

Cost analysis of various topical eye preparations currently available in Indian market

Shweta Agrawal¹, Neelesh Arya^{2*}, Mehul Agrawal²

¹Department of Shalakyta Tantra, Pt. K.L.S. Govt. (Auto.) Ayurvedic College and Hospital, Bhopal, Madhya Pradesh, India
²Department of Pharmacology, Gandhi Medical College, Bhopal, Madhya Pradesh, India

Received: 19 May 2019

Revised: 10 June 2019

Accepted: 02 July 2019

***Correspondence to:**

Dr. Neelesh Arya,
Email: drneesharya@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: topical eye preparations are very commonly used in India for different eye diseases hence their prices should not be much different in Indian pharmaceutical industry. The common man therefore has to shell out more money with medicine prices spinning out of his reach. Aim of this study was to compare the cost of drugs of the different brand of topical ophthalmic drugs.

Methods: cost of various topical eye preparations was compared using “Current Index of Medical Specialties” (CIMS) January-April 2019 and cost variation was recorded. Drugs were categorized into anti-infective and antiseptics, topical corticosteroids, mydriatics, anti-glaucoma drugs, anti-inflammatory and lubricants.

Results: That of the 26 drug formulations studied, the percentage cost variation of 10 drug formulations was more than 100%, out of which one formulation of moxifloxacin had more than 1000% variation. Cost ratio of 10 drug formulations were more than two. Moxifloxacin 0.5% eye drops had maximum percentage cost variation of 5610.66% and cost ratio of 57.11, followed by ofloxacin 0.30% eye drops (310.92%, 4.11), timolol 0.50% eye drops (263.64%, 3.64), ciprofloxacin 0.30% eye drops (142.42%, 2.42), tobramycin 0.30% eye drops (120.14%, 2.20).

Conclusions: There is a significant variation in the price of various topical eye preparations. As most of the preparations being prescribed on an out-patient basis, which was not covered under most of the insurance program. Out of pocket expenditure adversely affects the drug compliance in the long run. There should be a comprehensive action from policymakers, regulatory authorities, government agencies, doctors, pharmacists, and the general public to solve this issue of cost variation of drugs.

Keywords: Cost analysis, Cost variation, Eye drops, Pharmacoeconomics

INTRODUCTION

Pharmaceutical Industry in India has grown with tremendous pace and Indian markets are flooded with a huge number of branded formulations with large difference in the manufacturing cost of drugs and their maximum retail price along with the cost of different brands of the same formulation. This apart from creating confusion among innocent consumers often allows them to be misled by unfair traders.¹

High cost of medicines has economic implications for the patients. Prices of prescription can affect users, suppliers and most importantly payers in health care system.² In fact; several studies have indicated that therapeutic compliance is influenced by drug prices.³ Recent progressions have been made in pharmacological therapies to treat ocular disorders such as glaucoma, conjunctivitis, diabetic macular oedema and retinal vascular occlusions to improve the diagnosis for these disorders. Due to these advances, there is a great deal of interest in minimally

invasive delivery methods, which has generated rapid developments in the field of ocular drug delivery.⁴

Effective treatment of ocular diseases is a formidable task because of the nature of diseases and presence of ocular barriers. Ocular drug delivery is complex since delivery of drugs to the targeted ocular tissues is restricted by pre-corneal and other ocular barriers. Advances in drug delivery techniques have revolutionized the ocular drug delivery, but the topical administration is the most employed route of drug delivery in ocular diseases.⁵

Drug cost can play an important role in long term compliance to the treatment. In India, where majority of the population is not covered by any insurance, the cost of treatment expenses is mainly out of pocket. Significant fraction of population is dragged below the poverty line every year due to these out of pocket expenses for the treatment.⁶ To address such situations, the Government of India has taken measures like establishing the National Pharmaceutical Pricing Authority and drug price control order (DPCO). However, only a few drugs were included in DPCO. It was noted that the percentage rise in the price of drugs under DPCO was less than the drugs that are not under its purview.^{7,8} Drug price control order (DPCO) is an order issued by the government to fix prices of drug. Once medicine is brought under DPCO, it cannot be sold at a price higher than that fixed by the government. In India, in 1979, 80-85% of the drugs in the market was under price control. The number has slowly decreased and by 2002 only 15-20% drugs were under price control.⁹ The common man therefore has to shell out more money with medicine prices spinning out of his reach. This study was undertaken to compare the cost of drugs of the different brand of topical ophthalmic drugs.

METHODS

In this observational study, cost of particular topical eye preparations in the same dose and dosage forms being manufactured by different companies was compared using "Current Index of Medical Specialties" (CIMS) January-April 2019. The cost was expressed in Indian rupee (INR) per standard dose/concentration and quantity of each topical preparation. The cost variation among all the topical eye preparations mentioned in the CIMS January-April 2019 was recorded. The drugs manufactured by only one pharmaceutical company or by different pharmaceutical companies of different strengths were excluded. Drugs were categorized into anti-infective and antiseptics, topical corticosteroids, mydriatics, anti-glaucoma drugs, anti-inflammatory and lubricants. The cost information about each drug among various brands and number of manufacturing pharmaceutical companies was collected.

The difference between the maximum and minimum costs of the same drug manufactured by different pharmaceutical companies was calculated. The cost ratio

i.e. the ratio of the highest cost brand to lowest cost brand of the same generic topical eye preparations was calculated.

The following formula was used to calculate the percentage cost variation,

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

Statistical analysis

The data collected was entered in Microsoft excel 2007 and analysed for percentage cost variation and cost ratio of the individual drugs. The findings were expressed as absolute numbers as well as percentage.

RESULTS

The costs of a total of nineteen topical eye preparations available in twenty six different formulations were analysed and a substantial variation in cost was observed. Of the 26 drug formulations, 11 were anti-microbial, 2 were corticosteroids, 2 were mydriatics, 4 were anti-glaucoma drugs, 4 was anti-inflammatory and antiallergics and 3 were lubricants (Table 1).

Among anti-microbials, 12 brands were available for moxifloxacin 0.50% eye drops and 18 brands for ofloxacin 0.30% eye drops, and all other preparations were available in less than ten different brands. Which of the 26 drug formulations studied, the percentage cost variation of 10 drug formulations was more than 100%, out of which one formulation of moxifloxacin had more than 1000% variation. Cost ratio of 10 drug formulations were more than two. Moxifloxacin 0.5% eye drops had maximum percentage cost variation of 5610.66% and cost ratio of 57.11, followed by ofloxacin 0.30% eye drops (310.92%, 4.11), timolol 0.50% eye drops (263.64%, 3.64), ciprofloxacin 0.30% eye drops (142.42%, 2.42), tobramycin 0.30% eye drops (120.14%, 2.20). The Fixed Dose Combination (FDC) of tropicamide 0.8%+phenylephrine HCl 5% eye drops had minimum percentage cost variation of 42% and a cost ratio of 1.42. The cost ratio and percentage cost variation of other formulations are mentioned in Table 1.

Among anti-infectives and antiseptics, Moxifloxacin 0.5% eye drops, ofloxacin 0.30% eye drops, tobramycin 0.30% eye drops were having cost ratio of more than 2. Fluorometholone 0.10% eye drops in topical corticosteroid group, timolol 0.50% eye drops and latanoprost 50mcg/ml eye drops among anti glaucoma drugs were also having cost ratio of more than 2. The average percentage cost ratio of anti-infective drugs was 522.64%, followed by lubricants (134.31%), topical corticosteroids (96.84%), anti-glaucoma drugs (91.57%), anti-inflammatory (58.46%), and mydriatics (30.1%) (Table 1).

Table 1: Costs of topical eye preparations.

Drug	Dosage form	Dose (mg)	Cost range (INR)*	Cost ratio	Price variation
Anti-microbial drugs					
Acyclovir	Eye ointment	3%	37.04-55.5	1.50	49.84
Ciprofloxacin	Eye drops	0.30%	6.53-15.83	2.42	142.42
Chloramphenicol	Eye drops	0.5%	13.5-35.85	2.65	22.35
Gatifloxacin	Eye drops	3%	25.06-48.46	1.93	93.38
Gentamicin	Eye drops	0.30%	7.65-12.5	1.63	63.40
Levofloxacin	Eye drops	0.50%	19.75-37.8	1.91	91.39
Moxifloxacin	Eye drops	0.50%	39.4-2250	57.11	5610.66
	Eye ointment	0.50%	44.7-65	1.45	45.41
Natamycin	Eye drops	5%	76.3-85.87	1.13	12.54
Ofloxacin	Eye drops	0.30%	17.95-73.76	4.11	310.92
Sulphacetamide	Eye drops	10%	11-21	1.91	90.91
	Eye drops	20%	12-23	1.92	91.67
	Eye drops	30%	13.4-23	1.72	71.64
Tobramycin	Eye drops	0.30%	39.52-87	2.20	120.14
Topical corticosteroids					
Fluorometholone	Eye drops	0.10%	38.5-79	2.05	105.19
Ofloxacin + dexamethasone	Eye drops	0.3%+0.1%	10.08-19	1.88	88.49
Mydriatics					
Cyclopentolate	Eye drops	1%	19.99-29.7	1.49	48.57
Tropicamide+phenylephrine HCl	Eye drops	0.8%+5%	43-48	1.12	11.63
Anti-glaucoma drugs					
Brimonidine	Eye drops	0.20%	107.27-186.28	1.74	73.66
	Eye drops	0.15%	154-210.16	1.36	36.47
Latanoprost	Eye drops	50mcg/ml	199-401	2.02	101.51
Pilocarpine	Eye drops	2%	32.65-51.3	1.57	57.12
Timolol	Eye drops	0.25%	17-19.9	1.17	17.06
	Eye drops	0.50%	22-80	3.64	263.64
Anti-inflammatory and anti-allergic drugs					
Diclofenac	Eye drops	0.10%	15.1-20.97	1.39	38.87
Ketorolac	Eye drops	0.50%	28.5-46	1.61	61.40
Olopatadine	Eye drops	0.10%	62.2-77	1.24	23.79
Flurbiprofen	Eye drops	0.03%	20-35	1.75	75.00
Lubricants					
Povidone+polyvinyl alcohol	Eye drops	6%+1.4%	37.6-64	1.70	70.21
Carboxy methylcellulose	Eye drops	0.50%	60-88	1.47	46.67
Sodium carboxy methylcellulose	Eye drops	0.50%	70-195	2.79	178.57
	Eye drops	1%	122-417	3.42	241.80

DISCUSSION

In this country different brands of some of the commonly used drugs are available with huge price variations. It is a common practice in this country to prescribe costlier medicines without any proof of their superiority over the cheaper alternatives. Also, incentives offered by the pharmaceutical companies in the form of cash and kind is

an important reason for such irrational prescribing patterns. Medication compliance is more important in chronic eye disorders like glaucoma, chronic

conjunctivitis etc, and the cost of the prescribed drugs are one of the factors which decide drug compliance.^{10, 11} The present study showed a wide variation in the price of topical eye preparations across the different brands available in the Indian market. Similar study done by Chandrappa S et al. showed wide cost variation in the price of topical eye preparations.¹² The cost variation study done on antiglaucoma drugs by Jadhao T et al, also showed wide variation in cost of latanoprost eye drops.¹³ Health insurance in India principally covers hospitalization and not out-patient or domiciliary care. Out-patient healthcare spending in India has augmented by almost fifty percent in the last 10 years. Most of the topical eye preparations are

prescribed on an out-patient basis. It increases “out of pocket spending” from patients and this may affect drug compliance and add to the cost of the drug making it difficult to reach a broad fraction of the population.¹⁴ According to prescribing pattern studies, prescribing with the brand name is more prevalent. Prescribing by generic names gives flexibility to the patient in choosing the brand which they can afford since generic drugs are in no way inferior to the costlier branded counterpart.¹⁵ Therefore, awareness should be created among the health care professionals regarding cost variation and its related consequences. The Drug Price Control Order (DPCO) has to take more drugs into consideration for price control. The limitation of the study is that sources of information were limited to CIMS but there are few other brands which are marketed in India but not published in the above-mentioned source.

CONCLUSION

There is a significant variation in the price of various topical eye preparations. As most of the preparations being prescribed on an out-patient basis, which was not covered under most of the insurance program. Out of pocket expenditure adversely affects the drug compliance in the long run. There should be a comprehensive action from policymakers, regulatory authorities, government agencies, doctors, pharmacists, and the general public to solve this issue of cost variation of drugs. Ultimately, the goal of eye care providers is to give the best, most cost-effective care to their patients taking into consideration efficacy, tolerability, medication response, compliance, and dosing regimens along with the cost of medication. The appraisal and management of marketing drugs should be directed toward maximizing the benefits of therapy and minimizing negative personal and economic consequences.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Das SC, Mandal M, Mandal SC. A critical study on availability and price variation between different brands: Impact on access to medicines. *Ind J Pharm Sci.* 2007;69(1):160-3.
2. Patel D, Thiyagu R, Surulivelrajan M, Patel H, Pandey S. Price variability among the oral antibiotics available in a South Indian Tertiary Care Hospital. *J Clin Diagn Res.* 2009;3(6):1871-5.
3. Shankar PR, Subish P, Mishra P, Lalit M. Ambiguous pricing of Nepalese medicines. *J Inst Med.* 2006;28(3):35-8.
4. Nagaich U. Recent advances in ocular drug delivery system. *J Adv Pharm Technol Res.* 2014;5(4):151.
5. Rawas-Qalaji M, Williams CA. Advances in ocular drug delivery. *Curr Eye Res.* 2012;37(5):345-56.
6. Mehani R, Sharma P. Cost variation analysis of oral anti-diabetic drugs. *Int J Basic Clin Pharmacol.* 2018 Sep;7(9):1709-14.
7. Kumar V, Gupta NV, Kumar KA. A comparison between old and latest systems in DPCO. *Int J Pharm Pharmaceut Sci.* 2014;6(2):19-20.
8. Compendium of notified ceiling prices of scheduled drugs- NPPA; 2015. Available at: http://www.nppaindia.nic.in/ceiling_price. Accessed 12 Aug 2018.
9. Jana S, Mondal P. Pharmacoeconomics: The need to sensitize undergraduate medical students. *Indian Pharmacol.* 2005;37(5):277-8.
10. Muir KW, Lee PP. Glaucoma Medication Adherence: Room for Improvement in Both Performance and Measurement. *Arch Ophthalmol.* 2011;129(2):243-5.
11. Brown MT, Bussell JK. Medication Adherence: WHO Cares? *Mayo Clin Proc.* 2011;86(4):304-14.
12. Chandrappa S, Rajarathna K. Cost variation analysis of various brands of topical eye preparations currently available in Indian pharmaceutical market. *Int J Basic Clin Pharmacol.* 2018;7:2364-7.
13. Jadhao T, Advani M, Jamdade S. Cost variation analysis of antiglaucoma drugs available in Indian market. *Paripex Ind J Res.* 2018 Feb 14;6(2).
14. Sohn HS, Kwon J, Park E. Out-of-Pocket (OOP) Expenditure for Prescription Drugs among South Korean Outpatients under the National Health Insurance System: Focus on Chronic Diseases Including Diabetes. *J Diabetes Metab.* 2012;3(5):197.
15. Tiwari A, Reddy P, Goyal C. Cost analysis of antifungal drugs available in India: A pharmacoeconomic perspective. *Indian J Pharmacy Pharmacol.* 2016;3(4):192-6.

Cite this article as: Agrawal S, Arya N, Agrawal M. Cost analysis of various topical eye preparations currently available in Indian market. *Int J Basic Clin Pharmacol* 2019;8:1754-7.