

Cost analysis of antipsychotic drugs available in India**Ajay Kumar Shukla^{1*}, Astha Agnihotri²**

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ABSTRACT

Background: Indian drug market has large numbers of branded formulations for every drug molecule. 1 Cost-sensitive healthcare environment has created a challenging workplace for clinicians. Efficient use of healthcare resources without compromising quality of patient care has been a challenging task for healthcare professionals. There is a wide range of variation in the prices of drugs marketed in India. Thus, a study was planned to analyse out cost variations of antiepileptic drugs available in Indian market.

Methods: Minimum and maximum costs in Rupees (INR) of different brands of same generic antipsychotic drugs, in the same strength and dosage forms were compared. The cost ratio and percentage cost variation were calculated for each generic antipsychotic drug. The number of formulations for antipsychotic drugs and number of brands for each of them were also taken into consideration.

Results: This study shows that in Indian market, there are wide variations in the prices of different brands of same generic antipsychotic drug. The highest cost ratio and percent cost variation was found for risperidone 2 mg [(1:16.27) and 1527.48], followed by risperidone 4 mg [(1:16.25) and 1525.25], risperidone 3 mg [(1:15.67) and 1467.33], risperidone 1 mg [(1:14.86) and 1386.78], olanzapine 10 mg [(1:12.36) and 1136.84], and olanzapine 5 mg [(1:12.31) and 1130.76]. Highest number of brands of antipsychotic drug available in Indian market are for divalproex sodium 500mg(25) followed by olanzapine 15 mg(23), olanzapine 5 mg(23), olanzapine 2.5mg(14), and risperidone 1 mg (14). Highest numbers of formulations of antipsychotic drug available in Indian market are for olanzapine(06), quetiapine(05), haloperidol(05), and aripiprazole(05).

Conclusions: In Indian market, the average percentage price variation of different brands of the same oral antipsychotic drugs is very wide. Treatment with antipsychotic drugs usually has a long course with treatment adherence being a crucial factor for successful treatment. Improved adherence to the drug treatment can be ensured by decreasing the cost of therapy. Decreased drug cost expenditure can be ensured by changes in the government policies and regulations, integrating pharmacoeconomics as part of medical education curriculum, and creating awareness among treating physicians for switching to cost effective therapy.

Keywords: Adherence, Cost analysis, Compliance, Cost variation, Health Economics

INTRODUCTION

Indian drug market has large numbers of branded formulations for every drug molecule.¹ Cost-sensitive healthcare environment has created a challenging workplace for clinicians. Efficient use of healthcare resources without compromising quality of patient care has been a challenging task for healthcare professionals.²

Rising medical care costs is a matter of concern for patients as well as for policy makers and service providers. Every year over 100 million people are dragged into poverty due to cost of illness and medical bills. In some countries, every year 5% of the population is forced into poverty as they have pay for health services. While millions of people suffer and die due to lack of access or inability to afford medical care, many others have to suffer as they end up paying through

borrowing debts and selling assets etc. WHO's annual World Health Report 2010 reflects that health and medical service is a limited resource for an unlimited demand. According to the report, between 20%-40% of all health expenditures are wasted because of inefficiency. Overpaying is a type of waste. In some countries, costs of medicine are up to 67 times higher than the international average price. This over expenditure grossly affects expenditures for other health services. Every year, direct and indirect medical costs have been dragging millions of Indian population into poverty.³

In India more than 80% health financing is borne by patients.⁴ There has been a lack of appreciation among clinicians about the difference between inexpensive and expensive drugs. Due to their ignorance about the drug cost, they also have tendency to overestimate the cost of inexpensive drugs while underestimating the cost of expensive ones. This lack of concern ultimately results in increased overall healthcare expenditures.⁵

The term "psychosis" denotes a variety of mental disorders: the presence of delusions, various types of hallucinations, and grossly disorganized thinking in a clear sensorium. Schizophrenia is a kind of psychosis characterized by a clear sensorium with a marked thinking disturbance. Schizophrenia is found to be neurodevelopmental disorder. Schizophrenia is considered as a genetic disorder with high heritability. Antipsychotic drugs reduce psychotic symptoms in schizophrenia, psychotic depression, bipolar disorder, senile psychoses, drug-induced psychoses and various organic psychoses. Antipsychotic drugs have led to drastic improvement in disease management.⁶

Relative risk of extrapyramidal side effects (EPS) with first generation antipsychotics (FGAs) has to be evaluated against the risk of metabolic side effects of second generation antipsychotics (SGAs).⁷ Long-acting injectable antipsychotics should be considered, if lack of adherence contributes to inadequate clinical improvement.⁸⁻¹⁰

For the first 7 days of initial treatment, goals are decreased agitation, anxiety, tension, hostility and aggression and normalization of sleep and eating patterns. Psychotic patients in first episode, due to increased sensitivity to side effects have typical dosing ranges approximately 50% of the doses used in chronically ill individuals.¹¹ If there is no improvement after 3 to 4 weeks at therapeutic doses, change of antipsychotic should be considered.^{11,12} Improvement is slow and steady and usually takes over 6 to 12 weeks or longer. During initial 2 to 3 weeks, goals are increased socialization and improvement in self-care habits and mood. Over 6 to 8 weeks of treatment, improvement in formal thought disorder takes over. Patients early in the course of their illness experience more rapid resolution than chronically ill patients.⁷ Treatment has to be

continued for at least 12 months after remission of first psychotic episode in a schizophrenic patient.^{8,13}

This study was aimed at investigating and comparing the cost differences in various brands of the same generic antipsychotic agent, so that we can analyze their number of brands for each formulation and their cost variations. This appreciation of cost variation of antipsychotic drugs can be applied for more economical treatment regimen to improve the patient compliance, decreasing the rate of failure of therapy while ensuring quality patient care.

METHODS

The prices of 14 oral antipsychotic drugs, available in 49 different formulations were analyzed.

1. Cost of a particular drug (cost per 10 tablets), in the same strength and dosage forms, manufactured by different companies was obtained from "Current Index of Medical Specialties" (CIMS) April-July 2016.
2. The drugs being manufactured by only one company were excluded.
3. The cost ratio, the ratio of the cost of the costliest to cheapest brand of the same generic antipsychotic drug was calculated. From this we can deduce that how many times costliest brand costs more than the cheapest brand in each generic group.
4. Percentage cost variation was calculated as follows:¹⁴

$$\text{Cost variation (\%)} = \frac{\text{Max. cost} - \text{Min. Cost} \times 100}{\text{Min. cost}}$$

RESULTS

This study shows that in Indian market, there are wide variations in the prices of different brands of same generic antipsychotic drug. The highest cost ratio and percent cost variation was found for risperidone 2 mg [(1:16.27) and 1527.48], followed by risperidone 4 mg [(1:16.25) and 1525.25], risperidone 3 mg [(1:15.67) and 1467.33], risperidone 1 mg [(1:14.86) and 1386.78], olanzapine 10 mg [(1:12.36) and 1136.84], and olanzapine 5 mg [(1:12.31) and 1130.76] (Table 1).

Highest number of brands of antipsychotic drug available in Indian market are for divalproex sodium 500 mg(25) followed by olanzapine 15 mg(23), olanzapine 5 mg(23), olanzapine 2.5 mg(14), and risperidone 1 mg (14). Highest numbers of formulations of antipsychotic drug available in Indian market are for olanzapine(06), quetiapine(05), haloperidol(05), and aripiprazole(05) (Table 2).

DISCUSSION

In our study, we found that in Indian market, there are wide variations in the prices of different brands of same

generic antipsychotic drug. The highest cost ratio and percent cost variation was found for risperidone 2mg, followed by risperidone 4mg, risperidone 3mg,

risperidone 1mg, olanzapine 10 mg, and olanzapine 5mg (Table 1).

Table 1: Variation in cost of antipsychotic drugs.

Antipsychotic Drug	Strength (mg)	Min. cost (INR)	Max. cost(INR)	Cost ratio	% cost variation
Amisulpiride	50 mg	45.00	55.00	1.22	22.22
	100 mg	75.00	89.00	1.19	18.66
	200 mg	147.60	165.00	1.12	11.79
	300 mg	207.00	235.00	1.13	13.52
Aripiprazole	5 mg	36.00	45.00	1.25	25
	10 mg	56.00	80.00	1.43	42.85
	15 mg	80.00	110.00	1.38	37.5
	20 mg	99.00	134.00	1.35	35.35
	30 mg	97.10	177.35	1.83	82.64
Chlorpromazine	50 mg	3.65	8.54	2.34	133.9
	100 mg	5.86	11.63	1.98	98.46
Clozapine	25 mg	18.00	25.00	1.39	38.88
	50 mg	35.00	53.00	1.51	51.42
	100 mg	60.00	82.00	1.37	36.66
Divalproex Sodium	200	29.50	41.50	1.40	40.7
	250	32	84	2.62	162.5
	300	27.3	62.5	2.29	128.9
	500	60	190	3.17	216.7
	750	90.00	105.00	1.17	16.6
Flupentixol	0.5 mg	20.25	40.00	1.97	97.53
	1 mg	35.00	55.00	1.57	57.14
Haloperidol	0.25 mg	1.96	15.00	7.65	665.3
	1.5 mg	4.10	17.00	4.14	314.6
	5 mg	9.25	32.50	3.51	251.35
	10 mg	22.50	41.00	1.82	82.22
	20 mg	45.90	59.41	1.29	29.43
Lamotrigine	25 mg	20.00	50.00	2.5	150
	50 mg	37.50	90.00	2.4	140
	100 mg	66.25	157.00	2.37	136.98
Loxapine	10 mg	13.33	34.12	2.56	155.96
	25 mg	26.66	70.61	2.65	164.85
Olanzapine	2.5 mg	11.00	25.00	2.27	127.27
	5 mg	19.50	240.00	12.31	1130.76
	7.5 mg	28.00	46.00	1.64	64.28
	10 mg	38.00	470.00	12.36	1136.84
	15 mg	60.00	88.00	1.47	46.66
	20 mg	84.00	144.30	1.71	71.78
Pimozide	4 mg	48.15	72.75	1.51	51.09
Quetiapine	25 mg	16.00	28.00	1.75	75
	50 mg	25.00	45.00	1.8	80
	100 mg	40.00	60.00	1.5	50
	200 mg	78.00	104.00	1.33	33.33
	300 mg	110.00	149.00	1.35	35.45
Risperidone	1 mg	9.08	135.00	14.86	1386.78
	2 mg	16.59	270.00	16.27	1527.48
	3 mg	25.84	405.00	15.67	1467.33
	4 mg	33.22	540.00	16.25	1525.25
Valproic Acid	200 mg	22.53	46.00	2.04	104.1
	500 mg	47.00	97.50	2.07	107.4

Table 2: Brands and formulations of antipsychotic drugs.

Antipsychotic drug	Formulations	Strength (mg)	Brands
Amisulpiride	04	50 mg	10
		100 mg	11
		200 mg	04
		300 mg	04
Aripiprazole	05	5 mg	03
		10 mg	11
		15 mg	11
		20 mg	08
		30 mg	10
Chlorpromazine	02	50 mg	02
		100 mg	02
Clozapine	03	25 mg	05
		50 mg	04
		100 mg	06
Divalproex Sodium	05	200 mg	10
		250 mg	11
		300 mg	10
		500 mg	25
		750 mg	07
Flupentixol	02	0.5 mg	04
		1 mg	03
Haloperidol	05	0.25 mg	05
		1.5 mg	06
		5 mg	07
		10 mg	05
		20 mg	02
Lamotrigine	03	25 mg	04
		50 mg	04
		100 mg	04
Loxapine	02	10 mg	02
		25 mg	02
Olanzapine	06	2.5 mg	14
		5 mg	23
		7.5 mg	10
		15 mg	23
		10 mg	07
Pimozide	01	20 mg	04
		4 mg	02
Quetiapine	05	25 mg	08
		50 mg	09
		100 mg	10
		200 mg	10
		300 mg	05
Risperidone	04	1 mg	14
		2 mg	13
		3 mg	10
		4 mg	11
Valproic Acid	02	200 mg	09
		500 mg	08

Highest number of brands of antipsychotic drug available in Indian market are for divalproex sodium 500mg followed by olanzapine 15mg, olanzapine 5mg, olanzapine 2.5mg, and risperidone 1mg. Highest numbers of formulations of antipsychotic drug available in Indian market are for olanzapine, quetiapine, haloperidol and aripiprazole (Table 2).

There were three antipsychotic drugs chlorpromazine, haloperidol and olanzapine included in National list of essential medicines (NLEM) 2011.¹⁵ NLEM 2015 has included four antipsychotic drugs clozapine, fluphenazine, haloperidol, and risperidone.¹⁶ We can see that more number of drugs and formulations which have been included in NLEM 2015 as compared to NLEM 2011.^{15,16} Thus, cost of more number of antipsychotic drugs will be regulated by drug prices control order (DPCO) 2013.¹⁷ This will play an important role in reducing the cost variation among the most commonly used antipsychotic drugs.

As per the recommendations of many experts, in schizophrenia patients with robust treatment response, medications should be continued for at least a period of 5 years. To prevent relapse in majority of chronic cases of schizophrenia, lifetime pharmacotherapy is recommended. Treatment should be started with lowest effective dose of antipsychotic medication that is most likely tolerated by the patient.^{8,13}

Higher medication costs play an important role for medication nonadherence.¹⁸ Cost related poor medication adherence has been associated with adverse health outcomes.¹⁹

In individuals with chronic illnesses it is often a challenge to maintain medication adherence.²⁰ Individuals with serious mental disorders has higher nonadherence rates as compared to those with general medical disorders.⁷

Decreased drug cost has been found to improve adherence to the medication regimen.²¹ Non compliance of the drug therapy results in progression of the disease which increases the overall medical care costs dramatically.

In the treatment of epilepsy, treatment with generic antiepileptic drugs was found to have fewer adverse seizure-related clinical outcomes and improved treatment adherence than treatment with brand name versions.²² The cost of medicines has been found to depend on their marketing strategies. There has been no correlation found between the quality of the medicine and its corresponding price.²³ Thus, it appears crucial that large cost differences between the brands of same generic antipsychotic drug have to be regulated by concerned agencies.

There is a lack of appreciation among the prescribing doctors about the magnitude of cost variation of drugs.

Prescribing doctors usually overestimate the cost of inexpensive drugs while underestimating the cost of expensive ones. This consequentially leads to increased overall drug expenditures.⁵ More than 80% health financing is borne by patients in India.⁴ In India, where majority of patients are paying out of their pockets for their medical bills and are not covered by insurance schemes, due importance to the costs of drug should be given by prescribing doctors.²⁴ In Indian market, wide and variable cost variations have been found among different brands of antiepileptic drugs, antidepressant drugs and antidiabetic drugs.²⁵⁻²⁷

Pharmacoeconomics and its influence on healthcare expenditure should be a component of medical education curriculum. This will create awareness about the impact of cost of therapy on the medication adherence and successful treatment of the disease. Physician's awareness about the cost differences of drugs can be enforced by ensuring ready availability of drug manual which has comparative drug prices. Availability of drug manual has been associated with reduction of patients' drug expenditure.²⁸

Currently, very few antipsychotic drugs are under drug prices control order. Government should regulate costs of more number of antipsychotic drugs. Thus, this study highlights that there exists a wide and variable price variation among the antipsychotic drugs manufactured by different companies. Strong measures must be taken by the government and concerned agencies for uniformity in drug pricing. Due consideration must be placed on antipsychotic drugs to increase their affordability and accessibility to common people.

CONCLUSION

In Indian market, the average percentage price variation of different brands of the same oral antipsychotic drugs is very wide. Treatment with antipsychotic drugs usually has a long course with treatment adherence being a crucial factor for successful treatment. Improved adherence to the drug treatment can be ensured by decreasing the cost of therapy. Decreased drug cost expenditure can be ensured by changes in the government policies and regulations, integrating pharmacoeconomics as part of medical education curriculum, and creating awareness among treating physicians for switching to cost effective therapy.

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