

# PRESCRIBING PATTERN OF DRUGS FOR DIABETIC PATIENTS IN A TERTIARY CARE PRIVATE SECTOR HOSPITAL, PESHAWAR, PAKISTAN

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## ABSTRACT

**OBJECTIVE:** to determine the prescription pattern of drug for hospitalized patients with diabetes mellitus (DM) attending a tertiary care hospital, Peshawar, Pakistan.

**METHODS:** This retrospective study was conducted from January 2015 to February 2015 in the department of endocrinology of tertiary care private sector hospital, Peshawar, Pakistan. During 2 months study period, 354 prescriptions were collected and analyzed. Prescriptions written for all DM patients of any gender, socio-economic status, religion specificity and ethnicity were included.

**RESULTS:** Out of 354 patients, 209 (59%) were female and 145 (41%) were males; majority age group was 60-69 years. Most common concurrent disease with DM was hypertension (31.63%). The maximum time spent by diabetic patients in hospitals was 3-days (27.15%). The most prescribed drugs were cardiovascular drugs (21.80% in females and 26.11% in males) followed by antibiotic (16.02% in females and 17.04% in males patients). Most common prescribed dosage form to female diabetic was tablet (46.19%) and to male diabetics was injection (45.84%). The most frequently prescribed anti-diabetic drug as a monotherapy was insulin (29.66%), two-drug combination was sitagliptin+metformin (8.47%), three-drug drug combinations were insulin+sitagliptin+metformin (5.08%) and four drug combinations were insulin+vildagliptin+metformin+pioglitazone (0.84%). The most frequently antibiotic prescribed for the management of diabetic foot was ceftriaxone (14.45%).

**CONCLUSION:** In our study, most prescribed antihyperglycemic monotherapy drug for hospitalized diabetic patient was insulin and two-drug combination drugs were sitagliptin+metformin. The most commonly drugs prescribed apart from anti-diabetic were cardiovascular drugs followed by antibiotics.

**KEY WORDS:** Comorbidity (MeSH), Diabetes mellitus type 2 (MeSH), Dosage forms (MeSH), Injections (MeSH), Prescription pattern (Non-MeSH).

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## INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorders in which hyperglycemia occurs due to either completely or relative lack of insulin secretion.<sup>1,2</sup> The

hyperglycemia produces the various signs and symptoms of diabetes mellitus such as excessive glucose loss in the urine (glucosuria), excessive formation of urine (polyuria), excessive water intake (polydipsia) and excessive food intake (po-

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lyphagia), and blurred vision.<sup>3,4</sup> Globally in 2011 it has been calculated nearly that the diabetes mellitus occurs in 366 million individuals and the number is increasing up to 552 million individuals by 2030.<sup>5</sup> While in Pakistan approximately 5.2 million people were affected by diabetes mellitus in 2000 which will increase to 13.9 million in 2030.<sup>6</sup>

The prescription pattern study is a part of medical assessment that focuses on checking as well as assessment of the prescribing practice of the prescribers plus to accomplish rational with cost effective medical care plus it also suggests fundamental changes in the prescription. Furthermore it assists to evaluate and propose modifications in the prescribing practices of physician to encourage rational drug utilization.<sup>7</sup> Drug prescription pattern studies are important investigative tools to find out the importance of drugs within the society. The outcomes of irrational prescribing consist of non-compliance to medications, which are able to result in complications because of uncontrolled glucose levels in the blood and also raise drug expenses as well as health care expenses. Numerous drug prescription pattern studies on anti-diabetic medication are available across the world.<sup>8-18</sup> In Pakistan, very limited studies have been conducted on the pattern of prescription writing for patients with DM.<sup>19,20</sup> This study was conducted to determine the prescription pattern of drug for hospitalized patients with DM attending a tertiary care private sector hospital, Peshawar, Pakistan.

## METHODS

This cross-sectional study was designed for analyzing the drug prescription pattern in indoor diabetic patients. The

study was conducted in the endocrinology department of tertiary care private sector hospital, Peshawar, Pakistan. After attaining approval from the institutional ethics committee and permission from medical records department (MRD) of tertiary care hospital, a retrospective data were collected and analyzed in January 2015 to February 2015 in between 9 am to 1 pm. This data was collected and recorded on the prescribed history proforma which is intended by the pharmacy department of Shaheed Benazir Bhutto University, Sheringal. The retrospective data which was collected actually containing the cases reported in the year 2011 to 2014. All the data was collected from the record room of the private hospital and all those cases were analyzed which was diabetic patient either type 1 or type 2 after the approval of ethical committee. All the prescriptions were critically analyzed and only those prescriptions were include which were possessing complete information about patient.

During the study; Out of 500 prescriptions, 354 cases were selected by simple random technique. Both the type 1 and type 2 diabetes patients of either gender were included, except the cases of pregnancy, and were evaluated for drug prescription patterns. Prescriptions from all diabetic patients of either gender along with no economical status, religion specificity and ethnicity were included. While prescriptions from pregnant women and with inadequate data were excluded. The collected data were carefully analyzed and prescriptions were checked for appropriateness. For the easy arrangement of entire data the Microsoft Excel 2007 was used and the data were analyzed by using descriptive statistics, showing the percentage and frequency of the observations.

## RESULTS

Out of 354 patients, 209 (59%) were female and 145 (41%) were males. Majority (n=334, 94.4%) were having

Type 2 DM and 20 (5.6%) had Type 1 DM. Majority of patients with DM were from age group of 60-69 years followed by 50-59 years (Figure 1).

Most common concurrent disease with DM was hypertension (31.9%), followed by chronic kidney diseases (15%) and coronary artery disease (15%) as given in Table 1.

Majority of patients (n=96; 27.2%) had duration of hospital stay of 3 days while 73 (20.6%) cases had spent 2 days (Figure 2).

The most prescribed drugs were cardiovascular drugs (21.80% in female and 26.11% in male) followed by antibiotic

(16.02% in female and 17.04% in male patients) [Table II]. The most common prescribed dosage form for females was tablets (46.19%), followed by injections (39.79%), capsules (6.8%) and syrups (5.25%). The most common prescribed dosage form for males was injections (45.84%), followed by tablets (41.94%), capsules (5.7%), syrups (4.33%), and inhalers (1.04%).

The most frequently prescribed anti-diabetic drug as a monotherapy was insulin (29.66%), two-drug combination was sitagliptin+metformin (8.47%), three-drug drug combinations were insulin+sitagliptin+metformin (5.08%)

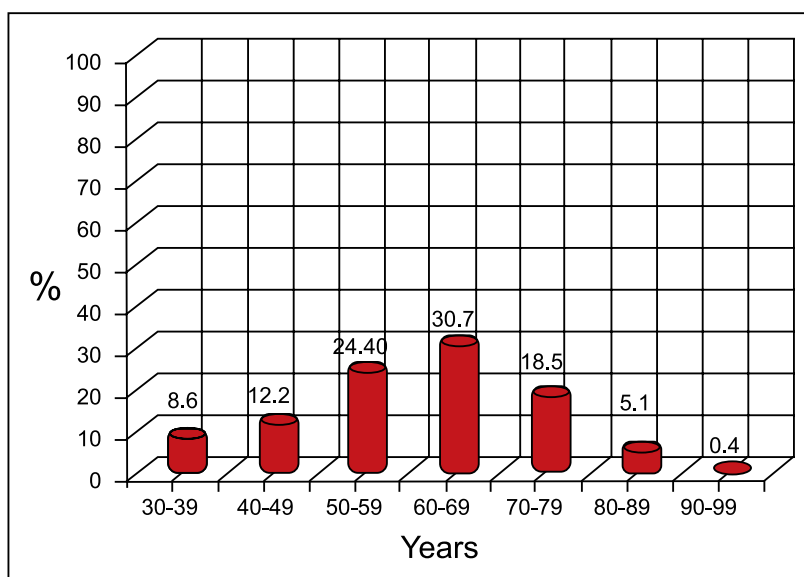


Figure 1: Age wise distribution of the patients with diabetes mellitus

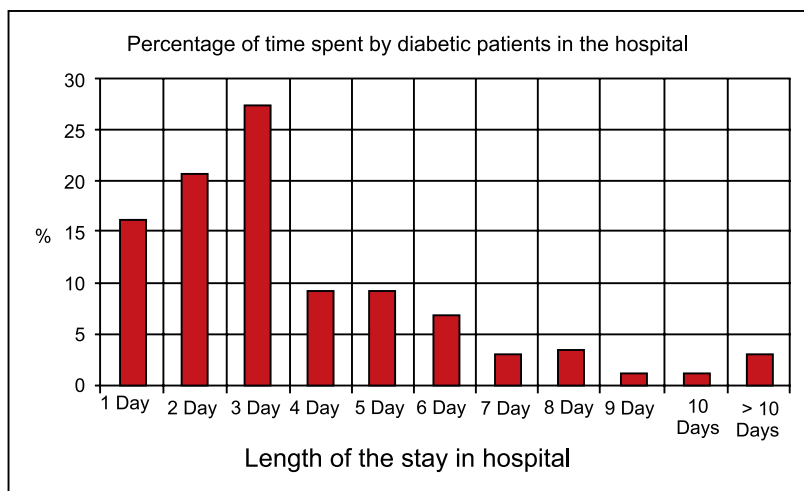


Figure 2: Length of stay of diabetic patients in the hospital

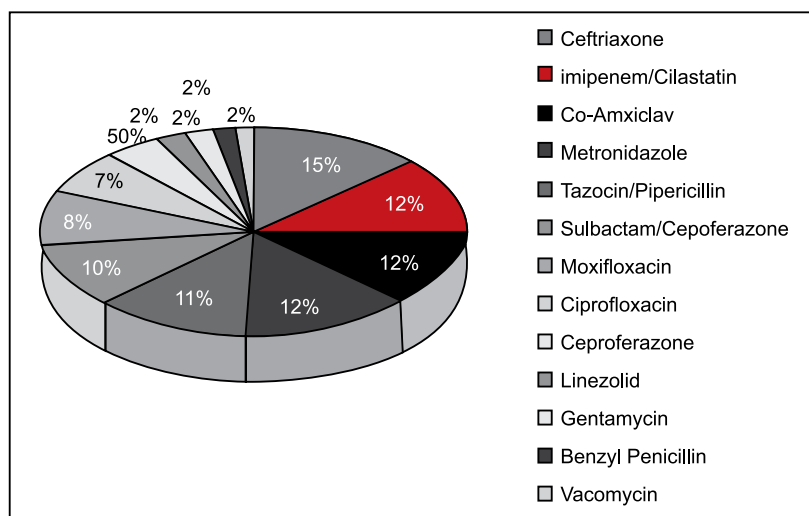


Figure 3: Prescription pattern of antibiotic recommended for the management of diabetic foot

TABLE I: CONCURRENT DISEASES WITH DIABETES MELLITUS

	Frequency (n=354)	%age
Hypertension	113	31.9
Chronic Kidney Disease	53	15
Coronary Artery Disease	53	15
Miscellaneous	46	13
Diabetic Foot Ulcer	25	7.1
Congestive Cardiac failure	21	5.9
Bronchial Asthma	21	5.9
Anemia	14	4
Tuberculosis	7	7

and four drug combinations were insulin + vildagliptin + metformin + pioglitazone (0.84%). Details of anti-diabetic drugs prescribed to both male and female diabetic patients are given in Table III.

The most frequently antibiotic prescribed for the management of diabetic foot was ceftriaxone (14.45%). Further details are given in Figure 3.

## DISCUSSION

In our study, insulin was the most frequently prescribed (29.66%) monotherapy anti-diabetic drug and sitagliptin + metformin (8.47%) as two-drug combination regimen. The commonest three-drug drug combinations were insulin + sitagliptin + metformin (5.08%) and four drug combinations were insulin + vildagliptin + metformin + pioglitazone (0.84%).

The most frequently antibiotic prescribed for the management of diabetic foot was ceftriaxone (14.45%).

In this study it has been found that female (59.04%) patients were more than male (40.96%) patients and is supporting findings of other studies.<sup>19</sup> The study also found that the frequency of type 2 diabetes (94.49%) is higher than type 1 diabetes mellitus (5.51%). The literature reported that the occurrence of type 2 diabetes mellitus is relatively higher than type 1 diabetes mellitus.<sup>1</sup> The reason that type 2 diabetes is more common than type 1 is because type 2 diabetes mellitus is associated with risk factors for example poor diet, obesity plus sedentary lifestyle.<sup>20</sup>

The study also highlighted that diabetes occurrence is higher in elderly

patients with highest among age range of 60-69 years. Similar report has been revealed by Desai et al, stated that majority of diabetes patients having age > 60 years.<sup>21</sup> The possible reason is the decreased proliferative ability of beta cells and higher rate of apoptosis in elderly patients. Another possible mechanism involved is the increased insulin resistance in which the cells cannot use insulin properly in elder patients. In this study, we also found that among the diagnosed co-morbidities, incidence of hypertension (31.63%) was higher followed by Chronic kidney disease (CKD) (15.31%), and CAD/IHD (14.70%). It has been reported in literature that hypertension is the most common concurrent disease occurred significantly with type 2 diabetes.<sup>3</sup> The study also observed that diabetic patients possess other co-morbidities like as CAD, nephropathy, neuropathy and dyslipidemia. Due to these co-morbidities diabetic patients were exposed to a greater risk of polypharmacy. The maximum length of the patient stay in hospital was 3-days (27.15%). Length of stay is a significant metric for evaluating the quality of care as well as planning facility within a hospital and it is a good symbol of the quantity of resource consumed for instance staffing, bed capacity and equipment.

Cardiovascular drugs (female; 21.80% and male; 26.11%) were the highly prescribed class of drugs followed by antibiotics (female; 16.02% and male; 17.04%) in the total prescriptions analyzed. The reason of higher prescription of cardiovascular drugs was mainly due to cardiovascular co-morbidities like hypertension (31.63%), CAD (14.70%) and CCF (5.50%), makes (52%) of total co-morbidities. Although the rationale for higher prescription of antibiotics was diabetic foot, CKD and some other miscellaneous diseases but prescription of higher antibiotics was related with the infection which was over assessed by physician. Excess utilization of antibiotics is responsible for drug resistance, in-

**TABLE II: CLASSES OF DIFFERENT DRUGS PRESCRIBED IN FEMALE AND MALE**

Therapeutic Category	Female		Male	
	Frequency (n=2890)	%age	Frequency (n=1819)	%age
CVS Drugs	630	21.80	475	26.11
Antibiotics	463	16.02	310	17.04
GIT Drugs	302	10.45	149	8.19
Anti-Diabetic Drugs	241	8.34	109	6
NSAIDs	191	6.60	138	7.58
Respiratory Drugs	166	5.74	116	6.38
Vitamins	135	4.67	71	3.90
Anti-Emetics	128	4.42	65	3.57
Psychotherapeutic Drugs	105	3.63	54	2.96
Steroids	92	3.20	37	2.03
Laxative	62	2.14	46	2.52
Anti-Anemic	73	2.52	32	1.75
Electrolyte	52	1.80	36	1.97
Opioids Analgesic	48	1.70	36	1.97
Anesthetics	38	1.31	27	1.48
Anti-Seizures Drugs	35	1.21	20	1.09
Muscle Relaxant	34	1.18	20	1.09
Nutrition Supplement	31	1.07	20	1.09
Anti-Parkinson's Drugs	12	0.41	7	0.38
Anti-T.B Drugs	12	0.41	25	1.37
Anti-BPH	3	0.10	16	0.87
Endocrine Drugs	9	0.31	4	0.21
Ophthalmic Drugs	8	0.27	1	0.03
Anti-Gout Drugs	7	0.24	—	—
Anti-Alzheimer Drugs	3	0.10	4	0.21

creased adverse drug reactions as well as makes the treatment costly. In this study 26 classes of drugs were prescribed to female and 25 classes to male. Therefore, the physician should avoid himself from the prescription of unnecessary medications like electrolytes, multivitamins plus nutrition supplement etc until extremely vital for the patients.

Among the dosage forms tablets (46.19%) were highly prescribed to female patients followed by injections (39.79%), capsules (6.8%) and syrups (5.25%). The rationale for highly prescribed tablet dosage form is because

tablets are simple and economical. Unlikely in male the most commonly prescribed dosage forms were injections (45.84%), followed by tablets (41.94%), capsules (5.7%), syrups (4.33%), and inhalers (1.04%). The reason for higher prescription of injections is might be due to use of insulin which is available only in injection form. However, overuse of injection as well as risky practices outcome in a main way of transmission for hepatitis B and C virus further more unsafe injections cover infection with HIV, septicemia, malaria and abscesses.

Among monotherapy anti-diabetic

medications, Insulin was the highly prescribed (29.66%) followed by metformin (11.86%) and glimepiride (8.47%). Similar finding was also revealed by Kumar et al that Insulin was the most prescribed medication followed by metformin.<sup>22</sup> The reason of highly prescribed of insulin is obvious because insulin is effective and produces good response in diabetic patients. In the present study it was found that among two drug combination sitagliptin + metformin (8.47%) was the most prescribed followed by vildagliptin + metformin (2.82%). The rationale for higher prescription of combination of sitagliptin and metformin is because it is recommended as an adjunct to diet as well as exercise to enhance glycemic control in adults having type 2 diabetes.

The most prescribed three drugs combination was insulin + sitagliptin + metformin (5.08%) while among four drugs combination insulin + vildagliptin + metformin + pioglitazone (0.84%) was highly prescribed. The reason for two drugs, three drugs and four drugs combination is because of conventional management of type 2 diabetes through single medication frequently fails so for better control on clinical symptoms and preventing the progression of the disease there is increase in the prescription combination drugs.<sup>15</sup>

Similarly regarding the prescription pattern of antibiotics recommended for treatment of diabetic foot, ceftriaxone (14.45%) was most highly prescribed followed by imipenem / cilastatin, Co-amoxiclav and metronidazole (12.04%). Similar findings have been reported that ceftriaxone is the most highly prescribed drug in the management of diabetic foot.<sup>21</sup> However placing ceftriaxone as a 1st preference in the antibiotic therapy carries no sense, because ceftriaxone has little active against gram+ive pathogens. The ideal drug of choice is Co-amoxiclav because of their good control against gram+ive as well as penicillinase producing strains of bacteria. Therefore, the ciprofloxacin

**TABLE III: SHOWS THE FREQUENCY AND PERCENTAGE OF ANTI-DIABETIC DRUGS PRESCRIBED TO BOTH MALE AND FEMALE DIABETIC PATIENTS**

Prescription pattern of anti-diabetic drugs	Generic name	Frequency (n=354)	Percentage
Monotherapy	Insulin	105	29.66
	Metformin	42	11.86
	Glimepiride	30	8.47
	Sitagliptin	14	3.95
	Vildagliptin	13	3.67
	Gliclazide	12	3.38
	Pioglitazone	8	2.25
	Glibenclamide	2	0.56
Two drug combination regimen	Sitagliptin + Metformin	30	8.47
	Vildagliptin + Metformin	10	2.82
	Insulin + Metformin	9	2.54
	Gliclazide + Metformin	7	1.97
	Glimepiride + Metformin	6	1.69
	Insulin + Glimepiride	5	1.41
	Insulin + Gliclazide	3	0.84
	Glibenclamide + Metformin	2	0.56
	Pioglitazone + Metformin	2	0.56
	Insulin + Vildagliptin	1	0.28
Three drug combination regimen	Insulin + Sitagliptin + Metformin	18	5.08
	Insulin + Vildagliptin + Metformin	16	4.51
	Insulin + Glimepiride + Metformin	3	0.84
	Sitagliptin + Glimepiride + Metformin	3	0.84
	Vildagliptin + Glimepiride + Metformin	2	0.56
	Sitagliptin + Gliclazide + Metformin	2	0.56
	Insulin + Pioglitazone + Metformin	1	0.28
	Sitagliptin + Pioglitazone + Metformin	1	0.28
Four drug combination regimen	Insulin + Vildagliptin + Metformin + Pioglitazone	3	0.84
	Insulin + Sitagliptin + Metformin + Pioglitazone	2	0.56
	Insulin + Glimepiride + Sitagliptin + Metformin	2	0.56

utilization in diabetic foot infection must be discouraged for the reason that merely 10.0% coli and its associated species are involved in the diabetic foot ulcers.<sup>22</sup>

## CONCLUSION

This study gives significant information about drug prescription patterns in indoor diabetic patients. In our study, most prescribed antihyperglycemic monotherapy drug for hospitalized diabetic patient was insulin followed by metformin and glimepiride. Commonly

prescribed two-drug combination drugs were sitagliptin + metformin, three-drug drug combinations were insulin + sitagliptin + metformin and four drug combinations were insulin + vildagliptin + metformin + pioglitazone. The most commonly drugs prescribed apart from anti-diabetic were cardiovascular drugs followed by antibiotics. Frequency of type 2 diabetes patients was higher than type 1 patients and hypertension and CKD were the commonest comorbidities in hospitalized diabetic patients.

## REFERENCES

1. Ramachandran G, Rohith V, Topno I. Evaluation of prescribing pattern of anti-diabetic drugs using WHO prescribing indicators in a tertiary care hospital in Puducherry: A cross-sectional study. *The Pharm Innov J* 2015; 4(5):76-80.
2. Purushothaman A, Roshni PR. A study on prescribing practice and general trends of diabetes among patients in a tertiary care teaching hospital. *Int Res J Pharm* 2015;6 (8):505-8.
3. Goel M, Rawat N. Investigation of outpatients prescribing pattern of antidiabetic drugs in type 2 diabetic patients a study

- conducted at a tertiary care hospital. *IOSR- J Pharm Biol Sci* 2015; 10(2): 26-30.
4. Ozougwu JC, Obimba KC, Belonwu CD, Unakalamba CB. The pathogenesis and pathophysiology of type 1 and type 2 diabetes mellitus. *J Physiol Pathophysiol* 2013;4(4):46-57.
  5. Whiting DR, Guariguata L, Weil C, Shaw J. IDF Diabetes Atlas: Global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Res Clin Pract* 2011;94(3):311-21.
  6. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes. Estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27(5):1047-53.
  7. Kumar MA, Nizar A, Shailaja K, Jayasutha J, Ramasamy C. A study on prescribing pattern and drug-drug interactions in type 2 diabetes mellitus (inpatients) in a tertiary care teaching hospital. *Der Pharmacia Letter* 2011;3(4):13-9.
  8. Hassan Y, Mathialagan A, Awaisu A, Aziz NA, Yahaya R, Salhani A. Trend in the use of oral hypoglycemic agents in an outpatient pharmacy department of a tertiary hospital in Malaysia. *Asian J Pharm Clin Res* 2009;2(2):40-6.
  9. Jimoh AO, Sabir AA, Chika A, Sani Z. Pattern of antidiabetic drugs use in a diabetic outpatient clinic of a tertiary health institution in Sokoto, North-western Nigeria. *J Med Sci* 2011;11(5):241-5.
  10. 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(1):79-85.
  11. Vengurlekar S, Shukla P, Patidar P, Bafna R, Jain S. Prescribing pattern of antidiabetic drugs in Indore city hospital. *Indian J Pharm Sci* 2008;70(5):637-40.
  12. Kannan, Arshad, Kumar S. A study on drug utilization of oral hypoglycemic agents in type-2 diabetic patients. *Asian J Pharm Clin Res* 2011;4(4):60-4.
  13. 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.
  14. Dave DJ, Dikshit RK, Gandhi AM. Utilization of some newer oral antidiabetic agents in a tertiary care hospital. *Natl J Physiol Pharm Pharmacol* 2012;2(2):146-51.
  15. Kumar SK, 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.
  16. 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(4):485-91.
  17. 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(1):514-9.
  18. Alam MS, Aqil M, Qadry SAS, Kapur P, Pillai KK. Utilization pattern of oral hypoglycemic agents for diabetes mellitus type 2 patients attending outpatient department at a University hospital in New Delhi. *Pharmacol Pharm* 2014;5(7):636-45.
  19. Bukhsh A, Liaqat I, Javaid S, Bashir M, Khan B, Yaseen H, et al. Prescription analysis of ambulatory patients of diabetes mellitus at Lahore Pakistan. *Adv Pharm Ethnomed* 2014;2(2):21-5.
  20. Mohler ML, He Y, Wu Z, Hwang DJ, Miller DD. Recent and emerging anti-diabetes targets. *Res Rev* 2009; 29:125-95.
  21. Prachi D, Chirag D, Aarti P, Desai S. A drug prescribing pattern study in diabetes mellitus: an outpatient study. *J Pharm Sci Bioscientific Res* 2015; 5(1):115-8.
  22. Cantrill JA, Wood J. Diabetes mellitus. In: Walker R, Edwards C, editors. *Clinical Pharmacy and Therapeutics*. Edinburgh: Churchill Livingstone; 2006; p. 666-672.

#### CONFLICT OF INTEREST

Author declared no conflict of interest

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### AUTHORS' CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

**AA, SUR:** Concept and study design, Acquisition of data, drafting of manuscript, final approval of the version to be published.

**Ab, SA:** Acquisition of data, Critical revision, drafting of manuscript, final approval of the version to be published.

**HH, AK:** Analysis and interpretation of data, drafting of manuscript, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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