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RESEARCH ARTICLE

PHYSICIAN AND PHARMACIST OPINION ON DIABETES MELLITUS AND THE MOST COMMONLY PRESCRIBED ANTI-DIABETIC DRUG IN VARIOUS DISTRICTS OF U.P. (WEST), INDIA**Rastogi Vaibhav^{1*}, Kumar Bhaskar¹, Kumar Deepak¹, Kumar Arvind¹, Porwal Mayur¹, Yadav Pragya¹, Prasad Neelkant¹, Rastogi Pallavi²**¹Faculty of Pharmacy, IFTM University, Lodhipur Rajput, Delhi Road (NH-24) Moradabad- 244 001 (UP), India²Department of Mathematics, Hindu College, Station Road, Moradabad (U.P.) 244001, India

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ABSTRACT

Diabetes mellitus (DM) is a group of metabolic disorders characterized by a chronic hyperglycemic condition resulting from defects in insulin secretion, insulin action or both. The prevalence of diabetes is increasing rapidly worldwide and the World Health Organization indicates global prevalence of diabetes was estimated to be 9% among adults aged 18+ years and it will be the 7th leading cause of death in 2030. The aim of this paper is to gather latest information on the prevalence of Diabetes among the human society and also to investigate pharmaceutical marketing of Metformin and its combinations used for Diabetes Mellitus in various districts of U.P. (West) region. The survey was based on the questionnaire which was presented before the physicians and the pharmacist in-charge on medical store to get information about the patient having diabetes mellitus and commonly prescribed brands of Metformin alone and its combination with other anti-diabetic drugs. On the basis of physician's opinion on the Diabetes (type 2), 65.78% of patients from total OPD patients was found to have diabetes, 49.76% patients are type-2 patients, 7.45% of teenagers was fall in the category of having type-1 diabetes and 8.57% were among the new patients of diabetes. There are 20 and 30 brands in Metformin (and its HCl salt), Metformin (and its HCl salt) with other anti-diabetic drug categories, respectively. The sale of Glyciphage of Franco Indian Remedies brand of the Metformin only, Diapride M 1 containing Glimepiride and Metformin 500 mg from Micro Labs Ltd., respective categories, were highest in the area of interest.

Keywords: Diabetes Mellitus, Metformin (and its HCl salt), Combination drugs, Marketing Investigation.**INTRODUCTION**

"Man may be the captain of his fate, but he is also the victim of his blood sugar" said by Dr. Wilfred Oakley¹.

The prevalence of diabetes in 21st century is increasing due to diet changes, aging, urbanization, and increasing prevalence of obesity and physical inactivity. King *et al.*, 1998 predicted a rise in global diabetes prevalence to 5.4% of the world population by the year 2025 (27% increase in developed countries and 48% increase in developing countries)². In 2000, there were 171 millions of people having diabetes in the world; 2006 was 246 million people. It was estimated that in 2025, there would be 380-399 million people having diabetes³. According to an estimate of International Diabetes Federation comparative prevalence of Diabetes during 2007 is 8.0 % and likely to increase to 7.3% by 2025. Number of people with diabetes is 246 million (with 46% of all those affected in the 40–59 age group) and likely to increase to 380 million by 2025⁴. The World Health Organization believes that the 21st century is the time of endocrine diseases and metabolic disorders, for

example, diabetes. In over the world, people have to spend 232 billion to 430 billion USD for diabetes treatments and prevention. Diabetes reduces 5-10 years of human life expectancy. In 2014, the World Health Organization indicates global prevalence of diabetes was estimated to be 9% among adults aged 18+ years and it will be the 7th leading cause of death in 2030⁵⁻⁷.

Diabetes is a metabolic disorder caused by many reasons. It is characterized by chronic hyperglycemia and metabolic disorders of sugar, protein, fat caused by the deficiency of insulin secretion, the insulin activities, or both. Pathophysiology of type 2 and 1 Diabetes Mellitus is explained in the Fig. 1 and Fig. 2 respectively⁸.

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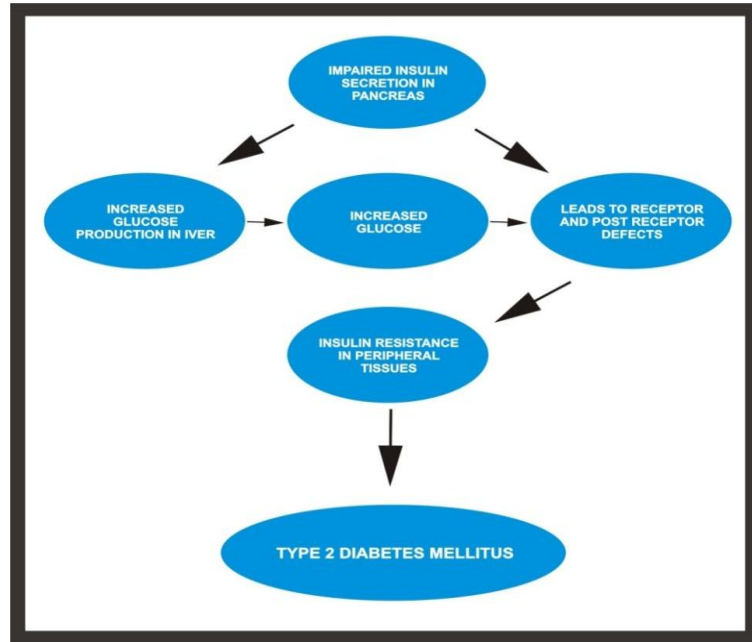


Figure 1: Pathophysiology of Type 2 Diabetes Mellitus

Pharmaceutical marketing, sometimes called medico-marketing or pharma marketing in some countries is the business of advertising or otherwise promoting the sale of pharmaceuticals or drugs [9]. Pharmaceutical detailing is a marketing technique used by pharmaceutical companies to educate a physician about a vendor's products in hopes that the physician will prescribe the company's products more often. Although this practice is controversial, many drug companies spend billions of dollars a year on this legal tactic. In the United States, marketing and distribution of pharmaceuticals is regulated by the Federal Food, Drug, and Cosmetic Act and the Prescription Drug Marketing Act, respectively. Food and Drug Administration (FDA) regulations require all prescription drug promotion to be truthful and not misleading, based on "substantial evidence or substantial clinical experience", to provide a "fair balance" between the risks and benefits of the promoted drug, and to maintain consistency with labeling approved by the FDA. The FDA Office of Prescription Drug Promotion enforces these requirements⁹.

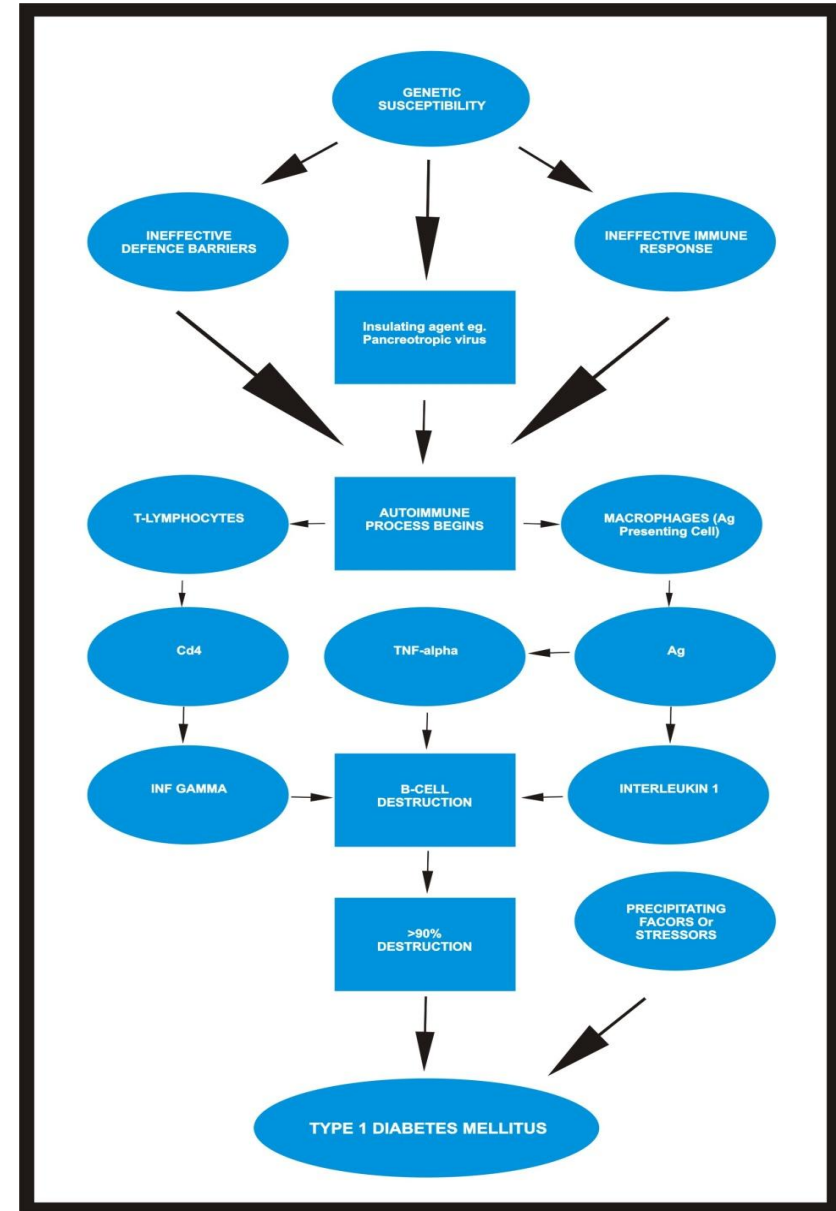


Figure 2: Pathophysiology of Type 1 Diabetes Mellitus

It was long believed that since physicians made the selection of drugs, mass marketing was a waste of resources; specific advertisement targeting the medical profession were thought to be cheaper and just as effective. This would involve advertisement in professional journals and visits by sales staff to physician's offices and hospitals. An important part of these efforts was marketing to medical students¹⁰. On the basis of this background, we made pharmaceutical marketing investigation of Metformin and its combinations used for Diabetes Mellitus in Moradabad, Rampur, Bareilly and Meerut districts of U.P. (West).

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MATERIALS AND METHODS

This study was depended on a cross-sectional survey design and was conducted by administering a validated questionnaire to physicians and pharmacist on medical store of Moradabad, Rampur, Bareilly and Meerut districts of U.P. (West) on metformin and its combination drugs. Since this study was carried out during April 2015- April 2016, the sample size consisted of 10 Physicians and 10 pharmacist in-charge of medical store in the districts (Moradabad, Rampur, Bareilly, Meerut) of U.P.(West) region which will tend to reflect the population size. Both physician as well as pharmacist was informed with the objectives

of the study, and they were considered consented to participate in the survey.

Study Instrument:

A questionnaire (Table 1) was designed to collect information on Diabetes mellitus from the physicians. Another questionnaire (Table 2) was prepared for collecting information from pharmacists on medical stores. Both questionnaires were initially validated by two senior faculty members for content before data collection.

RESULTS AND DISCUSSION

Physician Opinion:

The objective of the study was to conduct and analyze a survey regarding the status of diabetes mellitus-2 among the people of various districts of U.P. west region of India.

Being diagnosed with diabetes is a major life stress and therefore it requires dealing with psychological challenges (grief, denial, anxiety, depression, shame and guilt). Various aspects of life associated diabetes that may affect quality of life include:

- The never-ending demands of diabetes care, such as eating carefully, exercising, monitoring blood glucose, and scheduling and planning
- Symptoms of low or very high blood glucose
- Fears about or the reality of complications

The specific things each person needs to feel satisfied and happy are unique to him or her. Still, there are some things most people would agree are important. Your quality of life is your own sense of how satisfied and happy you are with your life in general and your life with diabetes in particular. Many diabetes health care professionals are trained to help their patients adjust treatment regimens to ease the burden of diabetes management while maintaining good blood glucose control and good health. These providers may also be able to help you improve your day-to-day diabetes coping skills.

The data obtained after conducting the survey was drastically modified in comparison to the survey reported by Phool *et al.*, (2013)¹¹. In 2013, there were around 46.48% patients having diabetes and in 2015 the numbers are increased to 65.78%. The major outcome was found among the teenagers, 7.45% of teenagers are having type-1 diabetes. After consulting with the medical practitioner, the sole reason of having these disorders was found to be the improper nutritious diet taking and the magnetic effect of junk food, no physical exercise, increased mental stress, environmental toxins, etc, all these factors directly or indirectly linked to insulin resistance (a condition in which the body's muscle, fat, and liver cells do not use insulin effectively to counter the raised blood glucose level and resulted into diabetes).

Physician opinions on the questionnaire about the Diabetes (type-1 & -2) are shown in the Fig. 3. 65.78%

of patients from total OPD patients were found to have diabetes, 49.76% patients are type-2 patients, 7.45% of teenagers were fall in the category of having type-1 diabetes and 8.57% were among the new patients of diabetes. Among various anti-diabetic drugs, Metformin, an oral antidiabetic drug in the biguanide

class is the first-line drug of choice for the treatment of type-2 diabetes in particular, in overweight and obese people and those with normal kidney function, while Insulin become the primary drug of choice for type-1 Diabetic patients.

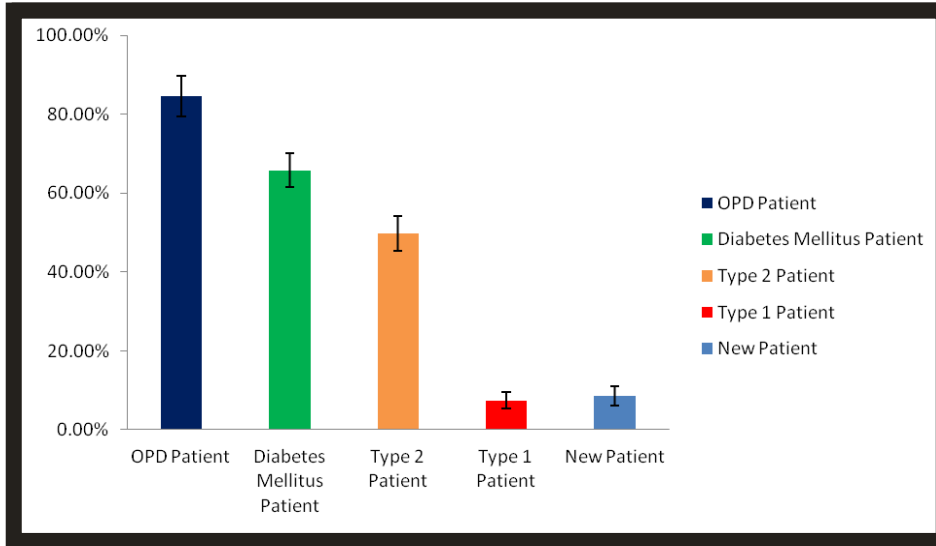


Figure 3: Physicians opinion on different type of patients

Pharmacist in-charge report:

There are 20 brands containing Metformin and its Hydrochloride salt found majorly in the market are mentioned in appendix 2 (Table 2). The sale of Glyciphage of Franco Indian Remedies brand containing Metformin only was higher among all other medicine and the sale was 22% of the total market and results are shown in the Fig. 4. Apart from the only metformin brand there are 30 brands of metformin (&

its HCl salt) in combination with other anti-diabetics drugs found majorly in the market are listed in Appendix 3 (Table 3). The investigation results produced the highest sale of Diapride M 1 containing Glimepiride and Metformin of Micro Labs Ltd. The sale was 35% and presented in Fig. 5. None of the pharmacist was agreed to sell metformin without prescription of physician. This reveals the great collaboration of pharmacist and physician to follow the rules laid by the FDA and the Central Government.

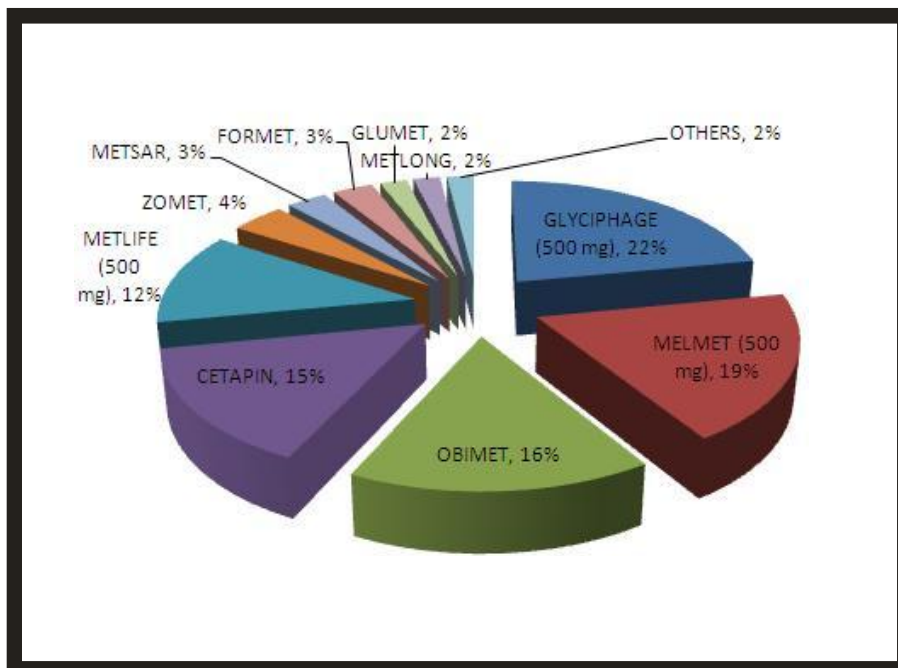


Figure 4: Pharmacist in-charge report on branded products of Metformin only

Table 1: Questionnaire for the physician

APPENDIX 1	
PHARMACEUTICAL MARKETING REPORT: “Physician opinion on diabetes Mellitus and Metformin and its Combinations”	
1	How many patients are coming to OPD in a day?
2	How many patients are suffering from Diabetes Mellitus?
3	How many patients are suffering from Type-2 Diabetes?
4	How many of them are new patients?
5	What is your choice of drug to treat type-2 Diabetes?
6	What are the concerns associated with Diabetes in your practice regarding quality of life?
7	What are the psychological impacts of diabetes on the life of diabetic patient?
8	Do you prescribe Metformin and its combinations?
9	If yes, then what are their brand names?
10	Do you prescribe generics over branded drugs?
Sign & Seal	

Table 2: Report from Pharmacist in-charge on brands having only metformin

APPENDIX 2			
PHARMACEUTICAL MARKETING REPORT: Pharmacist in-charge report about the Metformin and its combinations (Brands having only Metformin)			
S.No.	Brand	Company	Strength
1	Bigesens	Zydus Cadila Healthcare Ltd	500 mg, 1000 mg
2	Cetapin	Sanofi Aventis	500mg
3	Duomet ER	Biochem Pharmaceutical Industrial Ltd	500 mg
4	Emnorm	IPCA Laboratories Ltd	250 mg, 500 mg, 850 mg
5	Exermet	Cipla Limited	500 mg
6	Formet	Alkem Laboratories Ltd	850 mg
7	Formin	Alkem Laboratories Ltd	500 mg
8	Forminal, Forminal SR	Alembic Chemical Works Co Ltd	500 mg, 850 mg, 1000 mg
9	Glumet, Glumet EXT	Cipla Limited	500 mg, 850 mg
10	Glyciphage, Glyciphage SR	Franco Indian Remedies	250 mg, 500 mg
11	Glyrep, Glyrep XL	Emcure Pharmaceuticals Ltd.	500 mg, 1000 mg
12	Insumet, Insumet SR	Cadila Pharmaceuticals Ltd.	500 mg, 850 mg
13	Melmet, Melmet SR	DTF (Micro Labs Ltd)	500 mg
14	Metica	Sarabhai Piramal Pharmaceutical Ltd	500 mg, 850 mg
15	Metlife - 500	Mankind Pharmaceuticals Pvt. Ltd	500 mg
16	Metlong -DS	Panacea Biotec Ltd	500 mg
17	Metsar SR	Unichem Laboratories Ltd.	500 mg
18	Obimet	Abbott India Ltd	500 mg
19	Okamet	Cipla Limited	500 mg
20	Zomet, Zomet SR	Piramal Healthcare	500 mg

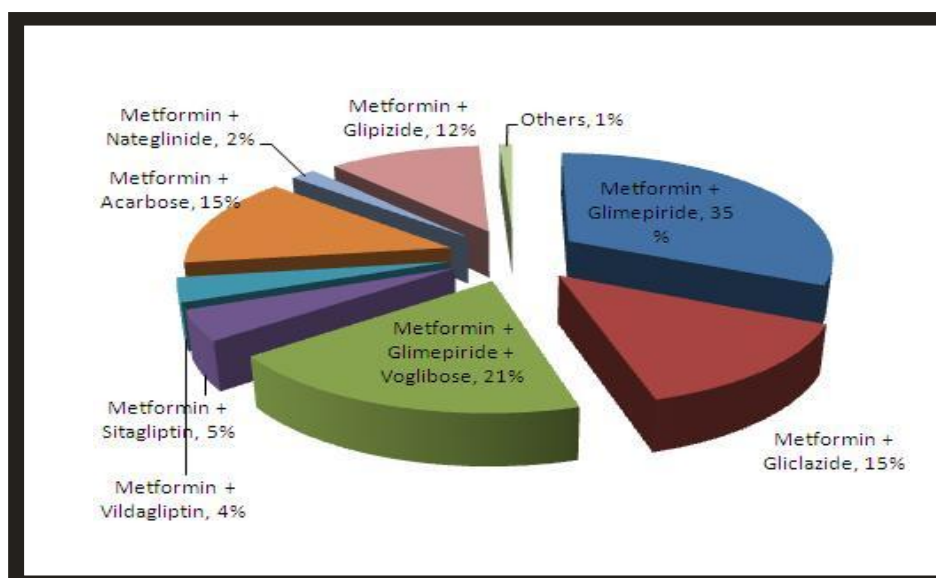


Figure 5: Pharmacist in-charge report on branded products of Metformin and its combinations.

Table 3: Report from Pharmacist in-charge on brands having only metformin and its combination

APPENDIX 3			
PHARMACEUTICAL MARKETING REPORT:			
Pharmacist in-charge report about the Metformin and its combinations (Brands having only Metformin and its combination)			
S.No	Brand	Combination strength	Company
1	Glimulin-MF	Glimepiride 1 mg, Metformin 500 mg- SR	Glenmark
2	Glimulin-MF Forte	Glimepiride 2 mg, Metformin HCl (SR) 500 mg	Glenmark
3	Glinat-MF	Nateglinide 60 mg, Metformin 500 mg	Glenmark
4	Amaryl-M	Glimepiride 1mg, Metformin XR 500mg	Sanofi Aventis
5	Amaryl-M 2	Glimepiride 2mg, Metformin (XR) 500mg	Sanofi Aventis
6	Amaryl-M Forte	Glimepiride 1mg, Metformin 1000mg	Sanofi Aventis
7	Amaryl-M Forte	Glimepiride 2 mg, Metformin 1000 mg	Sanofi Aventis
8	Diapride-M 1	Glimepiride 1 mg, Metformin 500 mg	Micro Labs Ltd
9	Azukon-M	Gliclazide 80mg, Metformin HCl 500 mg	Torrent
10	Azulix-MF	Glimepiride 1mg, Metformin HCl 500 mg	Torrent
11	Azulix-MF	Glimepiride 2mg, Metformin HCl 500 mg	Torrent
12	Azulix-MF Forte	Glimepiride 1mg, Metformin HCl 1000 mg	Torrent
13	Azulix-MF Forte	Glimepiride 2mg, Metformin HCl 1000 mg	Torrent
14	Betaglim-M1	Glimepiride 1mg, Metformin HCl (in Extended release form) 500 mg	Panacea
15	Betaglim-M2	Glimepiride 2mg, Metformin HCl (in Extended release form) 500 mg	Panacea
16	Betagrim-M	Glimepiride 1 mg, Metformin 500 mg	Panacea
17	Betagrim-M	Glimepiride 2 mg, Metformin 500 mg	Panacea
18	Daonil-M	Glibenclamide 5mg, Metformin (XR) 500mg	Sanofi Aventis
19	Daorid-M	Glibenclamide 5 mg, metformin 500 mg	Intas
20	Diaglip-M	Glipizide 5mg, Metformin 500 mg	Cipla
21	Diatrol-M	Gliclazide 80mg, Metformin 500 mg	Aurobindo
22	Dibimet Plus	Glipizide 5mg, Metformin HCl 500 mg	Novartis
23	Geminor-M	Glimepiride 1 mg, Metformin 500 mg	Macleods
24	Glimy-M	Glimepiride 2 mg, Metformin HCl 500 mg	Dr. Reddy's
25	Janumet	Metformin HCl 500 mg, Sitagliptin 50 mg	Merck
26	Glucobay M25	Acarbose 25 mg, Metformin HCl 500 mg	Bayer
27	Glucobay M50	Acarbose 50 mg, Metformin HCl 500 mg	Bayer
28	Galvumet	Vildagliptin 50 mg, Metformin HCl 1000 mg	Novartis
29	Vogli M 0.2	Voglibose 0.2 mg, Metformin HCl 500 mg	Medley Pharm. Ltd
30	Vogli GM 2	Voglibose 0.3 mg, Metformin HCl 500 mg, Glimepiride 2 mg	Medley Pharm Ltd

STUDY LIMITATION

The study gives an idea about the collaboration of Doctor-pharmacist. However, it has some limitations. The sample size is small which provides a brief idea. To increase precision, the sample size may be increased.

CONCLUSION

The global burden of diabetes is increasing worldwide as it is a costly disease for developing economies of the world. While many pharmaceutical companies have successfully deployed a plethora of strategies to target the various customer types, recent business and customer trends are creating new challenges and opportunities for increasing profitability. In the pharmaceutical and healthcare industries, a complex web of decision-makers determines the nature of the transaction (prescription) for which direct customer of pharma industry (doctor) is responsible. Essentially, the

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end-user (patient) consumes a product and pays the cost. During the process of task we have extracted out that Diabetes Mellitus found to be an epidemic disease among the population of India. Glyciphage, Melmet And Obimet were the brands of the Metformin only, Metformin: Glimepiride, Metformin: Glimepiride: Voglibose and Metformin: Gliclazide, respectively categories which were in highest sale in the area of interest.

CONFLICTS OF INTEREST

The Authors confirm that this article has no conflicts of interest.

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