

DOI: <https://dx.doi.org/10.18203/2319-2003.ijbcp20211647>

Original Research Article

Study of the cost variation analysis of anti-epileptic drugs available in different brands in Indian pharmaceutical market

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Received: 03 March 2021

Accepted: 05 April 2021

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ABSTRACT

Background: The aim of this study was to analyze the cost ratio and percentage cost variations in different brands of the commonly prescribed anti-epileptic drugs available in Indian pharmaceutical market.

Methods: The maximum and minimum price of each brand of the drug given in Indian rupees (INR) was noted by using CIMS January to April 2020 edition and drug today April to June 2020 volume 1. The cost ratio and the percentage cost variation for individual drug brands was calculated. The cost of one bottle in case of 100 ml syrup and 10 tablets/capsules was calculated in case of oral drugs and the cost of one 1 vial or ampoule was noted in case of injectable drugs. At last the cost ratio and percentage cost variation of various brands was compared.

Results: After calculation of cost ratio and percentage cost variation for each brand of anti-epileptic drug tablet clonazepam (2 mg) shows highest cost ratio and percentage cost variation as 10.41 and 941.66, carbamazepine (200 mg SR tablet) shows lowest cost ratio and percentage cost variation as 1.09 and 9.32.

Conclusions: Epilepsy is the most common neurological disorder and epileptic drugs are to be prescribed for prolonged period. If a costly brand is prescribed, the patients have to pay more money unnecessarily for their treatment. There is a wide difference in the cost of different brands of anti-epileptic drugs available in India. The clinicians prescribing these drugs should be aware of these variations in cost to reduce the cost of drug therapy.

Keywords: Anti-epileptic drugs, Percentage cost variation, Cost ratio

INTRODUCTION

Epilepsy is a group of neurological disorders which is characterized by seizures, loss of consciousness, muscular contraction.¹ The cause of most cases of epilepsy is unknown.² Some cases occur as the result of brain injury, stroke, brain tumors, infections of the brain and birth defects through a process known as epileptogenesis.² Known genetic mutations also causes some cases of epilepsy.³ The diagnosis involves ruling out other conditions such as alcohol withdrawal or electrolyte

problems.³ Epileptic seizures are the result of excessive and abnormal neuronal activity in the cortex of the brain.⁴ In 2015, about 39 million people have epilepsy.⁵ Nearly 80% of cases occur in the developing world. In 2015, it resulted in 125,000 deaths up from 112,000 deaths in 1990.⁶ Epilepsy is more common in older people.⁷ In the developed world, onset of new cases occurs most frequently in babies and the elderly.⁸ In the developing world, onset is more common in older children and young adults, due to differences in the frequency of the underlying causes.⁹ The diagnosis of epilepsy is typically made based on observation of the seizure onset and the

underlying cause.¹⁰ An electroencephalogram (EEG) to look for abnormal patterns of brain waves and neuroimaging (CT scan or MRI) to look at the structure of the brain are also usually part of the workup. Video and EEG monitoring may be useful in difficult cases. The mainstay treatment of epilepsy is anticonvulsant medications, possibly for the person's entire life.¹⁰ The choice of anticonvulsant is based on seizure type, epilepsy syndrome, other medications used, other health problems, and the person's age and lifestyle.¹⁰ A single medication is recommended initially.¹¹ If this is not effective, switching to a single other medication is recommended.¹² There are a number of medications available including phenytoin, carbamazepine and valproate. Low-quality evidence suggests that phenytoin, carbamazepine and valproate may be equally effective in both focal and generalized seizures.¹³ Controlled release carbamazepine appears to work as well as immediate release carbamazepine and may have fewer side effects.¹⁴ Patients from poor socioeconomic background must have access to the correct drug at the nominal price. Costly drugs can lead to economic burden which results in decreased compliance or even non-compliance. Non-compliance leads to incomplete treatment which tends to increase morbidity. There is a gross variation in the cost of different brands of same generic drugs available in Indian pharmaceutical market. Increase in the patient medication cost was found to be associated with decrease adherence to prescription medication.¹⁵ Hence the present study was conducted to evaluate the cost variation amongst the different brands of anti-epileptic drugs available in Indian pharmaceutical market.

METHODS

Price in INR of anti-epileptic drugs manufactured by different pharmaceutical companies in India, in the different strength were obtained from current index of medical specialists (CIMS) January to April 2020 edition and from drug today April to June 2020, volume 1 as they are readily available source of drug information and were updated regularly. The cost of 10 tablets/capsules, syrup of one bottle and that of one ampoule/vial were calculated. The cost of drugs were also crosschecked at pharmacy or retail drug store. Difference in the maximum and

minimum price of the same drug formulation manufactured by different pharmaceutical companies and percentage variations in prices were calculated. The cost of injectable drugs and oral drugs in forms of table, capsule and syrup was calculated separately. The cost ratio, calculated as the ratio of the costlier brand to that of the cheapest brand of the same drug, calculated as follows,

$$\text{Cost ratio} = \frac{\text{Price of the costliest brand}}{\text{Price of the least costly brand}}$$

The percentage cost variation of each drug should be calculated as follows,

$$\text{Percentage cost variation} = \frac{\text{maximum cost} - \text{minimum cost}}{\text{minimum cost}} \times 100.$$

Maximum percentage cost variation and cost ratio of a particular drug was noted down. Minimum percentage cost variation and cost ratio of a particular drug was noted down.

Inclusion criteria

Drugs belonging to group of anti-epileptics only was included. Dosage form of anti-epileptic drugs being capsule/tablet, syrup, ampoule/vial were included. Drugs belong to branded manufacturing companies, drugs of same and different strength was also included.

Exclusion criteria

Anti-epileptic drugs in combinations with other drugs and drugs belonging to bogus manufacturing companies were excluded.

RESULTS

Tablet clonazepam (2 mg) shows highest cost ratio and percentage cost variation as 10.41 and 941.66, tablet carbamazepine (200 mg SR tablet) shows lowest cost ratio and percentage cost variation as 1.09 and 9.32. We preferred those drugs who possessed cost ratio less than 2 and percentage cost variation less than 100.

Table 1: Cost ratio and percentage cost variation of anti-epileptic drugs available in Indian pharmaceutical market.

Drugs	Dose	Number of brands	Maximum price (rupees)	Minimum price (rupees)	Price ratio	% price variation
Carbamazepine	200 mg CR tablet	3	21.40	14.30	1.49	49.65
	200 mg ER tablet	2	23.50	15.79	1.48	48.82
	200 mg SR tablet	2	15	13.72	1.09	9.32
	200 mg tablet	20	21.40	11	1.94	94.54
	400 mg CR tablet	2	41.70	26.50	1.57	57.35
	400 mg ER tablet	2	45.75	31.02	1.47	47.48
	400 mg tablet	8	41.70	24.24	1.72	72.02

Continued.

Drugs	Dose	Number of brands	Maximum price (rupees)	Minimum price (rupees)	Price ratio	% price variation
Sodium valproate	100 mg tablet	11	11.21	6.50	1.72	72.46
	200 mg tablet	14	42	21.85	1.92	92.21
	200 mg/5 ml syrup	5	65	47.50	1.36	36.84
	250 mg tablet	4	64	45	1.42	42.22
	500 mg tablet	13	90	46.81	1.92	92.26
	500 mg ER tablet	5	118	58	2.03	103.44
	500 mg CR tablet	6	90	32	2.81	181.25
Phenytoin	50 mg tablet	4	13.50	7.26	1.85	85.95
	100 mg tablet	10	21.1	5.71	3.69	269.52
	300 mg ER tab/cap	3	59	50.19	1.17	17.55
	Inj 50 mg/ml (2 ml ampoule)	4	120.90	58	2.08	108.44
Pregabalin	75 mg capsule	21	97	54.89	1.76	76.71
	150 mg capsule	13	159	115	1.38	38.26
Clonazepam	0.25 mg tablet	24	22	9.10	2.41	141.75
	0.5 mg tablet	44	36	9.90	3.63	263.63
	1 mg tablet	25	43	18.29	2.35	678.29
	2 mg tablet	31	75	7.20	10.41	941.66
Lamotrigine	25 mg tablet	9	58	21	2.76	176.19
	50 mg tablet	9	90	39	2.30	130.76
	100 mg tablet	8	157	69	2.27	127.53
Gabapentin	100 mg tab/cap	5	47.50	42	1.13	13.09
	300 mg tab/cap	12	312.87	69.90	4.47	347.59
Levetiracetam	250 mg tablet	9	82	44	1.86	86.36
	500 mg tablet	17	164	75	2.18	118.66
	Inj 100 mg/ml	6	147	40	3.67	267.5
Topiramate	25 mg tablet	4	56	30	1.86	86.66
	50 mg tablet	6	87	58	1.5	50
	100 mg tablet	3	15	108	1.42	42.59

DISCUSSION

The Indian market has over 100,000 formulations and there is no system of registration of medicines. More than one company sells a particular drug under different brand names apart from the innovator company. This situation has led to greater price variation among drugs marketed. These wide variations in the prices of different formulations of the same drug have severe economic implications in India. Unlike developed countries, people in developing countries pay the cost of medicines out-of-pocket. Many poor people frequently face a choice between buying medicines or buying food or other necessities due to limited resources and high pricing of drug. So, medicine prices do matter. In India more than 80% health financing is borne by patients.¹⁶ Studies have shown that providing a manual of comparative drug prices annotated with prescribing advice to physicians reduced their patients drug expense especially in a disease like hypertension which needs long term treatment.¹⁷ Costs of drugs are controlled by the drug cost control order 2013 (DPCO).¹⁸ Hence, it was need to draw attention to the prices of various drug formulation brands available to reduce the cost of therapy.¹⁹ The treating physician should be made aware of

the cheapest drug available among the various brands so that the patient bears lesser burden of treatment cost.

CONCLUSION

Nowadays prices of few drugs are under government control through DPCO (drug price control order). The physician should always remember that he should not avoid treating the patients with a particular drug because it is expensive and should rather balance his therapeutic decisions in prescribing a particular drug by considering the patients socioeconomic status. There is a strong need to create awareness about this huge price variation among the general public, health care providers, health care payers, government agencies, policy makers, pharmacists for appropriate intervention to reduce economic burden on patients as well as the healthcare system.

Funding: No funding sources

Conflict of interest: None declared

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

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Cite this article as: Kumar H, Kesari USP, Kumar R. Study of the cost variation analysis of anti-epileptic drugs available in different brands in Indian pharmaceutical market. *Int J Basic Clin Pharmacol* 2021;10:523-6.