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Comparative study of Lansoprazole and Rabeprazole on ulcer healing property on albino rats

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ABSTRACT

Background: Proton pump inhibitors are widely used for gastroesophageal disorders. The present work was carried out to compare effect of lansoprazole & rabeprozole for gastric ulcer healing. Methods: The study was carried out on gastric ulcer induced by aspirin in albino rats. The rats were divided into control group lansoprazole group and rabeprazole group and the effects of the two drugs, with regards to mean ulcer index was compared with the control and with each other. Analysis of variance and Student's t-tests were applied to compare the results. Results: It was found that the mean ulcer index varied significantly across the three groups (p = .000). Compared to the control group, the ulcer index was significantly less in both lansoprazole and rabeprazole groups (p = .000). But the ulcer index with rabeprazole was significantly less than that with lansoprazole (p = .001). Conclusion: Rabeprazole is more efficacious than lansoprazole as far as ulcer healing effect is concerned.

Key words: Gastric ulcer, Rabeprazole, Lansoprazole, Anti-ulcer effect.

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Introduction: Peptic ulcer is defined as a disruption of the mucosal integrity of the stomach and/or duodenum leading to a local defect or excavation due to active inflammation.[1] It results probably due to imbalance between the aggressive (acid, pesin, bile and H-pylori) and defensive (gastric mucus and bicarbonate secretion, prostaglandin, nitric oxide innate resistance of mucosal cells. The incidence of peptic ulcer appears to be increasing.[2] An ulcer is termed according to the site of the lesion. Ulcer between cardia and gastro-duodenal junction in stomach is called gastric ulcer. Various other sites are duodenum, oesophagus and Meckel's diverticulum. The aim of management is to relieve symptoms, induce ulcer healing in the short term and cure the ulcer in the long term.[3] The peptic ulcer disease is most often associated with H-pylori induced hyperchlorhydric chronic gastritis which is present in 85% to 100% of individual with duodenal ulcer and in 65% with gastric ulcer.[4] One study showed that rabeprazole and esomeprazole achieves more rapid and profound inhibition of acid secretion than do older agents.[5] In the light of the above, the present work was carried out with objective to compare effect of lansoprazole & rabeprozole for gastric ulcer healing.

Materials And Methods: Albino rats (240-260 gms) of the either sex were grouped in control, lansoprazole and rabeprazole group for inducing the ulcers. All the experiments were approved by the Institutional Animal Ethics Committee, ethical committee of Katihar Medical College and Hospital, Katihar, Bihar, India for conducting animal experiments. Ulcer production was done by aspirin administration as per method of Carmichael et. al

(1978)[6]. Also for anti-ulcerogenic effect, the same Carmichael's (1978) Method was adopted[6], while "ulcer index" was calculated as per Goyal R.K (2003)[7]

Drugs under study were : (a) lansoprazole- 30 mg/kg body weight, (b) rabeprazole- 20 mg/ kg body weight

Gastric ulcer was produced by giving aspirin. For this purpose the dose of aspirin used was 200 mg/kg body weight, which produced 100% ulceration. Experimental drugs were given to treat the ulcer on the basis of body weight. After a fasting period of 24 hours, the drugs were introduced to stomach through a fine rubber catheter and a glass syringe. Half an hour after drugs were given, aspirin (in 2 ml 1% gum acasia) in the dose of 200 mg/ kg body weight was introduced. Neither food nor water was allowed after administration of drugs. Animals were left as such in the respective Cages for 4 hours. After 4 hours of aspirin administration rats were scarified with over dose of ether. Abdomen was opened with midline incision of 1.5 inches length. Incision was made from xiphoid process. Stomach was freed of mesentery and removed and was opened by making cut along greater curvature and washed under direct stream of cold water. Lesions were examined by naked eye. Percentage of albino rats ulcerated from total was determined.

Ulcer index calculation was done by Goyal R.K (2003) method.[7] This was done from Glandular portion of Stomach with the aid of magnifying glass & measuring tape.

Ulcer Index = 10/x

where x = Total Mucosal Surface
Total Ulcerated area

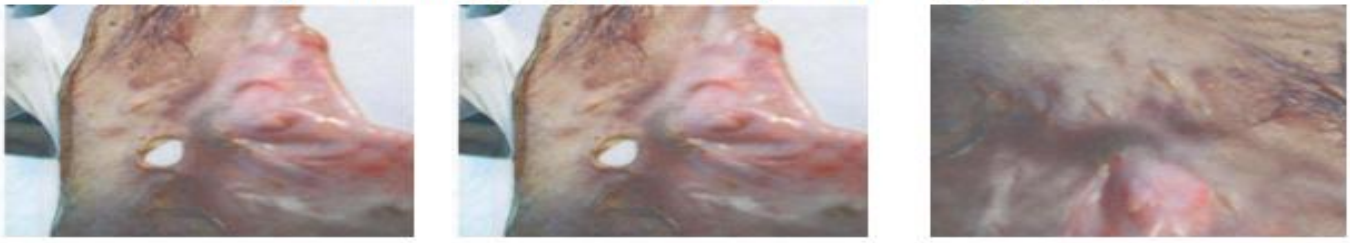
Statistical analysis: Data were presented in mean ± SEM. and were analyzed using Statistical Package for Social Scientists 10 (SPSS).) Student's t-tests and ANOVA were applied to compare significance between different groups ($p < 0.05$).

Results: The ulcer percentages in the control group, lansoprazole group and rabeprazole group were 100%, 62.5% and 37.5% respectively. (Table 1)

Table 1: Ulcer percentage and ulcer index in different groups of albino rats

S.. No	Drugs Used (doses)	Average body weight (gms)	Ulcer percentage	Ulcer Index (Mean ±SEM)
1	Control (2 ml) (n=8)	254 ± 1.2	100%	7.26 ± 0.072
2	Lansoprazole (30 mg/kg) (n=8)	248 ± 2.3	62.5%	3.10 ± 0.23
3	Rabeprazole (20 mg/kg) (n=8)	256 ± 1.1	37.5%	1.06 ±0.40

Figure 1: Photograph showing ulceration in albino rat after administration of aspirin (200 mg/kg body weight) in control A, lansoprazole (B) (30 mg/kg body weight) and rabeprazole (C) (20mg/kg body weight)



A B C

In the control group, the mean ulcer index was observed out to be 7.26 (± 0.72), while that in lansoprazole group and rabeprazole group was calculated to be 3.10 (± .23) and 1.06 (± .40) respectively. (Table 1) The mean ulcer index in the three groups varied significantly [$F (2, 21) = 137.178$ $p = .000$]. The mean ulcer index of lansoprazole group was significantly less that of the control group [$t (14) = 17.26$ $p = .000$]. It was also significantly less in the rabeprazole group in comparison to control group [$t (14) = 15.25$ $p = .000$]. However, the mean ulcer index in the rabeprazole group was found to be significantly less in the rabeprazole group than in the lansoprazole group [$t (14) = 4.42$ $p =.001$].

Ulceration after administration of aspirin in dose of 200 mg/kg body weight in albino rats, the ulcer healing after administration of lansoprazole in the dose of 30 mg/kg body weight and after

administration of rabeprazole in the dose of 20mg/kg body weight in these animals were shown as colour photographs in Figure 1 grouped into A for control, B for lansoprazole and C for rabeprazole.

Discussion: Proton pump inhibitors (PPIs) inhibit release of hydrogen ion from parietal cells. It inhibits gastric acid secretion by blocking H^+/K^+ATPase pump.[8] Lansoprazole prevents gastric mucosal damage by gastric prostaglandin production, expression of cyclo-oxygenase (COX) isoforms and release of stable nitric oxide metabolites into gastric juice and blocks the oxygen derived free radical output from neutrophils activated by *Helicobacter pylori* and exerts its antioxidant effect. [9, 10] Rabeprazole causes perhaps the fastest acid suppression and so aid gastric mucin synthesis. This is necessary for the maintenance of mucosal integrity.[11] Although these PPIs being similar in pharmacological actions they differ in clinical pharmacology.[11]

Therefore, the present work was undertaken with an aim to compare different PPIs namely lansoprazole and rabeprazole for the treatment of aspirin induced ulcer model in albino rats. It was observed that the mean ulcer index with rabeprazole was significantly less than that using lansoprazole. It was evident that rabeprazole was more effective than lansoprazole as far as ulcer healing was concerned.

Thippeswamy AHM et al (2010)[8] in a similar study f ound that Percent protection in ulcer index offered by omeprazole, rabeprazole and lansoprazole was 83.92, 89.28, and 79.45, respectively Rabeprazole was found to be most effective. There was significant increase in mucin and reduction in protein and pepsin content in PPIs treated groups compared to control group. Among these PPIs, rabeprazole showed better reduction of gastric acid secretion and decrease in ulcer index than to omeprazole and lansoprazole. This effect of rabeprazole may be due to rapid onset of H^+/K^+ ATPase pump inhibition and a greater effect on intragastric pH as compared to omeprazole and lansoprazole.[8]

Conclusion: It could be concluded from the present study that rabeprazole is more efficacious than lansoprazole as far as ulcer healing effect is concerned. However further work particularly randomized control trial on patients suffering from peptic ulcer is required to understand the clinical significance of the results of this animal experiment.

Ethical considerations: Ethical issues (including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors. Ethical clearance in the context of animal experimentation to conduct the study was obtained from the ethical committee of Katihar Medical College and Hospital, Katihar, Bihar.
Conflict of interests: None
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