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AN EXPERIMENTAL EVALUATION OF THE ULCER PROTECTIVE ACTION OF BALADI MANDURA

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ABSTRACT

Background: According to the international statistics, more than 50% of the world's population is suffering with gastric irritation due to various causative factors. '*Ayurveda*'- the science of life, promising a better and efficacious remedy with different formulations. *Mandura kalpana* is one such group of medicines with *Mandura* being the key ingredient. *Baladi mandura* is one among the *Mandura Kalpanas* mentioned in *Rasakamadhenu* indicated in *Amlapitta* and *Parinamashoola*. **Aims and objectives:** To evaluate the ulcer protective action of *Baladi MandAura* by Shay's method of pyloric ligation induced acid secretion and ulcer formation in Wistar strain albino rats. **Methodology:** The drugs were administered to the respective groups for 8 days by oral route. Ranitidine was taken as the standard drug for inducing ulcers. On 9^{th} and 10^{th} day after administering drugs to the respective groups, fasting and pyloric ligation performed respectively. The gastric juice collected for biochemical evaluation and stomach was cut opened for calculating ulcer index. The results were expressed as Mean ± SEM. **Results:** The trail group showed a non-significant reduction in volume of gastric juice, free acidity, total carbohydrate and ulcer index. Non- significant increase was seen in p^H, protein and significant increase in total acidity. Experimentally the trial group showed a significant reduction of ulcer formation by comparing with standard group. **Conclusion:** The increase in p^H of gastric juice indicates the capacity of *Baladi Mandura* in neutralizing the

gastric contents and the reduction in ulcer index showed the ulcer preventive action of Baladi Mandura.

KEYWORDS: Ulcer index, Gastric juice, Protein, *Mandura bhasma*, Peptic ulcer diseases.

INTRODUCTION

Rasashastra and *Bhaishajya kalpana* is the pharmaceutical branch of *Ayurveda*, which explores various *Kalpanas* formulated out of either herbal, mineral, animal or in combination of these drugs. *Baladi Mandura* is a herbo-mineral formulation comes under the *Mandura kalpanas* mentioned in the *Amlapittadhikara* of *Rasakamadhenu.*[1] *Mandura bhasma* is the key ingredient of *Baladi Mandura* and the other ingredients are *Bala, Shatavari, Yava, Eranda, Pippali, Jeeraka, Chaturjataka (Twak, Ela, Patra and Nagakesara)* and *Guda*.

Peptic ulcer diseases are one of the major burning issues of the present era due to various causative factors. The prevalence of Peptic ulcer is high in the developing countries with a ratio of duodenal ulcer as 5:1 to 2:1 in male to female whereas that of gastric ulcer is 2:1 or less.[2]

According to *Ayurveda, Swasthya chikitsa* (prevention) and *vikara prashamana chikitsa* (curing the disease) are the two treatment aspects where preventing the disease is the first and foremost.[3] Hence with this view point the present study has been taken to evaluate the ulcer protective action of *Baladi Mandura.*

MATERIALS AND METHODS

Test drug

The sample of *Baladi Mandura* was prepared as per the standard reference in the Practical lab of Department of Rasashastra and Bhaishajya Kalpana, Shri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Udupi.

Standard drug

Ranitidine (RANTAC-150)

Experimental Animals

24 Wistar strain albino rats weighing between 200-250 g of either sex were obtained from the animal house attached to the S.D.M Centre for Research in Ayurveda and Allied Sciences

and were divided into 4 groups of 6 rats in each. The rats were fed with Rat pellets and water daily.

Inclusion Criteria

- Healthy Wistar albino rats of both sexes.
- Wistar strain albino rats weighing between 200±50 gm.

Exclusion criteria

- Wistar albino rats which are infected and pregnant.
- Wistar albino rats which shows signs of infection during the experimental study.
- Wistar albino rats which are used for other experiments.

Grouping

- Group 1- Control group
- Group 2- Pyloric ligation control group
- Group 3- Standard group
- Group 4- Trail group

Dose fixation

The dose was calculated by converting the human therapeutic dose to animal dose on the basis of surface area ratio according to the Paget and Barnes table (1969).[4]

Standard conversion formula = Human dose × 0.018 × 5/kg body weight

- Dose of *Baladi Mandura* is 1 kola = 6 g/kg body weight

Rat dose = 540mg/kg body weight

- Dose of Ranitidine = 50mg/kg body weight

= 0.05g/g body weight

Preparation of stalk solution

Standard drug: The suspension was prepared by powdering the Ranitidine tablet in a porcelain crucible and added 10 ml distilled water along with 50 mg carboxy methyl cellulose (CMC).

Test drug: 1.08g of *Baladi Mandura* (granules) was measured and taken in a porcelain crucible. The suspension was prepared by adding 20 ml distilled water and 100 mg carboxy methyl cellulose (CMC).

METHODOLOGY

All the four groups had free access to food and water ad libitum for the first 8 days along with standard and test drug administered to the respective groups. On the 9th day, after the administration of standard and test drug to the respective groups, all the rats were kept for fasting (free access to water ad libitum) for around 36-40 hours by placing them in a metabolic cage to prevent coprophagy. On the 10th day after dosing to the respective groups, the pylorus was ligated by following the method of Shay et al. (1945). The rats were observed for 10 hours after performing the pyloric ligation. At the end of 10 hour of pyloric ligation all the rats were sacrificed by inhaling ether. Stomach was excised for calculating the ulcer index.[5] The gastric juice collected for the biochemical analysis such as p^{H} of gastric juice, Volume of gastric juice, free acidity[6], Total acidity[7], Total protein[8] and Total carbohydrate.[9]

Statistical Analysis

All the values were expressed as MEAN ± SEM (Standard error of mean). The data was analyzed by one-way ANOVA followed by Dunnet's multiple't' test as post hoc test. Graph pad Inst 3 was used for the statistical evaluation. A level of $p \leq 0.05$ was considered as statistically significant and $p \leq 0.01$ as statistically very significant. The level of significance was noted and interpreted accordingly.

RESULTS

The effect of *Baladi Mandura* in pyloric ligation induced gastric ulcers in Wistar albino rats was analyzed based on the following results of biochemical parameters such as p^{H}, Volume of gastric juice, free acidity, Total acidity, Total protein, and Total carbohydrate and Ulcer index and the results are depicted in Table 1,2,3,4,5,6,7 respectively. The ulcer index images of pyloric ligation control group, standard group and trail group are given in the Figure 1, 2 and 3 respectively.

Table 1: Effect of *Baladi Mandura* on p^{H} of gastric juice.

Groups	P^{H}	Percentage Change
Positive Control	2.5±0.84	
Standard	5.75±0.77*	130↑
Test	3.16±0.47	26.4↑

DATA: MEAN±SEM, $^{*}p< 0.05$

Table 2: Effect of *Baladi Mandura* on Volume of gastric juice.

Groups	Volume	Percentage Change
Positive Control	8.13±1.96	
Standard	3.25±1.02*	60.024↓
Test	7.33±0.88	9.84↓

DATA: MEAN±SEM, *p< 0.05

Table 3: Effect of *Baladi Mandura* on Free acidity.

Groups	Free acidity	Percentage Change
Positive Control	1.8±0.28	
Standard	0.52±0.19**	71.11↓
Test	1.40±0.24	22.22↓

DATA: MEAN±SEM, **p< 0.01

Table 4: Effect of *Baladi Mandura* on Total acidity.

Groups	Total acidity	Percentage Change
Positive Control	3.11±0.54	
Standard	1.96±0.22	36.977↓
Test	5.83±0.7**	87.459↑

DATA: MEAN±SEM, **p< 0.01

Table 5: Effect of *Baladi Mandura* on Total carbohydrate.

Groups	Total acidity	Percentage Change
Positive Control	857.33±79.546	
Standard	661.5±79.88	22.84↓
Test	854±69.3	0.388↓

DATA: MEAN±SEM

Table 6: Effect of *Baladi Mandura* on Total protein.

Groups	Total protein	Percentage Change
Positive Control	5430.5±746.24	
Standard	7669.6±1159.5	41.231↑
Test	6788.6±875.16	25.008↑

DATA: MEAN±SEM

Table 7: Effect of *Baladi Mandura* on Ulcer index.

Groups	Ulcer index	Percentage Change
Positive Control	5.33±2.20	
Standard	4.33±0.87	18.761↓
Test	1.91±0.65	64.165↓

DATA: MEAN±SEM

Fig 1: Positive control group.

Fig 2: Standard group.

Fig 3: Trial group.

DISCUSSION

Animal experimentation was done in Wistar strain albino rats by pyloric ligation induced gastric secretion and ulcer formation. The study parameters showed a satisfactory results in p^H, free acidity, total protein and volume of gastric juice along with ulcer index. This suggest the ulcer preventive action of *Baladi Mandura* on gastric mucosa.

Both in standard and trial group there was a non-significant decrease in the free acidity of gastric juice. The free acidity indicates the amount of HCl in the gastric juice. Though statistically it shown a non-significant reduction, but there was 22.22% reduction in the free acidity suggesting a moderate action of *Baladi Mandura* in inhibiting the HCl production.

Glycoproteins are the major constituent of the mucous barrier which protects the mucous membrane from the acidic medium in producing ulcers. The increase in total protein of the gastric medium shows the action of drug in preventing the ulcers by strengthening the mucous barrier.

Both standard and trial group showed a non-significant decrease in the ulcer index. By analyzing the percentage change, the trial group showed 64.165% reduction in the formation of ulcer indicating the ulcer preventing (Cytoprotective) action of *Baladi Mandura*. Even though the total acidity was more, the trial drug *Baladi Mandura* could strengthen the mucous membrane of the stomach and by this it prevented the ulcer formation. The increase in total acidity was found as extreme significant may be due to the presence of some organic acids, which couldn't be inhibited by the *Baladi Mandura*.

CONCLUSION

The ulcer preventive action of *Baladi Mandura* was assessed by Shay's method of pyloric ligation induced ulcers in Wistar strain albino rats. Though statistical evaluation showed a non-significant reduction in the ulcer index, experimentally there was a significant reduction in the trail group by comparing with standard group. This suggests the ulcer preventive action of *Baladi Mandura*.

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