

RESEARCH ARTICLE

Cost analysis of oral anti-platelet drugs – A pharmacoeconomic study

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ABSTRACT

Background: Antiplatelets are drugs which interfere with platelet function and are useful in the prophylaxis and treatment of thromboembolic disorders, acute coronary syndrome and preventive measures of coronary heart disease. **Aims and Objectives:** To find different anti-platelets available either singly or in combination. to evaluate and compare the cost of a particular drug (single/ combination drugs) in the same strength, number, and dosage forms being manufactured by different companies. **Materials and Methods:** Current Index of Medical Stores April-July 2016 edition and Indian Drug Review, were used for the study (1) The retail cost and the difference between maximum and minimum price of a particular drug being manufactured by different companies, in the same strength, number, and dosage forms will be compared. (2) Results will be calculated by proper statistical analysis. **Results:** The price of a total of 7 drugs (5 single and 2 combination preparations) available in 18 different formulations manufactured by different companies were analyzed. In single drug therapy, clopidogrel (75 mg) showed maximum price variation of 726.9%, while aspirin (50 mg) shows minimum price variation of 2.66%. In combination therapy, aspirin + clopidogrel (75 mg + 75 mg) showed a maximum price variation of 310.36%. **Conclusion:** There is a wide variation exist between the maximum and minimum cost among single and combination therapy of oral antiplatelets.

KEY WORDS: Oral Antiplatelets; Cost Analysis; Pharmacoeconomics

INTRODUCTION

Pharmacoeconomics plays a major role in the practice of medicine. The compliance of the patient may be significantly dependent on the cost of the prescribed medicines.^[1] Cost of the drug plays a crucial role in patient care. The cost of therapy for both patients and physician had a major concern in developing countries.

India produces around 8% of the medicines available in the global market in terms of volume and ranks 13th in

world production by value. Still 60% of the population does not have access to medicines.^[2] At present, the market size of the Indian Pharmaceutical industry was enjoying an important position in the global pharmaceutical sector and stands at US \$20 billion. According to March 2014, Indian Pharmaceutical manufacturing facilities registered with the US Food and Drug Administration stood at 523 positions, which is highest for any countries outside the US.^[3,4]

In the developing countries, the cost of drugs is a major concern to both physician and patient; yet there are very few data on prescribing patterns and expenditure. Cost of drugs is an important factor influencing compliance with treatment.^[5] Differential pricing could potentially be a very effective strategy to improve access to essential medicines in low- and middle-income countries where most patients pay for medicines out-of-pocket; therefore, cannot afford the prices compared to high-income markets.^[6]

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In general, anti-platelet drugs are used to prevent intravascular thrombosis and embolization, with minimal risk. In coronary artery disease - Aspirin/clopidogrel prophylaxis in post-myocardial infarction patients will prevent reinfarction and reduce mortality. These drugs are used either singly or in combinations in conditions such as acute coronary syndrome (ACS), cerebrovascular diseases, prosthetic heart valves and arteriovenous shunts, venous thromboembolism, and peripheral vascular diseases.

Antiplatelets are drugs which interfere with platelet function and are useful in the prophylaxis of thromboembolic disorders.^[7] Platelets have important and critical role in the coagulation and thromboembolic phenomenon. Platelets do not stick to healthy endothelium due to presence of prostacyclin (PGI₂) but when there is damage to endothelium platelet aggregation occurs to the hemostatic plug.^[8] Platelets play an essential role in the pathogenesis of ACSs. Therefore, an important part of the treatment of ACS, and of primary and secondary preventive measures in coronary heart disease, consists of anti-platelet treatment.^[9] Oral anti-platelet drugs available are:

1. Aspirin
2. Dipyridamole
3. Ticlopidine
4. Clopidogrel
5. Prasugrel.

Cardiovascular disease is both highly prevalent and exceedingly costly to treat. Several anti-platelet agents have been found to be effective in reducing the morbidity and mortality associated with cardiovascular disease. Hence, the use of these drugs is gaining importance in many cardiovascular conditions for treatment, prophylaxis, and maintenance therapies.

Different evaluation techniques are used to analyze the cost of medicines/total health-care costs. One of the most important aspects of calculating medicines cost is acquisition cost/medicine price. In India, most of the drugs are available in different brand names. Many patients in developing countries find it difficult to afford standard medicines which leads to poor or non-compliance. In a survey, it was found that a significant percentage of high-income patients also indicated cost-related noncompliance. To deal with the issues of affordability and availability of medicines, the Government of India introduced mechanisms such as drug price control order (DPCO) and National Pharmaceutical Pricing Authority. DPCOs are issued by the government for enabling the government to declare a ceiling price for essential and life-saving medicines.

Indian pharmaceutical market has over 20,000 medicine formulations.^[10] The drugs are mainly sold under brand names.^[3] Indian markets are flooded with a huge number of formulations of drugs, and the same formulations are sold

under different brands.^[11] This creates a lot of problems for the physicians in deciding the drug of choice for individual patients. Hence, the study was designed to evaluate the cost of anti-platelet drugs of different generic classes and different brand names and to analyze the price variation among the various drugs available in the Indian market.

In the global market, cost of drugs is highly variable; therefore, obtaining accurate and relevant costs is very important. The present study was aimed at investigating the cost difference of various brands. So that, whenever a problem is there, a physician can prescribe an alternative cheaper brand medicine to ensure better compliance and reduce total health-care cost.

MATERIALS AND METHODS

This study was done in the Department of Pharmacology at Dr. PSIMS and RF. Current Index of Medical Stores (CIMS) and Indian Drug Review (IDR) (2015 issues) were reviewed for the prices of anti-platelet drugs.

- The retail cost of a particular drug being manufactured by different companies, in the same strength, number, and dosage form was compared
- The difference in the maximum and minimum price of the same drug manufactured by different pharmaceutical companies was calculated
- The percentage variation in price was calculated
- The drugs being manufactured by only one company or being manufactured by different companies, however, in different strengths were excluded
- Results will be calculated by proper statistical analysis.

The percentage variation in price was calculated using the following formula:^[12-14]

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

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

RESULTS

The prices of a total of 7 drugs (5 single and 2 combination preparations) are available in 18 different formulations manufactured by different companies were analyzed.

Table 1 shows the price variations of single drugs. In this group, clopidogrel (75 mg) showed maximum price variation of 726.9%, while aspirin (50 mg) shows minimum price variation of 2.66% compared to other single preparations.

In addition, in Table 2 a total of 2 combinations of drugs that were analyzed. In this group,

Table 1: Cost analysis of single preparations of oral anti-platelet drugs

Drug	Number of formulations	Dose (mg)	Number of manufacturing companies	Minimum price (Rs.)	Maximum price (Rs.)	Price variation (%)
Aspirin	5	50	2	2.63	2.70	2.66
		75	9	1.94	7.40	281.44
		100	2	21.15	25.20	19.15
		150	7	2.85	7.90	177.19
		325	1	6.47	6.47	-
Dipyridamole	3	25	2	2.88	11.29	292
		75	2	7.90	9.60	21.5
		100	4	9.76	35.66	265.3
Ticlopidine	1	250	7	48	99.73	107.7
Prasugrel	2	5	4	54	120	122.2
		10	4	99	149	50.51
Clopidogrel	3	75	26	26.00	215.00	726.9
		150	6	22.96	142.77	521.8
		300	1	21.00	21.00	-

Table 2: Cost analysis of combination preparations of oral anti-platelet drugs

Drug	Number of formulations	Dose (mg)	Number of manufacturing companies	Minimum price (Rs.)	Maximum price (Rs.)	Price variation (%)
Aspirin+clopidogrel	3	75+75	17	19.30	79.20	310.36
		150+75	11	19.60	70	257.14
		150+150	1	27.50	27.50	-
Aspirin+dipyridamole	4	25+200	1	18.26	18.26	-
		40+75	1	13.80	13.80	-
		60+75	1	23	23	-
		100+75	1	75	75	-

aspirin + clopidogrel (75 mg + 75 mg) showed a maximum price variation of 310.36% whereas aspirin + dipyridamole were available in 4 different dosages by only one company.

DISCUSSION

According to our present study, as shown in Table 1 there are 5 single preparations available for oral use. In these, aspirin is available in 5 different formulations of which 50 mg dose has least price variation of 2.66% and 75 mg dose has highest price variation of 281.4%. In addition, dipyridamole is available in 3 different formulations, of which 75 mg has least price variation of 21.5% and 25 mg dose has highest price variation of 292%. Here, ticlopidine is available only in 250 mg dose. In addition, prasugrel has 2 different formulations of 5 mg and 10 mg and clopidogrel was available in 3 different formulations in which 75 mg showed maximum price variation of 726.9%. As shown in Table 2, there are 2 combination preparations available in market of which aspirin + clopidogrel have 3 different formulations and aspirin + dipyridamole has 4 different formulations. In this, aspirin + clopidogrel (75 + 75 mg) was available by 17 different manufacturing companies.

According to Suzanne V. Arnold et al. study, aspirin either single or in combination is used for primary and secondary prevention of cardiovascular events. Moreover, prasugrel has been shown to be more cost-effective than clopidogrel for patients with an ACS and planned percutaneous coronary intervention.^[15]

According to the study done by Ringbor et al., cost-effectiveness ratio of long-term treatment with clopidogrel in patients undergoing PCI is well below the threshold values currently considered cost-effective.^[16] In another studies done by Lindgren et al.^[17] and Mauskopf et al.,^[18] they compared cost-effective analyses of therapies for treating the patients.

This study was carried out with the objective of computing the costs and percentage variation among oral anti-platelet drugs across different brands available in Indian market. Selection of cost-effective brand will improve the compliance and consequence of the treatment. Drug prices were captured from CIMS and IDR because these are regularly updated. Our study finding showed a high percentage price variation in the minimum and maximum price of oral anti-platelet drugs.

In India, more than one pharmaceutical company sells a particular drug under different brand names. Hence, a large number of formulations for the same drug are available at different prices. In general, drugs are mainly sold under brand names. It has been observed that doctors have suboptimal awareness of drug cost. That's why we decided to carry out the study, which compares the cost of different brands of drugs because very few studies are available regarding pharmacoeconomics and cost of drugs in India.^[12]

CONCLUSION

According to this study, there is a wide variation existing between the maximum and minimum cost among single and combination therapy of oral anti-platelets drugs. In these situations, to counteract such cost variation, the practice of generic drugs prescribing should be encouraged.

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