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ANTI-ULCER ACTIVITY OF *HEDYCHIUM CORONARIUM* J. KOENIG RHIZOME: AN EXPERIMENTAL EVALUATION

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ABSTRACT

Introduction: In recent years, scientific investigations have increasingly explored traditional medical knowledge, including classical texts, ethnomedicinal practices, and indigenous databases, as valuable sources for drug discovery. The study and documentation of folk medicinal plants and their therapeutic effects play a crucial role in advancing modern medicine and pharmacology. *Hedychium coronarium* J. Koenig, a member of the family Zingiberaceae, is an extrapharmacopoeial plant widely distributed in South India. The present study was undertaken to assess the anti-ulcer activity of the rhizome of *Hedychium coronarium* J. Koenig in Wistar albino rats. **Methods:** The anti-ulcer activity was evaluated using the pyloric ligation model described by Shay *et al.* (1945) in Wistar albino rats. A decoction prepared from the rhizome of the test drug was administered during the experimental study. The experimental data were subjected to statistical analysis using one-way analysis of variance (ANOVA), followed by Dunnett's multiple comparison test to determine the significance of the results. **Results:** In Experimental study the test drug showed statistical significance in reducing ulcer index when compared to standard and control. The histopathological study

revealed test drug acts as a mucosal protective layer of the stomach which helps the further reduction in an ulcer condition. **Conclusion:** The experimental study results suggest that *Hedychium coronarium* J. Koenig rhizome is effective in curing peptic ulcer compared to Control and Standard group.

KEYWORDS: *Hedychium coronarium* J. Koenig; Anti-ulcer; Pyloric ligation.

INTRODUCTION

The development of Dravyaguna Vijnana has been a progressive process, influenced by the ongoing incorporation of new observations and empirically verified facts, along with the elimination of ideas that failed to endure critical scrutiny. Through systematic experimentation, validation of fundamental principles, and structured documentation of clinical and practical experiences, the discipline has evolved into a well-founded and continuously expanding branch of knowledge.[1]

Rapid urbanization and changes in lifestyle have contributed significantly to the rising prevalence of various health disorders, among which peptic ulcer disease (PUD) remains a major clinical concern. Increased occupational demands and psychological stress are known to further exacerbate this condition. Peptic ulcer disease is characterized by a breach in the mucosal lining of the stomach and/or duodenum, leading to localized lesions associated with active inflammatory processes. It represents one of the most common gastrointestinal disorders worldwide, with reported prevalence rates of nearly 40% in developed countries and as high as 80% in developing regions. The pathogenesis of PUD is widely attributed to an imbalance between aggressive gastric factors, such as hydrochloric acid and pepsin, and protective mechanisms of the gastric mucosa, including mucus and bicarbonate secretion.

On the basis of etiological factors and clinical features, a comparable condition described in Ayurvedic literature is *Amlapitta*. This pathological condition develops when *Pitta* Dosha becomes aggravated, particularly with an increase in its *Amlata* (acidic property). Continuous *Nidana-sevana* (exposure to causative factors) enhances the *Amla guṇa* of *Pitta*, resulting in *Vidagdhata* (improper digestion and vitiation) of ingested food. As a result, characteristic symptoms such as *Amlodgara* (acidic or sour eructation), *Urovidaha* (retrosternal burning sensation), and *Chhardi* (vomiting) manifest. Although *Amlapitta* is generally not considered a life-threatening condition, chronicity or lack of timely management may lead to severe and potentially life-endangering complications.

Therefore, there is an increasing need to explore readily available extrapharmacopoeial Ayurvedic drugs possessing gastroprotective properties. *Hedychium coronarium* J. Koenig, commonly known as *Suruli Sugandhi* in Kannada, is one such medicinal plant belonging to the family Zingiberaceae. It is an erect, rhizomatous herb widely distributed across South India. The rhizome of this plant has been traditionally employed by folk practitioners (*Vaidyas*) of the South Canara and Udupi districts of Karnataka for the management of peptic ulcer disease.[2]

Fresh rhizomes of *Hedychium coronarium* J. Koenig were collected and processed to prepare a decoction, which was administered orally to the test groups of Wistar albino rats. The therapeutic efficacy of the test drug was assessed using multiple observational parameters, including ulcer evaluation through ulcer index, gastric juice pH and volume, free acidity, total acidity, total carbohydrate content, and total protein levels.

MATERIALS AND METHODS

Experimental Animal

Wistar albino rats of either sex weighing between 200 ± 40g will be used for the study. Animals will be obtained from animal house a part of research lab, Sri Dharmasthala Manjunatheshwara Centre for Research and Allied Sciences Udupi. Twenty-four albino rats will be selected and allotted to four groups of 6 rats each. Six animals will be housed in each cage made up of poly-propylene with stainless steel top grill. The dry paddy husk will be used as bedding material and will change frequently to protect from infections.

Drugs

Test drug: Rhizome decoction of *Hedychium coronarium* J. Koenig – Freshly prepared each day at S.D.M Research Centre, Udupi.

Standard drug: Pantoprazole tablets – Purchased from the medical shop with Brand name Pan 40 with Batch No: 24441388.

Chemicals and Equipment used

Chemicals

- Saline, Formalin (10%), Ether, NaOH (0.1N), Topfer reagent,
- Phenolphthalein indicator, Sulfuric acid, Glucose standard, Phenol.
- Potassium tartrate, Copper sulphate, Sodium carbonate, Sodium dodecyl sulfate.

Equipments

- Stainless steel Surgical blade
- Stainless steel suture needles half-circle no.8
- Linen thread no.10
- pH strips
- Burette
- Micropipette

Inclusion criteria

a) Healthy Wistar albino rats of either sex
b) Wistar albino rats weighing 200 ± 40gm.

Exclusion criteria

a) Wistar albino rats with signs of infection or injury and pregnant ones were excluded from the study.
b) Wistar albino rats that exhibited abnormal behaviour.

Dosage calculation

The animal dose was calculated by extrapolating the human dose to animal dose based on the body surface area ratio (Paget & Barnes table)

i.e. Rat dose = Human dose x Body surface area constant of rat x5

= Human dose x 0.018 x 5 (kg bodyweight)

- Test drug dose (Rhizome decoction of *Hedychium coronarium* J. Koenig):

Human dose = 48ml

Rat dose = 48ml x 0.018 x 5 = 4.32ml/kg body weight.

- **Standard drug dose (Pantoprazole)**

Rat dose = 50mg/kg body weight = 0.05 gm / gram body weight.

Preparation of the drug

- Preparation of Test drug (Rhizome decoction): The decoction was made by the conventional method of kwatha preparation. The required drug was boiled with 8 times water and reduce to 1/4th. The kwatha was sieved and filtered to remove all the solid drug particles.[3]

- Preparation of standard drug: Ranitidine 150mg was finely powdered and made into suspension with 10ml distilled water and administered according to body weight.

Route of drug administration

The test drug and standard drug were administered according to the bodyweight via oral route with the help of oral gavage feeding tubes attached to a syringe.

Grouping of Animals

Selected animals were randomly divided into 4 groups with 6 rats in each group

Table no. 1: Showing the grouping of animals.

Sl. No	Groups	No. of animals per group	Treatment
1	Normal-Control	6	RO water
2	Control	6	RO water + Pyloric ligation
3	Standard	6	Pantoprazole(20mg/kg) + Pyloric ligation
4	Test	6	Test drug + Pyloric ligation

Experimental procedure

- Rhizome decoction of *Hedychium coronarium* J. Koenig was fed orally to all the rats of test groups (group D) for 7 days.
- The standard drug was given for the standard group for the same number of days.
- Animals were fasted for 36 h by placing them in metabolic cages to prevent coprophagy but provided free access to water prior to pyloric ligation.
- On the 7th day, one hour after test drug administration pylorus was ligated by following the method of Shay et al., (1945).[4]

Pre-procedure

- Rats were anesthetized with Inj. Pentobarbital (P) at dosage 1ml/100gm bodyweight IP (Dilution-20mg P in 90ml Distil water)

Operative procedure

- The ventral portion of the abdomen was opened in layer by a small midline incision just below and lateral to the xiphoid process.
- The 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 the stomach was replaced carefully.
- The incision was closed with interrupted sutures in layers.

Post-operative procedure

- The animals were deprived of food and water during the postoperative period.
- Each rat was kept in separate metabolic cages.
- After 6 hours of the pyloric ligation, the rats were sacrificed by an overdose of ether.
- The abdomen was opened and a ligature was placed around the oesophagus, the stomach was removed and the contents were drained into a graduated centrifuge tube after making a small incision along the greater curvature, near the site of pyloric ligation.
- Gastric contents were drained into tubes and centrifuged at 3000 rpm for 15 min.
- The volume of gastric juice was noted the volume of the supernatant was expressed as ml/100g body weight and used for biochemical estimation.
- Subsequently, the stomach was carefully excised for evaluation of the ulcer index.

Parameters for the assessment of Antiulcer activity of drug

i. Ulcer index[5]
ii. Volume of Gastric juice
iii. pH of gastric juice
iv. Biochemical estimations in gastric juice[6]

a. Free acidity
b. Total acidity
c. Total protein
d. Total carbohydrates[7]

RESULTS AND DISCUSSION

Effect on Ulcer Index

The test drug, *Hedychium coronarium* J. Koenig, produced a significant reduction in ulcer index (53.57%) when compared to the control group ($p < 0.05$), indicating strong gastroprotective activity. The reduction was greater than that observed with the standard drug (31.60%), suggesting superior mucosal protection.

Effect on Gastric Volume

The test drug caused a mild increase in gastric volume (13.02%) compared to the control group, which was statistically non-significant. This finding suggests that the anti-ulcer effect is not primarily mediated through modulation of gastric secretory volume.

Effect on Gastric pH

An increase in gastric pH (23.07%) was observed in the test drug group; however, the change was statistically non-significant when compared to control and standard groups. This indicates a mild buffering or acid-modulating effect.

Effect on Free Acidity

The test drug showed only a minimal increase in free acidity (9.42%) compared to the control group, which was substantially lower than that observed in the standard group (33.28%). This suggests that the test drug helps prevent excessive acid-related mucosal injury.

Effect on Total Acidity

Total acidity was reduced by 21.87% in the test drug group, while the standard group exhibited a slight increase (13.53%). Although statistically non-significant, this reduction supports a tendency toward acid regulation and mucosal protection.

Effect on Total Carbohydrates

The test drug produced a marked decrease in total carbohydrate content (55.45%) compared to control, which was greater than the reduction observed in the standard group (33.37%). Despite the lack of statistical significance, this trend indicates improved gastric mucosal integrity.

Effect on Total Proteins

The test drug resulted in a moderate increase in total protein levels (28.28%) relative to control. Although this increase was statistically non-significant, it suggests a supportive role in enhancing mucosal defense and tissue repair.

Histopathological changes

Histopathological study of the stomach tissue reveals the following observations. Three out of four samples in the Test group show mild mucosal injury with minimal inflammatory infiltration without oedema. No change in tissue architecture. Compared with Control group, there is high reduction of mucosal injury and inflammatory infiltration. Compared with

Control group, there is good reduction in histological changes in three samples. Most of the samples show minimal inflammatory cells and minimal gastric haemorrhage in the Standard group. Oedema seen in two samples. No change in tissue architecture. Compared with Control group, there is high reduction of mucosal injury and inflammatory infiltration. Compared with Control group, there is good reduction in histological changes. From the above facts, we could infer that the property of the Test drug acts as a mucosal protective layer of the stomach which helps the further reduction in an ulcer condition.

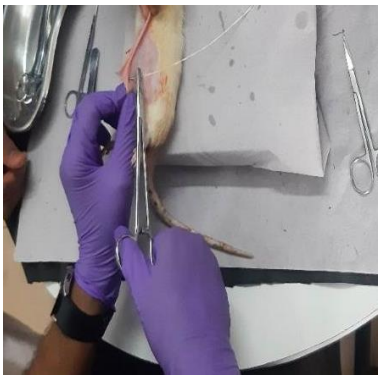
Showing stages of experimental anti-ulcer study

a) Preparation of Rhizome decoction

b) Drug administration

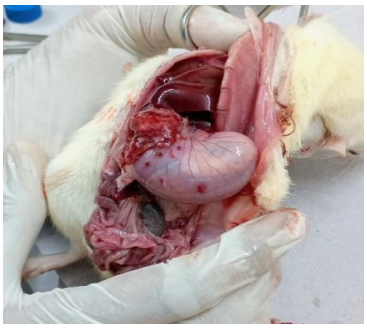
c) Table setting

d) Steps of Incision making



e) Pyloric ligation with cotton thread

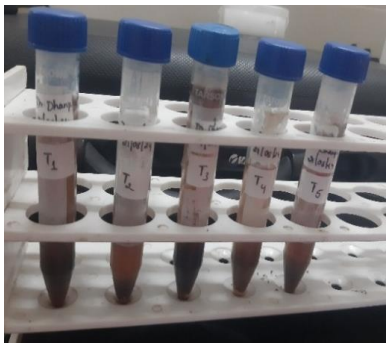
f) Closing incision with interrupted sutures



g) Removal of Stomach

h) Stomach with gastric juice

i) Collected gastric juice



j) Open Stomach for ulcer evaluation

k) Stomach collected for histopathology.

Figure. 1a-1k: Showing stages of experimental anti-ulcer study.

Histopathological section of Stomach

CONTROL

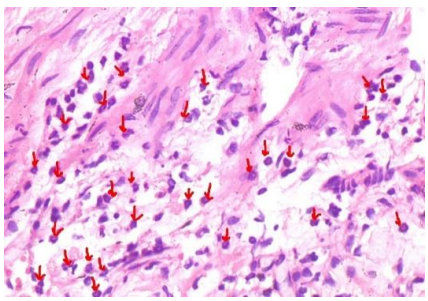


Fig. 2a.

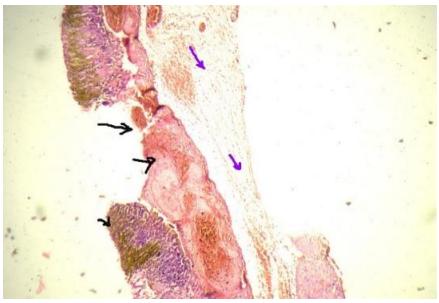


Fig. 2b.

STANDARD

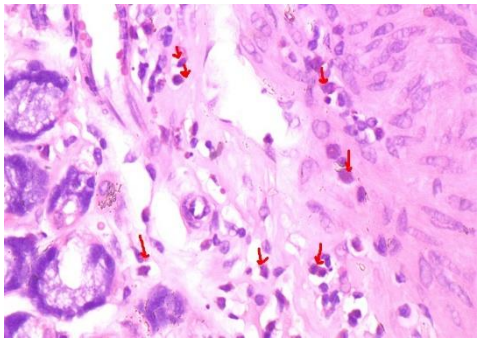


Fig. 2c.

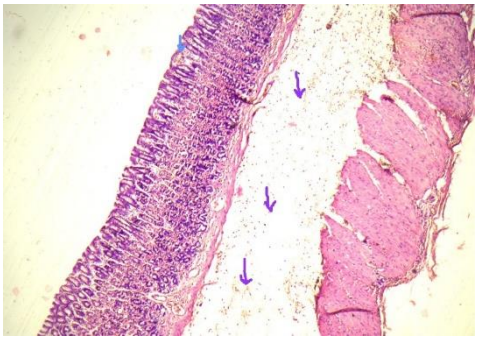


Fig. 2d.

TEST

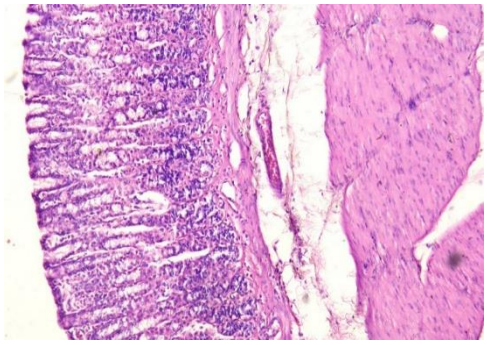


Fig.2e

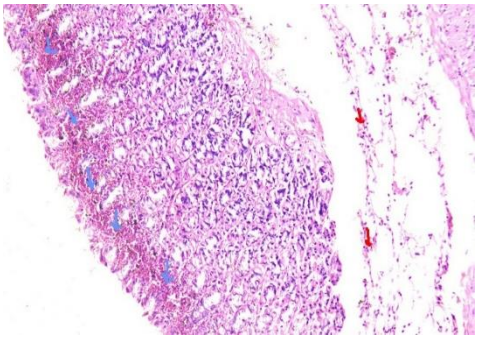


Fig.2f

Figure 2a-2f: Histopathological changes of Stomach.

Probable mode of action

In the present study, it was found that the test drug exhibits significant anti-ulcer potential owing to its predominance of *Tikta Rasa*, supported by *Katu* and *Kashaya Anurasa*, along with *Ushna Virya*. *Tikta Rasa*, dominated by *Vayu* and *Akasha Mahabhutas*, pacifies aggravated *Pitta* and *Kapha*, counteracts hyperacidity, reduces inflammation, and promotes mucosal regeneration through *Vrana Ropana*. The presence of *Katu Rasa* enhances *Agni*, clears *Kapha* stagnation, and prevents *Ama* formation, thereby supporting digestion without excessively aggravating *Pitta*. *Kashaya Rasa* contributes to ulcer healing by its astringent and stabilizing properties, forming a protective barrier over the gastric mucosa and preventing further erosion. Although *Ushna Virya* is generally associated with *Pitta* aggravation, its effect in this drug is balanced by the dominant *Tikta Rasa*, facilitating improved circulation and metabolic activity necessary for tissue repair.

From a modern pharmacological perspective, the observed gastroprotective activity may also be attributed to phytoconstituents such as flavonoids, phenolic compounds and essential oils,

which possess antioxidant and anti-inflammatory properties that mitigate oxidative stress and inflammatory damage to the gastric mucosa. Thus, the combined action of *Tikta*, *Katu*, and *Kashaya Rasas*, harmonized by *Ushna Virya*, restores *Dosha* balance, protects the gastric mucosa, and promotes ulcer healing, thereby validating the traditional use of *Hedychium coronarium* J. Koenig in the management of peptic ulcer disease.

CONCLUSION

From the present study, it can be concluded that the test drug *Hedychium coronarium* J. Koenig can be effectively used in the management of peptic ulcer disease. Further research studies like Clinical trials can be conducted to assess the therapeutic efficacy of *Hedychium coronarium* J. Koenig rhizome in peptic ulcer disease.

REFRENCES

1. Pullaiah T. Krishnamurthy K.V, Bahadur Bir. Ethnobotany of India Volume I Eastern Ghats and Deccan. Canada: Apple Academic Press Inc., 201; 10.
2. Gopalakrishna Bhat K. Flora of Udupi: Indian Naturalist, 2003; 156.
3. Murthy Chandra Himasagara. Sarngadhara Samhita. Varanasi: Chowkhamba Sanskrit Series Office, 2010; 111-112.
4. Shay H. Komarov S. A., Fels S. S, Meranze D, Gruenstein M, and Siplet H. A. Simple method for uniform production of gastric ulceration in the rat. Gastroenterology, 1945; 43-61.
5. Michael Buenor Adinortey et.al. "In Vivo Models Used for Evaluation of Potential Antigastroduodenal Ulcer Agents". 2013. [Internet] [cited on 8/08/2024] Available from: https://onlinelibrary.wiley.com/doi/10.1155/2013/796405
6. Kulkarni SK. Experiments on intact preparations (in-vivo studies). Handbook of Experimental Pharmacology. 3rd Edition. Delhi: Vallabh Prakashan, 1999; 148.
7. Vertebrate animal research, Office of the Institutional Animal Care and Use Committee, Iowa City. [Internet] [cited on 18/07/2024] Available from: https://animal.research.uiowa.edu/iacuc-guidelines-anesthesia