MED-PHOENIX: JOURNAL OF NATIONAL MEDICAL COLLEGE

ORIGINAL ARTICLE

PRESCRIPTION PATTERN OF ANTI-DIABETIC DRUGS IN TYPE 2 DIABETES MELLITUS PATIENTS AT A TERTIARY HEALTH CARE CENTER, BIRGUNJ, NEPAL

Smita Singh,[1]* Chandrajeet Yadav,[1] Phulgen Bhagat,[1] Dhivya Chakravarthy,[1] Sudhakar Jha,[2] Anish Mudvari,[3] Prabin Kumar Singh,[4] Kush Raut,[2] Rohit Sah[5]

[1]Department of Pharmacology, National Medical College Teaching Hospital, Birgunj, Nepal
[2]Department of Internal Medicine, National Medical College Teaching Hospital, Birgunj, Nepal
[3]Department of Pharmacology, Institute of Medicine, Kathmandu, Nepal
[4]Department of Pediatrics, Narayani Sub-regional Hospital, Birgunj, Nepal
[5]Department of Biochemistry, National Medical College Teaching Hospital, Birgunj, Nepal

Date of Submission : August 21, 2025
Date of Acceptance : September 5, 2025
Date of Publication : March 20, 2026

Correspondence to:
Smita Singh
Associate Professor
Department of Pharmacology
National Medical College Teaching Hospital, Birgunj, Nepal
Email: singhrajputsmita64@gmail.com
Contact No: 9779852056346

Citation:
Singh S, Yadav CK, Bhagat P, Chakravarthy D, Jha S, Mudvari A, Singh PK, Raut K, Sah R. Prescription Pattern of Anti-Diabetic Drugs in Type 2 Diabetes Mellitus Patients at a Tertiary Health Care Center, Birgunj, Nepal. Medphoenix. 2025;10(2):14-18:
DOI:*https://doi.org/10.3126/medphoenix.v10i2.91693*

Conflict of interest: None, ***Funding:*** None

Publisher: *National Medical College Pvt. Ltd.*
MedPhoenix - Journal of National Medical College (JNMC); 2025,10(2), available at www.jnmc.com.np

ISSN:2631-1992 (Online); ISSN:2392-425X (Print)

ABSTRACT

Introduction: *Diabetes mellitus has been an emerging public health concern in our country, lifestyle modifications and pharmacotherapy have been the main treatment modality till date. This study was conducted to evaluate the prescription pattern and rational use of anti-diabetic medications.*

Materials and Methods: *This cross- sectional study was conducted for three months at National medical college and teaching hospital among 134 type 2 diabetic patients. Socio-demographic data, anti-diabetic medications detail and adherence to the National essential drug list were obtained. SPSS version 16 was used for statistical analysis.*

Results: *Out of 134 participants, 68 were male and most of the participants (64.17%) were residing in urban area. Hypertension (31.34%) was the most common comorbidity. The number of participants on combination of Biguanides and Sulfonylurea were 38 (28.35%) whereas participants who were only on Metformin was 26(19.40%). The average number of ant-diabetic drugs prescribed per prescription was 1.97.Only single prescription contained a drug prescribed by generic name. Insulin Injections were given to 18(13.43%) patients.*

Conclusion: *The study revealed that Metformin was still the most commonly prescribed anti-diabetic agents both as monotherapy and in combination. Newer agents like DPP-4 inhibitors, SGLT-2 inhibitors have also been used. Prescribing by generic name was low. Average number of drugs prescribed per prescription was also less.*

Keywords: *Biguanides, Diabetes Mellitus, DPP-4 Inhibitors, Prescription Pattern, Sulfonylurea*

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder in which normal processing of carbohydrates, protein and fats are dysfunctional due to disturbance in either production or resistance of peripheral tissues to hormone insulin. It is basically categorized into two types Type 1 DM which occurs due to destruction of beta cells of pancreas and Type 2 DM where body tissues become resistant to insulin and insulin production cannot meet body demand.[1] If uncontrolled hyperglycemic persists it can cause micro and macrovascular complications affecting different organs such as eye, kidney, blood vessels, heart and nerves leading to both morbidity and mortality.[2]

According to International Diabetes Federation(IDF) Diabetes Atlas 2025, the global prevalence of diabetes in adults aged 20-79 years is estimated around 11.1% with increasing trend in low and middle income countries.[3] Nepal is also witnessing a steady rise in DM in urban and semi-urban areas due to sedentary life style, dietary transitions etc. A systematic review and meta-analysis in 2020 reported 8.5% prevalence for DM and 9.2% for prediabetic among Nepalese population.[4]

Life style modifications, Insulin and oral hypoglycemic drugs have been the basis of treatment of DM. Newer

classes of drug such as incretin-based therapies, dipeptidyl peptidase4 (DPP-4) inhibitors, Amylin analogue, SGLT-2 inhibitors have made a revolutionary remark in the treatment of DM. [5] Drug utilization (DU) studies give idea about the current trend in prescribing pattern, motivation for prescribing rationally and also help in giving feedback to the practitioners. It also helps to know about the use of drugs form essential drug list, adherence to national drug list and use of generic name.[6]

This study was conducted at a tertiary center which provides care to diverse population, both urban and rural population. It helped to identify rational use of drug, evidence based treatment for patient safety and treatment outcome.

MATERIALS AND METHODS

Study Design

A descriptive cross sectional study was conducted among all type 2 DM patients attending the diabetic clinic of NMCTH (National Medical College Teaching Hospital) for three months. Ethical consideration was taken from Institutional Review Committee, National Medical College (Ref. F-NMC/721/082-083).

All patients above 18 years of either gender who had been diagnosed as type -2 diabetes mellitus (Diagnostic criteria: Symptoms of DM, plus RBS ≥200mg/dl, or FBS ≥ 126mg/dl, or PP2BS ≥ 200mg/dl, HBA1C>6.5gm %) were enrolled in the study. [7]Patients less than 18 years, patients with type I DM, gestational DM and unwillingness to participate in the study were excluded from the study. Purposive Sampling method was applied.

The sample size was calculated using Cochrane formula

$$n=Z^2PQ/e^2$$

$$= (1.96)^2 \times 0.085 \times (1-0.085)/ (0.05)^2$$

where, p= prevalence of type IIDM in Nepal (0.085)[4]

e=allowable error

After adding 10% non-response rate the total sample size was 133.33=134

After obtaining informed consent from the patient, structured questionnaire containing socio-demographic profile of patient, details about anti-diabetic medications, past h/o of any medical illness were recorded.

i) The socio-demographic detail contained age, gender, address.

ii) Anti-diabetic medications detail contained:- name of the drug, co-prescribed medications, duration of type II DM. The average number of drugs per prescription was calculated.

iii) Adherence to essential drug list: The percentage of anti-diabetic drugs prescribed from the National List of Essential medicines Nepal was calculated.

RESULTS

Table 1: Demographic Details

Demographic details	Number of patients (n=134)	Percentage (%)
Age in years		
30-45	34	25.37
46-60	69	51.49
61-75	22	16.41
>76	9	6.71
Gender		
Male	68	50.74
Female	66	49.25
Address		
Rural	48	35.82
Urban	86	64.17
Comorbidities		
COPD	29	21.64
Hypertension	42	31.34
Hypothyroidism	22	16.41
Hyperthyroidism	6	4.47
Duration of Diabetes		
Less than 5 years	34	25.37
6-10 years	62	46.26
11-15 years	41	30.59
Greater than 16 years	3	2.23

After analyzing 134 prescriptions, gender distribution was nearly equal with 50.74% male and 49.25% female and 51.49% of the study population were into the age group 46 to 60 years. The mean age (±SD) of population was 54.75 ± 11.46 years. With regard to duration of diabetes, 46.26% of participants had been diagnosed for 6-10 years. Out of 134 prescriptions fasting blood sugar report was available for 115 participants and the mean± SD value was 131 ± 44.1mg/dl whereas the random blood sugar report was available for 123 participants and the mean ± SD value was 223 ± 79.85mg/dl.

Table 2: Prescribing drugs detail

Name of drugs	Number of prescriptions(n=134)	Frequency (%)
Biguanides (B)	26	19.40
Sulfonylurea(S)	2	1.49
DPP4- inhibitors	6	4.47
Biguanides+ Sulfonylurea	38	28.35
Biguanides+ DPP4- inhibitors	8	5.97
Sulfonylurea+ DPP4- inhibitors	8	5.97
Biguanides + SGLT-2 inhibitors	4	2.98
Biguanides+ Sulfonylurea + SGLT-2 inhibitors	11	8.20
Biguanides+ Sulfonylurea+DPP4- inhibitors	9	6.71
Biguanides+ Sulfonylurea + SGLT-2 inhibitors +α-glucosidase inhibitors	4	2.98
Insulin	6	4.47
Insulin +DPP4- inhibitors	7	5.22
Insulin +DPP4- inhibitors+ Biguanides	2	1.49
Insulin + Biguanides+ Sulfonylurea +DPP4- inhibitors	2	1.49
Insulin + Biguanides+ Sulfonylurea +DPP4- inhibitors +SGLT-2 inhibitors	1	0.74

Among 134 participants, Biguanides was the most commonly used oral monotherapy prescribed to 19.4% patients. For oral combination therapy, Biguanides + Sulfonylurea combination (28.35%) was preferred. In the injectable form only insulin was used in six patients whereas it was used with combination with other oral anti-diabetic drugs in 12 patients. (Table 2)

Table 3: Prescribing indicators of study population (n=134)

Prescribing indicators	N (%)
Total number of anti-diabetic drugs prescribed	265
Average number of drugs prescribed per prescription	1.97
Prescriptions with monotherapy of oral anti-diabetic drugs	34(25.37)
Prescriptions with combination of oral anti-diabetic drugs	91(67.91)
Drugs prescribed from the National essential drug list (sixth revision)	130(49.05)
Use of generic name in prescription	1(0.75)
Prescriptions with parenteral preparations (insulin injections)	18 (13.43)
Prescriptions with oral preparations	116(86.57)

In the study population of 134 participants, a total of 265 anti-diabetic drugs were prescribed, with an average of 1.97 drugs per prescription. There were 91(67.91%) prescriptions containing combination of drugs. Drugs prescribed from the National essential drug list was 130. Only single prescription contained generic name. Insulin Injections were given to 18 patients. Insulin Glargine was given among 11(8.21%) patients.

DISCUSSION

In this study, prescribing pattern of anti-diabetic medications at tertiary health care center in Birgunj was evaluated where we observed an equal number of male and female diabetic patients which is consistent with the findings of Shakya et al.[8]Similarly, a study conducted in Pokhara by Shrestha and Vaidya also showed an equal distribution of Type II DM among males and females.[9] These findings suggests that either health - seeking behavior among females has improved or the number of female diabetic patients has increased as previous studies done in Nepal show gender differences in the prevalence of diabetes.[10]The age group mostly affected in our study was between 46-60 years which is consistent to study done by Shankhadev et al.[11]This might be attributed to stressful life style and unhealthy dietary habits. In our study, number of diabetic patients residing in urban area were higher than those in rural areas, similar to study done by Shrestha N etal.[10] Hypertension was the most common comorbidity observed which has also been reported in several other studies.[11,12]

In our study, monotherapy with Biguanides(Metformin) and its combination with sulfonylurea(SU)was the most commonly preferred regimen which is consistent with findings of other studies.[8,13,14]The preference to Metformin might be due to decrease in tissue resistance to insulin, euglycemic effect, lack of weight gain, improvement in beta cell function and additional vasoprotective effects.[15] Among SU, Glimipiride was the most frequently used medication and this aligns to Japanese study.[16]The Standards of care in diabetes 2024 recommends cautious use of SU due to risk of hypoglycemia and suggests Glipizide as a safer medication due to fewer side effects. Non-adherence to standard guidelines might be due to lack of awareness to guidelines.[17]Monotherapy with DPP-4 inhibitors was less frequently prescribed rather it was used in combination possibly due to higher cost of these newer drugs and relatively being less efficacious than SU in controlling blood glucose level.[18]

Duration of Diabetes also influenced the choice of treatment. In our study, patients with diabetic duration more than 11 years (33.8%) were treated with combination therapy consisting of three or four oral drugs and this is in accordance with study done by Jamali at Pakistan.[19]Voglibose (alpha glycosidase inhibitor) was used in quadruple therapy as its combined use has suggested to help in maintaining blood glucose level, decreasing body weight and has good acceptance among Indian origin people who consume a lot of carbohydrate in their diet.[20]

The present study showed lower frequency use of Insulin use, either as monotherapy or in combination with other drugs, consistent with findings reported by Shakya et al.[8] The reason behind this might be not as a first choice of drug in type 2DM, in acceptance to parental drugs, finding difficult to administer, painful and costly.[21] Meta- analysis studies have also shown higher risk of hypoglycemia and weight gain due to Insulin use.[22]

None of the prescriptions included thiazolidinediones, meglitinide analogue, GLP-1 agonist. The reason behind this might be side effects of thiazolidinediones such as bone fractures, weight gain, oedema, heart problems. Meglitinide analogue require frequent dosing and risk of hypoglycemia is also high. GLP-1 agonist are costly and preferred in uncontrolled Diabetes. SGLT-2 inhibitors were also less frequently prescribed as it is an add on therapy and caries high risk of urinary tract infections. [23]

This study also showed that average number of anti-diabetic drugs prescribed per prescription was 1.97 which is accordant with study done by Karki et al in Nepal [24] but several studies done in India have shown 2.27[25] and 3.34.[26] Prescribing fewer drugs is desirable as it may enhance compliance, lower the cost of therapy and reduce the risk of drug interactions. Brand name prescribing was more than that of generic name which has been seen by many studies and this might be due to influence by pharmaceutical companies or in developing countries bioequivalence studies are not done so prescribers might not have trust in generic name. [6, 14, 24] In our study, prescribing from essential drug list was also low similar to Pushpa etalstudy.[6] Majority of patients received oral preparations rather than parenteral form. This might be due to cost and difficult to self-administer.

CONCLUSION

Diabetes mellitus is a chronic disease and its prevalence has been increasing widely as well as in Nepal. This study concluded that Biguanides was still commonly used as a monotherapy where as in combination Sulfonylurea and Biguanides. Newer agents like DPP-4 inhibitors, SGLT-2 co-transporter inhibitors were also used. Combination of oral drugs were preferred. Furthermore, majority of the drugs were prescribed by brand name and were not selected from the National Essential Medicines List of Nepal, both of which are essential components for rational use of drugs. Thus for promoting rational use of drugs so that improvement in compliance, decrease in cost and adverse effects can be done by conducting workshops and seminars.

ACKNOWLEDGEMENT

The authors would like to acknowledge National Medical College Teaching Hopsital for the support provided to conduct the study and above all the study subjects for their invaluable time and smooth participation.

CONFLICT OF INTEREST: None

REFERENCES

1. Jha H, Khan TA, Khan N, Fatima G. Analysis of Prescription Pattern of Anti-diabetic Medications in a Teaching Hospital in North India. Cureus. 2024;16(6):e63343. DOI: 10.7759/cureus.63343. PMID: 39070354; PMCID: PMC11283627.

2. Raj DR, Firdose DN, Kalabharathi DH, V.H. DP, A. DPC, Satish DA. A Study of Prescription Pattern of Anti-Diabetic Drugs and Usage of Teneligliptin for Type II Diabetis Mellitus. J Pioneering Med Sci. 2024 ;13(5):74-8.DOI : 10.61091/jpms202413513

3. International Diabetes Federation. IDF Diabetes Atlas. 11th ed. Brussels:International Diabetes Federation; 2025.

4. Shrestha N, Mishra SR, Ghimire S, Gyawali B, Mehata S. Burden of Diabetes and Prediabetes in Nepal: A Systematic Review and Meta-Analysis. Diabetes Ther.2020 ;11(9):1935-46. DOI: 10.1007/s13300-020-00884-0. PMID: 32712902; PMCID: PMC7434818.

5. Chong K, Chang JK-J, Chuang L-M. Recent advances in the treatment of type 2 diabetes mellitus using new drug therapies. Kaohsiung J Med Sci. 2024;40(3): 212–20. DOI:10.1002/kjm2.12800

6. Satpathy SV, Datta S, Upreti B: Utilization study of antidiabetic agents in a teaching hospital of Sikkim and adherence to current standard treatment guidelines. J Pharm Bioallied Sci. 2016, 8:223-8. DOI: 10.4103/0975-7406.175975.

7. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2010 ;33:S62-9. DOI: 10.2337/dc10-S062. Erratum in: Diabetes Care. 2010 ;33(4):e57. PMID: 20042775; PMCID: PMC2797383.

8. Shakya Shrestha S ,Palanchoke S , Shrestha R , Bhatta RD . Study of Prescription Pattern and Factors Associated with Clinical Outcomes in Type 2 Diabetes Mellitus with Reference to Short Term Glycemic Control. Kathmandu Univ Med J. 2019;17(68):279-86. PMID: 33311036.

9. Shrestha N, Vaidya G. Prevalence of type 2 diabetes and its associated factors among general population of Pokhara Metropolitan City. J Gandaki Med Coll.2024; 17(1):47–53. DOI:10.3126/jgmcn.v17i1.64516

10. Shrestha N, Karki K, Poudyal A,Aryal KK, Mahato NK, Gautam N et al. Prevalence of diabetes mellitus and associated risk factors in Nepal: findings from a nationwide populationbased survey. BMJ Open 2022;12:e060750. DOI:10.1136/bmjopen-2022-060750.

11. Shankhadev A, Shrestha GP, Khadka D, Shrestha A, Shrestha A. To Study the Prevalence and the Risk Factors of Diabetes Mellitus in Patients Attending a Tertiary Center of Nepal. Curre Res Diabetes &Obes J 2024; 17(4): 555970. DOI: 10.19080/CRDOJ.2024.17.555970.

12. Alsaadon H, Afroz A, Karim A, Habib SM, Alramdan MJ, Billah B et al. Hypertension and its related factors among patients with type 2 diabetes mellitus – a multi-hospital study in Bangladesh. BMC Public Health .2022;22:198. DOI:10.1186/s12889-022-12509-1

13. Kumar PA, Kumar KR. Prescribing pattern ofantidiabetic drugs in tertiary care hospital.IntJBasic Clin Pharmacol 2021;10:251-4. DOI: 10.18203/2319-2003.ijbcp20210555

14. 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):825-28. DOI: 10.5455/njppp.2020.10.05138202010062020

15. Bailey CJ. Metformin: Therapeuticprofile in the treatment of type 2 diabetes. Diabetes ObesMetab. 2024;26(Suppl. 3):3-19. DOI:10.1111/dom.15663BAILEY 19

16. Sakamoto M, Yamazaki M ,Takebe T , HosokawaM, Saika T, Nakao Y etal. Sulfonylurea prescription patterns in elderly patients with type 2 diabetes mellitus: A comprehensive analysis of real-world data from pharmacies in Japan.J Diabetes Investig 2024; 15: 1604–13. DOI: 10.1111/jdi.14302

17. American Diabetes Association Professional PracticeCommittee. Standards of care in diabetes—2024. DiabetesCare 2024; 47(Suppl 1): S244–S257.

18. Amod A. The Place of Sulfonylureas in Guidelines: Why Are There Differences? Diabetes Ther. 2020 ;11(Suppl 1):5-14. doi: 10.1007/s13300-020-00811-3. Epub 2020 Apr 22. PMID: 32323155; PMCID: PMC7261304.

19. Jamali A, Ram N, Karim S, Sattar S, Rashid MS, Islam N. Prescribing patterns of antidiabetic drugs and glycaemic control in type 2 diabetes patients visiting tertiary care hospital based in Karachi, Pakistan. Int J Community Med Public Health.2023;10:4082-8. DOI: 10.18203/2394-6040.ijcmph20233433

20. Parmar N, Gupta A, Jhaveri K et al. Real-World Assessment of Personalized Approach WithVoglibose Fixed-Dose Combination in Type 2 Diabetes Mellitus. Cureus.2024;16(4): e57494. DOI 10.7759/cureus.57494

21. Yilmaz A, Ak M., Cim A., PalanciY, Kilinc F. Factors influencing insulin usage among type 2 diabetes mellitus patients: A study in Turkish primary care. Eur J Gen Pract.2016; 22(4): 255–261. DOI:10.1080/13814788.2016.1230603

22. Erpeldinger, S., Rehman, M.B., Berkhout, C. et al. Efficacy and safety of insulin in type 2 diabetes: meta-analysis of randomised controlled trials. BMC EndocrDisord . 2016;16, 39 . DOI: 10.1186/s12902-016-0120-z

23. Sharma M,Nazareth I, Petersen I. Trendsin incidence, prevalence andprescribing in type 2 diabetesmellitus between 2000 and 2013 in primary care: a retrospective cohortstudy.BMJ Open 2016;6:e010210. DOI :10.1136/bmjopen-2015-010210

24. Karki N, Kandel K, ShahK, PrasadP,Khanal J. Combination Therapy in Diabetes Mellitus Patients Attending Outpatient Department in a Tertiary Care Centre: A Descriptive Cross-sectional Study. J Nepal Med Assoc 2022;60(256):1016-20.DOI: 10.31729/jnma.7642.

25. Khanna S, Malik M, Ahmad R. Prescription Audit and Prescribing Patterns of Antidiabetic Drugs of The Out-Patient Department of Medicine in A Tertiary Care Teaching Hospital in South Delhi, India. J PopulTher Clin Pharmacol .2025;32(3):999-1008. DOI: 10.53555/mnw6qw28.

26. Kiran PG, Anil SP, Karmur M. Prescription pattern and cost variation analysis in type 2 diabetes mellitus patients at private outpatient department. J Basic Clin Pharm2021;12: 11-14.