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RESEARCH ARTICLE

Analysis of pricing of oral antiviral drug formulations available in Indian market

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ABSTRACT

Background: Price of drug is highly variable in Indian market and it is a serious issue for people belonging to lower economic status in India. Manufacturing of single drug under different brand names by various pharmaceutical companies and sold under different price. Thus, a study was conducted to evaluate the variation in prices of antiviral drugs in Indian rupees. **Aims and Objectives:** Analysis of the price variation of the antiviral drugs of various brands available in Indian market. **Materials and Methods:** Price of a particular drug in the same strength and dosage forms being manufactured by different companies was obtained from "Current Index of Medical Specialties" October 2016–January 2017. Maximum and minimum price of antiviral drugs manufactured by different pharmaceutical companies and percentage variation in price were calculated. **Results:** Overall, the prices of 14 single and eight fixed-dose combinations (FDCs) of antiviral drugs available in different formulations were analyzed. Among antiretroviral drugs, percentage price variation in Indian market was found to be maximum for zidovudine (100 mg capsule) 763% followed by lamivudine (100 mg tablet) - 361% and didanosine (400 mg tablet) - 69%. Among anti-herpes drugs, it was acyclovir (200 mg tablet) 161%. Among FDCs maximum price variation found to be lamivudine + zidovudine (300 + 300 mg) tablet 290% followed by lopinavir + ritonavir (150 + 300 mg) tablet 24.58% and nevirapine + lamivudine + stavudine (200 + 150 + 30 mg) tablet 21.18%. **Conclusion:** There is a wide variation in the prices of oral antiviral drugs available in Indian market. Physician should consider the cost while prescribing antiviral drugs. To minimizing the economic burden to the patients, the physicians, regulatory authorities, and Pharma companies should maximize their efforts to reduce the cost of drugs.

KEY WORDS: Antiviral therapy; Price variation; Pharmaceuticals; Pharmacoeconomics

INTRODUCTION

Viral infectious diseases such as lower respiratory tract infections are the deadliest communicable disease which causes significant mortality and morbidity in humans. Both antiviral drugs and vaccines have been employed to combat viral infectious diseases. Emerging and reemerging viruses with resistant form such as Ebola and Zika virus are one of the threats of viral infections.[1] History of antiviral therapy started in 1977, acyclovir which was the first, and still, the gold standard antiviral drug was found to inhibit DNA replication of herpes simplex virus. Around 90 antiviral drugs have been approved to treat these viral infectious diseases and many antiviral drugs are being evaluated in clinical trials.[2]

The field of antiviral therapy both the number of antiviral drugs and our understanding of their optimal use historically has lagged behind that of antibacterial treatment, but

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Table 1: Price variation of single antiviral drug therapy

Drug	Dose (mg)	Dosage form	Minimum price	Maximum price	% of price variation	Price difference
Acyclovir	200	Dis-tab	57.40	84.63	47.60	27.23
	400	Dis-tab	122.22	135	10.45	12.78
	800	Dis-tab	199	292	46.73	93
Acyclovir	200	Tablet	30.70	80	160.50	49.30
	400	Tablet	131.40	156.60	19.17	25.20
	800	Tablet	253	323.40	27.82	70.40
Ribavirin	200	Capsule	820	861.25	5.03	41.25
Abacavir	300	Fc-tab	470	481.50	2.44	11.50
Didanosine	250	Capsule	246.10	416.66	69.30	170.56
	400	Capsule	395.66	650	64.28	254.33
Efavirenz	200	Capsule	243.18	270	11.02	26.82
	600	Tablet	690	774	12.17	84
Famciclovir	250	Tablet	296.33	431.66	45.66	135.33
	500	Tablet	592.66	803.33	35.54	210.66
	250	Fc-tab	298.33	392	31.39	93.66
	500	Fc-tab	596.66	686.66	15.08	90
Indinavir	400	Capsule	180	200	11.11	20
Lamivudine	100	Tablet	76	350	360.52	274
	150	Tablet	85	117.50	38.24	32.50
Nelfinavir	250	Tablet	240	256.80	7	16.80
Stavudine	30	Capsule	28.88	34.98	21.13	6.103
	40	Capsule	32.76	38.86	18.62	6.10
Zidovudine	100	Capsule	62	535.24	763.29	473.24
	300	Tablet	153	164.30	7.39	11.30
Saquinavir	500	Fc-tab	500	535	7	35
Oseltamivir	75	Capsule	449	475	5.79	26

Dis-tab: Dispensable tablet, Fc-tab: Film-coated tablet

significant progress has been made in recent years on new drugs for several viral infections.[3] The development of antiviral drugs possesses several challenges. In developing countries, expenditure on medicines accounts for major health cost. The access to treatment is dependent on the availability of affordable medicines.[4]

A large number of generic drugs and branded formulations of same drug available in Indian market and Indian pharmaceutical industries are one of the largest pharmaceuticals in the world. Due to variation in drug cost that creates problems to the prescribing physician as well as to the patient.[5] Ignorance and insufficient information on drug costs, quality and bioequivalence, and wide variation in the costs of the same drug makes it difficult for the physician to prescribe the most cost-effective treatment.[6]

Limited studies are available in the Indian scenario regarding price variation analysis of antiviral drugs. The present study was aimed at investigating the variation in price of various brands of same generic antiviral drugs available in Indian market.

Objectives of Study

The objective of this study was to analyze the price variation of antiviral drugs of various brands available in Indian market.

MATERIALS AND METHODS

Price of oral antiviral drugs manufactured by different pharmaceutical companies in India (Price per 10 tablets/capsules), in the same strength, was obtained from "Current Index of Medical Specialties (CIMS)" October 2016–January 2017.[7] The antiviral drugs manufactured by single company or by different companies in different strengths were excluded. Price of the antiviral drug formulation was calculated for an average of 10 tablets/capsules. Difference in maximum and minimum price of the same drug manufactured by different pharmaceutical companies and percentage price variation was calculated. Percentage price variation was calculated as follows:

% Price variation = [Maximum price−Minimum price ×100]/Minimum price

Price difference = Maximum price−Minimum price

Table 2: Price variation of FDC therapy

Drug combinations	Dose (mg)	Dosage form	Minimum price	Maximum price	% of price variation	Price difference
Tenofovir+emtricitabine+efavirenz	300+200+200	Fc-tab	1266.60	1300	2.68	34
Lamivudine+zidovudine	300+300	Tablet	210	820	290.47	610
Lopinavir+ritonavir	150+300	Tablet	200	249.16	24.58	49.16
Lamivudine+stavudine	150+30	Tablet	115	116.63	1.41	1.63
	150+40	Tablet	115	125	8.69	10
Lopinavir+ritonavir	200+50	Fc-tab	483.33	500	3.44	16.67
Nevirapine+lamivudine+stavudine	50+30+6	Dis-tab	68.65	70	1.96	1.35
	100+60+12	Dis-tab	124.83	126.66	1.46	1.83
Nevirapine+lamivudine+stavudine	200+150+30	Tablet	181.54	220	21.18	38.46
	200+150+40	Tablet	227.91	240	5.30	12.09
Lamivudine+zidovudine+nevirapine	150+300+200	Tablet	230	238.33	3.62	8.33
Atazanavir+ritonavir	300+100	Tablet	1000	1066.66	6.66	66.66

Dis-tab: Dispensable tablet, Fc-tab: Film-coated tablet, FDCs: Fixed-dose combinations

Statistical Analysis

The collected data were entered into Microsoft Excel 2007 and analyzed for percentage price variation and price difference of the individual drugs. The findings were expressed in numbers and percentages.

RESULTS

The prices of 14 single and eight fixed-dose combinations (FDCs) of antiviral drugs available in different formulations from "CIMS" October 2016–January 2017 were analyzed.

Table 1 shows price variation of antiviral drugs used as a single drug therapy. Among antiretroviral drugs, maximum percentage variation in price found to be zidovudine (100 mg) 763% followed by lamivudine (100 mg tablet) - 361% and didanosine (400 mg tablet) - 69%. Among anti-herpes drugs, maximum percentage price variation found to be acyclovir (200 mg tablet) - 161%.

Table 2 shows price variation of antiviral drugs used in FDCs. Maximum percentage variation in price found to be lamivudine + zidovudine (300 + 300 mg) tablet 290% followed by lopinavir + ritonavir (150 + 300 mg) tablet 24.58% and nevirapine + lamivudine + stavudine (200 + 150 + 30 mg) tablet 21.18%.

DISCUSSION

The present study calculated the percentage price variations among different antiviral drugs with different brands using CIMS from October 2016 to January 2017.

Our study showed a wide variation in the price of antiviral drugs used as both single drug therapy and FDCs which are being manufactured by different companies with the different brands.

In a cost variation, the study was done only on antiretroviral drugs by Panchal *et al*.[8] showed wide variation in cost and zidovudine (100 mg) showed maximum variation among monotherapy and lamivudine + zidovudine (150 + 300 mg) in combination therapy which is in consistent with the findings of the present study.

It is evident from the present study that there is a wide discrepancy in the price of antiviral drugs in the Indian market. In a country like India, patients have to pay money for their medical bills which are not covered by the insurance companies/schemes, if costly drugs are prescribed to the patients, it leads to unnecessary economic burden to patients.[9,10]

Possible reasons for this could be due to unawareness of the physician regarding wide cost variation and companies offering incentives to the physician for prescribing a particular brand, and even pharmacist does not dispense the same brand as prescribed by the physician and substitute it with some other brand and reasoning as non-availability. This is done for the higher profit margin and economic gains with some brands.[11] Inadequate government regulation and pricing policies, raw material cost, promotion and distribution cost, existing market structure, and asymmetry of information could also be the possible reasons.[12]

Government issued an order called drug price control order (DPCO) to fix prices of drug which cannot be sold at a price higher than that fixed by the government. Hence, there is a need for government to bring all lifesaving and essential medicines under DPCO.[13]

Pharmacoeconomics analysis helps in therapeutic decision-making, formulary decision-making, program justification, drug policy decisions, and treatment guidelines ultimately benefitting the society in terms of availability of the affordable drugs and reduction in health-care expenses.[14]

In India, a particular drug is sold under different brand names by different pharmaceutical companies along with their innovator company. Hence, for a particular drug, a large number of formulations are available at different prices. Higher medication costs are an important factor for medication non-adherence.[15]

Therefore, there is a need for coordinated action from pharmaceutical companies, physicians, pharmacists, regulatory authorities, as well as general public at large to address the problem of huge variation in the cost of the drugs.[14]

The limitation of the study is that sources of information were limited to CIMS, but other brands of antiviral drugs which are marketed in India were not included in this study.

CONCLUSION

Oral antiviral drugs showed a wide variation in prices available in Indian market. Physician should consider the price while prescribing antiviral drugs. Regulatory authorities, pharmaceutics, and physicians should maximize their efforts to reduce the price of drugs and thereby minimizing the economic burden to the patients.

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