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Original Article

Pharmacology Section

Prescribing Pattern of Proton Pump Inhibitors (PPI) and Histamine Blockers in a Tertiary Care Hospital

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ABSTRACT

Introduction: Gastric problems are the most common diseases seen in many countries for which majority of the population prefer Proton Pump Inhibitors (PPI) and Histamine (H2) Blockers. They are prescribed most commonly for Gastroesophageal Reflux Disease (GERD), Dyspepsia, Peptic Ulcer Disease, along-with medications like Non-Steroidal Antiinflammatory Drugs (NSAIDs) and other drugs. Concerns have been raised about the increasing costs associated with prescription of these drugs as they are often prescribed for minor symptoms and without clear indications. Prescribing pattern should be evaluated periodically to promote rational use of medicines.

Aim: To assess the prescribing pattern of PPIs and H2 Blockers in Surgery and Medicine Department of a Tertiary Care Hospital.

Materials and Methods: An observational study was conducted in a Tertiary Care Hospital, Karamsad over a period of one year from November, 2018 to October, 2019, among patients visiting to Out Patient Department (OPD) and In Patient Department (IPD) of Medicine and Surgery Department that were prescribed PPI and H2 Blockers. Total 1100 prescriptions and 1265 PPI, H2 Blockers were analysed. The data were analysed for socio-demographic variables along with details of PPI and H2 Blockers. co-prescribing drugs, Fixed Dose Combinations (FDCs) and drug interactions of each prescription was analysed.

Results: In the study, PPI and H2 Blockers were prescribed more in males (54.36%). The predominant age group was 18-40 years (42%). Among studied drugs, most commonly prescribed single drug was Pantoprazole and FDC was Ranitidine + Domperidone. The drugs were most commonly prescribed through oral route (90.9%). They were most commonly prescribed along with an NSAID for gastroprotection (28.9%). Pharmacokinetic drug interactions were observed more in the study.

Conclusion: This study showed that physicians prescribe PPI and H2 Blockers as a co-medication for gastroprotection. There is a need to increase documentation for prescribing PPI and H2 Blockers.

Keywords: Acid peptic disease, Appropriateness, Fixed dose combinations

INTRODUCTION

Prescribing is the core therapeutic effort made by doctors both in hospitals and in primary care [1]. Prescription Pattern Monitoring Studies (PPMS) is defined as drug utilisation studies which focus mainly on prescribing, dispensing and administration of medicines. It promotes appropriate use of medicines [2]. Rational use of drugs is defined by WHO as "patients receive medicines appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community [3].

The health of millions of people around the world is affected by acid-related diseases. The treatment goal of these diseases mainly focuses on decreasing acid production by the stomach [4]. Drugs which are used to inhibit gastric acidity include PPI, H2 Blockers and other antacid medications. H2 Blockers inhibit postprandial gastric acid secretion which limits its ability as an antacid and are ineffective in controlling reflux symptoms and healing oesophagitis. Whereas, PPI block the final step of acid secretion, which regardless of the stimulus results in a profound and long-lasting acid suppression [5].

Compared to H2 Blockers, PPIs are more efficacious in decreasing gastric acidity. PPI have assumed a leading role in the treatment of Peptic Ulcer and GERD, eradication of *Helicobacter pylori*, pathological hypersecretion like Zollinger-Ellison syndrome and for prophylaxis of gastrointestinal bleeding in high-risk patients [6].

However, inappropriate use of antacids has been observed worldwide in various hospitals. PPIs are utilised more due to easy availability, high level of efficacy and expanded indications. There are long-term adverse effects of using PPI like Clostridium Difficile infection, gastric carcinoids, hypomagnesaemia and increased risk of hip fractures [7].

Rational prescribing of drugs need to increase to reduce the risk of toxicity, adverse drug reactions, antimicrobial resistance and hence wastage of public economy [8].

Studies on prescribing pattern of PPI and H2 Blockers have not been done before in Karamsad. So in the light of studies mentioned above, the present study was undertaken to assess the prescribing pattern of PPIs and H2 Blockers in Surgery and Medicine Department of a Tertiary Care Hospital.

MATERIALS AND METHODS

An observational study was conducted at Shree Krishna Hospital, Karamsad, which is a Tertiary Care Teaching Hospital, from November, 2018 to October, 2019. After getting approval (Approval letter no. IEC/HMPCMCE/101/Faculty/8/) from Ethics Committee, a pilot study was done on 50 patients to ensure feasibility of the study. After ensuring feasibility, data collection was done. As there was no interaction with the patient and data was taken from software, patient's consent was not required. Patient's confidentiality was maintained throughout the study.

From the hospital software, over a period of time all patients' data were seen and screened. Out of that, 50% prevalence of prescribing PPI and H2 Blockers was found. So, the sample size was calculated considering 50% prevalence for prescribing PPI and H2 Blockers in clinical setting. The data was obtained from hospital electronic database.

Patients of either gender and more than 18 years of age receiving PPI or H2 Blockers visiting to OPD and IPD of Surgery and Medicine Department were included in the study. Emergency or ICU patients were excluded from the study.

Total 1100 patients/prescriptions were taken, 400 from OPD of each Department and 150 from IPD of each Department. After collecting patient's data, 1100 patients were selected randomly from the data by creating a table of random numbers in Excel.

A Performa was made mentioning socio-demographic data, PPI and H2 Blockers drug details and indications relevant for assessment of prescribing pattern of PPIs and H2 Blockers. Data was also analysed for drug-drug interaction.

For the appropriateness, the prescriptions were analysed on the basis of Goodman and Gillman Textbook of Pharmacology 13th Edition and NICE guidelines [9,10]. According to a study by Verma N et al., appropriateness of prescribing was categorised in three groups. If the case sheet had a documented indication, then use was considered 'appropriate'. If case sheet did not had a documented indication or justification, then use was considered 'inappropriate'. The indication was considered 'probable' when PPIs might have been indicated but there was no clear evidence [11].

STATISTICAL ANALYSIS

Percentage analysis was done for the descriptive data.

RESULTS

Out of 1100 patients, PPI and H2 Blockers were prescribed more in 18-40 years age group (42%) and more in male (54.36%) [Table/Fig-1].

Age (Year)	Male	Female	Total
18-40	258 (23.45%)	204 (18.54%)	462 (42%)
41-60	185 (16.81%)	196 (17.81%)	381 (34.63%)
>60	155 (14.09%)	102 (9.27%)	257 (23.36%)
Total	598 (54.36%)	502 (45.63%)	1100 (100%)

[Table/Fig-1]: Age and gender distribution of participants.

The most common single drug formulation prescribed was Pantoprazole both in Surgery and Medicine Department [Table/Fig-2].

The most common FDC prescribed was Ranitidine + Domperidone in surgery and medicine with the frequency of 15 (7.57%), 183 (92.4%) [Table/Fig-3].

	Single drug formulations	Brand name	Frequency of prescribing in surgery	Frequency of prescribing in medicine	Total
PPI	Pantoprazole	Pantodac 40, Protera 40, Pantocid 40	428 (69.5%)	187 (30.4%)	615 (100%)
	Omeprazole	Omez 20	18 (81.8%)	4 (18.2%)	22 (100%)
	Rabeprazole	Rabicer 20	1 (14.2%)	6 (85.7%)	7 (100%)
H2 blockers	Ranitidine	Rantac	184 (56.44%)	142 (43.55%)	326 (100%)
	Famotidine	Topcid-20, Topcid-40	6 (60%)	4 (40%)	10 (100%)
	Total		637 (65%)	343 (35%)	980 (100%)

[Table/Fig-2]: Frequency of prescribing single drug formulations of PPI and H2 blockers.

	Fixed dose combinations	Brand names	Frequency of prescribing in surgery	Frequency of prescribing in medicine	Total
PPI	Pantoprazole + Domperidone	PPSON-DSR, Troypan-D	31 (38.27%)	50 (61.72%)	81 (100%)
	Rabeprazole + Domperidone	Generic drug	1 (16.66%)	5 (83.33%)	6 (100%)
H2 blockers	Ranitidine + Domperidone	Nilcer-D	15 (7.57%)	183 (92.4%)	198 (100%)
	Total		47 (16.49%)	238 (83.5%)	285 (100%)

[Table/Fig-3]: Frequency of prescribing Fixed dose combinations (FDCs) of PPI and H2 blockers.

The result shows that PPI and H2 Blockers were most commonly prescribed through oral route (90.9%). The result also depicts that PPI and H2 Blockers were prescribed 1265 times which shows that in 165 prescriptions, more than one PPI or H2 Blocker was prescribed by more than one route [Table/Fig-4].

	Frequency		
Route of administration	Oral	Parenteral	Total
PPI	661 (90.42%)	70 (9.57%)	731 (100%)
H2 blockers	489 (91.57%)	45 (8.42%)	534 (100%)
Total	1150 (90.9%)	115 (9.09%)	1265 (100%)

[Table/Fig-4]: Route of administration of PPI and H2 blockers.

The study shows that there were 628 prescriptions in which adequate documented indications were present so they can be considered as appropriate whereas 472 prescriptions in which indication was not documented or uncertain, so they can be considered as inappropriate.

Out of 472 prescriptions, there were 135 prescriptions in which PPI and H2 Blockers were co-prescribed with antimicrobial, which did not require gastroprotection so antacids were prescribed for no reason [Table/Fig-5].

Drug-drug interactions were noted mainly with Aspirin (85%) in the study [Table/Fig-6].

Indications	Prescriptions (n=1100)
Adequate documented indications	**628 (57.09%)**
Co-medication with NSAIDs	318 (28.9%)
Co-medication with antimicrobials	114 (10.36%)
Co-morbidities (Febrile Illness, Liver impairment, Stroke, others)	89 (8.09%)
Co-medication with anticoagulants	53 (4.8%)
Acid peptic disease (GERD, GE, Peptic Ulcer)	30 (2.7%)
Co-medication with Iron supplements	21 (1.9%)
Co-medication with steroids	3 (0.27%)
Uncertain/No documented indications	**472 (42.9%)**
No documented indication	337 (30.63%)
Co-medications with antimicrobials (no reason)	135 (12.27%)

[Table/Fig-5]: Indications of prescribing PPI and H2 blockers.

Drug-drug interactions	Prescriptions (n=60)
Digoxin+ PPI or H2 blocker	8 (13.3%)
Omeprazole + Lorazepam	1 (1.66%)
Aspirin + PPI or H2 blocker	51 (85%)

[Table/Fig-6]: Drug-drug interactions of PPI and H2 blockers.

DISCUSSION

The current study was undertaken to assess the prescribing pattern of PPIs and H2 Blockers in a Tertiary Care Hospital. Males (54.36%) were prescribed more PPI and H2 Blockers than females (45.63%). Study by Jha KK et al., Osman A and Musa SA also showed similar results wherein males were prescribed PPI and H2 Blockers more as compared to females [5,12]. The predominant age group who were prescribed PPI and H2 Blockers was 18-40 years (42%). Studies by Jha KK et al., and D'Souza AM et al., showed that the predominant age group who were prescribed Acid Suppressant Drugs (ASD) were among 50-60 years which is different from this study [5,7]. Study by Gamelas V et al., also showed that among average age of 75 years patients were prescribed PPI at IPD which is different from this study [6]. This shows that in this study, there was an increasing trend of prescribing PPI and H2 Blockers among males of 18-40 years age group.

Pantoprazole was the most commonly prescribed study drug followed by Ranitidine [Table/Fig-2]. In a study by Scagliarini R et al., Patel HR and Dhande P, Singh VK et al., and Rad LV et al., similar findings can be seen wherein PPI are most widely prescribed drugs [13-16].

FDCS of Ranitidine and Domperidone (brand name Nilcer-D) was frequently prescribed compared to FDC of Pantoprazole and Domperidone [Table/Fig-3].

Oral route was frequently preferred than parenteral [Table/Fig-4]. Study by D'souza AM et al., and Dhande PP and Patel HR found similar results wherein oral route was more preferred than parentral route for PPI and H2 Blockers [7,17].

The most common indication for prescribing PPI and H2 Blockers was along with NSAID for gastroprotection {318 (28.9%)}. In a study by Patel HR and Dhande P stated an increasing trend is seen among physicians for prescribing PPIs for gastroprotection [14]. Study by Gamelasa V et al., also showed that PPIs are prescribed for gastroprotection along with the antiplatelet or anticoagulant therapy, COX inhibitors or Selevtive Serotonin Reuptake Inhibitors (SSRIs) in high-risk patients and patients with high doses of NSAIDs even without risk factors [6]. Study by Sheikh Taha M et al., showed that there is an increasing trend of prescribing ASD for stress ulcer prophylaxis [18].

In the present study, PPIs and H2 Blockers were co-prescribed with NSAIDs, antimicrobials, anticoagulants, ion supplements and steroids. There were no documented indications for 472 (42.9%) prescriptions [Table/Fig-5]. Accordingly, 628 (57.09%) prescriptions were considered appropriate whereas 472 (42.9%) prescriptions were considered inappropriate as no documented indications were mentioned. Study by D'souza AM et al., also found majority of indications for prescribing PPI to be inappropriate [7]. Study by Sheikh Taha M et al., also described an increasing trend of prescribing ASDs in non-critical patients for stress ulcer prophylaxis is inappropriate [18]. Study by Verma N et al., showed that the use of PPI was found to be appropriate in 7.39%, probable in 1.6%, and inappropriate in 91% patients. Study by Verma N et al., shows more inappropriate prescriptions compared to this study [11]. On the basis of this study, it can be concluded that there is an increasing need for clinicians to emphasise on the need for documentation and rational use of drugs.

Drug interactions are essential because PPIs and H2 Blockers alter the gastric pH and may affect the pharmacokinetics of drugs. Such interactions were noted with Aspirin (85%), Digoxin (13.3%) and Lorazepam (1.6%) in the study. In a study by Patel HR and Dhande P, PPI and H2 Blockers were co-prescribed with aspirin, Vitamin B12 and calcium preparations [14]. In a study, by D'Souza AM et al., PPIs were mainly co-prescribed with Atorvastatin, Propanolol, Torsemide and Aspirin [7]. The findings in these studies showed that Aspirin is commonly co-prescribed drug along with PPIs and H2 Blockers. Thus, drugs which alter the absorption of PPI and H2 Blockers needs continuous monitoring.

Limitation(s)

As this was an observational study, the prescriptions have been taken from hospital software and analysed. Physicians were not asked reasons for prescribing PPIs and H2 Blockers where no indications were mentioned. Further, the study has focussed only one hospital setting, so the findings cannot be generalised.

CONCLUSION(S)

From the present study, it was concluded that PPIs are the most commonly prescribed drugs due to the adherence to the hospital formulary. Pantoprazole was the most commonly prescribed PPI. It was most commonly prescribed along with an NSAID for gastroprotection. The study concluded that more than 50% of prescriptions were appropriate and rest of the prescriptions was missing few information as per the guidelines.

There is continuous need of monitoring of prescribing pattern of PPIs and H2 Blockers in clinics through audits and reports. Focus should be made on documenting the indications for prescribing PPI and H2 Blockers and adhering to the guidelines for their rational use.

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