



Research Article

Cost Variation Study of Various Brands of Anti-Asthmatic Drugs Available in India

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Abstract

Objective: Asthma is chronic inflammatory disorder of lungs that affects people of all ages and is a significant source of morbidity and mortality worldwide. It requires continuous medical care. Higher and unaffordable drug prices are among the major reasons for non-compliance and resultant treatment failure. The cost of drugs plays a major role in patient's care especially in developing countries. It has been observed that there is a gross variation in the cost of different brands of same generic drug. If doctors are not aware, then they may prescribe costly brands, which ultimately lead to non-adherence. The present study was planned to get some idea about cost differences in various brands of anti-asthmatic drugs.

Methods: The minimum and the maximum cost in Rupees (INR) of a particular anti-asthmatic agent manufactured by various pharmaceutical companies in the same strength were noted from latest issue of Drug today 2017. The cost ratio and percentage cost variation were noted for each brand.

Results: This study showed a noticeable variation in the prices of anti-asthmatic drugs. The highest percent cost variation was found for Doxophylline 400mg (3100%), followed Deflazacort 6mg (1300%), Methylprednisolone 4mg (1104%), Combination of Formoterol and Budesonide (444%), Salbutamol 4mg caps (363%), Theophylline and Salbutamol combination (236%), Ketotifen 1mg (217%). The lowest percent cost variations found were: Fluticasone 50mcg (0.4%), Cromolyn 20mg (2%), Formoterol 12mcg (11.5%), Tiotropium 18 mcg (11.5%), Ipratropium 20mcg/200mdi (19%) etc.

Conclusion: Government should look into the pricing control policy of anti-asthmatic drugs manufactured by various companies in India, so that pricing of various brands remains uniform, quality assured and affordable. Doctors must prescribe rationally, choosing cost effective medicines based on country's health situation.

Keywords: Anti-asthmatic Drugs, Non-Compliance, Adherence, Cost Variation, Rational.

Introduction

The Indian pharmaceutical market has over 20,000 medicine formulations^[1]. These drugs are mainly sold under brand names and generic branded names^[2,3]. Availability of same drug under different dosage forms with different brands creates a lot of problems for the physicians in choosing the less costly drug for individual patients^[4]. Individual drugs will be having great cost variation in the market which may directly influence the compliance^[5-7]. This implies the need for cost analysis of available formulations of drugs in the practice of medicine to identify needs to reduce cost for selecting less costlier or cheaper alternatives in prescribing. Optimizing the cost of therapy helps to promote the rational use of drugs^[1].

Asthma, a chronic and serious inflammatory disease of the airways of lungs, affecting all age group with increasing prevalence in many developing countries. It is one of the most common chronic diseases globally, affecting around 300 million individuals worldwide^[8]. The prevalence of asthma has increased by affecting 10%–12% of adults and 15% of children in affluent countries over the last 30 years. Increased urbanization in developing countries is leading to increase in the prevalence of asthma, which had been much lower previously^[9].

Worldwide deaths from this condition have reached over 180,000 annually. India has an estimated 15-20 million asthmatics^[10]. Asthma is associated with enormous healthcare expenditures that includes both direct costs, in the form of hospitalizations and medications, and indirect costs, in the form of loss of work which is a combination of directly missed days of work/school that occur during the exacerbation and the loss of future potential earnings associated with both morbidity and mortality^[11]. Asthma imposes an unacceptable burden on healthcare systems, and on society through loss of productivity in the workplace and, especially for pediatric asthma, disruption to the family^[8]. Asthma is a serious burden in low- and middle-income countries^[12]. The economic costs associated with asthma are estimated to rank as one of the highest among chronic diseases due to the significant healthcare utilization associated with this

condition^[11]. Worldwide, these costs are estimated to exceed those of TB and HIV/AIDS combined. Because asthma is a chronic condition, it usually requires continuous medical care. Failure to use appropriate drugs or comply with treatment can lead to unnecessary deaths^[10].

Expenditure on medicines accounts for a major proportion of health costs in developing countries. The access to treatment is heavily dependent on the availability of affordable medicines^[13]. The consideration of cost of treatment for ailments is an important aspect in health economics^[14]. Modern management of bronchial asthma mandates prolonged medication. A key issue in the management of bronchial asthma is adherence (compliance) to treatment^[15]. Cost related poor patient compliance is a worldwide problem. Poor or noncompliance affects clinical outcome and increases healthcare costs^[16]. Several surveys on retail prices of drugs have been carried out and published. All these studies have reported wide variations in the retail prices of drugs^[17].

The rationale of this study was that by observing the cost variation and identifying less costly/cheaper anti-asthmatic formulation; the study would help in rational prescribing. The prescriber and patient will become aware about the cost and availability of different formulations of anti-asthmatics in market. This study would also help provide a method to select less costlier drugs formulations in formulary.

Aim and Objectives

- 1) To calculate percentage cost variation of individual formulation of drug manufactured by different companies.
- 2) To identify cheapest anti-asthmatic drug.

Materials & Methods

A cross-sectional, observational study was carried out after approval from the Institutional Ethics Committee (BJGMC/IEC/Pharmac/ND-Dept 1017219-219) was obtained before initiating the study. It was conducted for 2 months of period from 01st Oct 2017 to 31st Nov, 2017 at B.J. Government medical college in Pune.

Prices of various anti-asthmatic agents were obtained from the latest issue of Drug today (Oct-Dec, 2017).^[18] Data, mainly ceiling prices and per unit prices of various anti-asthmatic drugs was also obtained from National Pharmaceutical Pricing Authorities, GOI official “PharmaSahi Dam” app.^[19] Data was analysed for:-

- To identify the price (in Indian rupees) of various brands of anti-asthmatic drugs- i.e. Minimum price (INR), & Maximum price (INR) (of a particular anti-asthmatic drug manufactured by various pharmaceutical companies in the same strength)
- The cost ratio: The ratios of the cost of the costliest to cheapest brand of the same generic anti-asthmatic drugs were calculated. This tells, how many times costliest brand costs more than the cheapest one in each generic group.
Cost Ratio = Cost of costliest brand / Cost of cheapest brand
- The following formula was used to analyse the cost variation.
% Cost variation
=
$$\frac{(\text{Price of most expensive brand} - \text{Price of least expensive brand}) \times 100}{(\text{Price of least expensive brand})}$$
- Ceiling price and Retail price and cost per unit in INR of different brands was also noted from NPPAs “Pharma Sahi Daam” app.

Statistical Analysis

All detailed data entered in MS Excel 2010 and values expressed in mean, counts, percentages, ratios.

Results

This study shows that there is a noticeably wide variation in the prices of various brands of same antiasthamatic drug available in Indian market. The highest percent cost variation (3100%) was found for Doxophylline 400 mg tablet, followed (1300%) for Deflazacort 6 mg tab. Other significant percent cost variations were: Methylprednisolone 4 mg tab (1104%), Combination of Formoterol and Budesonide (444%), Salbutamol 4 mg caps (363%),

Theophylline and Salbutamol combination (236%), Ketotifen 1mg tab (217%), Theophylline 400mg tab (178%), Monteleukast 10 mg tab (114%) and Theophylline 600mg tab (138%), Monteleukast 5 mg tab (114%), Beclomethasone and Salbutamol combination (60%), Salmeterol 50 mcg caps (57%), combination of Monteleukast and Bambuterol (51%), Bambuterol 10mg tablet (50%). The lowest percent cost variations found were: Fluticasone 50mcg (0.4%), Cromolyn 20mg (2%), Formoterol 12mcg (11.5%), Tiotropium 18 mcg (11.5%), Ipratropium bromide 20mcg/200mdi (19%), and Roflumilast 500 mcg tab (20%) etc. (Table 01).

Very few anti-asthmatic drugs, mainly Salbutamol, Ipratropium & Tiotropium and Formoterol with budesonide combination prices were under price control by National Pharmaceutical Pricing Authority (NPPA), Government of India. Medicines which are under pricing control by NPPA are shown in Table 02 with their Ceiling and retail price per unit INR as per in NPPA’s “Pharma Sahi Daam” app.

Discussion

It has been estimated that over two billion people in developing countries have no access to drugs because of their high prices and low purchasing power.^[17] According to Planning Commission of India report (2014), 363 million people were below poverty line in 2011-12 in India, accounting for 29.5% of total population of the country.^[20] People purchase the amount of drug they can afford and not what they need to be cured for.^[21] In a large survey significant percentage of even high income respondents indicated cost of the drugs as an important factor.^[22] Acquisition cost (medicine price) is one of the most important aspects in calculating health-care costs.^[23] One of the important factors contributing to poor patient compliance is the cost of the drugs.^[24]

Poor patient compliance is a worldwide problem and can result in patients receiving inappropriate doses of medication.^[16] A new Harris Interactive Survey shows that as a direct result of the high out-of-pocket cost of drugs, millions of the people do not ask the doctors for the prescription they need, do

not refill the prescriptions they are given, use lower doses of drugs than they are prescribed and take their drugs less often than they should. The higher the people's out-of-pocket cost of drugs, the more likely they are to be non-compliant. In this survey it was found that with out-of-pocket costs of \$500 a

year, 44% patients do not refill the prescription, 41% use a lower dose to make prescription last longer and 46% use a drug less often than prescribed to make it last longer.^[25]

Table 01: Cost analysis of different brands of anti-asthmatic drugs

DRUG DETAILS				DRUG TODAY				
				Oct - Dec 2017				
Sr No.	Group (Drug Name)	Dosage Form	Strength (mg)	Min Price (INR)	Max Price (INR)	Cost Ratio	% Cost Variation	
1	BRONCHODILATORS							
1A	Beta2 Sympathomimetics							
	Salbutamol	Caps	4mg (10caps)	1.48	6.85	4.63	362.8	
	Levosalmeterol	Tab	2mg (10tab)	7.78	12.82	1.65	64.8	
	Salmeterol	Caps	50mcg (30caps)	62.5	98	1.57	56.8	
	Formoterol	Caps	12mcg (30caps)	74	82.5	1.11	11.5	
	Bambuterol	Tab	10mg (10tab)	32	48	1.50	50.0	
		Tab	20mg (10tab)	56	68.8	1.23	22.9	
1B	ANTICHOLINERGICS							
	Ipratropium	Caps	40mg (30caps)	36.19	44	1.22	21.6	
		Inh	20mcg (200mdi)	160	190	1.19	18.8	
	Tiotropium	Caps	18mcg (15caps)	139	155	1.12	11.5	
1C	METHYLXANTHINES							
	Theophylline	Tab	400mg (10tab)	25.75	71.7	2.78	178.4	
		Tab	600mg (10tab)	38.76	92.3	2.38	138.1	
	Doxophylline	Tab	400mg (10tab)	2.5	80	32.00	3100.0	
2	CORTICOSTEROIDS							
	Budesonide	Caps	100mcg (30caps)	44	61	1.39	38.6	
		Caps	200mcg (30caps)	65.13	82	1.26	25.9	
		Inh	100mcg (200mdi)	186	264	1.42	41.9	
	Fluticasone	Caps	50mcg (30caps)	60	60.25	1.00	0.4	
	Deflazacort	Tab	6mg (10tab)	7.5	105	14.00	1300.0	
	Methylprednisolone	Tab	4mg (10tab)	4.9	59	12.04	1104.1	
3	MAST CELL STABILIZERS							
	Cromolyn	Caps	20mg (30caps)	60.75	61.96	1.02	2.0	
	Ketotifen	Tab	1mg (10tab)	12.6	40	3.17	217.5	
4	LT ANTAGONISTS/MODULATOR							
	Monteleukast		4mg (10tab)	63.4	89.18	1.41	40.7	
				5mg (10tab)	46	98.3	2.14	113.7
				10mg (10tab)	72	178.56	2.48	148.0
5	COMBINATIONS							
	Salmeterol + Fluticasone	Caps	50+100mcg (30caps)	98.2	119	1.21	21.2	
	Formoterol + Budesonide	Caps	12+400mcg (30caps)	215	1170	5.44	444.2	
	Ipratropium + Salbutamol	Caps	40+200mcg (30caps)	55.12	71	1.29	28.8	
	Bambuterol + Monteleukast	Tab	4+5mg (10tab)	73.83	87	1.18	17.8	
				10+10mg (10tab)	148	223	1.51	50.7
	Theophylline + Salbutamol	Caps	200+4mg (10caps)	5.95	20	3.36	236.1	
	Beclomethasone + Salbutamol	Caps	100+200mcg (30caps)	19.09	30.53	1.60	59.9	
6	PDE4 Inhibitor							
	Roflumilast	Tab	500mcg (10tab)	125	150	1.20	20.0	

Table 02: Ceiling & Retail price of anti-asthmatic drugs under price control by NPPA, GOI

DRUG DETAILS				PHARMA SAHI DAAM	
Sr No.	Group (Drug Name)	Dosage Form	Strength (mg)	Ceiling Price(Per unit INR)	Retail Price(Per unit INR)
1	BRONCHODILATORS				
1A	Beta2 Sympathomimetics				
	Salbutamol	Tab	2mg	0.14	0.16
	Salbutamol	Caps	4mg	0.55	0.62
	Salbutamol	Tab	4mg	0.16	0.18
	Salbutamol	mdi/dpi	100mcg/dose	0.36	0.4
	Salbutamol	Resp Sol	5mg/ml	0.64	0.72
1B	ANTICHOLINERGICS				
	Ipratropium	Resp Sol	250mcg/ml	2.3	2.58
	Ipratropium	mdi/dpi	20mcg/dose	0.56	0.63
	Tiotropium	Dpi	18mcg/dose	2.24	2.51
	Tiotropium	Mdi	9mcg/dose	2.11	2.36
2	COMBINATIONS				
	Formoterol + Budesonide	mdi/dpi	6+400mcg	2.68	3
	Formoterol + Budesonide	mdi/dpi	6+200mcg	2.14	2.4
	Formoterol + Budesonide	mdi/dpi	6+100mcg	1.7	1.9
3	CORTICOSTEROIDS				
	Methylprednisolone	Tab	8mg	4.63	5.19

Being a chronic medical condition, management of asthma requires continuous medical care. A key issue with the proper management of asthma is adherence to treatment.^[15]

In this study noticeable cost variation was found in different brands of same generic anti-asthmatic drug. Similar findings have been reported from different studies conducted in India.^[14,26] The cost difference calculated in this study was for a course of drug sufficient for a maximum period of one month. The cost variation assumes more significance in chronic diseases like asthma, which require prolonged treatment. Even a minor cost variation between different brands of same anti-asthmatic drug will have serious financial implications, as asthma requires prolonged medical care.

Doctor's ignorance of costs, combined with their tendency to underestimate the price of expensive drugs and overestimate the price of inexpensive ones, demonstrate a lack of appreciation of the large difference in cost between inexpensive and expensive drugs. This discrepancy in turn could have profound implications for overall drug

expenditures.^[27] Many medicines are very expensive and there are often equally effective brands available for treating the same condition. In India most of the drugs are available in brands and they are also prescribed by clinicians mostly by brand name. This may affect the patients finance adversely if costly brand is prescribed especially in diseases like asthma that needs treatment for longer duration. Prescribing a costlier brand can result in noncompliance which leads to treatment failure and may even necessitate hospital admissions.^[16] If a doctor prescribes the cheaper effective brand it could result in savings for whoever is paying for the drug, be it the government, the patient or a medical insurance organization.

Conclusion

Direct costs of asthma have been shown to exceed in direct costs and the major component of direct medical costs includes pharmacological expenditures. Many studies have found that the drug cost of asthma accounted for the greatest part (53-100%) of the overall cost. In the present study, the costs of many anti-asthmatic drugs were found

highly variable. Governments should ensure that anti-asthmatic drugs are available, quality assured and affordable for everyone. Very few anti-asthmatic drugs group were found to be under price control by National Pharmaceutical Pricing Authority (NPPA), GOI. Considering this government should look into the pricing control policy of anti-asthmatic drugs manufactured by various companies in India, so that pricing of various brands remains uniform and cost effective. Doctors must prescribe rationally. Rational prescribing means choosing cost effective and safe medicines based on country's health situation.

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