

**Cost analysis of antiretroviral agents available in India****Sagar S. Panchal<sup>1\*</sup>, Prasad R. Pandit<sup>1</sup>, Abhishek M. Phatak<sup>1</sup>, Komal M. Lohi<sup>2</sup>**<sup>1</sup>Department of Pharmacology, Topiwala National Medical College and B. Y. L. Nair Charitable Hospital, Mumbai, Maharashtra, India,<sup>2</sup>Department of Microbiology, Lokmanya Tilak Municipal Medical College & Sion Hospital, Sion, Mumbai, Maharashtra, India**Received:** 01 April 2015**Accepted:** 24 April 2015**\*Correspondence to:**Dr. Sagar S. Panchal,  
Email: dr.sspanchal@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:** AIDS is one of the most prevalent causes of death due to infectious origin which requires a lifelong therapy. There is variation in prices of antiretroviral drugs available in Indian market. Thus, a study was planned to find out variation in prices of antiretroviral drugs either as a single drug or in combination and to evaluate the difference in cost of various brands of the same antiretroviral drugs by calculating percentage variation in cost in Indian rupees.**Methods:** Cost of antiretroviral drugs manufactured by different pharmaceutical companies, in the same strength and dosage forms was obtained from "Current Index of Medical Specialties" July-October 2014 and "Indian Drug Review" Vol. XXI, Issue No. 4, 2014. The difference in the maximum and minimum price of the same drug manufactured by different pharmaceutical companies and percentage variation in cost was calculated.**Results:** Percentage variation in cost for antiretroviral drugs marketed in India was found to be zidovudine (100 mg) - 436%, lamivudine (100 mg) - 268%, tenofovir (300 mg) - 149.5%, didanosine (250 mg) - 73.75%, indinavir (400 mg) - 35.26%. Among the combination therapy, price variation was lamivudine + zidovudine (150 + 300 mg) - 314%, lamivudine + stavudine (150 + 40 mg) - 105%, lopinavir + ritonavir (133.3 + 33 mg) - 25%.**Conclusion:** There is wide variation in the prices of antiretroviral agents available in the market. Regulatory authorities, pharma companies, physicians should maximize their efforts to reduce the cost of drugs.**Keywords:** Human immunodeficiency virus, National pharmaceutical pricing authority, Antiretroviral therapy, Drug price control order, Pharma industry**INTRODUCTION**

Cost of a therapy is a major concern to both physician and patient in a developing and a resource poor country like India, which also affects compliance with therapy.<sup>1</sup> Indian pharma industry is growing at a tremendous pace, at present globally ranked 4<sup>th</sup> by volume and 13<sup>th</sup> in value.<sup>2</sup> Still 60% of the population does not have access to medicines. Most health care is provided by the private sector, which often causes high out-of-pocket health expenditure that leads to debt and impoverishment.<sup>3</sup>

AIDS is a disease caused by a human immunodeficiency virus (HIV) and characterized by profound immunosuppression that leads to opportunistic infections, secondary neoplasms,

and neurologic complications. According to WHO 2013 report, currently there are 35 million people affected by AIDS worldwide.<sup>4</sup> India has the third highest number of estimated people living with HIV in the world. According to the HIV estimations 2012, the estimated number of people living with HIV/AIDS in India was 20.89 lakh, with an estimated adult (15-49 age group) HIV prevalence of 0.27% in 2011.<sup>5</sup>

AIDS being an incurable disease and requiring lifelong therapy is associated with significant and long-lasting health, social and financial burdens, not only for patients but also for their families and other caregivers. Even today, despite advances in our scientific understanding of HIV and its prevention and treatment as well as years of significant effort by the global health community and leading government and

civil society organizations, most people living with HIV or at risk for HIV do not have access to prevention, care, and treatment.

The Indian health sector has been affected by economic liberalization, structural adjustment reforms by the World Bank and increasing cost of production of pharmaceuticals. Increasing cost of medicines may be a reason for people not accessing health care.<sup>6</sup> Ignorance and insufficient knowledge of antiretroviral drug prices, makes it difficult for the physician to decide and prescribe most economical treatment regime. Hence, the study was designed to evaluate the cost of antiretroviral drugs of different generic classes and different brand names and to analyze price variation among various antiretroviral drugs available in Indian market.

## METHODS

1. Price in Indian rupees of antiretroviral drugs manufactured by different pharmaceutical companies in India, in the same strength was obtained from "Current Index of Medical Specialties (CIMS)" July-October 2014 and "Indian Drug Review" Vol. XXI, Issue No.4, 2014
2. The drug formulation being manufactured by only one company or being manufactured by different companies; however, in different strengths were excluded
3. Cost of the antiretroviral drug formulation was calculated for an average of 10 tablets as the number of tablets available per strip varied
4. Difference in the maximum and minimum price of the same drug formulation manufactured by different pharmaceutical companies and percentage variation in price was calculated
5. Percentage cost variation was calculated as follows:

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

## RESULTS

The prices of 20 antiretroviral drugs (10 single and 10 combinations) available in different formulations were analyzed.

Table 1 shows variation in cost of antiretroviral drugs used as a single drug therapy. Percentage variation in cost was found to be zidovudine (100 mg) - 436%, lamivudine (100 mg) - 268%, tenofovir (300 mg) - 149.3%, nelfinavir (250 mg) - 71%, abacavir (300 mg) - 66.80%, nevirapine (200 mg) - 43.4%.

Table 2 shows variation in the cost of antiretroviral drugs used in combinations. Percentage variation in cost was found to be:

Lamivudine (150 mg) + zidovudine (300 mg) - 314%  
Lamivudine (150 mg) + stavudine (40 mg) - 105%

## DISCUSSION

To the best of our knowledge, this analysis is the first economic evaluation assessing price variation among various antiretroviral drugs in the Indian market. Our study found that there is a large variation among antiretroviral drugs available with maximum variation in zidovudine and minimum with efavirenz.

In India, more than one pharmaceutical company sells a particular drug under different brand names along with the company that has patent. Hence, a large number of formulations for the same drug are available at different prices. The Indian market has over 100,000 formulations and there is no system of registration of medicines.<sup>6</sup> Drugs are mainly sold under brand names.<sup>7</sup> Several studies in the western world found drug prices to be high and that price discrimination occurred across the industry. However, very few studies are available in our scenarios which compare the cost of drugs of different brands. Therefore, we decided to carry out the study, which compares the cost of different brands of drug. The drug prices available in CIMS and Indian Drug Review were compared as they are one of the available sources of drug information which are updated on a regular basis.

It is observed from our results that there is a wide (up to 436%) variation in prices of drugs manufactured by different pharmaceutical companies. The reasons for this price variation could be as follows:<sup>8-14</sup>

1. Increase in competition among pharma companies
2. Asymmetry of information or imperfect information
3. Existing market structure of the pharmaceutical industry
4. Marketing/advertising costs
5. Government regulations and pricing policies.

Drug price control order (DPCO) is an order issued by the Indian government to fix prices of drugs. Once any medicine is brought under purview of DPCO, it cannot be dispensed at a price higher than that fixed by the government. In India, over the years, number of the drugs under DPCO has decreased. Due to this, cost of therapy has increased tremendously and has put an economic burden on the poor population of India.

National Pharmaceutical Pricing Authority recently introduced some amendments revising the prices of 418 drugs in April 2014. Among the antiretrovirals only zidovudine, lamivudine, stavudine, nevirapine, ritonavir, indinavir have been included in the new list of essential medicines while many other newer and more effective antiretroviral drugs are not included in this list.<sup>15,16</sup>

In India, most of the people are not covered under medical insurance, so they have to pay for drugs out of pocket which is difficult for patients belonging to lower socio-economic strata. Generally, physician does not take into consideration the financial background of the patient before prescribing; it

**Table 1: Variation in cost of single drug therapy.**

Drug	Dose (mg)	Number of manufacturing companies	Minimum cost (INR)	Maximum cost (INR)	% variation in cost
Zidovudine	100	2	100	536	436
	300	3	153	215	40.6
Lamivudine	100	7	76	280	268
	150	5	85	230	170
Tenofovir	300	2	400	997	149.3
Didanosine	250	3	240	417	73.75
	400	3	390	650	66.66
Efavirenz	200	2	270	275	2
	600	3	690	774	12.2
Indinavir	400	3	190	257	35.26
Abacavir	300	2	470	784	66.80
Nelfinavir	250	2	234	400	71
Nevirapine	200	4	136	195	43.4
Ritonavir	100	2	275	300	9.1

INR: Indian rupees

**Table 2: Variation in cost of combination drug therapy.**

Combination	Dose (mg)	Number of manufacturing companies	Minimum cost (INR)	Maximum cost (INR)	% variation in cost
Lamivudine+zidovudine	150+300	6	198	820	314
Lopinavir+ritonavir	133.3+33.3	2	400	500	25
Lamivudine+zidovudine+nevirapine	150+300+200	3	225	240	6.7
Efavirenz+zidovudine+lamivudine	600+300+300	2	1080	1100	1.8
Stavudine+efavirenz+lamivudine	30+600+150	2	940	950	1.1
Lamivudine+stavudine	150+30	3	109	115	5.5
Lamivudine+stavudine	150+40	4	114	240	105
Nevirapine+lamivudine+stavudine	200+150+30	3	215	230	7
Nevirapine+lamivudine+stavudine	200+150+40	3	222	240	8.1
Didanosine+efavirenz+lamivudine	250+60+300	2	1110	1260	13.51

INR: Indian rupees

also leads to poor compliance because of non-affordability of medicines.

In the absence of information on comparative drug prices and quality, it is difficult for doctors to prescribe the most economical prescription.<sup>17</sup>

It is felt that physicians could provide better services and reduce costs of drugs if information about drug prices were readily available.<sup>17</sup> Studies have shown that providing a manual of comparative drug prices annotated with prescribing advice to physicians reduced their patient's drug expense.<sup>17</sup>

At present, only a few drugs are under DPCO price control, more and more of essential drugs need to be brought under DPCO to prevent economic implications of cost variation.

There is a need for concerted action from government agencies, policy makers, regulatory authorities, doctors, pharmacists, and general public to solve this issue of drugs price variation. The situation can be improved by incorporating an analysis of prescription costs in the medical curriculum and by providing updated and complete information regarding bioequivalence, quality and cost of the pharmaceutical preparation to the doctors. Wherever possible, a cheaper brand should be prescribed because the superiority of any particular brand over the others has never been proved scientifically.

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## REFERENCES

1. Kuruvilla A, George K, Rajaratnam A, John KR. Prescription patterns and cost analysis of drugs in a base hospital in south India. *Natl Med J India.* 1994;7(4):167-8.
2. Sundaram VM. Pharma industry in India. *Drug News Perspect.* 2008;21(1):59-63.
3. Patel V, Chatterji S, Chisholm D, Ebrahim S, Gopalakrishna G, Mathers C, et al. Chronic diseases and injuries in India, India. *Lancet.* 2011;377:413-28.
4. Available at [http://www.who.int/hiv/data/epi\\_core\\_dec2014](http://www.who.int/hiv/data/epi_core_dec2014). Accessed 25 March 2015.
5. Available at [http://www.naco.gov.in/upload/2014%20mslns/NACO\\_English%202013-14.pdf](http://www.naco.gov.in/upload/2014%20mslns/NACO_English%202013-14.pdf). Accessed 01 January 2015.
6. Shankar PR, Subish P, Bhandari RB, Mishra P, Saha AC. Ambiguous pricing of topical dermatological products: a survey of brands from two South Asian countries. *J Pak Assoc Dermatol.* 2006;16:134-40.
7. Monaghan MJ, Monaghan MS. Do market components account for higher US prescription prices? *Ann Pharmacother.* 1996;30(12):1489-94.
8. Sarkar PK. A rational drug policy. *Indian J Med Ethics.* 2004;12:30-5.
9. Roy V, Rewari S. Ambiguous drug pricing: a physician's dilemma. *Indian J Pharmacol.* 1998;30:404-7.
10. Wertheimer AI, Grumer SK. Overview of international pharmacy pricing. *Pharmacoeconomics.* 1992;2(6):449-55.
11. Berki SE, Richards JW, Weeks HA. The mysteries of prescription pricing in retail pharmacies. *Med Care.* 1977;15(3):241-50.
12. Rataboli PV, Dang A. Antimicrobial price variation: conundrum of medical profession! *J Postgrad Med.* 2007;53(1):72-4.
13. Das SC, Mandal M, Mandal SC. A critical study on availability and price variation between different brands: impact on access to medicines. *Indian J Pharm Sci.* 2007;69(1):160-3.
14. Dawadi S, Rao BS, Khan GM. Pattern of antimicrobial prescription and its cost analysis in respiratory tract infection. *Kathmandu Univ J Sci Eng Technol.* 2005;1(1):1-9.
15. National Pharmaceutical Pricing Authority, Government of India, current price list. Available at <http://www.nppaindia.nic.in/ceiling/press28april14/so1156e-28-4-14.html>. Accessed 28 March 2015.
16. National List of Essential Medicines of India. Available at <http://www.mohfw.nic.in/WriteReadData/1892s/7364497513National%20List%20of%20Essential%20Medicine,%202011.pdf>. Accessed 28 March 2015.
17. Frazier LM, Brown JT, Divine GW, Fleming GR, Philips NM, Siegal WC, et al. Can physician education lower the cost of prescription drugs? A prospective, controlled trial. *Ann Intern Med.* 1991;115(2):116-21.

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