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Original Research Article

Cost variation analysis of oral anti-diabetic agents available in Indian market

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ABSTRACT

Background: The objective of this study was to analyze cost variations of oral antidiabetic drugs available in Indian market

Methods: An observational study was carried out using CIMS (current index of medical specialities), (July 2020 to October 2020) and 1 mg.com, where difference in the maximum and minimum price of a particular drug, manufactured by different pharmaceutical companies, in the same strength, number and dosage form was compared and the percentage variation in price was calculated. Data was analyzed using descriptive statistical analysis.

Results: The minimum and maximum percentage price variation for different classes of drugs respectively is as follows- in single drug therapy, the price variation between a sulfonylurea group of drugs glibenclamide (5 mg) shows maximum price variation of 400%, while glipizide (2.5 mg) shows variation of 81.8%. In biguanides, thizolidinediones and DPP4 inhibitor groups of drugs, metformin (500 mg), pioglitazone (30 mg) and vildagliptin show maximum price variation of 334.78%, 307 % and 264.6% respectively. In α - glucosidases inhibitor group of drugs voglibose (0.2 mg) shows maximum price variation of 284%. In meglitinides group of drugs, nateglinide (60 mg) shows maximum price variation of 284.6 %. In combination drug therapy, glimepiride and metformin combination (2+500 mg SR) shows the maximum variation up to 352.8%.

Conclusions: The percentage cost variation of different brands of the same drug manufactured in India is very wide and the reason behind marketing a drug should be directed towards maximizing the benefit of therapy and minimizing negative personal and economic consequences.

Keywords: Price variation, Oral anti diabetic drugs, Cost variation, Cost ratio, Diabetes mellitus

INTRODUCTION

Diabetes is a chronic metabolic disorder associated with significant morbidity and mortality affecting almost 6.2% of world population.¹

Diabetes mellitus is reaching possibly epidemic proportions in India. India had 69.2 million people living with diabetes (8.7%) as per the 2015 data-an increase of over 10 million from 2011 when estimates suggested that about 50.8 million people in the country were suffering

from the disease. By the year 2030, over 100 million people in India are likely to suffer from diabetes.^{2,3}

Type 2 diabetes is a disease marked by high levels of blood glucose due to insufficient insulin synthesis and release. Type 2 diabetes accounts for approximately 90% to 95% of all diagnosed cases of diabetes.⁴

It is accompanied with abnormal carbohydrate, protein and lipid metabolism. Diabetes if uncontrolled can lead to several acute and chronic complications.^{5,6}

Type 2 diabetes mellitus requires lifelong treatment. In case of absence of appropriate treatment, it can lead to microvascular and macrovascular complications. These can affect the longevity as well as the quality of life.⁷

For successful treatment, appropriate drug regime with regular follow up and the proper compliance to the treatment play an important role. For the treatment of a condition which requires lifelong treatment, various factors can affect the compliance. 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. It is a chronic disorder which needs lifelong treatment. Cost association is very large with treatment of diabetes. Type 1 diabetes mellitus is to be treated with insulin whereas in Type 2 diabetes, oral anti diabetic dugs are used. Drug should be selected on the basis of its efficacy, major side effects and also on patients' clinical characteristics like body mass index (BMI), presence of other disease, financial background/socioeconomic status.

There are over 20,000 drug formulations are available in Indian market with different brand names. Sometimes it is difficult for physician to select appropriate drug because of unavailability of information on comparative drug prices.

Indian pharmaceuticals market is the third largest market in terms of volume and thirteenth largest market in terms of value. Indian pharmaceuticals market is dominated by branded generics which constitutes about 70 to 80 percent of the market. 8.9 India being the largest provider of generic drugs globally accounts for 20 percent of global exports in terms of volume. The focus of this study was at comparing and analyzing the costs of various brands of the same generic oral anti diabetic drugs, so that authors can study

their cost variations. Awareness of the cost variations among oral anti diabetic drugs can be applied to ensure more economical treatment regimen to improve the treatment adherence and the rate of success of therapy.

Aim

The aim of the study was to evaluate the cost of oral antidiabetics of different brand names of one compound and the difference in cost of different brands of the same active drug by calculating percentage variation of cost.

Objectives

The objective of this pharmacoeconomic study wass designed with the main objectives of- (a) to find different anti-diabetics available either singly or in combination and the number of the brands available for each; (b) to evaluate the cost of oral anti-diabetics of different generic classes and different brand names of one compound; and (c) to evaluate the difference in cost of different brands of the same active drug by calculating percentage variation of cost.

METHODS

The study was undertaken in the department of pharmacology at NSCB medical college Jabalpur Madhya Pradesh.

Analysis of data was done using CIMS- current index of medical specialities' (July-October 2020) and 1 mg.com, they were reviewed for the prices of different oral hypoglycaemic drugs used in the management of diabetes mellitus. (a) The maximum retail price of a particular drug being manufactured by different companies, in the same strength, number and dosage form was compared. (b) The difference in the maximum and minimum price of the same drug manufactured by different pharmaceutical companies was calculated. (c) The percentage variation in price was calculated.

The percentage variation in price was calculated using the following formula,

 $Percentage\ cost\ variation = \frac{(Price\ of\ most\ expensive\ brand-Price\ of\ least\ expensive\ brand)}{Price\ of\ least\ expensive\ brand} \times 100$

RESULTS

The prices on a total of 20 drugs (12 single and 8 combination preparations), available in 45 different formulations were analyzed.

These 45 formulations are manufactured by different pharmaceutical companies.

Single drug therapy

In single drug therapy, Table 1 shows the price variation between a sulfonylurea group of drugs. In this group, glibenclamide (5 mg) shows maximum price variation of 400%, while glipizide (2.5 mg) shows variation of 81.8%. Table 2 shows price variation in biguanides, thizolidinediones and DPP4 Inhibitor groups of drugs. In these groups, metformin (500 mg), pioglitazone (30 mg) and vildagliptin show maximum price variation of 334.78%, 307% and 264.6% respectively.

Table 1: Cost variation among sulfonylureas.

Drug	Formulation	Strength in mg	Least expensive price (INR)	Most expensive price (INR)	Cost ratio	Cost variation (%)	No. of brands
Glibenclamide	Tab	2.5	4.75	10	2.1	110.5	6
Gilbenciannue	Tab	5	8	40	5	400	5
	Tab	40	17.5	50	2.8	185.7	9
Gliclazide	Tab	80	30	83	2 .7	176.67	14
	SR	30	31	69	2.2	122.5	05
	SR	60	52	125	2.4	140.38	06
	Tab	1	15	39.31	2.6	162.06	43
Glimepiride	Tab	2	23	81	3.5	152.17	44
	Tab	4	40	172	4.3	330	11
Glipizide	Tab	2.5	2.75	5	1.8	81.8	02
	Tab	5	4.55	11	2.4	141.75	06
	Tab	10	10.36	22	2.1	112.35	02

Tab- tablet, SR- sustained release

Table 2: Cost variation among biguanides, thiazolidinediones and DPP-4 inhibitors.

Drug	Formulation	Strength in mg	Least expensive price (INR)	Most expensive price (INR)	Cost ratio	Cost variation (%)	No. of brands
Metformin	Tab	500	6.9	30	4.3	334.78	31
	SR	500	12.59	31.26	2.48	149	18
	SR	1000	24	59.91	2.5	149.6	11
Pioglitazone	Tab	15	19	53	2.79	178.9	12
	Tab	30	20.51	83.48	4.07	307	12
Teneligliptin	Tab	20	55	139	2.75	152.7	18
Vildagliptin	Tab	50	82	299	3.6	264.6	8

Tab- tablet, SR- sustained release

Table 3: Cost variation among α-glucosidases inhibitor.

Drug	Formulation	Strength in mg	Least expensive price (INR)	Most expensive price (INR)	Cost ratio	Cost variation (%)	No. of brands
Voglibose	Tab	0.2	21	85.69	3.8	284	26
	Tab	0.3	29.5	135	3.7	272	27
Acarbose	Tab	25	47.25	79	1.59	60	5
	Tab	50	90	128	1.56	56	6

Tab- tablet, SR- sustained release

Table 4: Cost variation among meglitinides.

Drug	Formulation	Strength in mg	Least expensive price (INR)	Most expensive price (INR)	Cost ratio	Cost variation (%)	No. of brands
Nateglinide	Tab	60	19.5	75	3.8	284 .6	31
	Tab	120	29.5	110	3.7	272 .9	29
Repaglinide	Tab	0.5	22	75	3.4	241	10
	Tab	1	44	145	3.3	230	10
	Tab	2	78	231.65	3	197	6

Tab- tablet

Table 3 shows the price variation between α - glucosidases inhibitor group of drugs. In this group, voglibose (0.2 mg) shows maximum price variation of 284%.

Table 4 shows the price variation between meglitinides group of drugs. In this group, nateglinide (60 mg) shows maximum price variation of 284.6%.

Combination therapy

In combination therapy, total 8 combination preparations were analyzed.

Table 5 shows price variation in combination drug therapy. In this, glimepiride & metformin combination (2+500 mg SR) shows the maximum variation up to 352.8%.

Table 5: Cost variation among fixed dose combinations.

Drug	Formulation	Strength in mg	Least expensive price (INR)	Most expensive price (INR)	Cost ratio	Cost variation (%)
Glibenclamide+metformin	Tab	5+500	16	51	3.2	218.75
Gliclazide+metformin	Tab	80+500	40	100	2.5	150
	Tab	1+500	39	65	1.67	66.67
	Tab	2+500	41	78	1.9	90.24
Glimepiride+metformin	Tab	2+1000	58	159	2.7	174.14
	SR	1+500	36	86	2.39	138.89
	SR	2+500	36	163	4.5	352.8
Glipizide+metformin	Tab	2.5 + 500	5.14	22	4.3	328
Gnpizide+metiorium	Tab	5+500	11.64	50	4.3	329.5
	Tab	15+500	36.4	84	2.3	130.8
Pioglitazone+metformin	SR	15+500	42	113.84	2.7	171
	SR	30+500	62.35	86.2	1.38	38.25
Disalitarana dimenini da	Tab	15+1	19.25	53.80	2.8	179.5
Pioglitazone+glimepiride	Tab	15+2	40	137	3.4	242.5
X7121 46	Tab	0.2 + 500	49	100	2.04	104.08
Voglibose+metformin	Tab	0.3+500	58.9	115	1.95	95.25
Vildagliptin+metformin	Tab	50+500	75	150	2	100

Tab- tablet, SR- sustained release

DISCUSSION

Diabetes is a complex, chronic illness requiring long duration and expensive treatment. This affects not only patient's quality of life but also imposes huge economic burden to both the family and society. It was evident from literature that rise in burden of diabetes can be due to high price variation among different brands of same drug. ¹⁰⁻¹²

The compliance of patient also is significantly dependent on the cost of the prescribed medicines and higher cost means the compliance will be less. ¹³ Selection of cost-effective brand will improve the compliance and the consequence of the treatment. The National pharmaceutical pricing authority (NPPA), of Government of India controls drug prices in Indian market. It fixes the ceiling price of a drug based on essentiality of a drug and the pharmaceutical companies fix the price for their products equal to or below the ceiling price for that formulation; however, they cannot sell any medicine given in the drugs prices control order (DPCO) list at a cost higher than that fixed under this order. ¹⁴

Physicians should thus prescribe the low-cost drugs and should not be influenced by pharmaceutical industries. Even though government of India has insisted on prescribing drugs by their generic name there has been indifference among prescribing physicians towards the same.

There is a general belief among the common people including a fraction of prescribing physicians that costlier branded drugs are superior then their generic equivalents. Provision of readily available drug manual with comparative drug prices can ensure the doctor's awareness about the cost variations among same generic medications. This can play an important role in decreasing patient's drug expense. Decreased drug cost is an important factor for improved adherence to the medication regimen.

CONCLUSION

The study highlights that there is wide price variation of different brands of the same generic anti-diabetic drug in Indian market. To decrease the wide cost variation among different brands of anti-diabetic drugs; it is high time to generate physician awareness about impact of cost effectiveness of drug regimen and for regulation of drug prices by the concerned agencies.

Government should make a policy whereby the prices of branded-generic drugs can be made realistic and affordable to common person.

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Institutional Ethics Committee

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