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Research Article

Pharmacoeconomic analysis of drugs used for peptic ulcer in India

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ABSTRACT

Background: Acid peptic disorders are common medical problems in daily clinical practice leading to a significant economic burden on healthcare expenses. Due to lack of information on comparative drug prices and quality, it becomes difficult for physicians to prescribe the most economical treatment. So the present study was planned to analyse the price variations of various anti-ulcer drugs available in India.

Methods: The cost of a particular anti-ulcer drug being manufactured by different companies, in the same dose and dosage forms, was obtained from latest issue of ''current index of medical specialties'' January to April, 2016. The difference between the maximum and minimum prices of same drug was analysed and percentage variation in the prices was calculated.

Results: Overall, the prices of a total of 12 anti-ulcer drugs belonging to four different categories available in 38 different formulations were analysed. Among the proton pump inhibitors, pantoprazole (40 mg; EC tablet) showed the maximum price variation of 500.75%. With regard to H2 blockers, ranitidine (50 mg; injection) showed the maximum price variation of 989.92%. The maximum price variation among various formulations of ulcer protective was seen with sucralfate (1000 mg; tablet) of 166.00% while misoprostol (200µg; tablet) was the only drug present in prostaglandin analogues and it showed a price variability of 14.33%.

Conclusions: The average percentage variations of different brands of the same anti-ulcer drugs in same dose and dosage form manufactured in India were very wide. The government and drug manufacturing companies must direct their efforts in reducing the cost of anti-ulcer drugs and thereby minimizing the economic burden on the patients.

Keywords: Cost analysis, Proton pump inhibitors, H2 blockers, Ulcer protective

INTRODUCTION

Acid peptic disorders are the result of distinctive, but overlapping pathogenic mechanisms leading to either excessive acid secretion or diminished mucosal defence. Peptic ulcers occur mainly in the stomach-gastric ulcer or proximal duodenum - duodenal ulcer. They are common medical problems in daily clinical practice that, owing to their chronicity, represent a significant cost to healthcare. Acid-related disorders influence the quality of life and productivity of afflicted patients and are common and important causes of morbidity and mortality.[1] Approximately 40% of adults in the USA complain of monthly some form of heartburn making them one the most common gastrointestinal disorders with resultant costs of more than US$10 billion per year.[2,3]

Various drugs are available for treating peptic ulcer like proton pump inhibitors (PPIs), H2 blockers, antacids, ulcer protectives and prostaglandin analogues. In developed countries, where a system of medical insurance is in place, it may not be a concern but in developing countries like India, where the medical insurance is only in an emerging stage, affordability to anticancer drugs becomes a major concern.[4] The compliance of the patient also is significantly dependent on the cost of the prescribed medicines and higher cost means the compliance will be less.[5]

Pharmaceutical market in India has over 20,000 medicine formulations and majority of them are sold under brand names.[6,7] Indian markets are flooded with a huge number of formulations of anti-ulcer drugs, and the same formulations are sold under different brands which puts

the prescribing physicians in difficult state in deciding the best drug for a given patient.[8]

Information generated from cost analysis studies will be helpful for both the doctors in choosing the correct medicine for their patients and for policy makers in successfully utilizing the meagre resources that are available.[9] A med line search was done for studies which analysed the variation of prices among anti-ulcer drugs and it did not yield any positive result. So the present study was done to analyse the variation of cost among different brands of anti-ulcer drugs available in the Indian market.

METHODS

The study was done in the department of pharmacology of a tertiary care teaching hospital in south India. Latest volume of current index of medical specialities (CIMS) i.e. January to April, 2016 was used to analyse the prices of anticancer drugs.

The cost of a particular anti-ulcer drug in the same dose and dosage forms being manufactured by different companies was compared. The drugs manufactured by only one company or by different companies, however, in different strengths were excluded. Formulations containing combination of drugs were also excluded. The difference between the maximum and minimum costs of the same drug manufactured by different pharmaceutical companies was calculated. The following formula was used to calculate the price variation.

$$\text{Percentage price variation} = \frac{\text{Price of the most expensive brand} - \text{Price of the least expensive brand}}{\text{Price of the least expensive brand}} \times 100$$

Statistical analysis

The findings of our observational study were expressed as absolute numbers and percentages.

RESULTS

The prices of a total of 12 anti-ulcer drugs belonging to four different categories available in 38 different formulations were analysed.

Table 1: Price variation among proton pump Inhibitors.

Drug	Dosage form	Dose (mg)	Number of manufacturing companies	Minimum price (INR)	Maximum price (INR)	Price variation
Omeprazole	Tablet	20	5	24.50	39.60	61.63%
	Capsule	10	5	20.00	28.98	44.90%
		20	27	23.00	63.33	175.35%
		40	2	65.00	73.33	12.31%
	EC capsule	20	2	39.00	54.4	39.49%
	Injection	40	2	23.25	23.75	2.15%
Esomeprazole	Tablet	20	3	17.00	35.00	105.88%
		40	7	27.00	60.00	122.22%
	EC tablet	20	2	33.00	35.93	8.88%
		40	2	55.00	56.93	3.51%
	Injection	40	3	77.00	95.75	24.35%
Lansoprazole	Capsule	15	3	21.80	26.25	20.41%
		30	8	44.00	103.00	134.09%
Pantoprazole	Tablet	20	13	18.55	58.00	212.67%
		40	67	30.00	78.00	160.00%
	EC tablet	20	5	25.00	54.39	117.56%
		40	16	13.33	80.08	500.75%
	Injection	40	52	44.80	79.50	77.46%
Rabeprazole	Tablet	20	57	18.50	86.50	367.57%
	EC tablet	20	13	15.90	76.50	381.13%
	FC tablet	20	2	29.00	59.10	103.79%
	Injection	20	19	50.00	89.00	78.00%
Dexrabeprazole	Tablet	5		35.00	120.00	85.56%
		10		18.00	33.40	242.86%
Ilaprazole	Tablet	5	2	45.00	52.00	15.56%
		10	2	77.00	85.00	10.39%

INR: Indian rupees; EC: Enteric coated; FC: Film coated.

Table 2: Price variation among H2 blockers used in peptic ulcer.

Drug	Dosage form	Dose (mg)	Number of manufacturing companies	Minimum price (INR)	Maximum price (INR)	Price variation
Ranitidine	Tablet	150	7	4.82	7.60	57.68%
		300	3	8.34	13.53	62.23%
	FC Tablet	150	2	7.25	9.00	24.14%
		300	2	10.18	10.19	0.10%
	Injection	50	8	2.38	25.94	989.92%
Famotidine	Tablet	20	5	3.21	16.04	399.69%
		40	5	5.03	34.86	593.04%
Roxatidine	SR Tablet	75	2	39.25	44.65	13.76%
		150	2	73.10	73.47	0.51%

INR: Indian rupees; FC: Film Coated; SR: Sustained Release.

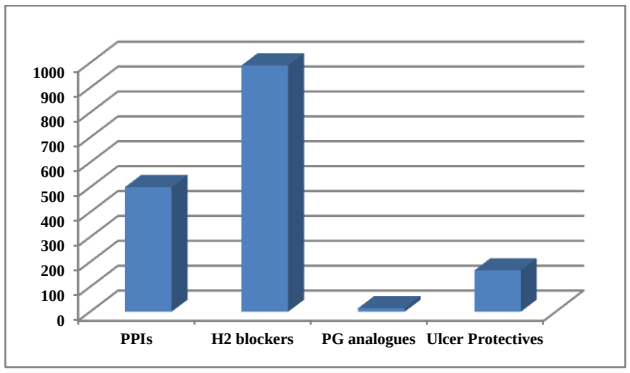
Table 3: Price variation among prostaglandin analogues used in peptic ulcer.

Drug	Dosage form	Dose (µg)	Number of manufacturing companies	Minimum price (INR)	Maximum price(INR)	Price variation
Misoprostol	Tablet	200	4	61.00	69.74	14.33%

INR: Indian rupees; µg: Microgram.

Table 4: Price variation among ulcer protectives.

Drug	Dosage form	Dose (mg)	Number of manufacturing companies	Minimum price (INR)	Maximum price (INR)	Price variation
Sucralfate	Tablet	1000	2	15.00	39.90	166.00 %
	Oral suspension	1000/10 ml	4	103.80	115.00	10.79 %



PPIs: Proton pump inhibitors; PG: Prostaglandin.

Figure 1: Maximum price variation among different groups of anti-ulcer drugs.

Overall, among the various categories of anti-ulcer drugs available in the Indian market, the maximum price variability was seen highest with H2 blockers (ranitidine - 989.92%) followed by PPIs (pantoprazole - 500.75%) which was followed by ulcer protectives (sucralfate-166.03%) and lowest was seen with prostaglandin analogues (misoprostol-14.33 %) (Figure 1).

Among the proton pump inhibitors, pantoprazole (40 mg; EC tablet) showed the maximum price variation of 500.75% while omeprazole (40 mg; Injection) showed the minimum price variation of 2.15% (Table 1).

As far as individual PPIs are concerned, the highest price variation with omeprazole was found to be 175.35% and the least price variation was found to be 2.15% ; with esomeprazole, highest was found to be 122.22% and least was found to be 3.51%; with lansoprazole, highest was found to be 134.09% and least was found to be 20.41%; with pantoprazole, highest was found to be 134.09 % and least was found to be 20.41%; with rabeprazole, highest was found to be 134.09 % and least was found to be 20.41%; with dexrabeprazole, highest was found to be 134.09% and least was found to be 20.41% and finally with ilaprazole, the highest price variation was found to be 15.56% and the least price variation was found to be 10.39% (Table 1 and Figure 2).

With regard to H2 blockers used in peptic ulcer, ranitidine (50 mg; injection) showed the maximum price variation of 989.92 % while ranitidine (300 mg; FC tablet) showed the minimum price variation of 0.10 % (Table 2 and Figure 3).

As far as individual H2 blockers are concerned, the highest price variation with ranitidine was found to be 989.92% and the least price variation was found to be 2.15%; with famotidine, highest was found to be 593.04% and least was found to be 399.69% and with roxatidine, the highest price variation was found to be 13.76% and

the least price variation was found to be 0.15% (Table 2 and Figure 2).

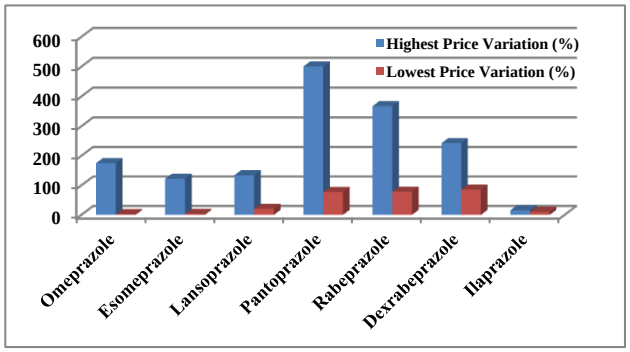


Figure 2: Price variation of various formulations among proton pump inhibitors in India.

In relation to prostaglandin analogues, misoprostol was the only drug available as 200 µg tablet and it showed a price variation of 14.33% (Table 3).

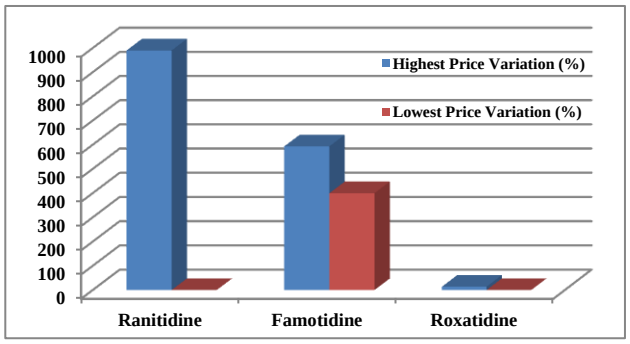


Figure 3: Price variation of various formulations among H2 blockers in India.

As far as ulcer protectives are concerned, sucralfate was the only drug available. Among its various formulations, the maximum price variation was seen with 1000 mg tablet of 166.00% whereas minimum price variation was seen with oral suspension (1 gm/10 ml) of 10.79% (Table 4).

DISCUSSION

To the best of our knowledge, there was no study done to evaluate the variability of prices of anti-ulcer drugs in India. Our study for the first time analysed the variation of cost among different brands of anti-ulcer drugs available in the Indian market. Our findings revealed that the prices of various anticancer drug formulations showed great variation.

Stress in various forms has been increased tremendously in the present day society which leads to many diseases including peptic ulcer which can be seen clearly in the tremendous increase in the prevalence of acid peptic disorders in the recent years.[10,11] Even though many categories of drugs are used in peptic ulcer, PPIs are known to be more efficacious than other anti-ulcer medications and to have a relatively low toxicity, they have become one of the most prescribed drugs worldwide.[12,13]

The cost of anti-ulcer drugs plays a major decisive influence on the availability and utilization of them by the patients especially in resource poor country like India. Cost becomes a concerning factor when these drugs should be used on a long term basis and it can influence the compliance also which will have devastating effects on the health of the population.[14] Due to lack of information on comparative drug prices and quality, it becomes difficult for physicians to prescribe the most economical treatment.[15]

The difference in cost between the various brands of the same drug varies from two fold to more than 100 fold.[16] There are various reasons for this price variation which include majority of them being under patent protection and also the present market for new chemical entities being monopolistic in nature. In this market structure, the sellers retain appreciable influence over the price of a product.[17] Prescribing physicians are usually influenced by information provided to them in the form of formularies, promotional literature and marketing tactics of the medical representatives of that particular brand. The notion that new drug is always better than old drugs is also prevalent among physicians which need not be true always. This kind of biased information restricts both prescribers and patient's choices.[17]

Manufacturing companies claim high cost of research involved in developing new anti-ulcer drugs as a reason for higher pricing of drugs. There are many middlemen involved in the process of a drug reaching to the consumer after it gets manufactured. Even though many times, the manufacturing cost of a particular anticancer drug is less, these middlemen who are involved in distribution and retail sale of drugs because of their bargaining power and based on demand are quite often responsible for high and indiscriminate variability of prices seen among various drugs.[18]

Differences in guidelines of drug regulating authorities of various countries and their pricing policies account for the varying prices of drugs among different countries. Drug price control order (DPCO) is an order issued by the Indian government in 2013 to fix the price of drugs, which covers 680 formulations at present.[19]

Once any medicine is brought under the purview of DPCO, it cannot be sold at a price higher than that fixed by the government. In the past few years, the numbers of medicines that are under DPCO have been decreasing slowly due to which the cost of drugs are escalating. Among anti-ulcer drugs, only five drugs out of the total 12 drugs whose price variation was analysed in this study i.e. omeprazole, pantoprazole, ranitidine, famotidine and misoprostol were included in the national list of essential

Medicines (NLEM), while many other newer and more effective anti-ulcer drugs were not included in the list.[20]

As mentioned earlier, as the medical insurance is in an emerging stage only in India, majority of the patients should pay the cost of medicines out of their pocket which poses a great financial burden on them.[21] A substantial part of the medical expenditure is due to drugs alone which again reiterates the need to decrease the cost of medicines in developing countries.[22]

In a developing country like India, one of the smart ways to reduce the prescription costs is to use the generics. Even though the Medical Council of India have insisted on prescribing the generic drugs as far as possible, doctors are reluctant to write prescriptions containing only generic or unbranded chemical name of drugs. All too often, the physicians and the patients prefer the expansive brand name drugs because they believe that the generic equivalent is inferior. Patients have to pay more unnecessarily if costly brands are prescribed. The costly brand of same generic drug is scientifically proved to be in no way superior to its economically cheaper counterpart.[23]

So it becomes the need of the hour by not only government, but also by all the stake holders like NGOs, health care providers and general public to make a concerted effort in order to put pressure on the pharmaceutical manufacturing companies whereby the prices of both branded and generic drugs can be brought down and can be made affordable to common man.

In conclusion, this study shows that there is a wide variation in the prices of most of the anti-ulcer drugs available in India. Health care providers must be aware of availability of low cost brands or generics available among anti-ulcer drugs and prescribe accordingly based on the economic status of the patient for successful treatment of acid peptic disorders. There an urgent need to decrease the wide price variation seen with anti-ulcer drugs by the government in order to decrease the economic burden on population.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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