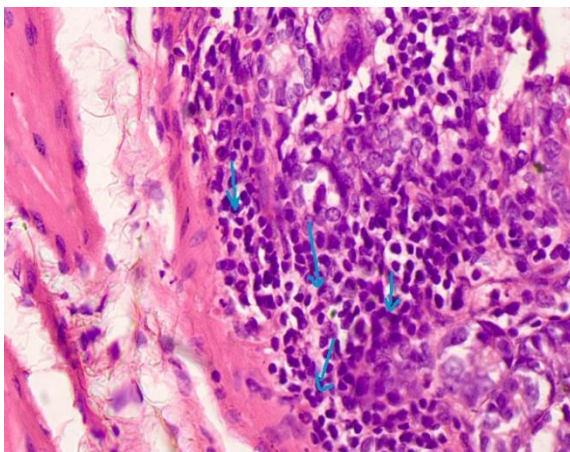
**Acute and chronic inflammatory infiltration**



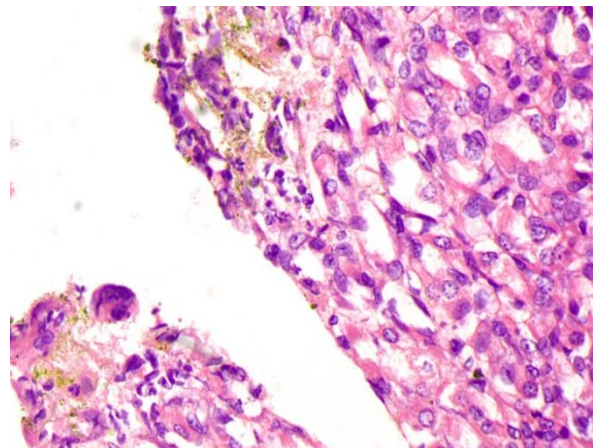
**Cystic dilation of glands**



**Focal area of inflammatory infiltration**

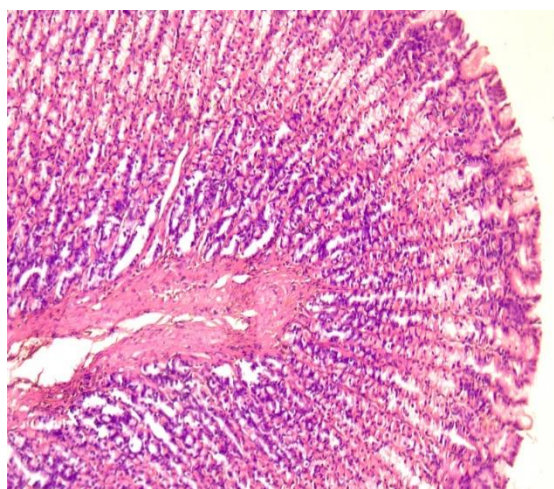


**Small necrosed area**

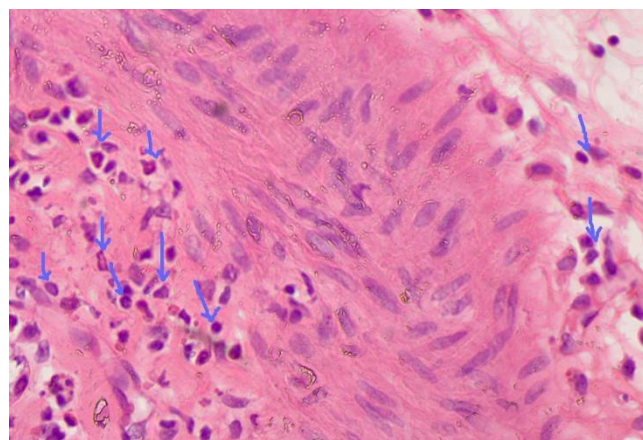


**Test group:**

**No damage in mucosa**

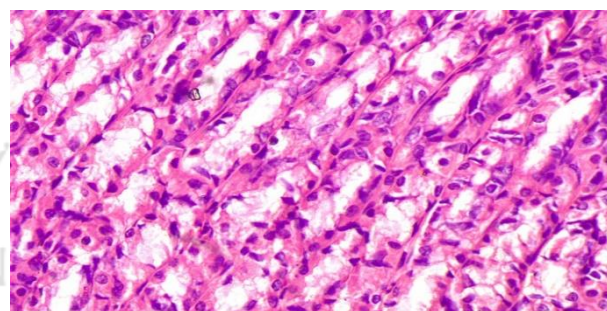
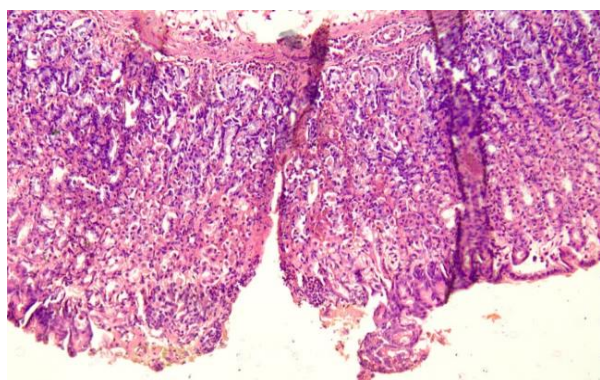


**Acute inflammatory infiltration**



**Small necrosed area with inflammatory infiltration.**

**No damage in mucosa**



**DISCUSSION:**

The above-mentioned results proved the anti-ulcer activity of Chinnodbhavadi Arka through experimental models. During the period of the study, some points were observed. They are: -

The reduced value of the ulcer index implies reduced ulcer formation. In the present study highly significant decrease in ulcer index in test group when compared with the positive control. Whereas there is a significant decrease in ulcer index in test group compared with standard group also.

There was a decrease in gastric volume in both the standard and trial group compared to the positive control, but it was statistically non-significant.

It was observed that there was an increase of gastric pH in the standard group and trial group when compared with the positive control. This increase in the pH level of gastric juice by the test drug contributes to the reduction of ulcer formation.

The present study, observed an anon-significant decrease in free acidity in standard and trial groups.

There is a highly significant increase in total acidity in trial group when compared to standard and control groups, the total acidity will neutralize the gastric acidity by the trial drug to prevent ulceration.

In the present study there was a highly significant increase in total carbohydrates in trial group compared to positive control and standard group. Increased carbohydrates indicate increased mucosal and mucosal defensive mechanisms against damage.

In the present study there was an increase in protein content in trial group and standard group compared to the positive control. But there was a decrease in protein content in trial group compared to standard group. It shows trial drug has better action for strengthening the gastric mucosal layer than the standard drug.

## **CONCLUSION:**

All branches of medical systems are mainly focused on providing the utmost care and comfort to the suffering ones. Ayurveda the well-documented eternal system of medicine stands high in this field. The time-tested combinations of herbal and herbo-mineral drugs are potent enough to manage all types of major and minor disorders affecting body and mind. Advanced extraction technologies such as distillation etc. were popularized among the Vaidya's of ancient times. Arka kalpana is a distillate preparation which is most effective and devoid of bad smell and taste, can be consumed by the people easily without hesitation. Ayurveda considers the maintenance of Agni or the digestive system in its normalcy is the sole reason for our health. Peptic ulcer disorders hence need prior attention in its early stage itself. Chinnodbhavadi arka after careful evaluation using both preclinical and clinical studies revealed that it is highly effective in this present condition. For presenting it to the scientific world and popularizing it among the common people all possible standardization parameters are also performed in combination. Such combinations from books other than our great lexicons are also to be revalidated for the scientific background which will further improve the acceptance of our medical system, Ayurveda.

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