International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 3 May - June 2021, pp: 770-773 www.ijprajournal.com ISSN: 2249-7781

The Cost Variation Anlysis of Various Oral Anti-Diabetic Drugs Available In Indian Pharmaceutical Market

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Date Of Submission: 01-06-2021 Date Of Acceptance: 14-06-2021

ABSTRACT: Diabetes mellitus is a chronic metabolic disorder occurs due to a combination of insulin release and insulin secretary defects. There are large numbers of oral anti-diabetic drugs available for the treatment of Type-II diabetes mellitus with a wide variation in their price. This study was conducted to find recent price variation in various brands for the single generic drug with same strength and dosage form in Indian market. Price of a particular drug was obtained from the price list provided by the pharmaceutical companies in Current Index of Medical Specialties (CIMS), Online Pharmacies, Medline and Retail Pharmacies. The difference in the maximum & minimum price of the same drug manufactured by various pharmaceutical companies and percentage variation in cost was calculated. In monodrug therapy, among all classes of anti-diabetic drugs, the sulphonylureas (Glimepiride: 2mg) shows the maximum price variation of 840.78% and α-glucosidase inhibitors (Acarbose: 25mg) shows the minimum price variation of 88.88%. We concluded that there is a wide variation in the cost of different brands of same generic anti-diabetic drugs available and the price of monotherapy was found to be costlier in India.

Keywords: Diabetes, Percentage price variation, Monotherapy, Pharmacies, Insulin.

I. INTRODUCTION:

Diabetes Mellitus (DM) is a chronic disorder that involves lifelong pharmacological and non-pharmacological management to prevent the complications such as cardiovascular disease, retinopathy, nephropathy, and neuropathy[1]. The WHO defines, DM as "A metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in the insulin secretion, insulin action, or both"[2]. According to WHO, about 1.5 million fatalities were reported, making it the eighth leading cause of death. It should also be noted that about 2.2 million deaths are attributed to diabetes and associated complications[3].

It is one of the major causes of morbidity, mortality and needs lifelong treatment[4]. In case of absence of appropriate treatment, it can lead to microvascular and macrovascular complications. These can affect the longetivity of life as well as the quality of life[5]. The cost of antidiabetic drug is the major deciding factor for the patient's compliance. Selection of an oral antidiabetic agent as first-line drug or combined therapy should be based on both the pharmacological properties of the compounds and the clinical characteristics of patient[6]. National urban survey conducted across metropolitan cites of India and reported the people affected with diabetes is: 11.7% in Kolkata, 6.1% in Kashmir, 11.6% in New Delhi, 9.3% in Mumbai, 13.5% in Chennai and 16.6% in Hyderabad[7].

India being the largest provider of generic drugs, accounts for 20% of global exports in terms of volume. In India, health insurance schemes are significantly underutilized and majority of the health care costs are afforded by the patients[8]. Currently very few studies are available on Cost Variation Analysis of oral anti-diabetic drugs available in Indian Pharmaceutical market. Hence this study was taken to analyze the cost variation in various brands of same generic oral anti-diabetic drugs available in Indian market.

II. MATERIAL AND METHODS:

In this study, we mainly focused on cost variation analysis of oral anti-diabetic drugs available in Indian pharmaceutical market. The drug costs were obtained from Current Index of Medical Specialties (CIMS), Medline, Retail and Online Pharmacies. The data were updated regularly on these portals. Only one dosage form was considered. i.e., tablets for the uniformity of

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the data. The minimum and maximum price of the same dosage form was evaluated. The price of drugs in Indian Rupee (INR) for 10 tablets was calculated for each brand. The difference between the maximum & minimum price of the same drug manufactured by various pharmaceutical companies was calculated. The percentage variation in the cost of the drugs was calculated using the following formula[9]

$$\text{Percentage cost variation} = \frac{(\text{Maximum cost-minimum cost})}{(\text{minimum cost}) \text{ X } 100}$$

Exclusion Criteria: The drugs manufactured by only one company and drugs for which price information is unavailable were excluded. Fixed dose combinations containing two/more anti-diabetic agents were also excluded.

III. RESULTS:

In this study, the cost of seven anti-diabetic drugs with different strengths manufactured by various pharmaceutical companies was evaluated and found there was a wide variation in the cost of the anti-diabetic drugs (Tables: 1-4).

Among the five categories of oral anti-diabetic drugs, the price variation was seen highest with sulfonylureas like (Glimepiride: 2mg) 840.78%, (Glimepiride: 1mg) 729.83%, followed by Biguanides (Metformin: 500mg) 584.40%, Thiazolidinediones (Pioglitazone: 15mg) 540% and Dipeptidyl Peptidase-IV (DPP-IV) inhibitors (Vildagliptin: 50mg) 451.02%, (Tenegliptin: 20mg) 189.85%. Whereas lowest price variation was observed with α-glucosidase inhibitors (Acarbose: 25mg) 88.88%.

Among the Biguanides, Metformin-500mg shows maximum price variation (584.40%) and Metformin-1000mg shows minimum price variation (104.76%). Among Sulfonylureas, Glimepiride with various doses (Glimepiride-2mg) shows maximum price variation of 840.78% and (Glimepiride-3mg) shows minimum price variation of 138.88%. Among the α-glucosidase inhibitors, Voglibose-0.3mg shows maximum price variation and Acarbose-25mg shows minimum price variation. Among the all, Glimepiride-2mg showed maximum cost variation of 840.78%, while Acarbose-25mg showed minimum cost variation of 88.88%.

Table 1: Price variation between Biguanides with various doses

S. No	Generic Name	Strength (mg)	Minimum Price	Maximum Price	% Cost Variation
1	Metformin	250mg	4.34	20.50	372.35
2	Metformin	500mg	7.18	49.14	584.40
3	Metformin SR	500mg	11.6	41.77	260.08
4	Metformin	850mg	10.32	36.00	248.83
5	Metformin	1000mg	31.50	64.50	104.76
6	Metformin SR	1000mg	19.4	58.50	201.54

Table 2: Price variation between Sulfonylureas with various doses

S. No	Generic Name	Strength (mg)	Minimum Price	Maximum Price	% Cost Variation
1	Glimepiride	1mg	9.52	79	729.83
2	Glimepiride	2mg	15.2	143	840.78
3	Glimepiride	3mg	54	129	138.88
4	Glimepiride	4mg	22	110	400.00

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Table 3: Price variation between Thiazolidinediones & DPP-IV Inhibitors

S. No	Generic Name	Strength (mg)	Minimum Price	Maximum Price	% Cost Variation
1	Pioglitazone	15mg	12.50	80	540.00
2	Pioglitazone	30mg	23	98	326.08
3	Vildagliptin	50mg	49	270	451.02
4	Tenegliptin	20mg	69	200	189.85

Table 4: Price variation between α-Glucosidase inhibitors

S. No	Generic Name	Strength (mg)	Minimum Price	Maximum Price	% Cost Variation
1	Voglibose	0.2mg	37	100	170.27
2	Voglibose	0.3mg	30	118	293.33
3	Acarbose	25mg	36	68	88.88
4	Acarbose	50mg	38.5	117	203.89

IV. DISCUSSION:

This study was conducted to investigate and compare the cost difference in various brands of same generic anti-diabetic drugs. In India, particular drugs of same dose and amount are being sold by different pharmaceutical companies under different brand names with wide variation in their cost. It is therefore, necessary for the health care providers to have an idea on the cost of various formulations of the same drug. Generally, physicians do not go with the cost of the drug, which can attribute to the ignorance of drug cost eventually leads to increase in overall drug expenditure by the patient. Increase in drug cost is associated with the decline in medication adherence, which in turn leads to the poor patient therapeutic outcome[10]. The huge variation in cost of the drug is regulated by the pharmaceutical companies which are not associated with the generic drug. This study highlights the difference in pricing of the generic drug by different marketing agencies. This will faster the awareness about the impact of cost on the medication adherence[11].

Due to the long term treatment duration, diabetes patients usually have higher than average monthly expenses and this can be a barrier to medication adherence. Many chronically ill patients discontinue the medications due to high prescription cost. Market structure and subsequent market segmentation provide a basis for prescription agent and pricing policies, leading to wide variation in cost of drugs. In the absence of information on comparative drug prices and quality, it is difficult for clinicians to prescribe the most economical prescription.

There is a need for concerted action from regulatory agencies, clinicians, pharmacists and general public at large to address the issue on oral anti-diabetic drugs. At the hospital level concerned committees have to frame policies on these aspects. The situation can be improved by assimilating 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. Currently, very few medicines are under Drug Prices Control Order, DPCO[12].

V. CONCLUSION:

In our study, we concluded that the existence of wide variation on the cost of different brands of same generic anti-diabetic drugs available in Indian pharmaceutical market. As Type-II Diabetes is a chronic condition for which lifelong treatment is required, strict adherence to the drugs is essential, which can be achieved by minimizing the cost of drugs prescribed. To decrease the wide cost variation among different brands; it is high time to establish physician awareness about impact of cost effectiveness of drug regimen and for regulation of drug prices by the concerned authorities. The cost of the monotherapy was also found to be costlier in this study.

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