IJBCP International Journal of Basic & Clinical Pharmacology

Research Article

Cost analysis of different brands of antianginal drugs available in India

L. Akila*, R. Jamuna Rani

Department of Pharmacology, SRM Medical College Hospital & Research Centre, SRM University, Potheri, Kattankulathur, Kanchipuram, Tamil Nadu, India

*Correspondence to:
Dr. L. Akila,
Email: drakilasenthil@gmail.com

ABSTRACT

Background: Ischemic heart disease is the most common cardiovascular disease in developed countries such as United States and Angina pectoris is the most frequent among them. If not managed adequately angina results in significant morbidity and mortality too due to the complications. Antianginal therapy is lifelong. Therefore, analysis of the price of drugs used in ischemic heart disease will help to improve patient compliance.

Methods: Prices of various antianginal drugs of different strengths and combinations marketed by different companies was obtained from current index of medical stores. The variation between highest and lowest price of the same medication manufactured by various pharma companies and percentage variation in price for ten tablets was calculated.

Results: In India, percentage variation in price for antianginal drugs was found to be: tablet isosorbide dinitrate (5 mg) 250%, glyceryltrinitrate (6.4 mg) 24.44%. In calcium channel blockers group, tablet amlodipine 10 mg shows maximum price variation of 1045%, closely followed by 5 mg of amlodipine with a variation of 1040%, while 120 mg of diltiazem shows the least variation of 262%. In beta-adrenergic receptor blockers group, tablet atenolol 50 mg shows maximum price variation of 563%, whereas 100 mg of extended release metoprolol shows the least variation of 42%.

Conclusions: To increase the benefit to the patient and reduce drug in compliance, doctors should be trained to be familiar from internship period itself about the brand names of cost-effective drugs with good safety profile for a long period.

Keywords: Antianginal drugs, Cost analysis, Branded drugs

INTRODUCTION

Coronary artery diseases (CAD) are the prevalent cause of mortality, accounting for around 50% of the death resulting from non-transmissible diseases. In 2008, CADs accounted for around 25% of the mortality rate in our country. They are expected to be the fastest growing long-term disease by 2015 expanding at 9.2% every year since 2000.[1] Angina pectoris, a common symptom of ischemic heart disease affects >9 million American population also.[2] Compliance is defined as the extent to which the patient follows a regimen prescribed by a healthcare professional. Elderly patients come across age-related barriers like decreased social and financial support.[3] Rational prescribing should be practiced for all patients. Doctors most common use brand names in the prescription order. Prescribing by generic names gives more flexibility to the pharmacist in choosing the particular drug product and therefore offers the patient a potential saving when the prices are competitive.[4]

Drugs effective in the treatment of angina are: organic nitrates, beta-adrenergic blocking agents, calcium channel blockers and potassium channel openers. Recent advances include cytoprotectives such as ranolazine and ivabradine. History of use of antianginal drugs date back to 1879, when nitrates were discovered by a physician, William Murrell.[5]

Nitrates are used in the treatment of acute attack of angina and beta-blockers are most commonly prescribed in chronic prophylaxis.[6]

Patients are usually initiated with lowest dose as monotherapy. If the symptoms are not controlled adequately, then dose titration is done or patient is prescribed a fixed dose combination of two drugs to improve adherence to therapy. However, this will definitely increase the financial burden of the patient, which may result in poor compliance.[7] Inadequately treated ischemic heart disease can result in

complications like myocardial infarction, cerebrovascular accident, and thromboembolic disorders, which may be fatal.

The current scenario about pharma industry in India shows that the Indian pharmaceuticals field is the third largest with respect to volume and thirteen largest in terms of value. The market is dominated majorly by branded generics which constitute three-fourths of the market. Needless to say there will be a wide variation among the costs of generic antianginal drugs.[8] Our aim is to carry out price analysis study of conventional antianginal drugs which are available in the market under various brand names manufactured by different pharmaceutical companies.

METHODS

Current index of medical stores (CIMS) October 2014 was used as information guide to review the prices of drugs used in the treatment of angina.[9]

1. The maximum retail price of a particular drug which is being manufactured by various pharmaceutical companies in the same dose, strength and number was compared
2. Drug formulations of varying strengths and drugs manufactured by only one or two companies were not included in the study
3. Cost of antianginal drugs was calculated for ten tablets as the number of tablets available per strip differed
4. Maximum and minimum drug cost for the same formulation manufactured by different pharmaceutical companies was noted. The variation between the two is considered
5. Percentage cost variation was calculated as follows:

$$\%\text{Cost variation} = \frac{\text{Maximum cost-Minimum cost}}{\text{Minimum cost}} \times 100$$

RESULTS

The cost on a total of 14 drugs (11 as monotherapy and 3 as fixed dose combinations) were analyzed. They are available in the market as 33 different formulations which are manufactured by different pharmaceutical companies.

Monotherapy

The prize variation of some of the commonly used antianginal drugs namely nitrates, calcium channel blockers, beta-adrenergic receptor blockers and potassium channel openers prescribed as monotherapy is shown in Tables 1-4.

Table 1 shows in nitrates group, tablet isosorbide dinitrate 5 mg shows maximum price variation of 250%, whereas 6.4 mg of glyceryltrinitrate shows the least variation of 24.44%.

It is very evident from Table 2 that among calcium channel blockers group, tablet Amlodipine 10 mg shows maximum

price variation of 1045%, closely followed by 5 mg of amlodipine with a variation of 1040%, while 120 mg of diltiazem shows the least variation of 262%.

From Table 3 it is obvious that among beta-adrenergic receptor blockers group, tablet atenolol 50 mg shows maximum price variation of 563%, whereas 100 mg of extended release metoprolol shows the least variation of 42%.

Nicorandil, a potassium channel opener shows a percentage prize variation of 294 for 5 mg and 234 for 19 mg.

Fixed dose combination

Table 5 shows the variation in prize of two groups of antianginal drugs, namely beta-adrenergic receptor blockers and calcium channel blockers. Largest % prize variation is seen in amlodipine+atenolol (5+50) mg as 673% and the least variation is observed in ISMN+aspirin (30+75) mg as 70%.

DISCUSSION

Fresh MBBS graduates have more knowledge from theory and clinical examination viewpoint. They lack adequate knowledge on cost-benefit aspect of prescription. They tend to follow the same steps of their seniors and prescribe branded drugs based on the suggestion of either doctor parents, postgraduates or medical representatives.

If they have a ready reckoner which tells the cost effective brand at a quick glance, then it will be beneficial to the patient as well time-saving for the doctor.

Earlier studies in cost analysis have been done in USA, Sudan.[10] In India, these types of research articles are recently upcoming. Study on antianginal drugs was not done so far. Therefore, the current study was done. CIMS gives updated information about drugs periodically and is available in medical bookstores.

Earlier studies on different groups of drugs show wide variation in cost. This current study confirms that in India the system for pricing the drugs should be regularized. This tells that not only for antianginal drugs but for antidepressants,[9] antihypertensives,[11] dyslipidemic drugs[12] and antidiabetics[13] also cost variation is wide.

When drug cost is affordable, patient compliance will improve. This will reduce the economic burden of the country. In addition according to the WHO, definition health is defined as the state of physical and mental wellbeing. This can be achieved by providing drugs at an optimum price.

According to India ratings the pharmaceutical industry in our country is calculated to expand at 20% compound annual growth rate within 2020.This may further add to the existing differences in cost of drugs.

Table 1: Cost variation in nitrates.

Nitrates Drug	Dose (mg)	Formulations	Number of manufacturing pharma companies	Minimum cost (INR)	Maximum cost (INR)	% price variation
Glyceryl trinitrate	2.5	3	3	12	36	200
	2.6		5	29.56	49.36	66.98
	6.4		6	45	56	24.44
ISDN	5	2	2	0.20	0.70	250
	10		2	0.43	0.80	86.04
ISMN	10	4	6	12.60	22.44	77.8
	20		10	14.67	37.21	154
	30		7	24.50	60.70	147
	60		6	35.10	97.01	176

ISDN: Isosorbide dinitrate, ISMN: Isosorbide mononitrate, INR: Indian rupees

Table 2: Cost variation in calcium-channel blockers.

Calcium channel blockers Drug	Dose (mg)	Formulations	Number of manufacturing pharma companies	Minimum cost (INR)	Maximum cost (INR)	% price variation
Amlodipine	2.5	3	24	5.71	44	670
	5		35	7.54	86	1040
	10		16	10	114.52	1045
Diltiazem	90	2	7	32	135	321
	120		5	40	145	262

INR: Indian rupees

Table 3: Cost variation in beta-adrenergic receptor blockers.

Beta blockers Drug	Dose (mg)	Formulations	Number of manufacturing pharma companies	Minimum cost (INR)	Maximum cost (INR)	% price variation
Atenolol	25	3	13	5.80	37.90	553
	50		18	8.00	53.09	563
	100		8	36.00	76.70	113
Bisoprolol	5	1	2	20.90	56	167
Carvedilol	12.5	2	8	30	60	100
	25		6	52	100	92
Metoprolol	50	4	13	18.50	53.09	186
	100		6	46.20	73.35	58
	ER-50		12	30	70	133
	ER-100		6	66.7	95	42
Propranolol	40	3	5	18.60	31	66
	80		2	32.25	46.50	44

INR: Indian rupees

Table 4: Cost variation in potassium channel opener.

Potassium channel openers Drug	Dose (mg)	Formulations	No of manufacturing pharma companies	Minimum cost (INR)	Maximum cost (INR)	% price variation
Nicorandil	5	2	8	47	185.40	294
	10		6	79.50	266.00	234

INR: Indian rupees

Table 5: Cost variation in fixed dose combination.

Drug	Dose	Formulations	No of manufacturing pharma companies	Minimum cost (INR)	Maximum cost (INR)	% price variation
Amlodipine+atenolol	5+50	1	36	10.30	79.70	673
Atenolol+nifedipine SR	50+20	1	4	18.05	39.90	121
ISMN+aspirin	30+75	1	2	23.50	40.00	70

INR: Indian rupees, ISMN: Isosorbide mononitrate

In a patient with angina, he receives additional drugs such as antiplatelet drugs, dyslipidemic drugs, and drugs to treat co-morbid conditions if any. The actual economic burden faced by the patient is underestimated in the current study. Therefore, we conclude that (1) immediate data availability for cost analysis of all medicines which come in essential drug list and (2) regularizing prize of all bioequivalent drugs by the government itself will be the need of the hour.

REFERENCES

1. Chauhan S, Aeri BT. Prevalence of cardiovascular disease in India and it is economic impact - A review. Int J Sci Res Publ. 2013;3(10):2-4.
2. Michel T, Hoffman BB. Treatment of myocardial ischemia and hypertension. In: Rosamond W, Flegal K, Furie K, Go A, Greenlund K, Haase N, editors. Goodman and Gilman's the Pharmacological Basis of Therapeutics. 11th Edition. New York, NY: McGraw-Hill; 2005: 745.
3. Buxton IL. Principles of prescription order writing and patient compliance. Goodman and Gilman's the Pharmacological Basis of Therapeutics. 11th Edition. New York, NY: McGraw-Hill; 2005: 1886.
4. Lofholm PW, Katzung BG. Rational prescribing and prescription writing. In: Katzung BG, Masters SB, Trevor AJ, editors. Basic and Clinical Pharmacology. 11th Edition. New Delhi: Tata McGraw-Hill Education Private Limited; 2009.
5. Satoskar RS, Bhandarkar SD, Rege NN. In pharmacotherapy of angina pectoris, acute mi and peripheral vascular diseases. Pharmacology and Pharmacotherapeutics. Revised 23rd Edition. New Delhi: Elsevier; 2013: 401.
6. Ritter J, Lewis L, Mant T, Ferro A. In: a Textbook of Clinical Pharmacology and Therapeutics. 5th Edition. London:A Hodder Arnold Publication; 2012: 196-203.
7. Muszbek N, Brixner D, Benedict A, Keskinaslan A, Khan ZM. The economic consequences of noncompliance in cardiovascular disease and related conditions: a literature review. Int J Clin Pract. 2008;62(2):338-51.
8. Indian Brand Equity Foundation. Introduction: Indian Pharmaceutical Industry. Available at http://www.ibef.org/industry/pharmaceutical-india.aspx. Accessed 01 August 2015.
9. Patel BJ, Patel KH, Patel MP. Antidepressant drugs: evaluation of price variation. Int J Basic Clin Pharmacol. 2015;4(3):432-7.
10. Kheder SI, Ali HM. Evaluating medicines prices, availability, affordability and price components in Sudan. Sudan Med Monit. 2014;9(1):19.
11. Karve AV, Chattar KB. Cost analysis study of oral antihypertensive agents available in Indian market. Int J Basic Clin Pharmacol. 2014;3(3):479-83.
12. Patel KP, Joshi HM, Khandhedia C, Shah H, Shah KN, Patel VJ. Study of drug utilization, morbidity pattern and cost of hypolipidemic agents in a tertiary care hospital. Int J Basic Clin Pharmacol. 2013;2(4):470-5.
13. Date AP, Mahajan HM, Dashputra AV, Bhosale RR. Study of variation in price of various antidiabetic drugs available in Indian market. Int J Basic Clin Pharmacol. 2015;4(1):36-40.