

Cost Effectiveness Analysis of H₂ Receptor Blockers in Surgical Patients Available in Different Brands in Indian Pharmaceutical Market

Manoj Kumar¹, Chandra Jyoti², Krishna Gopal^{3*}

¹Senior Resident, Department of General Surgery, IGIMS, Patna (Bihar), India

²Senior Resident, Department of Obs. & Gynae. AIIMS, Patna (Bihar), India

³Additional Professor, Department of General Surgery, IGIMS, Patna (Bihar), India

Abstract: ***Aim:** To study percentage price variations among different brands of the commonly prescribed H₂ receptor blockers. **Methods:** The maximum and minimum price of each brand of the drug in INR was noted by using CIMS January to April 2018 edition, Drug Today April to June 2018 Vol-1. The price ratio and the percentage price variation for individual drug brands was calculated. The price of 10 tablets/capsules were calculated. At last the price ratio and percentage price variation of various brands were compared. **Results:** Percentage variation in price for H₂ receptor blockers marketed in India was found to be tablet cimetidine 200mg:81.89, tablet cimetidine 400mg:91.27, tablet ranitidine 150mg:295.64, tablet ranitidine 300mg:123.19, tablet famotidine 20mg:939.62, tablet famotidine 40mg:1110.09, tablet roxatidine 75mg:38.65, tablet roxatidine 150mg: 21.85. **Conclusion:** H₂ receptor blocker is the most common drug prescribed for prolonged period in case of gastritis, gastro-esophageal reflux disease[GERD], peptic ulcer. If a costly brand is prescribed, the patients have to pay more money unnecessarily for their treatment. The doctors prescribing these drugs should be aware of these variations in price to reduce the price of drug therapy.*

Keywords: Gastritis, GERD, Percentage price variation, Price ratio

1. Introduction

H₂ receptor blockers, are a class of medications that block the action of histamine at the H₂ receptors which are located inside apical canaliculi of the gastric parietal cells in the stomach. This decreases the production of stomach acid. H₂ antagonists can be used in the treatment of dyspepsia, peptic ulcers and gastroesophageal reflux disease. H₂ antagonists are a type of antihistamine, although in common use the term "antihistamine" is often reserved for H₁ antagonists, which relieve allergic reactions. Like the H₁ antagonists, some H₂ antagonists function as inverse agonists rather than receptor antagonists, due to the constitutive activity of these receptors.¹The prototypical H₂ antagonist, called cimetidine, was developed by Sir James Black².The H₂ antagonists are competitive antagonists of histamine at the parietal cell's H₂ receptor. They suppress the normal secretion of acid by parietal cells and the meal-stimulated secretion of acid. They accomplish this by two mechanisms: Histamine released by ECL (Enterochromaffin like cell) cells in the stomach is blocked from binding on parietal cell H₂ receptors, which stimulate acid secretion; therefore, other substances that promote acid secretion (such as gastrin and acetylcholine) have a reduced effect on parietal cells when the H₂ receptors are blocked. H₂ antagonists are, in general, well-tolerated, except for cimetidine, wherein all of the following adverse drug reactions (ADRs) are common. Infrequent ADRs include hypotension. Rare ADRs include: headache, tiredness, dizziness, confusion, diarrhea, constipation, and rash.³Cimetidine is an inhibitor of the P450 enzymes CYP1A2, CYP2C9, CYP2C19, CYP2D6, CYP3A4. By reducing the metabolism of drugs through these enzymes, cimetidine may increase their serum concentrations to toxic levels. Many drugs are affected, including warfarin,

theophylline, phenytoin, lidocaine, quinidine, propranolol, labetalol, metoprolol, methadone, tricyclic antidepressants, dihydropyridine, calcium channel blockers, sulfonyleureas, metronidazole⁴. Patients from poor socioeconomic background must have access to the correct drug at the nominal price. Costly drugs can lead to economic burden which results in decreased compliance or even non-compliance. Noncompliance leads to incomplete treatment which tends to increased morbidity. There is a gross variation in the cost of different brands of same generic drugs available in Indian market. Increase in the patient medication cost was found to be associated with decrease adherence to prescription medication.⁵Cost analysis is the study in which comparison of costs of two or more alternative medication is made without regard to outcome.⁶⁻⁷Studies conducted in past show a wide variation in cost of branded and generic versions of same drugs.⁸⁻⁹Hence the present study was conducted to evaluate the cost variation amongst the different brands of H₂ receptor blockers available in India.

2. Methods

Price in Indian rupees (INR) of H₂ receptor blockers manufactured by different pharmaceutical companies in India, in the same strength were obtained from Current index of medical specialists (CIMS) January to April 2018 edition and from Drug Today April to June 2018, vol-1 as they are readily available source of drug information and are updated regularly. The maximum and minimum cost of H₂ receptor blockers of different brands was calculated. The cost of drugs were also crosschecked at pharmacy or retail drug store. Difference in the maximum and minimum price of the same drug formulation manufactured by different pharmaceutical companies and percentage variations in

prices were calculated. The cost ratio, calculated as the ratio of the costlier brand to that of the cheapest brand of the same drug, calculated as follows:

Cost ratio= Price of the costliest brand/Price of the least costly brand.

The percentage cost variation of each drug should be calculated as follows:

Percentage cost variation=(Maximum cost-Minimum cost/minimum cost)x 100.

Maximum & minimum percentage cost variation & cost ratio of a particular drug should be noted down.

Inclusion criteria

a) Only H₂ receptor blockers should be included.

- b) Doses form of Drugs will be only tablet or capsule.
- c) Drugs belong to branded manufacturing companies should be included.
- d) H₂ receptor blockers belong to same or different strength but in same quantity should be included.

Exclusion criteria

- a) H₂ receptor blockers in combinations with another drugs should be excluded.
- b) The drug formulation being manufactured by only one company or being manufactured by different strengths are excluded.
- c) Drugs belong to bogus manufacturing companies should be excluded.

3. Results

Table A: Drug costs, cost ratio and percentage cost variation of H₂ receptor blockers available in Indian Market.

Drug	Dose/Strength	No of brands	Maximum Price[Rs]	Minimum Price[Rs]	Cost ratio	Percentage cost variation
Tablet Cimetidine	200mg	4	11.44	6.31	1.81	81.29
Tablet Cimetidine	400mg	3	22.80	11.92	1.91	91.27
Tablet Ranitidine	150mg	22	19.07	4.82	3.95	295.64
Tablet Ranitidine	300mg	14	18.57	8.32	2.23	123.19
Tablet Famotidine	20mg	21	22.04	2.12	10.39	939.62
Tablet Famotidine	40mg	21	37.15	3.07	12.10	1110.09
Tablet Roxatidine	75mg	4	31.89	23	1.38	38.65
Tablet Roxatidine	150mg	4	52.47	43.06	1.21	21.85

The analysis of data showed a large variation in costs of different brand of H₂ receptor blockers available In Indian market. Percentage variation in cost for H₂ receptor blockers marketed in India was found to be Percentage variation in price for H₂ receptor blockers marketed in India was found to be tablet cimetidine 200mg:81.89, tablet cimetidine 400mg:91.27, tablet ranitidine 150mg:295.64, tablet ranitidine 300mg:123.19, tablet famotidine 20mg:939.62, tablet famotidine 40mg:1110.09, tablet roxatidine 75mg:38.65,tablet roxatidine 150mg:21.85 Tablet roxatidine shows minimum cost ratio as: 1.21 and minimum percentage cost variation as: 21.85 Tablet famotidine 40mg shows maximum cost ratio as: 12.10 and maximum percentage cost variation as: 1110.09We can prefer those drugs who possess cost ratio less than 2 and percentage cost variation less than 100

4. Discussion

The Indian market there is no system of registration of Medicines. More than one company sells a particular drug under different brand names apart from the innovator company. This situation has led to greater price variation among drugs marketed. These wide variations in the prices of different formulations of the same drug have severe economic implications in India. People in developing countries pay the cost of medicines out-of-pocket. In India, more than 80% health financing are borne by patients. Patients have to pay more unnecessarily if costly brands are prescribed. Many poor people frequently face a choice between buying medicines or buying food. In India, more than 80% health financing are borne by patients.¹⁰⁻¹¹ The situation becomes more complex due to the presence of number of brands with variety of names and prices.¹² The

price variation assumes significance when the cost ratio exceeds 2 and percentage cost variation exceeds 100. By this fact the above analysis showed that cost ratio & percentage cost variation of tablet cimetidine 200mg & 400mg, tablet roxatidine 75mg & 150mg is below 2 &100,so these drugs do not show significant price variation and these drugs can be prescribed in poor patients. Significant price variation creates economic burden on poor patients. Costs of drugs are controlled by the drug cost control order 2013(DPCO).¹³ Hence,we need to draw attention to the prices of various drug formulation brands available to reduce the cost of therapy¹⁴. The treating physician should be made aware of the cheapest drug available among the various brands so that the patient bears lesser burden of treatment cost.¹⁵In India, doctors have less awareness in the cost difference of different brands of the same drug. It is felt that physicians could provide better services and reduce costs of drugs if information about drug prices was readily available.

5. Conclusion

The above study shows a wide variation in the prices of different brands of H₂ receptor blockers available in Indian market (Table A). There is a strong need to create awareness about this huge price variation among the general public, health care providers, health care payers, government agencies, policy makers, pharmacists for appropriate intervention to reduce economic burden on patients as well as the healthcare system. Ceiling cost of drugs are fixed by national pharmaceutical pricing authority government of India in accordance with DPCO 2013.Despite this there exists a wide variation of drug costs within one drug with the availability of various brands. The national pharmaceutical pricing authority (NPPA) should act strictly

to ensure that the prices of drugs are brought under control so that all patients irrespective of the economical class should be able to afford these medicines and get treated completely.

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