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# A PROSPECTIVE OBSERVATIONAL STUDY ON COMPARISION OF EFFICACY OF PANTOPRAZOLE AND RANITIDINE FOR GASTROINTESTINAL ULCER PROPHYLAXIS IN CASE OF POLYPHARMCY IN A TERTIARY CARE HOSPITAL, BANGALORE

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## INTRODUCTION

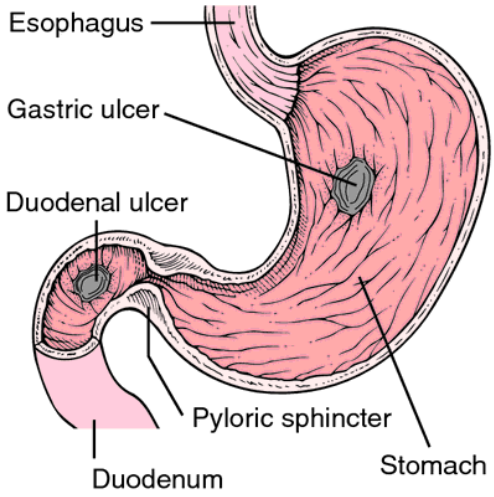
Patients who are admitted to hospital due to certain conditions, in most of the cases are usually receives multiple number of drugs. As a result, due to this, there is a high chance of developing GI Ulcers for these patients.

A Gastrointestinal ulcer is a sore that forms when acidic digestive juices wear away the lining of the digestive system. A Gastrointestinal ulcer is a sore in the lining of the stomach, duodenum, or esophagus.

About 10% of adults are globally affected by gastric ulcers once in their lifetime.

It is of 3 types:

- Gastric ulcer: Peptic ulcer affecting the stomach.
- Duodenal ulcer: Peptic ulcer affecting the duodenum.
- Esophageal ulcer: Peptic ulcer affecting the esophagus.




**Symptoms**

- Indigestion
- Nausea and vomiting
- Stomach pain
- Difficulty in swallowing
- Regurgitation
- Stomach discomfort after eating
- Loss of weight
- Loss of appetite

**Most common causes of GI Ulcers are**

1. Helicobacter pylori bacteria
2. NSAIDS

***Helicobacter pylori***

About 80% of gastric ulcers and 95% of duodenal ulcers are caused due to H.*pylori* infection. Mostly about 2/3$^{rd}$ of people carry H.*pylori* but the reason is not clear why it is causing ulcers in few people.

It enters in to stomach through food and water. After entering in to stomach it rests in the mucus lining of the stomach and duodenum. This bacteria produces urease enzyme which neutralizes the stomach acid to make it less acidic. To counteract this stomach produces more acid which leads to irritation of the mucus lining of the stomach. This also devitalizes the

defense mechanism of the stomach leading to inflammation. Peptic ulcers due to H.*pylori* infection require treatment to eradicate bacterium and to avoid its recurrence.

**NSAIDS**

These are the most commonly used drugs for pain relief in minor pains.

Example: Ibuprofen, Aspirin…

They act by lowering the ability of stomach to produce a protective mucus lining, thereby increasing chances of damage due to acid. They also alter the normal blood flow to the stomach and reduce the body's potency of repairing cells.

Other causes include genetics, alcohol consumption, smoking, mental stress.

**Diagnostic tests include**

- Invasive tests: Endoscopy and Biopsy
- Non-invasive tests: Blood test, Breath test, Stool test, GI X-ray.

**Treatment:** Treatment of GI Ulcers is mainly based on the cause i.e. H.*pylori* or NSAIDs use. The main aim of the therapy is to reduce acid levels in the stomach thereby promoting healing of ulcers and eliminating the H.*pylori* infection.

**Drugs used for treatment of GI Ulcers**

1. Proton pump inhibitors.
2. Antibiotics + proton pump inhibitors for H.*pylori* infection.
3. H2 –receptor antagonists.
4. Alginates for indigestion.
5. Antacids.
6. Prostaglandins.
7. Sucralfate.
8. Bismuth preparations.

**PROTON PUMP INHIBITORS**

Proton pump inhibitors are the drugs that reduce the amount of acid produced by the stomach and these drugs are commonly prescribed for patients having a negative result for H.*pylori* infection. Duration of treatment ranges between 1-2 months but in severe cases, duration may be extended.

**Examples**

- Pantoprazole
- Omeprazole
- Lansoprazole
- Esomeprazole
- Dexlansoprazole
- Rabeprazole

**PANTOPRAZOLE:** Following research for 8 years in the U.S., Wyeth Pharmaceuticals has introduced Pantoprazole in April, 1985. Initially, it was approved for the treatment and maintenance of erosive esophagitis but in 2001, intravenous use of Pantoprazole was approved for short-term treatment of patients with GERD with a history of erosive esophagitis who are not able to tolerate oral Pantoprazole. After that the use of Pantoprazole was extended for variety of gastric acid-related diseases including NSAIDs-induced ulcer, Peptic Ulcer Disease, adjunctive therapy for H.*pylori* eradication and Zollinger-Ellison syndrome.

**MOA:** This drug acts by decreasing gastric acid secretion by binding irreversibly to H+ K+ ATPase pump and thereby inhibiting proton pump on gastric parietal cells.

Pantoprazole is usually taken at a dosage of 20 mg and 40 mg once a day either orally or intravenously.

Common and serious side effects include abdominal pain, increased urination, blurred vision, fruit-like breath odor, unexplained weight loss, increased thirst and hunger, vomiting, etc.

**RANITIDINE:** Ranitidine is Histamine- receptor antagonist and came into market for selling in 1981. It is used to reduce the amount of acid produced in the stomach. It is mainly used for treating Peptic Ulcer Disease, GERD and Zollinger-Ellison syndrome. Available brands include Zantac, Zantac 75, Zantac 150, Zantac 300, etc.

**MOA:** It is a reversible and competitive inhibitor of histamine at the histamine H2 receptor on the gastric parietal cells and thereby reduces the production of acid and thus decreases gastric volume and H+ ion concentration.

It is available orally, intravenously and intramuscularly at several doses like 75 mg, 150 mg, 300 1mg, 15 mg/mL, 25 mg/mL, 1 mg/mL, 25 mg.

Side effects associated with the use of Ranitidine include constipation, bradycardia, tachycardia, somnolence, dizziness, malaise, alopecia, pain at the site of injection, etc.

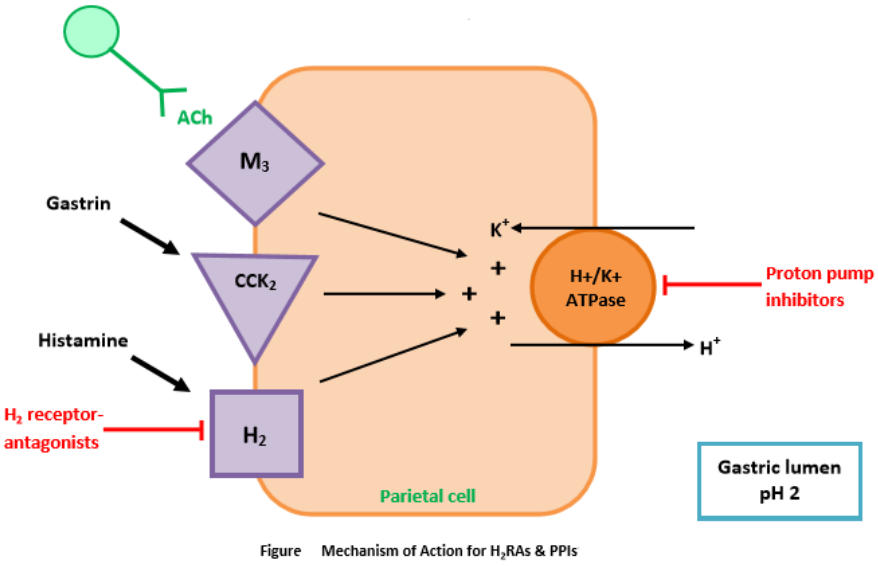



Figure Mechanism of Action for $H_2$RAs & PPIs

## OBJECTIVES

### Primary objective

- To compare the efficacy of Pantoprazole and Ranitidine for Gastrointestinal ulcer Prophylaxis in case of polypharmacy.

### Secondary objectives

- To evaluate the efficacy of Pantoprazole based on
  - Frequency of administration.
  - Duration of therapy.
  - Drug-wise distribution.
  - Disease-wise distribution.
  - Switched-therapy.
  - Reasons for switching.
- To evaluate the efficacy of Ranitidine based on
  - Frequency of administration.
  - Duration of therapy.

- Drug-wise distribution.
- Disease-wise distribution.
- Switched-therapy.
- Reasons for switching.

➢ To compare the efficacy of both drugs.

**REVIEW OF LITERATURE**

**1. CHEN MO, GANG SUN, YAN-ZHI WANG, MING-LIANG LU, AND YUN-SHENG YANG et al (2008)** conducted a study on PPI versus Histamine H2 Receptor Antagonists for Prevention of Upper Gastrointestinal Injury Associated with Low-Dose Aspirin: Systematic Review and Meta-analysis. This study compared proton pump inhibitors (PPIs) and histamine H2 receptor antagonists (H2RAs) for prevention of low-dose aspirin (LDA)-related gastrointestinal (GI) erosion, ulcer and bleeding. Randomized controlled trials comparing PPIs and H2RAs for prevention of GI injury associated with low-dose aspirin (LDA) were collected. Meta-analysis was performed using RevMan 5.1 software. They included nine RCTs involving 1047 patients. The meta-analysis showed that PPIs were superior to H2RAs for prevention of LDA-associated GI erosion/ulcer and bleeding. In conclusion, PPIs were superior to H2RAs for prevention of LDA-related GI erosion/ulcer and bleeding.

**2. DEMETRASHVILI ZM, LASHKHI IM, EKALADZE EN, KAMKAMIDZE GK. et al (2015)** conducted a study on Comparison of intravenous pantoprazole with intravenous ranitidine in peptic ulcer bleeding. In their study they compared the efficacy of intravenous pantoprazole and ranitidine for prevention of rebleeding of peptic ulcers following initial endoscopic hemostasis. In their study they randomly assigned the patients in to two groups. One group was treated with intravenous pantoprazole, with an initial dose of 40 mg and subsequently with 40 mg every twelve hours during the first three days, followed by 40 mg a day orally. The other group was treated with intravenous ranitidine, with an initial dose of 50 mg and subsequently every eight hours during the first three days, followed by 150 mg ranitidine every 12 h. One patient had rebleeding in pantoprazole group and 6 patients from ranitidine group had recurrence of bleeding. The frequency of rebleeding was significantly low in the group of pantoprazole compared to ranitidine group. After endoscopic treatment of bleeding peptic ulcers, they concluded that intravenous pantoprazole is more effective than ranitidine for the prevention of rebleeding.

**3. ALHAZZANI et al (2013)** conducted a systematic review and meta-analysis in which they compared Proton Pump Inhibitors versus Histamine 2 Receptor Antagonists for stress ulcer prophylaxis in critically ill patients. Studies had reported clinically important upper gastrointestinal bleeding or overt upper gastrointestinal bleeding. Both the types and the doses of the PPI and Histamine 2 Receptor Antagonists varied considerably, though many studies used Omeprazole and/or Ranitidine. Trial population characteristics (for example, medical or surgical patients) and the bleeding definitions used also varied widely. Meta-analyses were performed using a random-effects model. They have concluded that PPI is more effective than Histamine 2 Receptor Antagonists as it reduces gastrointestinal bleeding.

**4. LIN PC et al (2010)** conducted a meta-analysis that directly compares proton pump inhibitors with histamine-2 receptor antagonists in prevention of stress-related upper gastrointestinal bleeding in intensive care unit patients. They identified seven randomized, controlled trials with a total of 936 patients for planned comparison. The overall pooled risk difference of stress-related upper gastrointestinal bleeding comparing proton pump inhibitors vs. histamine-2 receptor antagonists was -0.04. There was no difference between proton pump inhibitors and histamine-2 receptor antagonist's therapy in the risk of pneumonia and intensive care unit mortality, with pooled risk differences of 0.00.It was concluded that meta-analysis did not find strong evidence that proton pump inhibitors were different from histamine-2 receptor antagonists in terms of stress-related upper gastrointestinal bleeding prophylaxis.

**5. SOMBERG L et al (2008)** conducted a study on "Intermittent Intravenous Pantoprazole and Continuous Cimetidine Infusion: Effect on Gastric pH Control in Critically Ill Patients at Risk of Developing Stress-Related Mucosal Disease" in which 222 ICU patients were randomized. During the study, gastric pH was well controlled by all treatments and gastric control was improved from day 1 to day 2 in all Pantoprazole groups and on the other hand there was decreased control of pH in the Cimetidine group which indicates that intermittent IV Pantoprazole effectively controls gastric pH and may protect against upper GI bleeding in high risk ICU patients without the development of tolerance.

**6. CONRAD et al (2005)** compared oral omeprazole with intravenous cimetidine in patients receiving mechanical ventilation and found similar rates of significant UGIB in the 2 groups. Conrad et al also reported significantly greater elevation of gastric pH with omeprazole than with cimetidine. In that study, the definition of clinically significant bleeding was based

solely on persistence of evidence of bleeding, without reference to defined clinical effect, unlike the definitions used by other investigators.

**7. PING-I HSU et al**. **(2004)** conducted a study on "Intravenous Pantoprazole versus Ranitidine for prevention of rebleeding after endoscopic homeostasis of bleeding peptic ulcers" in which 102 patients were enrolled in the trial. Bleeding recurred in 2 patients (4%) in the pantoprazole group ($n$ = 52), as compared with 8 (16%) in the ranitidine group ($n$ = 50). The rebleeding rate was significantly lower in the pantoprazole group ($P$ = 0.04). It was concluded that Pantoprazole is superior to ranitidine as an adjunct treatment to endoscopic injection therapy in high-risk bleeding ulcers.

**8. GISBERT JP1, GONZÁLEZ L, CALVET X, ROQUÉ M, GABRIEL R, PAJARES JM et al** (2001) conducted a meta-analysis on comparative randomized trials of proton pump inhibitors vs. H2RA in which eleven studies fulfilled the inclusion criteria and contained data for at least one of the planned comparisons. Persistent or recurrent bleeding was reported in 6.7% of the patients treated with proton pump inhibitors, and in 13.4% of those treated with H2RA. Five studies evaluated the effect of both therapies given in bolus injections on persistent or recurrent bleeding rate, which was 6% and 8.1%, respectively. Persistent or recurrent bleeding in high risk patients occurred in 13.2% of the patients treated with proton pump inhibitors and in 34.5% of those treated with H2RA. Conclusion was made that PPIs are more effective than H2RAs in preventing persistent or recurrent bleeding from peptic ulcer.

**9. LAU et al (2000)** conducted a randomized double-blind study which assessed whether the use of a high dose of a proton-pump inhibitor would reduce the frequency of recurrent bleeding after endoscopic treatment of bleeding peptic ulcers. Patients were randomly assigned in a double-blind fashion to receive omeprazole. After the infusion, all patients were given 20 mg of omeprazole orally per day for eight weeks. The primary end point was recurrent bleeding within 30 days after endoscopy. In this study, 240 patients were enrolled, 120 in each group. Bleeding reoccurred in omeprazole group as compared to placebo group, most recurrent bleeding occurred in first 3 days during infusion period. 3 patients in omeprazole group and 24 patients in placebo undergone surgery.3 patients in omeprazole group and 9 in placebo died within 30 days. It was concluded that a high dose infusion of omeprazole was reported to decrease the hospital stay of patients following endoscopic treatment of bleeding ulcers.

**10. JOSEPH R. PISEGNA, M.D., PATRICK MARTIN, M.D., WILLIAM MCKEAND, M.D., GORDON OHNING, M.D., JOHN H. WALSH, M. et al (2008)** compared the gastric acid inhibitory ability of increasing doses of intravenous (i.v.) pantoprazole with that of i.v. famotidine and placebo in which Pentagastrin (1m g/kg/h) was infused to stimulate maximum acid output in 39 subjects over a 25-h period. After 60 min of Pentagastrin infusion, subjects received a single dose of i.v. pantoprazole, i.v. famotidine or saline placebo. In this study, all doses of i.v. pantoprazole produced a dose dependent suppression of acid output to 10 mEq/h. Single i.v. doses of pantoprazole, 80 and 120 mg, suppressed acid output by .90% in all subjects for #21 h and had an onset of action of 1hour. It was concluded that Intravenous pantoprazole has a rapid onset and a clear dose-related effect, with a significantly longer duration of action than that of i.v. famotidine.

**11. NEVELLI.D.YEOMANS M.D, ZSLOT TULASSAY, PH.D, LASZLO JUHASZ, PH.D, ISTVAN RACZ, PH.D, JOHN M. HOWARD, M.D, CHRISTOFFEL J.VANRENSBURG, M.MED. et al (1998)** conducted a double blinded randomized study on comparison of omeprazole with ranitidine for ulcers associated with NSAIDS in which they observed that 8 weeks treatment was successful in 80% of patients in group given 20 mg of omeprazole per day and 79% of those given 40 mg of omeprazole per day and 63% of those given ranitidine. The rates of healing of all types of lesions were higher with omeprazole than with ranitidine. In this study they concluded that in patients who use NSAIDS regularly, omeprazole healed and prevented ulcers more effectively than did ranitidine.

**12.FRIED R, BEGLINGER C, STUMPF J, ADLER G, SCHEPP W et al (1997)** conducted Comparison of intravenous pantoprazole with intravenous ranitidine in peptic ulcer bleeding and revealed that the efficacy of infusion of high dose ranitidine to prevent recurrent ulcer bleeding was similar to that of pantoprazole infusion.

## METHODOLOGY

### Duration of the study

The study was conducted for a period of 6 months.

### Site of the study

The study was conducted in a tertiary care hospital.

**Study design**

A hospital based Prospective Observational study.

**Sources of data and materials**

- Patient profile form.
- Medication chart.
- Laboratory data report.

**Study Criteria**

- *Inclusion Criteria*

Patients receiving Pantoprazole and Ranitidine in all the departments.

- *Exclusion Criteria*

Paediatrics and Gynaecology & Obstetrics Department.

**Method of Data Collection**

- Data collection form.

**RESULTS**

**Table-1: Gender-Wise Distribution.**

| Gender-Wise Distribution | | |
|---|---|---|
| **Gender** | **Number of cases** | **Percentage** |
| Male | 99 | 66% |
| Female | 51 | 34% |
| Total | 150 | 100% |

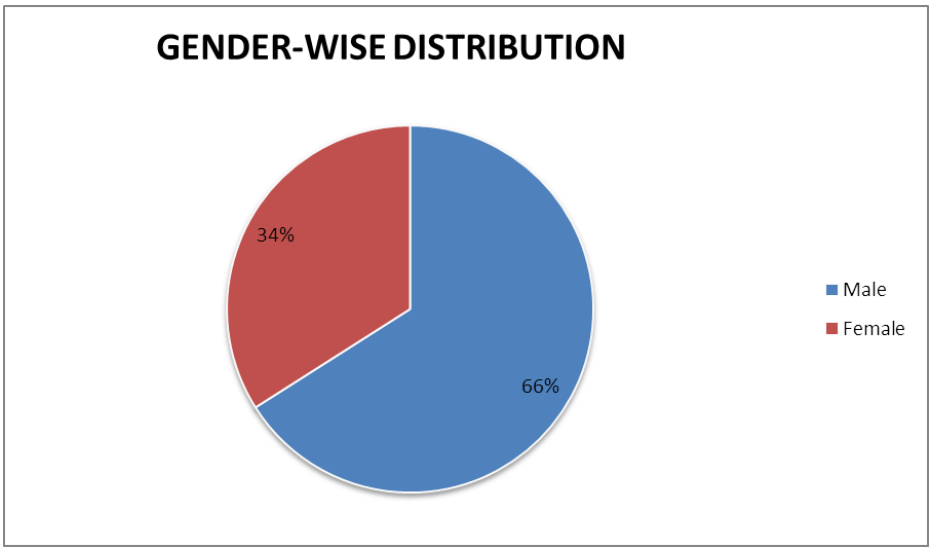



**Figure-1: Gender-Wise Distribution.**

Table-1 and Figure-1 showing distribution of gender among study population and shows that there are 66% male and 34% female.

**Table-2: Age-Wise Distribution.**

| Age | Number | Percentage |
|---|---|---|
| **20-30 years** | 26 | 17.3% |
| **31-40 years** | 22 | 14.6% |
| **41-50 years** | 22 | 14.6% |
| **51-60 years** | 28 | 18.6% |
| **61-70 years** | 38 | 25.3% |
| **71-80 years** | 13 | 8.6% |
| **81-90 years** | 1 | 0.6% |
| **Total** | 150 | 100% |

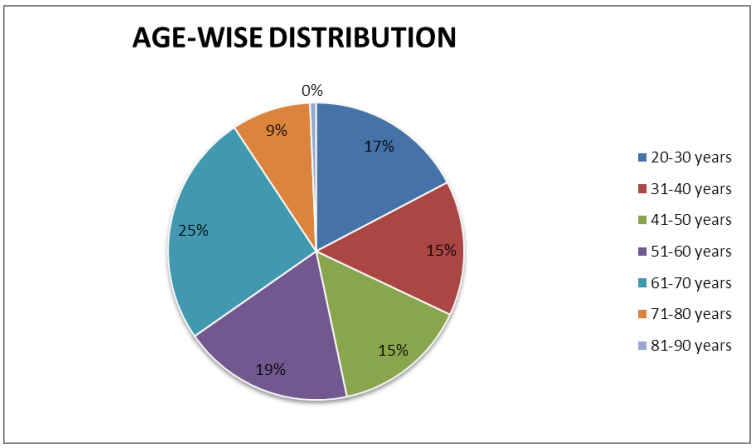



**Figure-2: Age-Wise Distribution.**

Table-2 and Figure-2 showing Age-wise distribution in which 17% are between 20-30 years, 15% between 31-40 years, 15% between 41-50 years, 19% between 51-60 years, 25% between 61-70 years, 9% between 71-80 years and 0% between 81-90 years.

**Table-3: Drug-Wise Distribution.**

| Drugs | Number of cases | Percentage |
|---|---|---|
| **Pantoprazole** | 95 | 63.33% |
| **Ranitidine** | 55 | 36.66% |
| **Total** | 150 | 100% |

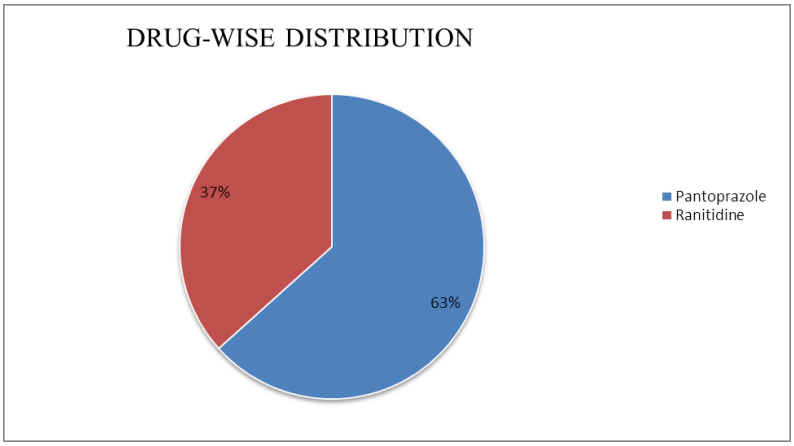



**Figure-3: Drug-Wise Distribution.**

Table-3 and Figure-3 showing drug-wise distribution and showed that there are 63.33% Pantoprazole and 36.66% Ranitidine.

**Frequencies**

| **Statistics** | | |
|---|---|---|
| Medicine | | |
| N | Valid | 150 |
| | Missing | 0 |
| Mean | | .6333 |
| Std. Error of Mean | | .03948 |
| Median | | 1.0000 |
| Std. Deviation | | .48351 |

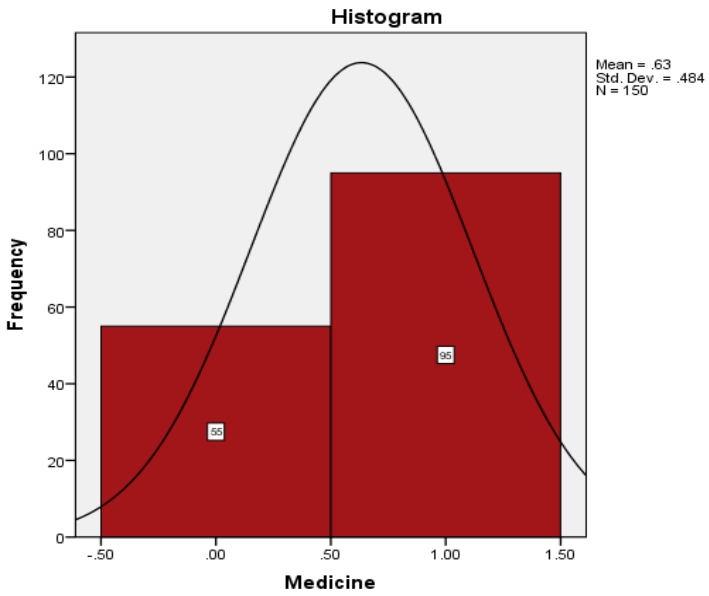



**Figure no. 3.1: According to the Histogram graph, we have observed that the skewness is towards the right (i.e. Positive skewness), we came to know that Pantoprazole is more efficacious than Ranitidine. (Std. dev- 0.484)**

| Medicine | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Ranitidine | 55 | 36.7 | 36.7 | 36.7 |
| | Pantoprazole | 95 | 63.3 | 63.3 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

| Statistics | | | |
|---|---|---|---|
| | | Pantoprazole | Ranitidine |
| N | Valid | 150 | 150 |
| | Missing | 0 | 0 |
| Mean | | 2.63 | 2.37 |
| Std. Error of Mean | | .039 | .039 |
| Median | | 3.00 | 2.00 |
| Mode | | 3 | 2 |
| Std. Deviation | | .484 | .484 |
| Variance | | .234 | .234 |
| Minimum | | 2 | 2 |
| Maximum | | 3 | 3 |

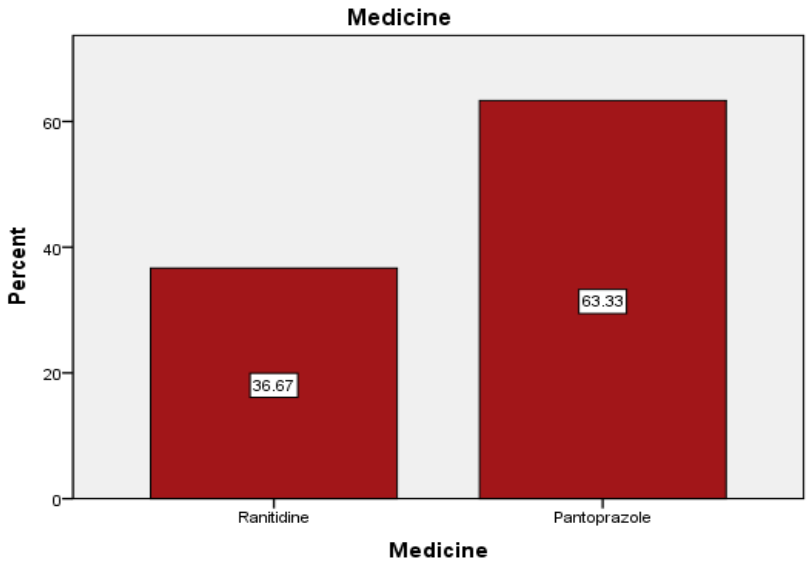



**Figure no.3.2: bar chart for drug wise distribution.**

**Hypothesis:** We are assuming that Pantoprazole is more efficacious than Ranitidine for GI Ulcer prophylaxis.

**Crosstabs**

| Case Processing Summary | | | | | | |
|---|---|---|---|---|---|---|
| | Cases | | | | | |
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Pantoprazole * Ranitidine | 150 | 100.0% | 0 | .0% | 150 | 100.0% |

| Pantoprazole * Ranitidine Cross tabulation | | | | |
|---|---|---|---|---|
| Count | | | | |
| | | Ranitidine | | Total |
| | | Not prescribe Ranitidine | Prescribe Ranitidine | |
| Pantoprazole | Not prescribe Pantoprazole | 0 | 55 | 55 |
| | Prescribe Pantoprazole | 95 | 0 | 95 |
| Total | | 95 | 55 | 150 |

| Chi-Square Tests | | | |
|---|---|---|---|
| | Value | Df | P-value |
| Pearson Chi-Square | 150.000[a] | 1 | .000 |
| N of Valid Cases | 150 | | |

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 20.17.
b. Computed only for a 2x2 table

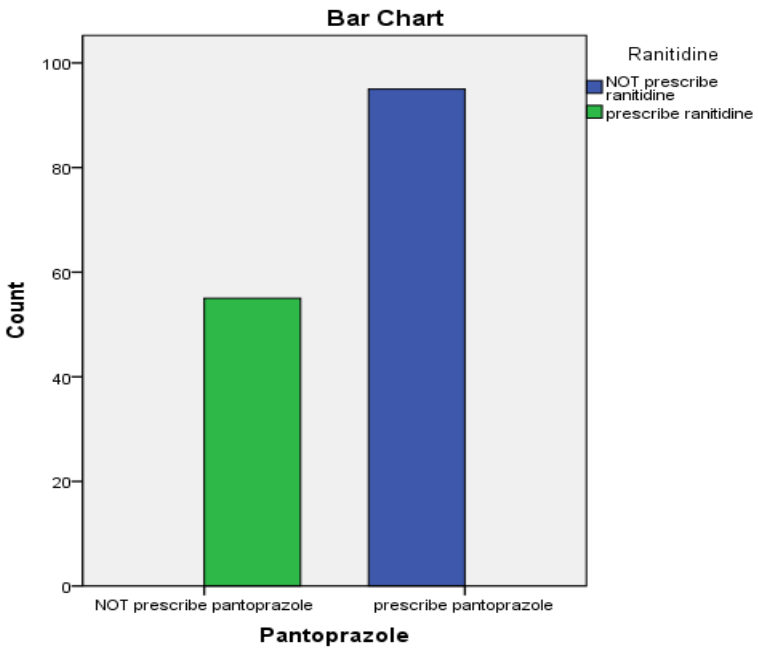



**Figure no. 3.3: bar graph for drug wise distribution.**

Based on statistics of these data, mean of Pantoprazole is 2.63 and Ranitidine is 2.37, standard error of mean for Pantoprazole and Ranitidine is 0.039, median for Pantoprazole is 3 and for Ranitidine 2, standard deviation for both drugs is 0.484 and variance for both drugs is 0.234.

By using Pearson's Chi-Square test, we have found that p-value=0.00 and $\alpha$=0.05 in which p-value <0.05 and this shows that Null Hypothesis is rejected and alternative hypothesis is accepted, i.e. Pantoprazole is more efficacious than Ranitidine for GI Ulcer prophylaxis.

**Table-4: Switching of Drugs.**

| Drugs | Total Cases | Total % | Switched Therapy | Total no. of switched cases | % of switched drugs |
|---|---|---|---|---|---|
| **Pantoprazole** | 95 | 63.33% | Pantoprazole-Ranitidine | 6 | 3.99% |
| **Ranitidine** | 55 | 36.66% | Ranitidine-Pantoprazole | 20 | 13.33% |

Table-4 showed that among 95 Pantoprazole cases (63.33%), 6 cases(3.99%) were switched to Ranitidine and among 55 Ranitidine cases(36.33%), 20 cases(13.33%) were switched to Pantoprazole.

**Table-5: Reasons for Switching from Pantoprazole-Ranitidine.**

| Reasons | Number of cases |
|---|---|
| **Diarrhea** | 3 |
| **Stomach pain** | 1 |
| **Vomiting** | 2 |
| **Total** | 6 |

Table- 5 showed that among 6 cases switched from Pantoprazole to Ranitidine, 3 cases were switched due to diarrhea, 1 case due to stomach pain and 2 cases due to vomiting.

**Table-6: Reasons for Switching from Ranitidine-Pantoprazole.**

| Reasons | Number of cases |
|---|---|
| **Vomiting** | 3 |
| **Abdominal pain** | 5 |
| **Diarrhea** | 2 |
| **Respiratory Tract Infection** | 4 |
| **Lack of effectiveness** | 6 |
| **Total** | 20 |

Table-6 showed that among 20 cases switched from Ranitidine to Pantoprazole, 3 cases were switched due to vomiting, 5 cases due to abdominal pain, 2 cases due to diarrhea, 4 cases due to RTI and 6 cases due to lack of effectiveness.

**Table-7: Frequency of Drug Administration.**

| Drugs | Once a day | Twice a day | Total |
|---|---|---|---|
| **Pantoprazole** | 73 | 36 | 109 |
| **Ranitidine** | 16 | 25 | 41 |

Table-7 showed that among 109 cases of Pantoprazole,73 cases were given once daily, 36 cases twice daily and among 41 cases of Ranitidine, 16 cases were given once daily and 25 cases were given twice daily.

**Table-8: Duration of Pantoprazole Therapy.**

| Days | Number of cases | Percentage |
|---|---|---|
| **1 day** | 37 | 39% |
| **2 days** | 26 | 28% |
| **3 days** | 20 | 21% |
| **4 days** | 6 | 6% |
| **5 days** | 3 | 3% |
| **6 days** | 2 | 2% |
| **7 days** | 1 | 1% |

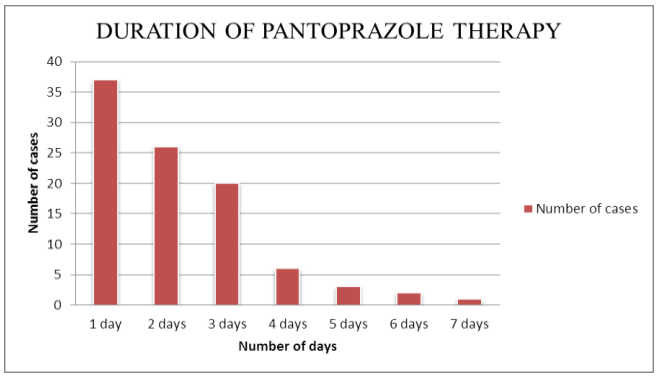



**Figure-8: Duration of Pantoprazole Therapy.**

Table-8 and Figure-8 showing the duration of Pantoprazole therapy. Among the 95 cases, 37 cases were given for 1 day, 26 cases for 2 days, 20 cases for 3 days, 6 cases for 4 days, 3 cases for 5 days, 2 cases for 6 days and 1 case for 7 days.

**Table-9: Duration of Ranitidine Therapy.**

| Days | Number of cases | Percentage |
|---|---|---|
| **1 day** | 22 | 40% |
| **2 days** | 3 | 5% |
| **3 days** | 9 | 16% |
| **4 days** | 11 | 20% |
| **5 days** | 8 | 15% |
| **6 days** | 1 | 2% |
| **7 days** | 1 | 2% |
| **Total** | 55 | 100% |

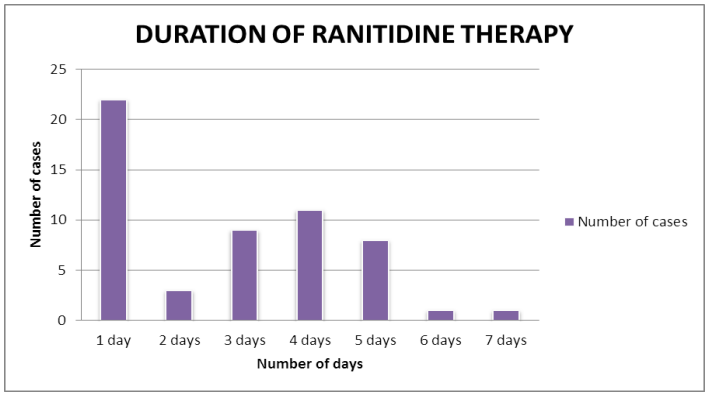



**Figure-9: Duration of Ranitidine Therapy.**

Table-9 and Figure-9 showing the duration of Ranitidine therapy. Among the 55 cases, 22 cases were treated for 1 day, 3 cases for 2 days, 9 cases for 3 days, 4 cases for 11 days, 8 cases for 5 days, 1 case for 6 days and 1 case for 7 days.

**Table-10: Disease-Wise Drug Distribution.**

| Diseases | Pantoprazole | Ranitidine |
|---|---|---|
| **Diabetes** | 2 | 1 |
| **HTN** | 12 | 3 |
| **Angina** | 11 | 0 |
| **Viral Fever** | 8 | 6 |
| **Tuberculosis** | 4 | 0 |
| **LRTI with Type-1 RF** | 3 | 1 |
| **URTI** | 3 | 0 |
| **CAD** | 4 | 0 |
| **COPD** | 3 | 0 |
| **Acute Pancreatitis** | 3 | 2 |
| **Parkinson's disease** | 3 | 0 |
| **Seizures** | 1 | 1 |
| **Bacterial Peritonitis** | 1 | 3 |
| **Pneumonia** | 4 | 5 |
| **Osteoarthritis** | 2 | 0 |
| **Acute Intestinal Obstruction** | 1 | 0 |
| **Uretric Calculus** | 1 | 10 |
| **Spondylitis** | 2 | 0 |
| **Gastritis** | 5 | 6 |
| **Breast Cancer** | 1 | 0 |
| **Poisoning** | 1 | 1 |
| **Retroviral Disease** | 1 | 1 |
| **Pilonidal Sinus** | 1 | 0 |
| **Asthma** | 2 | 3 |
| **Cystitis** | 1 | 0 |
| **GERD** | 2 | 0 |
| **Bronchitis** | 1 | 1 |
| **UTI** | 6 | 2 |
| **Hernia** | 2 | 4 |
| **Tonsilitis** | 0 | 2 |
| **Pelvic Cyst** | 0 | 1 |
| **Malaria** | 1 | 0 |
| **AKD** | 0 | 1 |
| **Aortic Stenosis** | 1 | 0 |
| **Jaundice** | 0 | 1 |
| **CKD** | 1 | 0 |
| **Sinusitis** | 1 | 0 |
| **Total** | 95 | 55 |

Among 95 cases who received Pantoprazole, 2 cases were hospitalized for Diabetes, 12 for HTN, 11 for angina, 8 for viral fever, 4 for TB, 3 for LRTI with Type-1 RF, 3 for URTI, 4 for CAD, 3 for COPD, 3 for Acute Pancreatitis, 3 for Parkinson's Disease, 1 for seizures, 1 for bacterial peritonitis, 4 for Pneumonia, 2 for Osteoarthritis, 1 for Acute intestinal obstruction, 1 for Uretric calculus, 2 for Spondylitis, 5 for Gastritis, 1 for breast cancer, 1 for poisoning, 1 for retroviral disease, 1 for Pilonidal sinus, 2 for asthma, 1 for cystitis, 2 for GERD, 1 for

bronchitis, 6 for UTI, 2 for Hernia, 1 for malaria, 1 for aortic stenosis, 1 for CKD and 1 for sinusitis.

Among 55 cases who received Ranitidine, 1 case was hospitalized for Diabetes, 3 for HTN, 6 for viral fever, 1 for LRTI with Type-1 RF, 2 for Acute Pancreatitis, 1 for seizures, 3 for bacterial peritonitis, 5 for Pneumonia, 10 for Uretric calculus, 6 for gastritis,1 for poisoning, 1 for retroviral disease, 3 for asthma, 1 for bronchitis, 2 for UTI, 4 for hernia, 2 for tonsillitis, 1 for pelvic cyst, 1 for AKD and 1 for Jaundice.

## DISCUSSION

There are more chances of occurrence of GI Ulcers during treatment with drugs. In order to prevent the occurrence of these ulcers, several drugs are given for ulcer prophylaxis which includes PPIs, H2RAs, GI Protectants, Antacids, etc.

In our study, we compared the efficacy of Pantoprazole with Ranitidine for GI Ulcer prophylaxis. The study included 150 patients as the total number of patients.

1. **GENDER-WISE DISTRIBUTION:** In our study, we included 150 patients as the total number of patients who were admitted in the hospital due to various conditions out of which 99 were males (66%) and 51 were females (34%).
2. **AGE-WISE DISTRIBUTION:** In our study, patients of different age groups were included among which 17.3% (26 cases) were 20-30 years, 14.6% ( 22 cases) were between 31-40 years, 14.6% (22 cases) were 41-50 years, 18.6% (28 cases) were between 51-60 years and 25.3% (38 cases) were between 61-70 years and 8.6% (13 cases) were between 71-80 years, 0.6% (1 case) between 81-90 years.
3. **DRUG-WISE DISTRIBUTION:** In our study, among 150 patients 95 patients (63.33%) were given Pantoprazole and 55 patients (36.66%) were given Ranitidine for prevention of GI Ulcers. From this data, we observed that Pantoprazole is more preferred for GI Ulcer prophylaxis than Ranitidine.
4. **SWITCHING OF DRUGS:** Among 95 patients who had received Pantoprazole therapy, 6 cases (3.99%) were switched to Ranitidine due to adverse effects and other reasons and among 55 patients who had received Ranitidine therapy, 20 cases (13.33%) were switched to Pantoprazole due to adverse effects and other reasons. From this data, we observed that switching is more for Ranitidine to Pantoprazole than from Pantoprazole-Ranitidine.

5. **REASONS FOR SWITCHING:** Among 6 cases which were switched from Pantoprazole to Ranitidine, 3 cases were switched due to occurrence of vomiting, 1 case due to stomach pain and 2 cases due to diarrhea and among 20 switched-cases of Ranitidine to Pantoprazole, 3 cases were switched due to vomiting, 5 cases due to abdominal pain, 2 cases due to diarrhea, 4 cases due to RTI and 6 cases due to lack of effectiveness. From this data, we observed that occurrence of adverse effects is less in Pantoprazole when compared to Ranitidine.
6. **FREQUENCY OF DRUG ADMINISTRATION:** Among 109 cases who received Pantoprazole (along with switched cases), 73 were given once in a day and 36 were given twice daily. And among 41 cases who received Ranitidine (along with switched cases), 16 were given once daily and 25 were given twice daily. From this data, we observed that Ranitidine requires more frequency of administration when compared to Pantoprazole.
7. **DURATION OF DRUG THERAPY:**

- **Pantoprazole:** Among 95 cases who received Pantoprazole, 37 cases(39%) received the drug for one day, 26 cases(28%) received for two days, 20 cases(21%) received the drug for three days and 6 cases(6%) received the drug for four days, 3 cases(3%) for five days, 2 cases(2%) for six days and 1 case(1%) received for seven days.
- **Ranitidine:** Among 55 cases who received Ranitidine, 22 cases (40%) received for one day, 3 cases (5%) received for two days, 9 cases (16%) for three days, 11 cases (20%) for four days, 8 cases(15%) for five days, 1 case (2%) for six days and 1 case (2%) received for seven days. From the above data, we observed that Ranitidine requires more duration of therapy when compared to Pantoprazole.

8. **DISEASE-WISE DRUG DISTRIBUTION:** Among 95 cases who received Pantoprazole, 2 cases were hospitalized for Diabetes, 12 for HTN, 11 for angina, 8 for viral fever, 4 for TB, 3 for LRTI with Type-1 RF, 3 for URTI, 4 for CAD, 3 for COPD, 3 for Acute Pancreatitis, 3 for Parkinson's Disease, 1 for seizures, 1 for bacterial peritonitis, 4 for Pneumonia, 2 for Osteoarthritis, 1 for Acute intestinal obstruction, 1 for Uretric calculus, 2 for Spondylitis, 5 for Gastritis, 1 for breast cancer, 1 for poisoning, 1 for retroviral disease, 1 for Pilonidal sinus, 2 for asthma, 1 for cystitis, 2 for GERD, 1 for bronchitis, 6 for UTI, 2 for Hernia, 1 for malaria, 1 for aortic stenosis, 1 for CKD and 1 for sinusitis.

Among 55 cases who received Ranitidine, 1 case was hospitalized for Diabetes, 3 for HTN, 6 for viral fever, 1 for LRTI with Type-1 RF, 2 for Acute Pancreatitis, 1 for seizures, 3 for bacterial peritonitis, 5 for Pneumonia, 10 for Uretric calculus, 6 for gastritis,1 for poisoning, 1 for retroviral disease, 3 for asthma, 1 for bronchitis, 2 for UTI, 4 for hernia, 2 for tonsillitis, 1 for pelvic cyst, 1 for AKD and 1 for Jaundice. From the above data, we observed that Pantoprazole is more prescribed for GI Ulcer prophylaxis when compared to Ranitidine.

9. **DETERMINATION OF P-VALUE:** Based on statistics of the drug-wise distribution data, mean of Pantoprazole is 2.63 and Ranitidine is 2.37, standard error of mean for Pantoprazole and Ranitidine is 0.039, median for Pantoprazole is 3 and for Ranitidine 2, standard deviation for both drugs is 0.484 and variance for both drugs is 0.234.

By using Pearson's Chi-Square test, we have found that p-value=0.00 and α=0.05 in which p-value <0.05 and this shows that Null Hypothesis is rejected and alternative hypothesis is accepted, i.e. Pantoprazole is more efficacious than Ranitidine for GI Ulcer prophylaxis.

## CONCLUSION

Based on current available data from our study, we have got a general idea about the efficacy of Pantoprazole and Ranitidine for GI Ulcer prophylaxis in case of polypharmacy in a Tertiary Care Hospital. The efficacy of both the drugs was compared based on demographic details, drug-wise distribution, switching therapy of Pantoprazole to Ranitidine and vice versa, duration of therapy, frequency of drug administration, disease-wise distribution. A statistical observation based on drug-wise distribution was done which showed that p-value = 0.00 and α= 0.05, i.e. p-value<0.05. So, we are concluding that Pantoprazole is more efficacious than Ranitidine for GI Ulcer prophylaxis in case of polypharmacy.

The present study revealed that polypharmacy and prescription by brand names were common. Use of generic name in the prescriptions need to be promoted and encouraged. Additional studies are therefore needed to confirm these results.

## SUMMARY

Since many patients with several numbers of drug therapies during their stay in the hospital are more prone to develop GI Ulcers due to which several drugs are given for the prevention of ulcers.

The present study is a Prospective Observational study conducted over a period of six months in a tertiary care hospital.

A total of 150 patients were enrolled in the study for comparison of efficacy of Pantoprazole and Ranitidine for GI Ulcer prophylaxis in case of polypharmacy.

Among our study population, there is more number of males (66%) than females (34%) and an age group of 61-70 years (25.3%) were more engaged in the study when compared to other age groups. Pantoprazole is mostly prescribed among the patient when compared to Ranitidine. In some cases, a switching of Pantoprazole to Ranitidine and vice versa was also observed and we found that there are more cases in the latter which is due to some adverse effects and lack of effectiveness, etc.

Frequency and duration of therapy of both Pantoprazole and Ranitidine and the use of both the drugs for certain diseases and conditions were also compared. Based on all the parameters mentioned, our study has revealed that Pantoprazole is more efficacious than Ranitidine in GI Ulcer prophylaxis in case of polypharmacy.

## FUTURE DIRECTION

- Study on a larger number of patients with follow up can be done.
- TDM parameters can be compared for more accurate results.
- Awareness regarding the rational use of PPIs and H2RAs for ulcer prophylaxis.
- Healthcare professionals should weigh the risks and benefits when choosing an agent for ulcer prophylaxis.

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**ABBREVIATIONS**

| % | Percentage |
|---|---|
| **ABIPER** | Aditya Bangalore Institute of Pharmacy Education and Research |
| **AKD** | Acute Kidney Disease |
| **CAD** | Coronary Artery Disease |
| **CKD** | Chronic Kidney Disease |
| **COPD** | Chronic Obstructive Pulmonary Disease |
| **GERD** | Gastro Esophageal Reflux Disease |
| **GI** | Gastrointestinal |
| **H2RAs** | Histamine-2 Receptor Antagonists |
| **HTN** | Hypertension |
| **ICU** | Intensive Care Unit |
| **IV** | Intravenous |
| **LRTI** | Lower Respiratory Tract Infection |
| **NSAIDs** | Non- Steroidal Anti-inflammatory Drugs |
| **PPIs** | Proton Pump Inhibitors |
| **RF** | Respiratory Failure |
| **RGUHS** | Rajiv Gandhi University of Health and Sciences |
| **TDM** | Therapeutic Drug Monitoring |
| **UGIB** | Upper Gastrointestinal Bleeding |
| **URTI** | Upper Respiratory Tract Infection |
| **UTI** | Urinary Tract Infection |

**DEPARTMENT OF PHARMACY PRACTICE**

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## PATIENT PROFILE FORM

| NAME: | IP. No: | WARD: | AGE: |
|---|---|---|---|
| DOA: | SEX: | Ht: | Wt: |
| DOD: | BMI: | | |

**PRESENT COMPLAINTS:**

_____
_____
_____
_____

**PAST MEDICAL HISTORY:**

**PAST MEDICATION HISTORY:**

**FAMILY HISTORY:**

**SOCIAL HISTORY:**

1. **ALCOHOL:**
2. **SMOKING:**
3. **DRUG ABUSE:**
4. **ALLERGY:**
   - **i. FOOD:**
   - **ii. DRUG:**
   - **iii. OTHERS:**

**GENERAL PHYSICAL EXAM:**

| P | I | C | C | L | E |
|---|---|---|---|---|---|
| | | | | | |

| VITAL SIGNS | 01 | 02 | 03 | 04 | 05 | 06 |
|---|---|---|---|---|---|---|
| TEMP | | | | | | |
| BP | | | | | | |
| PULSE | | | | | | |
| RR | | | | | | |

**SYSTEMIC EXAMINATION**

1. **RS:**
2. **CVS:**
3. **CNS:**
4. **P/A:**

**PROVISIONAL DIAGNOSIS**

**LAB INVESTIGATION**

**CULTURE TEST REPORT**

**OTHER INVESTIGATION**

**DIAGNOSIS**

**TREATMENT CHART**

| S.NO | DRUGS | | DOSE | ROUTE | FREQUENCY | DATE OF TREATMENT | |
|---|---|---|---|---|---|---|---|
| | TRADE NAME | GENERIC NAME | | | | DATE STARTED | DATE STOPPED |
| 1. | | | | | | | |
| 2. | | | | | | | |
| 3. | | | | | | | |
| 4. | | | | | | | |
| 5. | | | | | | | |
| 6. | | | | | | | |
| 7. | | | | | | | |
| 8. | | | | | | | |
| 9. | | | | | | | |
| 10. | | | | | | | |
| 11. | | | | | | | |
| 12. | | | | | | | |
| 13. | | | | | | | |
| 14. | | | | | | | |
| 15. | | | | | | | |

**Drug Interactions**

| S.No | Interacting Drug/Food/Lifestyle | Severity of Interaction | | | Effect | Clinical Management |
|---|---|---|---|---|---|---|
| | | Major | Moderate | Minor | | |
| | | | | | | |

**Suspected Adverse Drug Reactions**

| Drug | Suspected ADR | Clinical Management |
|---|---|---|
| | | |

**DISCHARGE MEDICATION**

| S.NO | DRUGS | | DOSE | ROUTE | FREQUENCY | NUMBER OF DAYS |
|---|---|---|---|---|---|---|
| | TRADE NAME | GENERIC NAME | | | | |
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |

**FOLLOW-UP/ DISCHARGE**

**SIGNATURE OF THE STUDENT**

**SIGNATURE OF THE STAFF**

**DATE**

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**PATIENT CONSENT FORM**

I have read / been briefed on **"A PROSPECTIVE STUDY ON COMPARISION OF EFFICACY OF PANTOPRAZOLE AND RANITIDINE FOR GASTROINTESTINAL ULCER PROPHYLAXIS IN CASE OF POLYPHARMACY IN A TERTIARY CARE HOSPITAL"** and I voluntarily agree to participate in the project. I understand that participation in this study may or may not benefit me. Its general purpose, potential benefits, possible hazards and inconveniences have been explained to me up to my satisfaction. I have the opinion to withdraw from the study at any stage. I hereby give my consent for this study.

Name of the patient. Signature/thumb impression of the patient.

Place:

Date: