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Comparison of Ulcer Healing Property of Lansoprazole and Rabeprazole in Albino Rats

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Abstract
Proton pump inhibitors (PPIs) are a group of drugs whose main action is a pronounced and long-lasting reduction of gastric acid production. Medically used proton pump inhibitors are Omeprazole, Lansoprazole, Dexlansoprazole, Esomeprazole, Pantoprazole, and Rabeprazole Hence this study is planned with the aim to compare outcome of lansoprazole & rabeprozole for gastric ulcer healing in albino rats.
Total 15 albino rates were used in the study and divided in 3 groups of 5 each. The control study group and drug administered group were divided for the comparison. Aspirin was administered 200mg/kg of body weight for generation of gastric ulcers. Lansoprazole was administered 30 mg/kg of body weight and Rabeprazole was administered 20 mg/kg of body weight.
In the control group of rats the average weight of the albino rats was observed as 230 to 240 gm. In this study group ulcers percentage is 100% with the Ulcer Index as 6.2 – 6.5. In the Lansoprazole drug induced study group the weight was 245 to 256 gms. The ulcer percentage was recorded as 67% with the ulcer index in the range of 3.2 to 3.4. In the Rabeprazole drug induced patients the ulcer percentage was observed as 35% with the reduced ulcer index to 1.1-1.4 compared to previous study group rats.
Hence form the present study it can be concluded that the Rabeprazole is more effective to control the peptic ulcer than the Lansoprazole in albino rats. This study further needs to be elaborated in patients with peptic ulcer to know the actual effect and onset of action.
Keywords: *Lansoprazole, rabeprozole, peptic ulcer, healing capcity, albino rats, etc.*

Introduction

Peptic ulcer disease refers to painful sores or ulcers in the lining of the stomach or first part of the small intestine, called the duodenum.

Peptic ulcer disease (PUD), also known as a peptic ulcer or stomach ulcer, is a break in the lining of the stomach, first part of the small intestine, or occasionally the lower esophagus[1][2]. An ulcer in the stomach is known as a gastric ulcer while that in the first part of the intestines is known as a duodenal ulcer. The most common symptoms are waking at night with upper abdominal pain or upper abdominal pain that improves with eating. The pain is often described as a burning or dull ache. Other symptoms include belching, vomiting, weight loss, or poor appetite.

About a third of older people have no symptoms [1]. Complications may include bleeding, perforation, and blockage of the stomach. Bleeding occurs in as many as 15% of people [3].

Peptic ulcers are present in around 4% of the population.[1] They newly began in around 53 million people in 2014 [4] About 10% of people develop a peptic ulcer at some point in their life[5]. They resulted in 301,000 deaths in 2013 down from 327,000 deaths in 1990[6]. The first description of a perforated peptic ulcer was in 1670 in Princess Henrietta of England[3] H. pylori was first identified as causing peptic ulcers by Barry Marshall and Robin Warren in the late 20th century,[7] a discovery for which they received the Nobel Prize in 2005.[8]

No single cause has been found for ulcers. However, it is now clear that an ulcer is the end result of an imbalance between digestive fluids in the stomach and duodenum. Most ulcers are caused by an infection with a type of bacteria called Helicobacter pylori (H. pylori).

Factors that can increase your risk for ulcers include:

- Use of painkillers called non steroidal anti-inflammatory drugs (NSAIDs), such as aspirin, naproxen (Aleve, Anaprox, Naprosyn, and others), ibuprofen (Motrin, Advil, some types of Midol, and others), and many others available by prescription; even safety-coated aspirin and aspirin in powered form can frequently cause ulcers.
- Excess acid production from gastrinomas, tumors of the acid producing cells of the stomach that increases acid output
- Excessive drinking of alcohol
- Smoking or chewing tobacco
- Serious illness
- Radiation treatment to the area

An ulcer may or may not have symptoms. When symptoms occur, they may include:

A gnawing or burning pain in the middle or upper stomach between meals or at night

- Bloating
- Heartburn
- Nausea or vomiting

In severe cases, symptoms can include:

- Dark or black stool (due to bleeding)
- Vomiting blood (that can look like "coffee-grounds")
- Weight loss
- Severe pain in the mid to upper abdomen

Though ulcers often heal on their own, you shouldn't ignore their warning signs. If not properly treated, ulcers can lead to serious health problems, including:

- Bleeding
- Perforation (a hole through the wall of the stomach)
- Gastric outlet obstruction from swelling or scarring that blocks the passageway leading from the stomach to the small intestine

Taking NSAIDs can lead to an ulcer without any warning. The risk is especially concerning for the elderly and for those with a prior history of having peptic ulcer disease.

Following are the conditions in which probability is more to develop ulcers:

- Are infected with the H. pylori bacterium
- Take NSAIDs such as aspirin, ibuprofen, or naproxen
- Have a family history of ulcers
- Have another illness such as liver, kidney, or lung disease
- Drink alcohol regularly
- Are age 50 or older

The pathological findings are the important sources of the information of the ulcerative diseases. The endocrinologist studying abnormal studying abnormal patterns of both gastric production and the hormonal control of gastric secretion of peptic ulcer have made important contributions [9-11].

To understand the basis etiology and pathogenesis of the fundamental efforts and basic knowledge is required. This has made the successful operational and medical therapy.

Proton pump inhibitors (PPIs) are a group of drugs whose main action is a pronounced and

long-lasting reduction of gastric acid production. Medically used proton pump inhibitors are Omeprazole, Lansoprazole, Dexlansoprazole, Esomeprazole, Pantoprazole, and Rabeprazole.

Robinson et alrevealed that rabeprazole and esomeprazole achieves more rapidand profound inhibition of acid secretion than doolder agents. Hence this study is planned with the aim to compare outcome of lansoprazole & rabeprozole for gastric ulcer healing [12].

Methodology

Healthy albino rats of either sex weighing between 200-300 g were used. Animals were housed individually in polypropylene cages, maintained under standard conditions 25±3° and 35-60% humidity; the animals were feed with standard rat pellet diet, and water ad libitum. The study was conducted after obtaining institutional animal ethical committee clearance. Ulcer production was done by aspirin administration as per method of Carmichael et. Al [6].

Total 15 albino rates were used in the study and divided in 3 groups of 5 each. The control study group and drug administered group were divided for the comparison. Aspirin was administered 200mg/kg of body weight for generation of gastric ulcers. Lansoprazole was administered 30 mg/kg of body weight and Rabeprazole was administered 20 mg/kg of body weight. After a fasting period of 24hours, the drugs were introduced to stomach through a fine rubber catheter and a glass syringe. Neither food nor water was allowed after administration of drugs. Animals were left as such in the respective Cages for 4 hours. Abdomen was opened with midline incision of 1.5 inches length. Incision was made from xiphoid process. 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.

$$\text{Ulcer Index} = \frac{10}{\text{Total Mucosal Surface}} \times \text{Total Ulcerated area}$$

The observations were noted as below.

Results & Discussion

The drug induced and the observations in the 3 study groups were as mentioned below.

Table 1 : Ulcer Observation Comparison in Study Group.

Sr. No	Drugs Used (doses)	Dose	Total Rats	Average body weight (gms)	Ulcer %	Ulcer Index
1	Control	NA	5	230-240 gm	100%	6.2-6.5
2	Lansoprazole	30 mg/kg	5	245 – 256 gm	67%	3.2-3.4
3	Rabeprazole	20 mg/kg	5	250 – 258 gm	35%	1.1-1.4

In the control group of rats the average weight of the albino rats was observed as 230 to 240 gm. In this study group ulcers percentage is 100% with the Ulcer Index as 6.2 – 6.5. In the Lansoprazole drug induced study group the weight was 245 to 256 gms. The ulcer percentage was recorded as 67% with the ulcer index in the range of 3.2 to 3.4. In the Rabeprazole drug induced patients the ulcer percentage was observed as 35% with the reduced ulcer index to 1.1-1.4 compared to previous study group rats.

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

Hence form the present study it can be concluded that the Rabeprazole is more effective to control the peptic ulcer than the Lansoprazole in albino rats. This study further needs to be elaborated in

patients with peptic ulcer to know the actual effect and onset of action.

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