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Original Article

Drug Utilization Evaluation of Proton Pump Inhibitors in the General Medicine Ward of a Tertiary Care Hospital

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ABSTRACT

Background: Proton Pump Inhibitors (PPIs) are the most effective agents for managing acid related disorders. However, Inappropriate Prescribing of PPIs is becoming an issue of concern. **Objectives:** To review proton pump inhibitors prescribing pattern, common drugs prescribed along with PPIs and Drug Interaction. **Materials and Methods:** A prospective observational study was carried out over a period of three months in a tertiary care hospital, adhering to predefined inclusion and exclusion criteria. **Results:** A Total number of 205 patients, PPIs prescriptions 190 (93%), Non-PPIs prescriptions 15 (7%), from the PPIs prescription, 95 (50%) male and females 95 (50%). Among all age groups, 59-68 years 35 (18.42%) age groups had the highest number of prescribed with PPIs and age group of 89-98 years 4 (2.10%) had the lowest prescribed with PPIs. Maximum concomitantly prescribed with PPIs are antibiotics165 (14.01%) and least prescribed drugs are anti-tb drugs, 1 (0.08%) and anti-spasmodic,1 (0.08%). PPIs utilization more was pantoprazole 177 (93.15%) and less was esomeprazole 13 (6.84%) more duration prescribed PPIs was more than four days 96 (51%), less prescribed duration was one to two days 33 (17%), more used route of administration was parenteral 133 (70%), less used route of administration was oral and parenteral 25 (13%), about drug interaction major 1 (3%), moderate 20 (59%) and minor 13 (38%). by NICE guidelines, the majority of prescriptions are appropriate 137 (72%) and in-appropriate prescription was found 53 (28%). **Conclusion:** The widespread use of Proton Pump Inhibitors (PPIs), particularly pantoprazole, often deviates from established guidelines, with many physicians prescribing them for gastro-protection alongside NSAIDs or antimicrobials. This practice increases the risk of drug-drug interactions, underscoring the need for prescriber awareness and adherence to guidelines. Educational programs and clinical pharmacist involvement can promote rational PPI use, improving patient outcomes and reducing healthcare costs.

Keywords: Proton Pump Inhibitors, Prospective, Non-steroidal anti-inflammatory drugs, National Institute of Clinical Excellence.

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INTRODUCTION

According to the World Health Organization (WHO), Drug Utilization Research (DUR) examines the marketing, distribution, prescribing and use of medications, focusing on their medical, social and economic impacts (Ravindra *et al.*, 2022). The primary objective of Drug Utilization Evaluation (DUE) is to assess the rationality of drug therapy. It offers valuable insights into prescribing practices, including factors such as frequency, dosage, duration of treatment, indications and outcomes. DUE serves as a useful tool for evaluating healthcare systems and plays a significant role in understanding the impact of medications within society (Pradeep, 2022). The misuse of Proton Pump Inhibitors (PPIs) has been noted in many hospitals globally. Long-term PPI therapy has been associated with various adverse effects, including a higher risk of pneumonia, Campylobacter enteritis, hip fractures, Clostridium difficile infections, acute interstitial nephritis and osteoporosis (Biradar *et al.*, 2021).

Proton Pump Inhibitors (PPIs), introduced in the 1980s, have seen consistent growth in usage. They are the preferred treatment for acid-related conditions and rank among the most commonly prescribed medications globally. Over the last decade, their worldwide use has risen significantly (Roozegar and Ramaiah, 2022). Proton Pump Inhibitors (PPIs) are highly effective medications for reducing gastric acid production. This class includes drugs such as omeprazole, esomeprazole, dexlansoprazole, lansoprazole, pantoprazole

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and rabeprazole, all of which demonstrate similar effectiveness when used in equivalent doses (Basyal *et al.*, 2022). Proton Pump Inhibitors (PPIs) have largely replaced histamine-2 receptor antagonists (H2-RAs) globally for managing conditions such as Gastroesophageal Reflux Disease (GERD), Zollinger-Ellison syndrome, gastrointestinal bleeding, Helicobacter pylori infections, stress ulcers and Peptic Ulcer Disease (PUD). They are also used as supportive therapy for GERD, hypersecretory disorders and for preventing ulcers induced by Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) (Maheswari, 2019; Pendhari *et al.*, 2016; Ravindra *et al.*, 2022). Examples of Proton Pump Inhibitors (PPIs) approved by the United States Food and Drug Administration include omeprazole, esomeprazole, lansoprazole, rabeprazole and pantoprazole. These medications are considered essential in the treatment of disorders related to excessive gastric acid production (Al-Dosari *et al.*, 2021). All Proton Pump Inhibitors (PPIs) are derivatives of substituted benzimidazole and act as prodrugs. They accumulate in the acidic environment of parietal cells, where an acid-catalyzed reaction converts them into active sulfenamides. These active forms bind covalently to the proton pump (H+/K+ATPase), irreversibly inhibiting it and significantly reducing both basal and stimulated gastric acid secretion. PPIs only target active proton pumps, meaning that inhibition occurs only in activated parietal cells, while inactive parietal cells remain unaffected (Asl and Bharathi, 2020). According to the World Health Organization (WHO) in 1985, rational drug use involves providing patients with medications that are suitable for their clinical needs, in the correct dosage, for an appropriate duration and at the lowest possible cost to the healthcare system (Ghorbani and Nagaraju, 2022). Studies on prescribing and dispensing practices are among the most effective methods for assessing rational prescribing behavior (Pendhari *et al.*, 2016). The guidelines provided by the National Institute of Clinical Excellence (NICE) recommend the use of Proton Pump Inhibitors (PPIs) for various conditions, including the management of Gastroesophageal Reflux Disease (GERD), upper gastrointestinal bleeding (including varices), Barrett's oesophagus, Zollinger-Ellison syndrome, ulcer healing and Helicobacter pylori eradication. PPIs are also advised for the prevention of peptic ulcer disease in patients using Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), aspirin, steroids, or anticoagulants, as well as for stress ulcer prophylaxis. Additionally, they are considered a second-line treatment for non-ulcer dyspepsia, characterized by dyspeptic symptoms without abnormal endoscopic findings. According to the guidelines, PPIs should be used intermittently to manage symptoms or promote healing, generally for a duration of 4 to 8 weeks (D'Souza, *et al.*, 2019).

Current recommendations support the use of Proton Pump Inhibitors (PPIs) as an empiric treatment for patients with suspected gastrointestinal disorders. These medications are generally well-tolerated, with temporary side effects such as headache, flatulence, diarrhea, nausea and abdominal pain, which can often be resolved by switching to a different PPI. While short-term use is considered safe, emerging evidence suggests potential long-term risks associated with PPIs. These include osteoporosis with an elevated fracture risk, Clostridium difficile-associated diarrhea, community-acquired pneumonia, hypomagnesemia, deficiencies in vitamin B12 and iron, acute interstitial nephritis, hypergastrinemia, altered anti-platelet drug metabolism, chronic atrophic gastritis and changes to the intestinal microbiota. Prolonged use may also increase the likelihood of Clostridium difficile infections and chronic liver disease (Lavu *et al.*, 2019; Sudhakar *et al.*, 2019).

MATERIALS AND METHODS

Study Population and size

Study was conducted at Mallige Hospital, located at 31/32 Crescent This Road, Madhava Nagar, Gandhi Nagar, Bengaluru, Karnataka. Mallige Hospital is a multispecialty tertiary care hospital situated in the heart of Bengaluru, the capital of Karnataka, India. The study was carried out in the inpatient department of the general medicine ward, collecting cases from both male and female wards. The study design was a prospective cohort observational study conducted over three months, from January 2023 to March 2023. A total of 205 patients from the inpatient department of the general medicine ward were enrolled during this period.

Inclusion and Exclusion Criteria

The study Included patients admitted to the inpatient department of the general medicine ward, encompassing both male and female wards. Eligible participants were individuals of either gender aged 18 years and above who provided informed consent to participate. Patients were Excluded if they declined to provide consent, if they were treated in the outpatient department, or if they were under the age of 18 years.

Source of Data

The tools used in this study included a patient data collection form and a consent form to ensure informed participation. Data sources comprised patient prescriptions and medication charts, case sheets, laboratory and investigational data, as well as notes from nurses and doctors. These comprehensive sources facilitated the accurate gathering and analysis of relevant patient information for the study. The study involved obtaining patient data from the case sheets of individuals admitted to the general medicine ward, after securing their consent through a signed consent form. The collected data was analyzed and interpreted using Google Forms, with a focus on reviewing drug utilization patterns and evaluating the use of proton pump inhibitors.

Statistical Analysis

Statistical analysis was performed using MS Excel and the results were assessed using appropriate statistical methods to ensure accuracy and reliability.

RESULTS

Total Number of Prescriptions

Figure 1 shows the distribution of PPI prescriptions among the 205 patients studied. A total of 190 patients (93%) were prescribed PPIs, while the remaining 15 patients (7%) were not prescribed PPIs.

Gender

Gender Distribution in PPIs Prescription

Figure 2 shows the gender distribution among the 190 PPI prescriptions, with 95 males (50%) and 95 females (50%).

Gender Distribution in Non-PPIs Prescription

Figure 3 shows the gender distribution among the 15 non-PPI prescriptions, with 8 males (53%) and 7 females (47%).

Age Distribution

Table 1 summarises the age distribution of the study population. The study comprised a total of 190 patients, with ages ranging from 18 to 98 years. The highest proportion of patients belonged to the 59-68 years age group, accounting for 18.42% of the total, followed closely by the 49-58 years group at 17.89%. The 18-28 years group represented 14.73%, while the 39-48 years and 29-38 years groups accounted for 13.68% and 12.10%, respectively. The elderly age groups of 69-78 years, 79-88 years, and 89-98 years made up 12.63%, 8.42%, and 2.10% of the population, respectively (Table 1).

Concurrent Drug Prescribed with PPIs

Table 2 shows the distribution of different classes of drugs prescribed concurrently with Proton Pump Inhibitors (PPIs) among the study participants. A total of 1177 concurrent drugs were recorded. The most frequently co-prescribed drugs were antibiotics (14.01%), followed by anti-ulcerants/antacids/anti-reflux agents (13.25%), NSAIDs/analgesics (10.36%), anti-emetics (8.49%), multi-vitamins/minerals/supplements (7.64%), and anti-hypertensives (7.64%). Other drug classes, including anti-diabetics, cold/cough medications, CNS drugs, cardiovascular drugs, probiotics, prebiotics, anticoagulants, diuretics, corticosteroids, anti-viral agents, and anti-TB drugs, were prescribed less frequently. This table highlights the wide range of medications commonly co-administered with PPIs, indicating the diverse therapeutic needs of the patients.

Proton Pump Inhibitors Utilization

Table 3 presents the utilization pattern of different Proton Pump Inhibitors (PPIs) among the 190 patients included in the study. Pantoprazole was the most commonly prescribed PPI, accounting for 93.15% of cases (177 patients), followed by esomeprazole at 6.84% (13 patients). Other PPIs, including rabeprazole, dexlansoprazole, and omeprazole, were not prescribed to any patients in this cohort. This table indicates a strong preference for pantoprazole among prescribers.

Duration of PPIs

Table 4 shows the duration of Proton Pump Inhibitor (PPI) therapy among the 190 patients studied. The majority of patients (51%) received PPIs for more than four days (96 patients), while 32% were treated for two to four days (61 patients), and 17% received PPIs for only one to two days (33 patients). This table highlights that over half of the patients were prescribed PPIs for

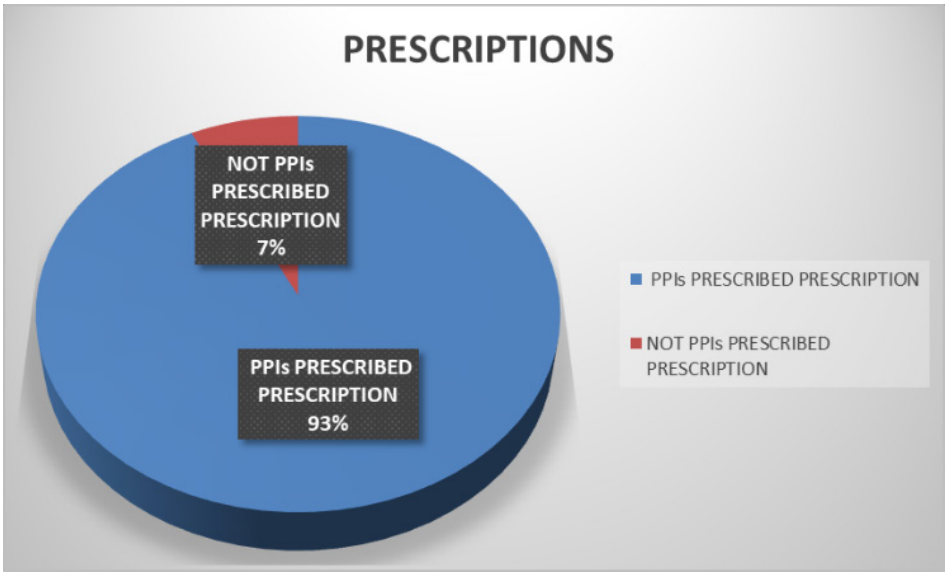

Figure 1: Total Number of Prescription.

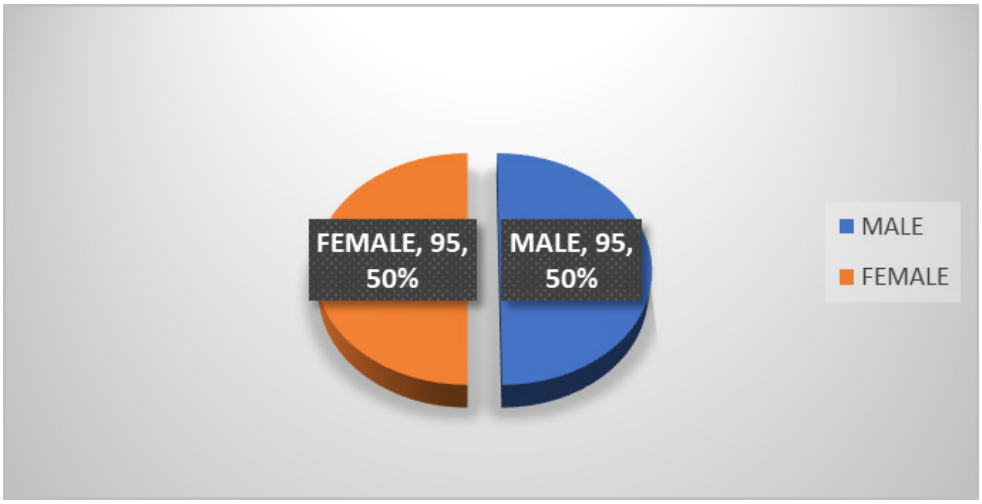

Figure 2: Gender Distribution in PPIs Prescription.

extended durations, raising potential concerns about prolonged PPI use.

Drug Interactions

Figure 4 illustrates the distribution of drug interactions identified among the 190 Proton Pump Inhibitor (PPI) prescriptions. It shows that 15% of the prescriptions (29 cases) had associated drug interactions, while 85% (161 cases) did not exhibit any interactions. This figure highlights the proportion of PPI prescriptions with potential safety concerns due to drug interactions.

Type of drug Interaction

Table 5 details the types of drug-drug interactions observed among patients prescribed Proton Pump Inhibitors (PPIs). It categorizes the interactions based on severity major, moderate, and minor and specifies the drug combinations, their interaction outcomes, the number of patients affected, and the corresponding percentages. The majority of interactions were moderate (59%), involving combinations such as pantoprazole with atorvastatin, clopidogrel, or fluconazole, which can increase plasma concentrations or reduce therapeutic effectiveness. Minor interactions (38%) included combinations like pantoprazole with aspirin, potentially decreasing aspirin's bioavailability. Only one major interaction (3%) was identified between digoxin and pantoprazole, which can significantly increase digoxin bioavailability.

Appropriateness of Prescription

Table 6 shows the evaluation of Proton Pump Inhibitor (PPI) prescriptions in 190 patients. Among them, 137 prescriptions (72%) were considered appropriate based on standard guidelines and clinical indications, while 53 prescriptions (28%) were inappropriate, indicating potential overuse or irrational prescribing of PPIs. This highlights the need for improved prescribing practices to ensure PPIs are used only when clinically justified.

Table 1: Age Distribution.

Age (years)	No. of Patients.	Percentage (%)
18-28	28	14.73
29-38	23	12.10
39-48	26	13.68
49-58	34	17.89
59-68	35	18.42
69-78	24	12.63
79-88	16	8.42
89-98	4	2.10
Total	190	100

Rationality of Prescription

Figure 5 illustrates the rationality of Proton Pump Inhibitor (PPI) prescriptions among the 190 patients studied. The figure shows that 72% of the prescriptions (137 cases) were classified as rational therapy, while 28% (53 cases) were considered irrational therapy. This highlights the need for improved prescribing practices to reduce inappropriate PPI use.

Route of Administration

Table 7 illustrates the distribution of routes of administration for Proton Pump Inhibitors (PPIs) prescribed to 190 patients. The majority of patients, 133 (70%), received PPIs via the parenteral route. Oral administration was used in 32 patients (17%), while a combination of both oral and parenteral routes was employed in 25 patients (13%). This highlights a predominant preference for parenteral administration in clinical practice.

DISCUSSION

In this study, patients admitted to the inpatient department of general medicine were between the ages of 18 and 98 years. Among the 205 patients included in the study, 190 were prescribed proton pump inhibitors, while the remaining 15 did not receive

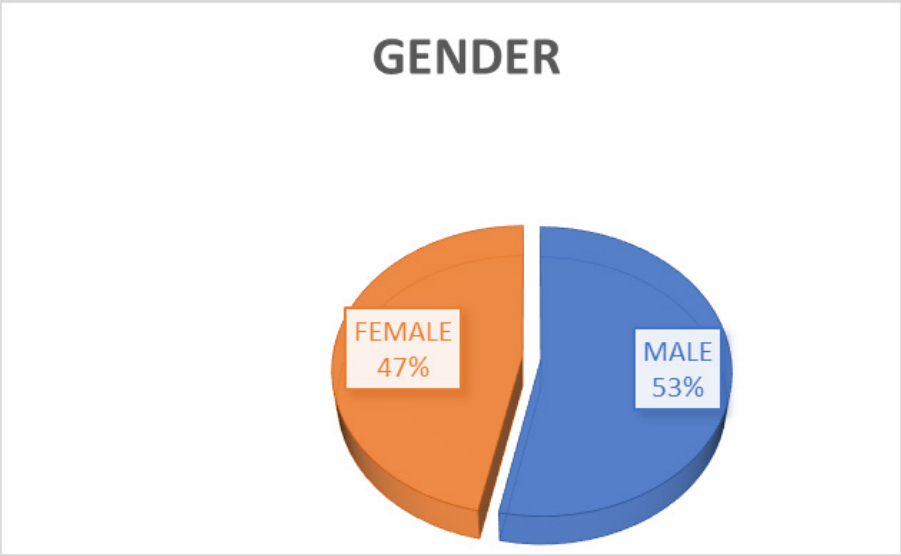

Figure 3: Gender Distribution in Non-PPIs Prescription.

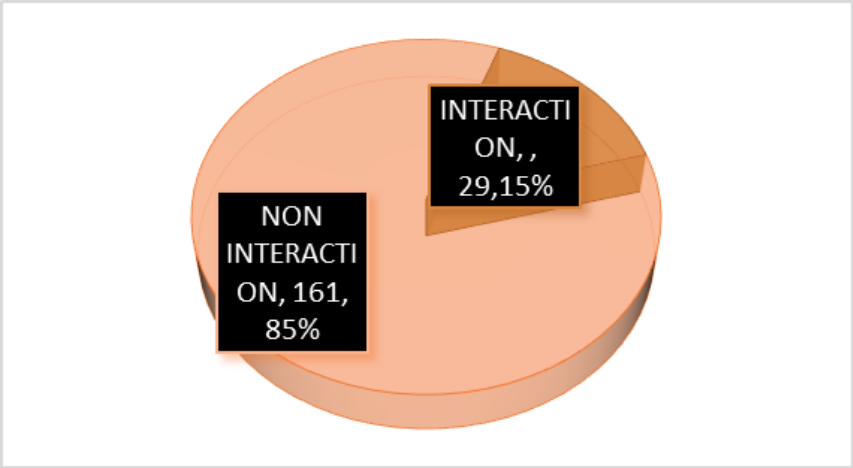

Figure 4: Drug Interaction.

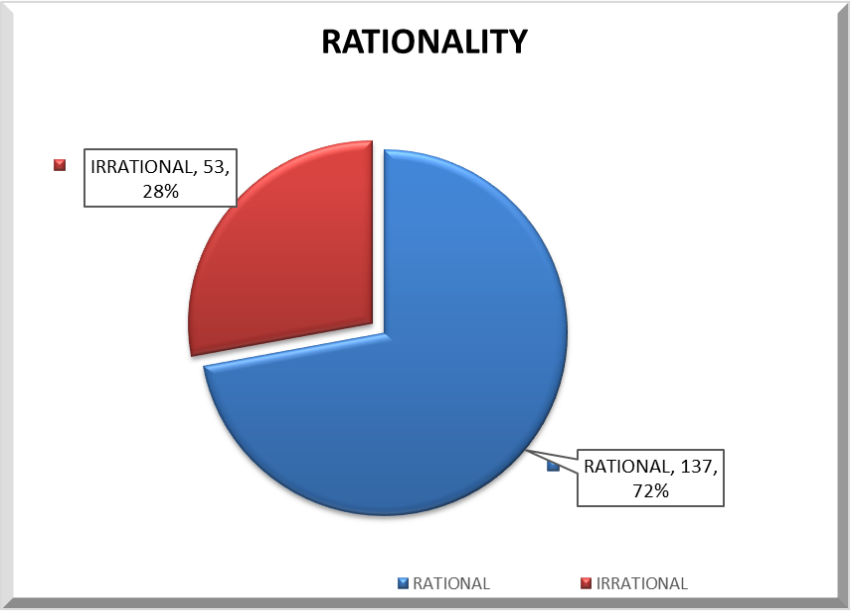

Figure 5: Rationality of Prescription.

Table 2: Concurrent Drug Prescribed with PPIs.

Class of Drug	No. of Drugs	Percentage (%)
Anti-Biotics	165	14.01
Anti-Asthmatics	68	5.77
Nsaid/Analagesics	122	10.36
Anti-Diarrheal	25	2.12
Anti-Emetics	100	8.49
Anti-Ulcerants/ Ant-Acids/Anti-Reflux	156	13.25
Anti-Hypertensive	90	7.64
Anti-Spasmodic	1	0.08
Anti-Diabetics	63	5.35
Cold/Cough	46	3.90
Anti-Platelet	15	1.27
Anti-Dyslipidomic	2	0.16
Cns Drugs	17	1.44
Cvs Drugs	10	0.84
Multi-Vitamin/Mineral/ Supplement	90	7.64
Anti-Fungal	5	0.42
Git-Drugs	17	1.44
Anti-Tb Drugs	1	0.08
Corticosteroids	21	1.78
Anti-Viral	36	3.05
Pro-Biotics	37	3.14
Pre-Biotics	14	1.18
Anti-Coagulant	20	1.69
Diuretics	20	1.69
Other	36	3.05
Total	1177	100

a prescription for PPIs. here considers our study among the 205 patients, 190 who are prescribed with proton pump inhibitors, in that percentage of male patients are 95 (50%) female patients are 95 (50%), remaining non-proton pump inhibitors prescribed patients are 15 members those, 8 are male patients and 7 are female patients. Among the 190 proton pump inhibitors patients different age group are prescribed in that (18-28) years age group patients are 28 (29-38) year patients are 23 (39-48) age group patients are 26 (49-58) years age group patients are 34 (59-68) years age groups are 35, (69-78) years age group patients are 24 (79-88)years age group patients are16,(89-98 years) age group patients are 4, among them 59-68 years age group patients are more number then other age group and (89-98) years age group patients are less admitted in general medicine ward of tertiary care hospital.

Table 3: PPIs Utilization.

PPIs drugs	Number of Patients	Percentage (%)
Pantoprazole	177	93.15
Esomeprazole	13	6.84
Rabeprazole	0	0
Dexalansoprazole	0	0
Omeprazole	0	0
Total	190	100

The primary aim of this study was to assess the drug utilization and evaluation of Proton Pump Inhibitors (PPIs) in the inpatient department of the general medicine ward at a tertiary care hospital. PPIs have become some of the most frequently prescribed medications globally due to their proven efficacy and safety. These drugs are commonly used to treat a range of acid-related conditions and are approved by the U.S. Food and Drug Administration (FDA) for various diseases, including gastric and duodenal ulcers, erosive esophagitis, Gastroesophageal Reflux Disease (GERD), ulcer prevention in patients using NSAIDs and corticosteroids, stress ulcer prophylaxis, Helicobacter pylori eradication, pyrosis, dyspepsia and Zollinger-Ellison syndrome (Biradar *et al.*, 2021; Fah *et al.*, 2019).

Concurrently drug prescribed with PPIs are the anti-biotics 165 (14.01%), anti-asthmatics 68 (5.77%), NSAIDs/analgesics 122 (10.36%), anti-diarrheal 25 (2.12%), anti-emetics 100 (8.49%), anti-ulcer drugs/anti-antacids/anti-reflux 156 (13.25%),anti-hypertensive 90 (7.64%), anti-spasmodic 1 (0.08%), anti-diabetics 63 (5.35%), cold/cough 46 (3.90%), anti-platelet 15 (1.27%), anti-dyslipidemia 2 (0.16%), CNS drugs 17 (1.44%), CVS drugs 10 (0.84%),multi-vitamin/mineral/supplement 90 (7.64%), anti-fungal 5 (0.42%), GIT-drugs 17 (1.44%), Anti-TB drugs 1 (0.08%), corticosteroids 21 (1.78%), anti-viral 36 (3.05%), pro-biotics 37 (3.14%),pre-biotics 14 (1.18%), anti-coagulant 20 (1.69%), diuretics 20 (1.69%) and other 36 (3.05%). Totally in our study concomitantly prescribed with PPIs drugs are 1177. Among these PPIs are majorly prescribed with anti-biotics and the least concomitant prescribed drugs are anti-TB drugs and anti-spasmodic drugs. In the therapy utilization of PPI drugs mainly pantoprazole was used as the major prescribing drug 177 (93.15%) and the next drug used was esomeprazole 13 (6.84%) then remaining PPIs class of drugs are dexalansoprazole, omeprazole, rabeprazole these are not used in the treatment therapy. Then the study of duration PPIs drugs reported as one to two days 33 (17%), two to four days 61 (32%) and more than four days 96 (51%) here most prescribed duration was more than four days as it reported and less prescribed duration was one to days.

PPIs drugs are administered in the form of oral, Parenteral and oral and parenteral in our study was reported oral prescribed PPIs are 32 (17%), Parenteral prescribed PPIs are 133 (70%) and oral

and parenteral prescribed PPIs are 25 (13%) here most utilized route of administration was parenterally and least utilized route administration was oral and parenterally.

Other objective of the study was to examine patient's case sheets for drug interaction involving proton pump inhibitors. Among 190 patients, a total 29 drug interactions were identified which were then categorized as major 1 (3%), moderate 20 (59) and minor 13 (38%) based on the severity assessed using Medscape, IBM drug interaction, web med and Drugs.com. Digoxin was found to be the drug that caused a major drug interaction with pantoprazole. Proton pump inhibitors has a moderate interaction with Furosemide, Torsemide, Cefditoren Atorvastatin, fluconazole, clopidogrel and naproxen and some minor drug interaction drugs are Aspirin, Inj, VIT B12, glimepiride, clarithromycin.

The major drug interaction was found to between drugs like proton pump inhibitors and digoxin, This interaction occurs because Proton Pump Inhibitors (PPIs) can increase the bioavailability of digoxin. This is attributed to a pH-dependent increase in gastrointestinal absorption or the suppression

Table 4: Duration of PPIs.

Duration of PPIs	Number of Patients	Percentage (%)
One to two days	33	17
Two to four days	61	32
More than four days	96	51
Total	190	100

Table 5: Drug Interactions.

Drug-Drug Interaction	Interaction Outcomes	No of Patients	Percentage (%)
Major:			
Digoxin-Pantoprazole	Increase the Bio-Availability of Digoxin.	1	3
Moderate:			
Esomeprazole-Naproxen	Decrease Gastrointestinal Absorption of Enteric-Coated Naproxen.	1	3
Pantoprazole-Torsemide	Hypomagnesemia	1	3
Esomeprazole-Fluconazole	Increase the Plasma Concentration of Esomeprazole (PPIs).	1	3
Pantoprazole-Furosemide	Hypomagnesemia	2	6
Pantoprazole-Fluconazole	Increase the Plasma Concentration of Pantoprazole (PPIs).	2	6
Pantoprazole-Atorvastatin	Increase the Plasma Concentration of Atorvastatin.	4	12
Pantoprazole-Clopidogrel	Reduce the Therapeutic Effectiveness of Clopidogrel.	3	9
Pantoprazole-Cefditoren	Decrease the Oral Absorption and Plasma Concentration of Cefditoren.	2	6
Pantoprazole-Furosemide	Hypomagnesemia Can Lead to Irregular Heartbeat.	1	3
Pantoprazole-Voriconazole	Increase the Plasma Concentration of Pantoprazole.	1	3
Pantoprazole-Naproxen	Decrease the Absorption of Enteric Coated Naproxen.	2	6
Minor			
Pantoprazole-Aspirin	Decrease Bioavailability of Aspirin.	8	24
Esomeprazole-Clarithromycin	Increase Plasma Concentration of Esomeprazole.	1	3
Esomeprazole-Glimepiride	Increase Bio-Availability of Glimepride.	1	3
Pantoprazole-Inj Eldervit	Reduce Vitamin Absorption	2	6
Pantoprazole-Inj Vitamin b Complex with Vitamin b12	Decrease Vitamin B12 (Cyanocobalamin) absorption.	1	3
Total		34	100%

Table 6: Appropriateness of PPI Prescriptions.

Appropriateness of Prescription	No. of Patients	Percentage (%)
Appropriate	137	72
Inappropriate	53	28
Total	190	100

Table 7: Route of Administration of PPI Prescriptions.

Route of Administration	Number of Patients	Percentage (%)
Oral	32	17
Parenteral	133	70
Oral and Parenteral	25	13
Total	190	100

of p-glycoprotein-mediated intestinal transport of digoxin. Therefore, caution is recommended when prescribing this combination (Pradeep, 2022).

Most of the moderate interaction involved the following mechanism. pantoprazole inhibits the conversion of clopidogrel to its active metabolite by the CYP450 2C19 *In vitro*, but it does not significantly inhibit this isoenzyme. P-glycoprotein inhibition may also be involved. It is recommended to closely monitor the effectiveness of clopidogrel when co-administered with Proton Pump Inhibitors (PPIs). If an interaction is suspected, an H2 receptor antagonist may be considered as an alternative. Regarding atorvastatin, co-administration with esomeprazole may lead to increased plasma concentrations of atorvastatin, elevating the risk of myopathy. This interaction is thought to occur due to the competitive inhibition of intestinal P-glycoprotein, which reduces the secretion of atorvastatin into the intestine and increases its bioavailability. A secondary, possibly less significant, mechanism involves the inhibition of CYP450 3A4 metabolism. This interaction was observed in a patient who had been on atorvastatin for over a year and esomeprazole for 6 weeks. Additionally, some minor drug interactions with PPIs include drugs like clarithromycin and aspirin. In particular, aspirin co-administered with pantoprazole may reduce the oral bioavailability of aspirin and other salicylates (Pradeep, 2022).

Using the guidelines provided by the National Institute for Health and Care Excellence (NICE), (11), to categorize the prescription as appropriate or non-appropriate by seeing the overall therapy to finalize prescription, it is to be rational or irrational therapy. In our study, we get 137(72.10%) appropriate prescriptions and 53 (27.89%) are non-appropriate prescriptions, as the same rational prescriptions are 137 (72.10%) and irrational prescriptions are 53 (27.89%).

CONCLUSION

The widespread use of Proton Pump Inhibitors (PPIs), particularly pantoprazole, often deviates from established guidelines, with many physicians prescribing them for gastro-protection alongside NSAIDs or antimicrobials. This practice increases the risk of drug-drug interactions, underscoring the need for prescriber awareness and adherence to guidelines. Educational programs and clinical pharmacist involvement can promote rational PPI use, Improving patient outcomes and reducing healthcare costs.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ACKNOWLEDGEMENT

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PATIENT CONSENT

Written informed consent was obtained from all participants after explaining the study objectives.

ABBREVIATIONS

PPIs: Proton Pump inhibitors; **NSAIDs:** Non-Steroidal Anti-Inflammatory Drugs; **NICE:** National Institute of Clinical Excellence.

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