



A study on cost analysis of various oral hypoglycemic Agents available in india

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ABSTRACT

To find out the different oral hypoglycaemic agents available in India either singly or in combination under different brands, comparing their cost and calculating the percentage variation in cost. Method-List of all oral hypoglycaemic drugs available in India was taken from CIMS and IDR 2016 version. The different formulations manufactured by different pharmaceutical companies were obtained and their costs were compared. Percentage variation in cost of each drug marketed under different brands was calculated. Totally 17 anti diabetic drugs (10 single drug therapies & 7 combination drugs) were analyzed. These drugs are available in 341 formulations being marketed in India with different brand names and prices. Glipizide 2.5 mg was the least expensive single drug therapy. Among the combination therapies available glibenclamide+ metformin combination was the cheapest of all. The drug showing the least percentage of cost variation when used singly is metformin 250 mg. Metformin 500 mg shows the maximum percentage of cost variation. Among the combination therapies available gliclazide + metformin and glimeperide + metformin shows the least and highest percentage of variation in cost respectively. The health care providers should be aware of the various formulations available along with the pricing of drugs to enable them to choose the best cost effective drug which will prevent economic burden to the society and maintain compliance of the patients.

Keywords: cost analysis, oral hypoglycaemic agents, diabetes mellitus, percentage cost variation, DPCO



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INTRODUCTION

Diabetes mellitus is one of the most common noncommunicable diseases prevalent globally and it is a modern epidemic in many developing and newly industrialized nations, thus posing a serious threat to be met within the 21st century¹ with a worldwide prevalence of 387 million (8.3%) and predicted to be 592 million by 2035.^{2,3} India is called as the 'diabetes capital of the world' and was home to 61.3 million patients with T2DM in 2011 with predictions of 101.2 million diabetics by 2030.^{4,5,6} Pharmaco-economic studies plays a pivotal important role in medical practice. Pharmacoeconomic analysis, compares two or more medication options in terms of cost-analysis and indicates the variations which prevails, within a group of pharmacological agents available for purchase in the community. It also serves as an important tool for drug utilization research and in policy making such as framing standard treatment guidelines etc.^{7, 9} In developing nations like India where universal health coverage is yet to be achieved most of them pay themselves for their health care. Issues like availability, variation in pricing of drugs are few among the major hindrances for the general public towards their health expenditure. It has been shown among other group of drugs , more commonly among anaesthetics and antipyretics, multivitamins , psychotropic drugs, antihypertensive drugs and other chronic medications. Few studies have reported that medications in India are overpriced and unaffordable. Recently the health ministry has banned 344 fixed dose combinations quoting the reason of safer alternatives available in the market and the above said

banned FDCs possessing risk to humans⁸. The margin in sales of drugs across the same generic class of medications is extremely high, ranging from 1000% to 4000%. In the developing countries the cost of drugs is one of the major concerns to both physician and patient. High cost of drugs affects patient compliance; particularly in case of diseases like diabetes where patient depends on medication adherence throughout their life to prevent related morbidity and mortality and to aid good quality of life.^{10,11,12} Even though diabetes is a major metabolic disease in India, very few cost analysis studies on diabetes are done in India and they show gross variation in the results. Newer drugs and combination therapies have come up. Hence we have taken this study to estimate the cost variation among the oral ant diabetic medications.

MATERIAL AND METHODS

This significant observational analysis was undertaken and done between May and November 2016 , by the Department of Pharmacology, Saveetha Medical College , Chennai. The oral hypoglycaemic agents which are commonly used in India were listed from CIMS and IDR. (2016 version). Different formulations manufactured by different pharmaceutical companies were obtained and there costs were compared. Cost of 10 tablets was calculated for each brand (as most of the brands had 10 tablets in each strip). The minimum price and maximum price of the same drug manufactured by different pharmaceutical companies was observed. % cost variation was calculated using the formula^{13, 15}

$$\frac{\text{Maximum Cost} - \text{Minimum Cost}}{\text{Minimum Cost}} * 100$$

Herbal preparations available in the market for the treatment of Type II diabetes mellitus were excluded from the study. The drug formulation which is being manufactured by only one company was excluded from the study. The drug formulations which are being manufactured by different companies in different dosage forms were excluded. Fixed dose combinations of more than two hypoglycaemic agents or combinations of oral hypoglycaemic agents with other classes of drugs were also excluded.

RESULTS

Totally 17 anti diabetic drugs (10 single drug therapies & 7 combination drugs) were analyzed. These drugs are available in 341 formulations being marketed in India with different brand names and prices. Table 1 shows the minimum cost, maximum cost and percentage

variation in cost of available formulations of single drug therapy. The percentage variation in cost for acarbose (25 mg) is 66.67%, (50 mg) is 60%. The percentage variation in cost of glibenclamide 2.5 mg and 5 mg is 135.5% and 203.05% respectively. The percentage variation in cost of gliclazide 30 mg, 40 mg, 60 mg and 80 mg is 120.26%, 96.67%, 80% and 165.55% respectively. For glimiperide the percentage variation in cost for 1 mg, 2mg, 3 mg and 4 mg is 543.04%, 626.89%, 530.07% and 431.82 % respectively. The percentage variation in cost of glipizide 2.5 mg and 5 mg is 81.81% and 62.47% respectively, metformin 250 mg- 21.62%, 500 mg- 644.18%, 850 mg – 236.40% and 1000 mg- 238.11%. Miglitol 25 mg- 57.4%, 50 mg- 63.3%, pioglitazone 7.5 mg- 27.7%, 15 mg- 483.31%, 30 mg – 446.34%, repaglinide 0.5 mg- 120%, 1 mg- 793.18% and 2 mg- 60%, voglibose 0.2 mg- 310.25% and 0.3 mg-272.88%.

Table 1
Variation in cost of single drug therapy

Drug	Formulations (n)	Dose (mg)	Minimum cost(INR)	Maximum cost (INR)	Percentage variation in cost (%)
Acarbose	7	25	42	70	66.67
		50	75	120	60
Glibenclamide	7	2.5	2.76	6.50	135.50
		5	3.60	10.91	203.05

Gliclazide	18	30	19	41.85	120.26
		40	15	29.50	96.67
		60	39	70.20	80
		80	29.50	78.34	165.55
Glimepiride	46	1	11.50	73.95	543.04
		2	18.29	132.95	626.89
		3	20.95	132	530.07
		4	25.14	133.70	431.82
Glipizide	4	2.5	2.75	5	81.81
		5	4.61	7.49	62.47
Metformin	45	250	7.40	9	21.62
		500	6.45	48	644.18
		850	10.85	36.50	236.40
		1000	17.50	59.17	238.11
Miglitol	5	25	50	78.70	57.4
		50	90	147.50	63.3
Pioglitazone	16	7.5	39.45	50.40	27.75
		15	12	70	483.3
		30	20.50	112	446.34
Repaglinide	4	0.5	22	48.40	120
		1	44	78.90	79.3
		2	78	124.80	60
Voglibose	24	0.2	19.50	80	310.25
		0.3	29.50	110	272.88

Table 2 shows the minimum cost, maximum cost and percentage variation in cost of combination therapies of oral hypoglycaemic agents. The percentage variation in cost of combination therapies is as follows: glibenclamide+metformin (2.5 mg+ 400 mg)- 269.86%, 5 mg+ 500 mg- 160.6%, 1.25 mg+ 250 mg- 76%, gliclazide+ metformin 40 mg+ 500 mg- 96.96%, 80 mg+ 500 mg- 182.60%, 30 mg+ 500 mg- 58.29%, 60 mg+

500 mg- 74.52%, glimeperide + metformin 1mg+500 mg- 638.33%, 2mg+ 500 mg- 472%, 1mg+ 1000 mg- 73.31, 2 mg+1000 mg- 120.68%, glipizide+ metformin- 5mg+500 mg- 34.61%, pioglitazone+ glimeperide 1+1.5 mg- 234.92%, 2+ 1.5 mg- 309.38%, pioglitazone+ metformin 15 mg+ 500 mg- 374.17%, 30+ 500 mg- 278.08% and voglibose+ metformin- 0.2 mg+ 500 mg- 182.05% and 0.3 mg+ 500 mg- 69.77%.

Table 2
Variation in cost of combination therapy

Drug combination	Formulations (n)	Dose (mg)	Minimum cost(INR)	Maximum cost (INR)	Percentage variation in cost (%)
Glibenclamide+ metformin	28	2.5+400	7.30	27	269.86
		5+500	14.14	36.85	160.60
		1.25+250	12.50	22	76
Gliclazide+ metformin	29	40+500	33	65	96.96
		30+500	23	65	182.60
		60+500	25.75	40.76	58.29
		80+500	39.25	68.50	74.52
Glimepiride+metformin	76	1+500	12	88.60	638.33
		2+500	25	143	472
		1+1000	46.16	80	73.31
		2+1000	58	128	120.68
Glipizide+metformin	5	5+500	10.40	14	34.61
Pioglitazone+glimiperide	10	1+1.5	20.90	70	234.92
		2+1.5	30.90	126.50	309.38
Pioglitazone+ metformin	25	15+500	21.30	101	374.17
		30+500	32.40	122.50	278.08
Voglibose+ metformin	16	0.2+500	39	110	182.05
		0.3+500	58.90	100	69.77

Table 3
Various measures to reduce cost variation among antidiabetic drugs

At National Level

- Including more number of drugs in essential list and making them accessible to the general public.
- Subsidizing anti diabetic medications through Drug Price Control Organization
- Strict regulatory measures to curtail irrational combinations and promoting rational prescribing among health professionals
- Framing and implementing Standard treatment guidelines even at primary health care level.

At Institutional Level

- Doing Need assessment and framing drug therapeutic committee
- Promoting and prescribing only by generic names
- Avoiding fixed dose combinations until it is proven rational and essential.
- Implementing and prioritization to anti-diabetic drugs to make it available for all
- Improving free supply of drugs at PHC level
- Educational measures to general public to adhere to prescribing medicine and not with over by themselves to other brands without consulting physician.

DISCUSSION

In India, particular drugs of same dose are being sold by different pharmaceutical companies under different brand names. This large number of formulations of the same drug also differs considerably in their prices. It is the decision of the registered medical practitioner to choose a specific brand of drug of a particular pharmaceutical company. The patients lack idea on the various brands available. In majority of the cases pharmacists also do not give the same brand prescribed by the doctor and gives other alternatives quoting the reason of non availability of the mentioned brand of drug. This is done mainly for more economic gains as some brands have a higher margin of profit. Hence prescribing a costlier drug when cheap alternatives are available may have economical implications especially in a developing country like India¹⁸. It is therefore necessary for the health care providers to have an idea on the cost of various formulations of the same drug and choose the most cost effective drug. In India, very few studies have calculated the percentage variation in costs of drugs used in type II diabetes mellitus. In this study, the price list and different formulations of oral hypoglycaemic agents marketed by different pharmaceutical companies were obtained from CIMS & IDR (2016 version) which provides detailed update on all currently used drugs. From this study it is observed that there is a wide variation in cost of all the commonly prescribed drugs like acarbose, glibenclamide, gliclazide, glimepride, glipizide, metformin, miglitol, pioglitazone, repaglinide and voglibose. The most common drug which is being prescribed among oral hypoglycaemic agents is metformin¹⁹. Whereas glimeperide+ metformin is the most common combination therapy prescribed¹⁹. It is also observed that the price variation among single drug therapy is maximum with metformin 500 mg (644.18%). However, this differed considerably from the findings of similar studies done by Salmaan Hussain et al who reported that glipizide 5 mg showed maximum variation in cost of 780%²¹. Jadhav et al reported that glimeperide 1mg showed maximum price variation of about 650%¹⁴. Date et al showed that glimeperide 2 mg has the highest price variation of 830%¹⁶. In our study, glimeperide

1mg+metformin 500 mg combination therapy shows the maximum percentage of cost variation of 638.33% among all recommended oral Fixed Dose Combinations. This finding is similar to the study conducted by Salmaan Hussain et al and Dale et al, however showing a different cost variation of 533% and 360% respectively. This is unlike the findings of Jadhav et al who reported glipizide 2.5 mg + metformin 400 mg to have maximum price variation of 400%. The number of brands is highest in metformin with total of 45 formulations available. Among the fixed dose combinations available, glimeperide + metformin combination has got the maximum number of brands with 76 formulations available. This shows that there is a linear relationship between percentage cost variation and number of branded drugs which is similar to the study conducted previously by Jadhav NB et al. (i.e. increase in the number of brands of a particular drug will show increase in percentage variation of cost)^{14,15, 17, 20, 21}. Suggestions from our study to curtail price variations at National and institutional level is tabulated 3²².

CONCLUSION

Our study concludes that regulatory, educational, rational and ethical prescribing must be followed as there is wide variation seen among FDCs of oral hypoglycaemic agents; to promote health among Indian population affected with diabetes. This study informs the health care providers of the of the various formulations available along with the pricing of drugs to enable them to choose the best cost effective drug which will prevent economic burden to the society and maintain compliance of the patients. The Government should also take initiatives to regulate the cost of drugs. A very few oral hypoglycaemic drugs are included in drug pricing control order (DPCO)¹⁶. Hence to minimize the cost of drugs and percentage variation of cost, more drugs should be revised by the DPCO.

CONFLICT OF INTEREST

Conflict of Interest declared none.

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