Original Research Article

Comparative study of esomeprazole and omeprozole on human by serum pepsinogen-I estimation method as a bio marker of gastric inflammation

Amit Kumar Jha[1*], Asha Kumari[2]

[1]Associate Professor, Department of Pharmacology, Darbhanga Medical College & Hospital, Laheriasarai, Bihar, India

[2]Assistant Professor& H.O.D, Department of Pharmacology, Darbhanga Medical College & Hospital, Laheriasarai, Bihar, India

Received: 21-08-2021 / Revised: 14-09-2021 / Accepted: 28-10-2021

Abstract

Background: Proton pump inhibitors are widely used for gastroesophageal disorders. The present work was carried out ot compare effect of omeprazole & esomeprozole for gastric ulcer healing. **Methods**: pepsinozen-I (none- Invasive) estimation method was taken. The Peasants were divided into control groupo, omeprazole group and esomeprozole group. and effect of two drugs with regard to pepsinozen-I compared with control and with each other. Analysis of variance oand Student's t-tests, and ANOVA were applied to compare the results. **Results**: It was found that the mean pepsinozen-I level varied significantly across the three groups (p=.000). Compared to the control group, the pepsinozen-I level was significantly less in both omeprazole and esomeprozole groups (p=.000). But the pepsinozen-I level was significantly less in esomeprozole in comparison to omeprazole(p=.001). It was evident that esomeprozole was more eficapious than omeprazole as far as acid reflux disorder was concerned .

Introduction

Peptic Ulcer is one of the commonest diseases of alimentary system. It is a world wide problem. It may be of different forms and drugs therapy is important for relief of symptoms and healing of Ulcers. The Ulcer is Localized[1]. The common Sites of Ulcers are (a) Duodenum(1st part) (b) The stomach (Mostly in lesser curvature) (c) lower end of esophagus as a result of reflux from the stomach into the esophagus (d) Meckel's diverticulum (e) jejunum after the gastro-jejunal anastomosis the "anastomotic ulcers".

Peptic ulcers are due to defect in gastrointestinal mucosa that penetrate muscularis mucosa. This is how it is different from superficial erosion that do not extend through the muscularis mucosa. The risk factor which are associated with its occurance are cigarette smoking, NSAID drugs, alcohol intake, Anxiety, and persons with blood group "O" and irregular spicy food habit[2].

It is an Ulcer (defined as mucosal erosions equal to or greater than .5 cm) of an area of gastrointestinal tract that is usually acidic. Most common cause of Peptic Ulcer-is Helicobacter Pylori bacteria.

Types of Peptic Ulcer

Type I - Ulcer along lesser curve of stomach
Type II - Two Ulcer present - one gastric, one duodenum
Type III - Pre pyloric Ulcer
Type IV - Proximal gastro esophageal Ulcer
Type V - Anywhere along gastric body

*Correspondence
Dr. Amit Kumar Jha
Associate Professor, Department of Pharmacology, Darbhanga Medical College & Hospital, Laheriasarai, Bihar, India.

In modern world various drugs are available to manage various diseases. Even though they produce serious side effects sometimes as well. Non-steroidal anti-inflammatory drugs are commonly used for management of arthrits. Aspirin causes gastrointestinal damage varying from acute microscopic gastric changes to serious chronic gastric ulcerations or haemorrhage, which produces symptom in the form of malena and hematemesis. Balance between aggressive capacity of (acid + Pepsin) and mucosal defense mechanism is disturbed either due to lowered mucosal resistance or by increased aggressiveness. Ulcers occur slightly more commonly in men than in women[3]. Though ulcer can occur in any age group, duodenal ulcers are more common between ages of 30 - 55, and gastric ulcers occur more commonly between ages of 55 - 70. The nocturnal basal gastric acid secretion which is highest at night is of importance in management of ulcer because gastro duodenal mucosa is most likely to be damaged by acid pepsin especially when no food is there in stomach to counteract effect of acid and pepsin. The incidence of duodenal ulcer disease has been declining dramatically for past 30 years, but the

Physiology of Gastric Secretion

In 24 hour, volume of gastric juice secreted in human varies between 1200 - 1500 ml. Acidity of fasting human gastric juice varies between (40 - 60) meEq|L and PH varies between .9 - 1.2. [Gastric Secretion is regulated by both mechanism[4].

a) Hormonal

b) Nervous-Para Sympathetic fibers of Vagus nerve and local intrinsic nerve plexus reflexes controls the nervous regulation.

Hormonal regulation takes place by mean of gastrin. Both Vagus and Gastrin mechanism in combination stimulated gastric secretion more than individual mechanism. Histamine also stimulated gastric secretion. The target for peptic ulcer drug therapy is regulation of acid secretion by parietal cell]. The hydrogen, Sodium and Potassium are principle cations. The main anion is Chloride: Gastric juice consists of mainly water, hydrochloric acid electrolytes namely. Sodium, potassium, bi- carbonates, Sulphur, Calcium, Phosphate. Organic constituents are enzyme, intrinsic factor of castle, mucus[5]. Gastric

mucus coats the gastric mucosa. It comprises of mucopolysaccharides, glycoprotein, protein and blood group substances. Intrinsic factor is mucoprotein. It is localized in gastric mucosa in the cytoplasm of oxantic cells. It is used for Vitamin B12 absorption[6]. The glands in the G.I. tract serve two functions namely [1] secretion of digestive enzyme [2] mucus gland provide mucus for lubrication and protection. The secretion of parietal cell is isotonic.

Etio-pathogenesis

Etiology has been explained separately for acute and chronic peptic ulcers.

Acute Peptic Ulcer

Acute peptic ulcer or stress ulcers are multiple small erosion in the mucosa seen commonly in the stomach but can also involve duodenum (Mohan. H, 2005).

Aetiology

Shock
Severe trauma
Septicemia
Burns
Intra cranial lesions (Cushing ulcer) Drug - Aspirin and other NSAID steroids Alcohol intake
Smoking habits etc.

Chronic Peptic Ulcer

This is common disease. In this condition ulcer is formed in area exposed to acid pepsin mixture. Common sites for peptic ulcers are (i) First part of duodenum (ii) lesser curvature of stomach but can also be seen in area like esophagus and Meckel's diverticulum[7].

Aetiology

Mucosal barrier break is responsible
Factors responsible are Helicobacter Pylori. Gastritis is mainly responsible for duodenal ulcers and for 60% gastric ulcers.

Acid Pepsin Secretion

This is responsible for both gastric and duodenal ulcer.
Mucus secretion - peptic ulcers are caused by decrease in normal mucus barrier.

Hormonal Factors

By tumour is related to peptic ulcer e.g. gastrin elaboration by islet cell tumour in Zollinger Ellison syndrome[8].

Diet

Nutritional deficiency causes peptic ulcer i.e. it's occurrence in low socio economic groups.

Genetic Factor

Person with blood group 'O'. Among Local irritant are cigarette smoking non-steroidal anti inflammatory drugs, alcohol and spicy food.

Pathogenesis

The concept behind this is that occurrence of ulcer is seen when following condition is present
i) If defence mechanism is weakened
ii) If acid-pepsin mixture actively increases
iii) When both i) and ii) factors are present in combination.
Aspirin and NSAID reduces defence mechanism and also reduces bicarbonate secretion.

Macroscopic appearance

Gastric ulcers are most often localised on lesser curvature of stomach. The ulcer is round to oval parietal defect ("hole") 2-4 cm diameter with a smooth base and perpendicular borders[9]. These borders are not elevated or irregular in the acute form of Peptic Ulcer. Regular but with elevated borders and inflammatory Surrounding in chronic form are seen. In the ulcerative form of gastric cancer, border are irregular surrounding mucosa may present radial folds.

Microscopic Appearance

A gastric Ulcer is a mucosal defect which penetrate muscularis mucosa and muscularis propria produced by acid and pepsin aggression. Ulcer margin are perpendicular and present chromic gastric[10]. During the active phase base of ulcer shows 4 zone inflammatory exudate, fibrinoid necrosis, granulation tissue and fibrosis vessels with thickened wall or with thrombosis.

Management of peptic ulcer

Following things are included in the management of Peptic Ulcer.

Non-Medical Management of Peptic Ulcer

Rest

It has been seen that bed rest causes percentage reduction of ulcer size. in patient and this also relieves symptom.

Diet

Babouris, Lennard John in year 1965 observed that any particular diet will not influence the healing rate of gastric ulcer. The factor which appear to affect true of any marked degree was timing of meals. It was assessed that diet should depend on nature of ulcer, on severity of symptoms and on the constitutional make up the individual. In prescribing a diet one must consider time of life at which ulcer symptom began amount of trouble patient has, and time of year he is afflicted.

Alcohol

Chronic intake of alcohol causes the preponderance of Peptic Ulcer.

Smoking

This increases the incidence of Peptic Ulcer. Novis Sloanin 1973 concluded that cigarette smoking over a long period stimulate basal gastric secretion or vagus. This should be checked.

Gastric Mucin

This works both as demulcent and antacid. It role has been demonstrated by Orndorff, Fauley and Ivy (1937).

Medical management of peptic ulcer

H_2 receptor antagonist

They work by blocking histamine receptors in acid producing cells in stomach. They bind H_2 receptors anywhere in body. They are selective for H_2 receptors but not for gastric Hcl secretion. H_2 Receptor antagonist can block only 70% of Hcl secretion (histamine mediated). Balance between the aggressive capacity of (acid + pepsin) and mucosal defence mechanism is disturbed either due to lowered mucosal resistance or by increased aggressiveness. A patient with gastric ulcer produce less amount or normal amount of acid. On other hand patient with duodenal ulcers produce about twice as much acid in compared to normal person[11].

The nocturnal basal gastric acid secretion which is highest at night is of importance in management of ulcer because gastroduodenal mucosa is most likely to be damaged by acid pepsin especially when no food is there is stomach to counteract effect of acid & pepsin.

In present study Male patients are to be between the age of (30-50) years will be taken for the study of the above topic. For intragstric PH measurement pepsinogen 1 estimation will be done.

Material and method

1. Patients of either sex age between 30-50 years was taken for my research work.
2. For intragatric Ph measurement – Determinatiom of serum pepsinogen 1 by non invasive method was done.
3. Drugs taken were Esomeprazole 40 mg per day and Omeprazole 20 mg .

This work was done during the period from August to September 2021 in the department of pharmacology, D.M.CH. Laheria Sarai.

Statistical analysis

Data were presented in mean ± SEM and were analysed using statistical package for social scientists 10 (SPSS). Student's t-test and ANOVA were applied to compare significance between different groups ($p<0.05$).

Results and discussion

Pepsinogen I level changes as a marker for gastric inflammation assessment after one month clinical trial

Serial No.	Drugs used	Pepsinogen I before drug	Pepsinogen I after drug
1	Control	Mean±S.E.M 33±.68	(M+S.E.M) 40 ± .68
2	Omeprazole	44±.62 P<.001	56.0±.67 P<.001
3	Esomeprozole	55.6 ± .32 P<.001	74.0 ± 1.73 P<.001

Group by Comparison of Pepsinogen-I done at different time interval before drug administration and after drug administration. The group comparison of PG-I revealed significant differences in PG-I level as ($p<0.05$) among both groups. Francesco Di Mario et. al did the similar work on 2005 and found Influence of antisecretory treatment with proton pump inhibitors on serum pespsinogen I levels and found that by using PPI, PG-I level increase . It was also seen that PG-I Value increased more with Esomeprozole in comparison to omeprazole .

Conclusion

From above observations it was evident that esomeprazole was more efficacious than omeprazole as far as intragastric PH regulation was concerned.

Ethical considerations

Ethical issues (including plagiarism, consent misconduct. data fabrication and /or falsification, double publication and / or submission, redundancy etc.) have been completely observe by the other. Ethical clearance to conduct the study was obtained from ethical committee of Darbhanga Medical Collage and Hospital Laheria Sarai, Bihar, India.

References

1. Hawkey. CJ. El.al Efficacy of esomeprazole for resolution of symptoms of heartburn and acid regurgitation in continuous users of non-steroidal anti-inflammatory drugs. Aliment Pharmacol Ther,; 25(7) : 813-21, Apr. 1 2007
2. Morgner. A. et.al Esomeprazole – Prevention and treatment of NSAID- induced symptoms and ulcers. Expert-opin Pharmacother2007. ; 8(7) : 975-88
3. Rohss. K. et.al. Esomeprazole 20mg provides more effective intragastric acid control than maintenance dose rabeprazole, lansoprazole or pantoprazole in healthy volunteers. clin Drug investing; 2004;24(1) : 1-7
4. Shay. H. et.al. A simplified method for the uniform production of gastric ulceration in the rat. Gastroenterology 5: 43-61 1945.
5. Subei. IM. et. al. One week of esomeprazole triple therapy vs I week of omeprazole triple therapy plus 3 week of omeprazole for duodenal ulcer healing in H. pylori positive patients. Dig. Dis Sci. 2007 52(6) : 1505-12
6. Blume. H, Donath F., Warne A. et. al. Pharmaco Kinetic drug interaction profiles of proton pump inhibitors. Drug Saf 29(9): 769-84; 2006.
7. Carmichael H. A. et. al. Gastroenterology 74: 1929, 1978.
8. Cox, A. J. Stomach size and its relation to chronic peptic ulcer. Archpathol, 54; 407, 1952.
9. Das, M. M. and Dutta S. K. A Ghosh's Modern Concept on pharmacology and Therapeutic 24th Edition 1991.
10. Gear M.W.L. Gastric ulcer and gastritis, Gut, 12, 639, 1971.
11. Frances Di Mario et. al Inluence of antisecrtory treatment with proton pump inhibitors on Serum pepsinogen I level. Fundamental and clinical pharmacology.2005;19(4):497-501

Conflict of Interest: Nil
Source of support: Nil