Drug utilization evaluation of pantoprazole in Kempegowda Institute of Medical Sciences (KIMS) hospital and research centre, India

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Abstract

Objective: To evaluate the rational use of Pantoprazole by analyzing the appropriateness of prescription. Methodology: This cross-sectional study was performed within four months in 150 patients hospitalized in Kempegowda Institute of Medical Sciences Hospital and Research Centre, India. Demographic data, type and doses of Pantoprazole, including risk factors, and other relevant clinical data were recorded. Result: Out of 150 prescriptions prescribed with Pantoprazole 102 prescriptions were prescribed along with Non-steroidal anti-inflammatory drugs (NSAIDs) and 90 prescriptions were prescribed along with antibiotics. The majority (78.7%) of the patients were endorsed with Pantoprazole. Following national institute for health and care excellence (NICE) rules, fitting utilization of protein pump inhibitors (PPIs) was found in 64% whereas it was unseemly to use in 36% of cases. A large portion of the potential medication sedate associations was moderate. Characterized everyday dose/100-bed day of PPIs was seen as 0.929. Rabeprazole (20 mg, tablet) demonstrated the most extreme rate value variety of 18.72%. Conclusion: Prevalence of dosage shows that Pantoprazole was prescribed more for males in the age group of 60-70 years with the significant risk factor of smoker (18%) and alcoholic (9.3%). Among 150 prescriptions, 22.67% of prescriptions were irrationally prescribed. PPIs should be used only when there is documented evidence and when their use is clinically justified so that the appropriate prescription of PPIs will decrease the social insurance weight of the patient.

Keywords: Drug utilization evaluation, NICE guidelines, pantoprazole, PPIs

Introduction

Drug utilization review (DUR) is defined as an approved, organized, continuous review of prescribing, administering, and utilization of medication. DUR envelops a drug review against predetermined criteria that results in changes to drug therapy when these criteria are not met. It includes an extensive review of patients’ prescription and medication data previously, during, and in the wake of administering to guarantee appropriate medication dynamic and positive patient results. As a quality confirmation measure, DUR programs give restorative activity, prescriber input, and further assessments.[10]

Pantoprazole is a proton pump inhibitor (PPI) and has both oral and intravenous (IV) dosage structures. Results of various studies showed that notwithstanding the more fast beginning of activity in IV Pantoprazole, both dosage structures (oral and IV) can lessen gastric acid secretion similarly. The choice to choose an appropriate dosage structure relies upon a few variables; like the patient’s capacity to take oral medication, the patient’s hemodynamic status just as intestinal porousness and absorptive limit. These components regularly ought to be viewed

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as particularly in basically sick patients when pantoprazole is demonstrated for either treating an acid-discharging issue or prophylaxis of stress-related mucosal injury.[10]

PPIs have arisen as the main treatment for gastro-esophageal reflux disease (GERD) and peptic ulcer disease, due to their adequacy and low poisonousness in treating these conditions.[11] UGIB refers to the bleeding in the upper gastrointestinal tract, commonly defined as bleeding emerging from the throat, stomach, or duodenum. Intense upper gastrointestinal bleeding is the most well-known entanglement of peptic ulcers, frequently brought about by Helicobacter pylori. PPIs are right now the best agents for acid-related issues. In any case, studies show that 25-75% of patients getting IV pantoprazole had no appropriate justification, indicating a high pace of inappropriate prescribing in emergency clinics.[12] Irrational utilization of drugs brought about perilous treatment, expanding unfavorable drug responses, and greater expenses of treatment. Drug using assessment can help recognize and right issues related to inappropriate utilization of drugs.[13] An investigation conducted by Kaplan et al.[14] announced that only 25% of patients in UGIB and 51% in non UGIB bunches were recommended IV pantoprazole appropriately. Creig et al. reasoned that most IV Pantoprazole prescriptions were inappropriate as far as one or the other sign for use, portion, or length of therapy, particularly among patients with non-upper gastrointestinal bleeding (non-UGIB) signs 5. Nalinin’s[15] exploration showed that 56% of patients who received IV pantoprazole had no acceptable sign for their utilization.

As per World Health Organization (WHO) in 1985, rational drug use was the drugs required by the patients are appropriate to their clinical concept, also by their requirements, for a right duration, period and to be the least health care cost. PPIs main action is to reduce long-time gastric acid production. The probability of ADRs with PPIs increases due to polypharmacy and is higher in chronic disease patients. This is due to cytochrome P450 by which the mechanism of PPI generates and leads to drug interactions by increasing the half-life and so causes various other complications are indicated for the acid-related dyspepsia treatment and peptic ulcers, by this they are widely used all over the world. PPIs are costlier than other acid suppression drugs and with that, the increased number of prescriptions has led to high health care costs worldwide. In hospitalized patients, the most commonly used drug is for acid suppression. In one of the studies, it was found that 54% of the drugs in the USA are used as acid suppression therapy. Non-gastroenterologists mainly prescribe 80% of PPIs in the hospital constituting irrational drug use. Drug toxicity, Adverse drug reactions (ADRs), and drug-drug interaction (DDI) are common results for irrational and inappropriate drug use. Responsible factors include physicians’ practice setting, formulary status and advertising based on consumer-orientation.[16,17]

**Methodology**

The study is a hospital-based prospective and observational study conducted in Kempegowda Institute of Medical Sciences Hospital and Research Centre, India. To record necessary data from the sources mentioned above, a self-designed Case Record Form was designed based on the data required for the study, which includes patient demography, family history, social history, medication history, clinical parameters like blood pressure and blood sugar levels, antihypertensive therapy and adjunct therapy. The study was conducted on 150 patients. For inclusion criteria, patients received Pantoprazole drug treatment for peptic ulcer, gastritis, GERD, and prophylactic pantoprazole therapy during NSAID, antibiotics, steroids, etc. The data collected are subjected to various drug-drug interactions and ADR by using, primary (Micromedex), secondary and tertiary resources, which are available in the clinical pharmacy department. The collected information was documented and subjected to the assessment using a suitable statistical method.

**Result and Discussion**

The results of our study suggest that among 150 cases examined in a tertiary care hospital, Pantoprazole was prescribed more to males (104, 69.33%) in comparison with females (46, 31.67%). Accompanying major age group having Pantoprazole is 60-70 years that is, 22.6% and 40-50 yrs that is, 20%. Our study shows that around 18% of patients had smoking habits and 9.33% showed alcoholic behavior which can be determined as a well-established risk factor of various diseases and 72.67% were nonsmokers and non-alcoholics under PPIs therapy.

Pantoprazole was mostly prescribed in general medicine 29.33% followed by the Cardiology Department 24% for the various indicators. Figure 1 shows that among them Pantoprazole was mostly prescribed to prevent drug-induced ulcer (87.9%) and for peptic ulcer (5.17%) [Table 1].

Among 150 prescriptions, 137 (91.33%) patients were prescribed with 40 mg and 13 (8.67%) were prescribed with 20 mg. Among prescribed Pantoprazole, 76% of prescriptions were prescribed once a day while 24% of prescriptions were prescribed twice a day.

![Figure 1: Use of pantoprazole in various department](https://example.com/figure1.png)
In our study, 77.33% of prescriptions were rationally prescribed whereas 22.67% of prescriptions were irrationally prescribed. Irrational prescriptions were mostly found on those prescriptions where pantoprazole was prescribed without any indication or any disease condition. The major route of drug administration was IV route 90 (60%) and the remaining 60 (40%) were prescribed in oral form. Among the 90 IV prescriptions, 20 (22.2%) were switched to oral therapy after the patient is stable and 70 (77.77%) were continued as IV therapy. Out of 150 prescriptions prescribed with Pantoprazole, 102 prescriptions were prescribed along with NSAIDs and 90 prescriptions were prescribed along with antibiotics [Table 2].

The majority of drug-drug interactions were caused by atorvastatin + pantoprazole 31 (20%), followed by propranolol + pantoprazole 22 (12.7%). The frequency and outcomes of the potential drug-drug interactions involving PPIs are summarized in Table 3.

The highest average cost per prescription was found for pantoprazole injection (INR 169.81) [Table 4].

These results were contrary to the study conducted by Kolasani and Divyashanthi et al. and Patel et al. where pantoprazole (40 mg; EC tablet) showed the highest price variation (500.75%) while omeprazole (40 mg; Injection) showed the least price variation (2.15%) because in this study price variation was done for different brands of PPIs available in the Indian market. Wide variation in the prices of the different brands of PPIs was seen, which will increase the economic burden on the patients. Hence, importance should be given to the prescription of generic drugs [Table 5].

In this study, anti-infectives were most commonly prescribed concurrent medications (22.5%) which showed similar results to the studies conducted by Tadvi NA et al. and Airee et al. According to the severity classification of drug-drug interactions, the study showed 87% moderate, 10% minor, and 3% major interactions. The results were compared with those observed in the Airee et al. study. Major interactions were caused by rabeprazole + clopidogrel, which increased the risk of thrombosis, and pantoprazole + cilostazol, which increased the cilostazol exposure.

### Table 1: Indication of Pantoprazole

| Indication       | No. of prescription | Percentage |
|------------------|---------------------|------------|
| Gastritis        | 4                   | 3.44%      |
| Peptic ulcer     | 6                   | 5.17%      |
| GERD             | 2                   | 1.72%      |
| Drug-induced ulcer | 102               | 87.9%      |
| CHRON’S disease  | 2                   | 1.72%      |

### Table 2: Concurrent Drugs Prescribed

| Drug                | No. of prescription | %. of prescription |
|---------------------|---------------------|---------------------|
| Antibiotics         | 90                  | 14.56               |
| NSAIDs              | 102                 | 16.50               |
| Antiemetic          | 60                  | 9.71                |
| Antidiabetic        | 24                  | 3.88                |
| Diuretics           | 44                  | 7.12                |
| Anti hypertensive   | 43                  | 6.96                |
| Vitamins            | 20                  | 3.24                |
| Statins             | 29                  | 4.69                |
| Corticosteroids     | 16                  | 2.59                |
| Anticonvulsants     | 26                  | 4.21                |
| Antianginal         | 8                   | 1.29                |
| Anti allergic       | 16                  | 2.59                |
| Antiplatelets       | 24                  | 3.88                |
| Antiasthmatic       | 24                  | 3.88                |
| Thyroid drug        | 9                   | 1.46                |
| Anticoagulants      | 35                  | 5.66                |
| Antacids            | 22                  | 3.56                |
| Iron products       | 6                   | 0.97                |
| Antimalarial        | 4                   | 0.65                |
| Insulin             | 16                  | 2.59                |

### Table 3: Frequency and outcomes of potential drug-drug interactions

| PDDIs involving PPIs | Outcomes of interaction | Number (n=150) | Percentage (%) |
|-----------------------|-------------------------|----------------|----------------|
| Atorvastatin + Pantoprazole | Increased blood levels of atorvastatin | 31 | 20 |
| Propranolol + Pantoprazole | Increased propranolol exposure | 22 | 12.7 |
| Torsemide + Pantoprazole | Hypomagnesemia | 16 | 8.7 |
| Furosemide + Pantoprazole | Hypomagnesemia | 16 | 10 |
| Fluconazole + Pantoprazole | Increased plasma concentration | 2 | 1.3 |
| Clopidogrel + pantoprazole | Increased effectiveness of clopidogrel | 9 | 6 |
| Cefpodoxime + Pantoprazole | Increased blood levels of cefpodoxime | 3 | 2 |
| Rifampin + Pantoprazole | Increased blood levels of rifampin | 7 | 4.7 |
| Ferrous fumarate + Pantoprazole | Increased absorption of iron | 9 | 6 |
| Metolazone + Pantoprazole | Hypomagnesemia | 1 | 0.7 |
| Digoxin + Pantoprazole | Increased effects of digoxin | 2 | 1.3 |
| Aspirin + Pantoprazole | - | 13 | 15.3 |
| Cilostazol + Pantoprazole | Increased cilastazole exposure | 2 | 1.3 |
| Budesonide + Pantoprazole | Decreased effects of budesonide | 4 | 1.3 |
| Theophylline + Pantoprazole | Increased effect of theophylline | 9 | 6 |
| Cyanocobalamin + Pantoprazole | - | 4 | 2.7 |
Conclusion

The appropriate indications for pantoprazole based on our approved administration guideline were as follows: IV pantoprazole was considered to be indicated when the patient was nothing per oral and manifested with at least one of the following conditions: Erosive esophagitis related to GERD, Pathologic hypersecretion related to Zollinger–Ellison syndrome, UGIB and prevention of re-bleeding stress ulcer prophylaxis. In patients who could tolerate the oral medication and those who are a candidate for PPI therapy.

Prevalence shows that Pantoprazole was prescribed more to males in the age group of 60-70 years with the significant risk factor of smoker (18%) and alcoholic (9.3%). Our study revealed that Pantoprazole was mostly prescribed to prevent drug-induced ulcers and peptic ulcers. The major route of drug administration was the intravenous route (60%). Among 150 prescriptions, 22.67% of prescriptions were irrationally prescribed.

This study showed a wide price variation of PPI brands. Hence, there is a need to decrease the variation in the prices, thereby reducing the economic burden on the patients. Finally, this study concludes that pharmacists and other medical professionals should work together for the rational use of PPIs by making interventions like educational programs and institutional specific guidelines should be developed and implemented to reduce the usage of PPIs in patients.

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Conflicts of interest
There are no conflicts of interest.

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