

Prescribing Pattern of Antidiabetic Drugs in Type II Diabetes Mellitus Patients at a Tertiary Centre

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Abstract:

Background: Type 2 diabetes, also known as adult-onset diabetes or non-insulin-dependent diabetes, is a chronic metabolic disorder that affects how your body uses insulin to regulate blood sugar (glucose) levels.

Aims and Objectives: The present study was conducted to assess prescribing pattern of antidiabetic drugs in type II diabetes mellitus patients.

Materials & Methods: 120 type II diabetes mellitus patients of both genders were included. Parameters such as duration of diabetes, family history of diabetes, prescribed antidiabetic drugs, associated medications and comorbid conditions were recorded.

Results: Out of 120 patients, 70 were men and 50 were women. Prescription pattern was monotherapy: oral in 30%, monotherapy: injectable in 54%, two drug combination in 41%, three drug combination in 25%, four drug combination in 23%, five drug combination in 67% and six drug combination in 64%. The difference was non-significant ($P > 0.05$). Comorbidities found were dyslipidaemia in 34%, hypertension in 40%, hypothyroidism in 12% and CAD in 15%. The difference was significant ($P < 0.05$).

Conclusion: The antidiabetic medicine prescribing trend was shifting towards combination therapy. Most common drugs prescribed were metformin, glimepiride, pioglitazone, miglitol, pioglitazone+ metformin, glimepiride+ metformin and pioglitazone+ glimepiride.

Keywords: Diabetes, Metformin, Glimepiride, Pioglitazone.

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Introduction

Type 2 diabetes Mellitus, also known as adult-onset diabetes or non-insulin-dependent diabetes, is a chronic metabolic disorder that affects how your body uses insulin to regulate blood sugar (glucose) levels [1]. Insulin is a hormone produced by the pancreas that allows your cells to absorb glucose from the bloodstream and use it for energy. In type 2 diabetes, your body becomes resistant to the effects of insulin and may not produce enough insulin to maintain normal blood sugar levels [2]. By 2025, the World Health Organisation (WHO) predicts that there will be 300 million people worldwide who have T2DM, up from 5 million in 1995. According to the International Diabetes Federation (IDF), the number of people with diabetes in the world in 2013 was 382 million, which is going to increase to almost 592 million by 2035 [3]. A clinician's prescription represents the

prescriber's perspective on the disease and the drug's role in treatment. Additionally, it sheds light on the makeup of the healthcare delivery system [4]. Drug utilisation studies' (DUS) main goal is to encourage the population's responsible drug use [5].

Drug therapy must be optimised with the use of drug utilisation studies. A medical audit, which aims to monitor, evaluate, and make necessary changes in prescribing practices to achieve rational and cost-effective pharmacotherapy, includes the examination of drug utilisation or prescribing trends as one of its components [6].

Aims and objectives

The present study was conducted to assess the prescribing pattern of anti-diabetic drugs in type II diabetes mellitus patients.

Material & Methods

The present prospective study consisted of 120 type II diabetes mellitus patients of both genders attending out-patient departments (OPD) or emergency care at the Department of Medicine in collaboration with the Department of Pharmacology at Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India, for a period of 2 years (May 2018–April 2020). The institutional ethical committee gave its clearance before the study could be conducted. To participate in the research project, each participant had to complete a written consent form. Data such as name, age, gender, etc. was recorded. Parameters such as duration of diabetes, family history of diabetes, prescribed anti-diabetic drugs, associated medications, and comorbid conditions were recorded. The data thus obtained were subjected to statistical analysis by using SPSS software version 22 and Microsoft version 16. A P value of <0.05 was considered significant.

Results

The present study included a total of 120 patients with Type 2 diabetes aged between 20 and 65 years, with a mean age of 52.6 ± 8.50 (Mean \pm S.D.) years. Out of 120 patients, 70 (58.33%) were male and 50 (41.67%) were female. The male-to-female ratio was found to be 1.4. Age-wise distribution of patients: 32 (26.67%) were below 40 years, 49 (40.83%) were between age groups 41–60 years, and 39 (32.25%) were above 60 years. The majority of the patients (40.83%) were in the age group of 41–60 years. Out of 120 patients, 22 (18.33%) were from the upper class, 53 (44.17%) from the upper middle class, 7 (5.83%) from the lower middle class, 30 (25%) from the upper lower class, and 8 (6.67%) belonged to the lower socio-economic status (Table 1).

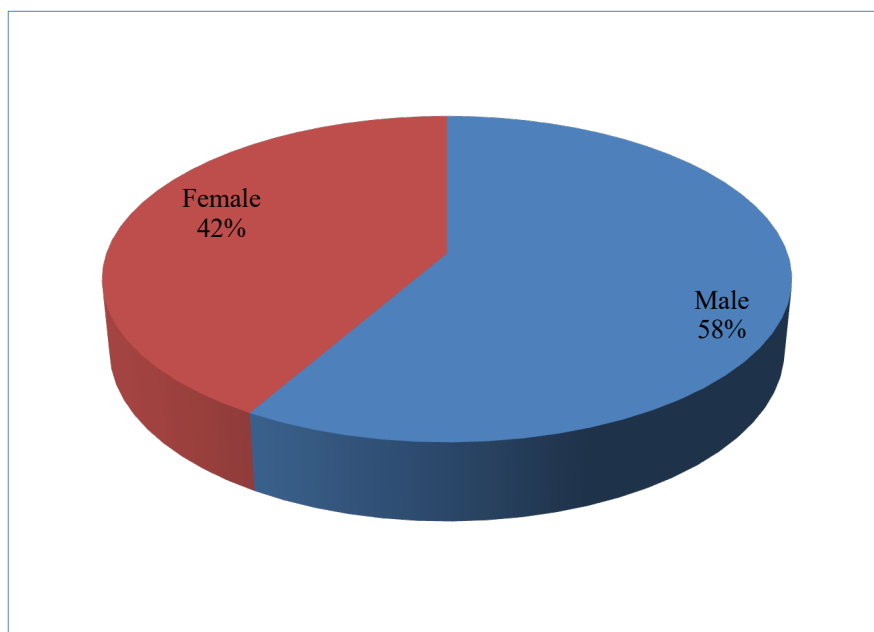


Figure 1: Gender wise distribution of patients

Table 1: Socio demographic parameters of Type II diabetic patients (n=120)

Parameters		Number of patients	Percentage
Gender	Male	70	58.33
	Female	50	41.67
Age (years)	<40	32	26.67
	41-60	49	40.83
	>60	39	32.25
Socio-economic status	Upper class	22	18.33
	Upper Middle class	53	44.17
	Lower Middle class	7	5.83
	Upper Lower class	30	25
	Lower class	8	6.67

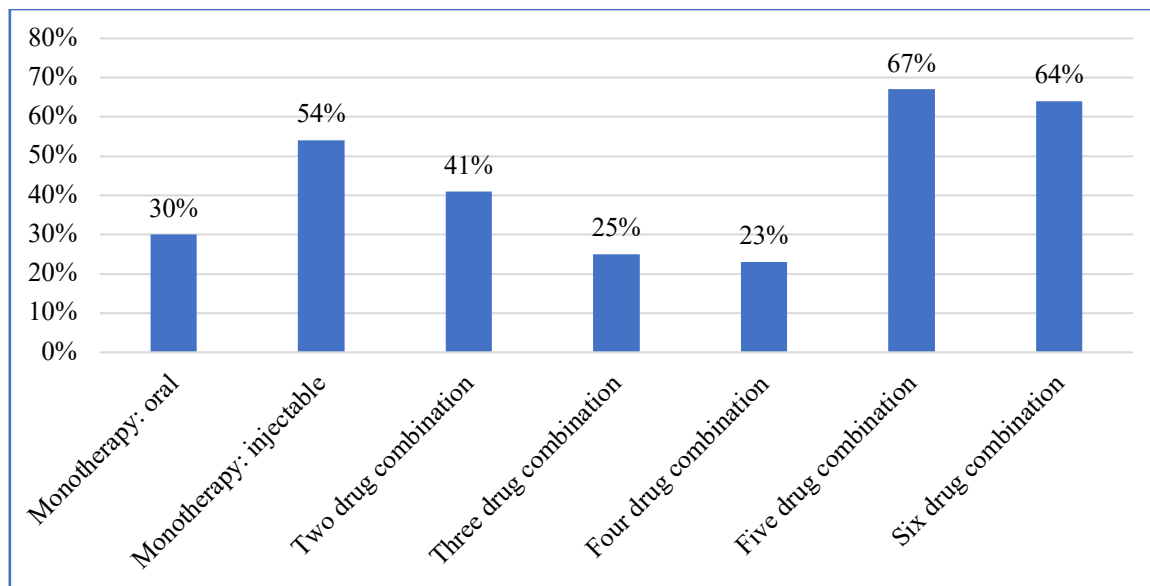


Figure 2: Percentage wise commonly prescribed antidiabetic drugs

Figure 2, shows that prescription pattern was monotherapy: oral in 30%, monotherapy: injectable in 54%, two drug combination in 41%, three drug combination in 25%, four drug combination in 23%, five drug combination in 67% and six drug combination in 64%. The difference was non- significant ($P > 0.05$).

Table 2: Evaluation of comorbidities

Comorbidities	Percentage wise distribution	P value
Dyslipidaemia	34%	0.05
Hypertension	40%	
Hypothyroidism	11%	
CAD	15%	

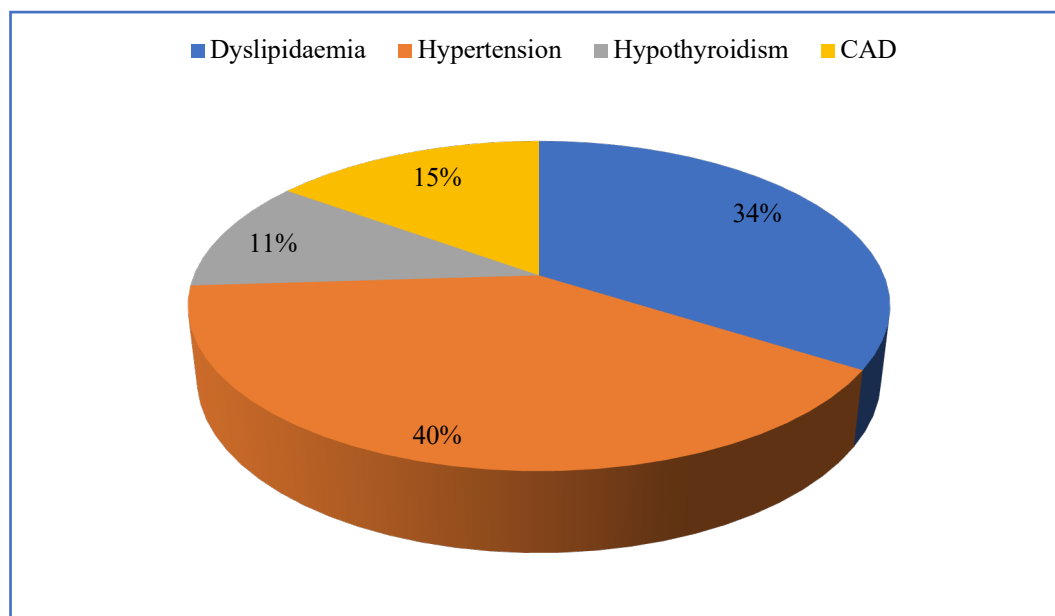


Figure 3: Percentage wise distribution of comorbidities

Table 2 and figure 3, shows that comorbidities found were dyslipidaemia in 34%, hypertension in 40%, and hypothyroidism in 11% and CAD in 15%. The difference was significant ($P < 0.05$).

Discussion

Diabetes is a chronic disease characterized by unusually high blood sugar (glucose) levels. The pancreas produces insulin, which decreases blood

sugar. Diabetes is brought on by a lack of insulin or its inadequate production [7,8]. Diabetes symptoms include increased urination, thirst, appetite, and weariness. Testing for blood sugar (glucose) can identify diabetes. Both acute and chronic diabetes problems are the main ones [9]. Chronic problems are linked to illnesses of the blood vessels (both small and large), which can harm the eye, kidneys, nerves, and heart. Acute complications include dangerously raised blood sugar and unusually low blood sugar as a result of diabetic treatments [10]. The kind and severity of the diabetes will determine how it is treated. Type 1 (insulin dependent) and type 2 (non-insulin dependent) diabetes are the two subtypes. Patients with type 1 diabetes are dependent on exogenous sources of insulin in order to survive. When weight loss, a diabetic diet, and exercise fail to manage the increased blood sugar levels, oral medicines are used to treat type 2 diabetes [11]. Insulin medicines are taken into consideration if oral drugs are still insufficient. One of the main causes of kidney failure is diabetes, however the prevalence of the condition varies throughout communities and is also influenced by how severe and long it has been [12,13]. The present study assessed prescribing pattern of antidiabetic drugs in type II diabetes mellitus.

In the present study, out of 120 patients, males were 70(58.33%) and females were 50(41.67%) and the male-to-female ratio was found to be 1.4. This is similar to studies conducted in India by Angel Dominic et al., reporting 56% male, 44% female, and a M:F ratio of 1.27 [14].

The majority of the patients (40.83%) belonged to the age group between 41 and 60 years, followed by the age group above 60 years (32.25%). This finding is inconsistent with the study conducted by Angel Dominic et al. (2016) [14].

In the present study, the majority of the patients belonged to the upper middle socio-economic class (44.17%), which is similar to the study conducted by Mamata Sharma et al. [15].

Alex et al [16], evaluated anti-diabetic medicine use patterns in diabetic outpatients. Of the 197 diabetic patients, 99 (50.3%) were men. Most patients (36.5%) had a history of diabetes for less than five years, and the majority of patients (39.6%) fell into the 51–60 age range. Metformin was the medication that was most frequently administered (68%), and then the sulfonylurea class of medications (49.7%). Patient usage of insulin preparations was almost 42%, with 30.4% of patients using biphasic isophane human insulin. The majority of the patients (58.4%) were receiving multidrug therapy, and approximately 40% were receiving two medication regimens. The most frequently prescribed single medication was metformin (18.8%), and the most frequently prescribed dual medication (13.2%) was

glimepiride plus metformin. 172 patients (87.3%) had a co-morbid condition.

We found that prescription pattern was monotherapy: oral in 30%, monotherapy: injectable in 54%, two drug combination in 41%, three drug combination in 25%, four drug combination in 23%, five drug combination in 67% and six drug combination in 64%. Pushpa et al. [17], in their study 706 anti-diabetic medicines were prescribed out of the 500 prescriptions examined; 90% were given orally, 8.31% were administered intravenously, and 1.69% were given both ways. An average of 0.7 anti-diabetic medications were recommended per prescription. Metformin (66% of prescriptions for oral hypoglycaemic medications) were most frequently combined with other alone and with diabetes medication. 18.9% of prescribed medications were prescribed under their generic names, while 41.78% came from the essential drug list. The study revealed that metformin was typically recommended as an oral anti-diabetic medicine, both alone and in combination. Drug prescriptions by brand name were more common than those from the essential drug list.

We found that comorbidities found were dyslipidaemia in 34%, hypertension in 40%, hypothyroidism in 12% and CAD in 15%. Vengurlekar et al. [18], found that prescription of metformin (27%) and glimepiride (22.60%) were found to be maximum among various available antidiabetic drugs.

Category wise the maximum prescribed drugs are glimepiride (22.60%, sulfonylurea category), metformin (27%, biguanide category) and pioglitazones (13.90%, glitazone category). Insulin prescription was found to be very less (4.5%). Combination of metformin and glimepiride (20.86%) was prescribed most commonly. Most common disease associated with diabetes mellitus was found to be hypertension (35%). Highest prevalence of disease was found to be in the age group of 51 to 60 followed by age group of 41 to 50. Men patients (66.36%) were found to be predominated over women patients (33.64%).

Limitations of study

The limitation the study was small sample size.

Conclusion

Authors found that the antidiabetic medicine prescribing trend was shifting towards combination therapy. The most common class of antidiabetic drugs used as monotherapy was biguanides (Metformin), followed by sulfonylureas (Glimepiride). The most frequently prescribed combination therapy was metformin and glimepiride, followed by metformin and pioglitazone. Prescriptions for metformin and linagliptin were the most frequently prescribed fixed

drug combinations. None of the drugs were given out under their generic names. The brand name for all drugs was prescribed.

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References

1. Shamna M, Karthikeyan M. Prescription pattern of antidiabetic drugs in the outpatient departments of hospitals in Malappuram district, Kerala. *J Basic Clin Physiol Pharmacol*. 2011;22(4):141-3.
2. Dave DJ, Dikshit RK, Gandhi AM. Utilization of some newer oral antidiabetic agents in a tertiary care hospital. *Nat J Physiol Pharm Pharmacol*. 2012;2(2):146-51.
3. Kumar KS, Sreerama G, Krishna KM, Nalini K, Kiranmai N, Vasavi P. Drug use pattern study of antidiabetics in type 2 diabetes mellitus at a tertiary care hospital in Tenali, Andhra Pradesh. *Int J Inv Pharm Sci*. 2013;1:162-6.
4. John LJ, Arifulla M, Sreedharan J, Muttappallymyalil J, Das R, John J, et al. Age and gender-based utilisation pattern of antidiabetic drugs in Ajman, United Arab Emirates. *Malay J Pharm Sci*. 2012;10:79-85.
5. Kannan A, Kumar S. A study on drug utilization of oral hypoglycemic agents in type-2 diabetic patients. *Asian J Pharm Clin Res*. 2011;4:60-4.
6. Mendes AB, Fittipaldi JA, Neves RC, Chacra AR, Moreira ED., Jr Prevalence and correlates of inadequate glycaemic control: Results from a nationwide survey in 6,671 adults with diabetes in Brazil. *ActaDiabetol*. 2010;47:137-45.
7. Raheja BS, Kapur A, Bhoraskar A, Sathe SR, Jorgensen LN, Moorthi SR, et al. DiabCare Asia – India Study: Diabetes care in India – current status. *J Assoc Physicians India*. 2001;49:717-22.
8. Patel B, Oza B, Patel KP, Malhotra SD, Patel VJ. Pattern of antidiabetic drugs use in type 2 diabetic patients in a medicine outpatient clinic of a tertiary care teaching hospital. *Int J Basic Clin Pharmacol*. 2013;2:485-91.
9. Sivasankari V, Manivannan E, Priyadarsini SP. Drug utilization pattern of anti-diabetic drugs in a rural area of Tamil Nadu, South India- A prospective, observational study. *Int J Pharm Bio Sci*. 2013;4:514-9.
10. Meneilly GS, Elliott T, Tessier D, Hards L, Tildesley H. NIDDM in the elderly. *Diabetes Care*. 1996;19(12):1320-5.
11. Rizvi AA. Management of diabetes in older adults. *Am J Med Sci*. 2007;333(1):35-47.
12. Truter I. An investigation into antidiabetic medication prescribing in South Africa. *J Clin Pharma Therap*. 1998;23(6):417-22.
13. Alam MS, Aqil M, Qadry SA, Kapur P, Pillai KK. Utilization pattern of oral hypoglycemic agents for diabetes mellitus type 2 patients attending out-patient department at a University hospital in New Delhi. *Pharmacol Pharm* 2014;5:636-45.
14. Dominic A, Joseph J, Augustin RM, Begum R, Nanjwade BK, et al. (2016) Study Of Drug Use Evaluation On Oral Antihyperglycemic Agents In Type 2 Diabetes Mellitus And Their Potential Drug-Drug Interactions 5: 1884-1896 Link: <https://goo.gl/vd6EPc>
15. Sharma M, Sharma K, Gaur K, Bedi R (2016) Socio demographic profile of Diabetic cases attended at Diabetic clinic of a tertiary hospital of western Rajasthan India 2: 23-28 Link: <https://goo.gl/MKze8M>
16. Alex SM, Sreelekshmi BS, Smitha S, Jiji KN, Menon AS, Uma Devi P. Drug utilization pattern of anti-diabetic drugs among diabetic outpatients in a tertiary care hospital. *Asian Journal of Pharmaceutical and Clinical Research*. 2015;8(2):144-6.
17. Pushpa VH, Nagesh HN, Ramesh HS. Study on prescribing pattern and rational use of antidiabetic drugs in elderly patients with type 2 diabetes mellitus in tertiary care hospital. *Natl J Physiol Pharm Pharmacol* 2020;10(10):825-828.
18. Vengurlekar S, Shukla P, Patidar P, Bafna R, Jain S. Prescribing pattern of antidiabetic drugs in Indore city hospital. *Indian journal of pharmaceutical sciences*. 2008 Sep;70(5):637.