ORIGINAL ARTICLE

ISSN: 0331 - 670X

https://doi.org/10.51412/psnnjp.2024.19

The Nigerian Journal of PHARMACY

AS MEN OF HONOUR WE JOIN HANDS

THE OFFICIAL ORGAN OF THE PHARMACEUTICAL SOCIETY OF NIGERIA FOUNDED 1927

Prescribing Pattern and Errors in the Prescriptions for Outpatients with Diabetes Mellitus at a Nigerian University Health Centre

Omotola D. Gbadegesin[1*], Oluwole I. Adeyemi[2]

[1]National Institutes of Health, Maryland, USA; [2]ODepartment of Pharmacology, Faculty of pharmacy, Obafemi Awolowo University, Ile-Ife, Nigeria

ARTICLE INFO

Article history:

Received 30th July 2024
Revised 26th September 2024
Accepted 29th September 2024
Online Published

Keywords:

diabetes mellitus,

prescribing errors,

prescribing patterns,

anti-diabetic medications

**Corresponding Author:*
Omotola D. Gbadegesin
Email: mtlogundipe@gmail.com
Tel: +12408988896

ABSTRACT

Background: Findings have revealed that prescribing errors are increasingly common in diabetes mellitus drug therapy mainly because of polypharmacy. An important way to tackle this problem is through regular prescription auditing.

Objectives: This study aimed to assess the prescribing pattern of prescriptions received from outpatients with diabetes mellitus at a Nigerian University Health Centre and identify prescribing errors in the prescriptions.

Methods: A cross-sectional study of prescriptions from outpatients who visited the Main Pharmacy of Obafemi Awolowo University Health Centre between January 28, 2020, and March 18, 2020, was conducted. The study included prescriptions for patients covered by the National Health Insurance Agency (NHIA) and contained orders for at least one medication for diabetes mellitus. Drug information and patient demographics were assessed for prescribing patterns and errors. Descriptive statistical analysis of the data was carried out using Microsoft Excel 2010.

Results: A total of 261 prescriptions containing at least one anti-diabetic medication were studied. All the patients were described as 'adults' but the exact ages were not indicated on the prescriptions. The medications were mostly prescribed in their brand names and metformin was the most prescribed drug either alone or in combination with other antidiabetic agents. A small percentage (4.2%) of the prescriptions had prescribing errors, a total of 11 in them. These errors included medication strength omissions, incorrect dosage, and therapy duration omissions.

Conclusions: We identified 11 prescribing errors from the outpatient prescriptions used in this study. Most times, these errors were identified by the clinical pharmacists on duty and were resolved either by communicating with the prescribers or using their professional discretion.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder causing an elevated glucose level in the blood due to a lack of or inadequate insulin in the body. Two major types of DM are type 1 DM (T1DM) and type 2 DM (T2DM). T1DM is an autoimmune disease where the body's immune system destroys the insulin-producing β-cells in the pancreas and requires that insulin be administered daily. T2DM, on the other hand, is characterized by resistance to insulin action or inadequate insulin secretion due to pancreatic β-cell dysfunction[1]. DM is one of the prevailing human medical conditions in the world. In 2019, 463 million adults aged 20–79 years lived with DM globally, and it has been estimated to increase to 700 million by the year 2045. Eighty-seven percent of diabetes-related deaths occur in low- and middle-income countries. In Nigeria, for example, more than 63000 deaths were attributed to diabetes in 2019 and 81.8% of these cases were people below 60 years of age[2].

Prescribing errors contribute to the prevalence of DM. Prescribing errors are failures during drug therapy that can

potentially cause harm to the patients. They are broadly classified into commission and omission errors[3,4]. In omission errors, essential information such as patient's name, age, and sex; prescriber's signature; and medication's dose, frequency, and dosage form are missing. In the case of commission errors, prescription information such as medication strength and combination therapy name are written wrongly[4]. Many studies have reported that patients with diabetes mellitus have at least one drug therapy problem with hypoglycemia being the commonest[5,6]. Prescribing errors were identified as one of the major causes of these therapy problems[6]. For example, 5 out of 13 fatal hypoglycemia events in elderly diabetic patients were due to errors in the dosage of chlorpropamide or insulin in a Poland study[3,7].

Regular prescription auditing is essential for assessing the appropriateness of written orders for the use of medications in patients by licensed healthcare professionals. Prescription auditing is defined as a descriptive analysis of the prescribing pattern of medications usually aimed at the rational use of drugs[8]. It helps to identify errors in the prescription and also provides feedback to the prescribers on the suitability of prescribed medications. Patients with DM are subjected to polypharmacy majorly due to manifold co-morbidities associated with DM, and this is a major contributor to prescribing error[9]. There are limited literature references on prescribing errors in DM. Thus prescription auditing should not be limited to highlighting prescribing patterns but also check for appropriateness of the prescriptions in terms of possible errors. This study aimed to assess the prescribing pattern of prescriptions for outpatients with DM at a Nigerian University Health Centre and also identify prescribing errors in the prescriptions.

METHODS

The study was conducted at the Main Pharmacy of Obafemi Awolowo University Health Centre in Ile-Ife, Osun State, Nigeria. The health facility provides medical services to the university community, including admissions and referrals. Tuesdays and Wednesdays were the clinic days for patients with DM and hypertension, with an average of 60 outpatient visits per day. All the prescriptions from outpatients who visited the Main Pharmacy between January 28, 2020, and March 18, 2020 were collected. The prescriptions written for patients that were covered by the National Health Insurance Agency (NHIA) and contained orders for at least one medication for DM were included in the study, while non-NHIA prescriptions and prescriptions without any antidiabetic medications were excluded. Drug information (medication name and dosage) and patient demographics (age and sex) were retrieved from a total of 261 NHIA prescriptions that contained orders for at least one medication for DM. Data collected were analyzed using Microsoft Excel 2010, and descriptive statistics (frequencies and percentages) were used to summarize prescribing patterns and errors.

RESULTS

A. Prescribing pattern

All the patients (140 females, 120 males, 1 unspecified) were described as adults but the exact ages were not indicated on the prescriptions. The majority (88%) of the prescriptions were written using their brand names. Metformin (86.6%) was the most prescribed drug either alone or in combination with other antidiabetic agents (Figure 1). Subcutaneous insulin (6.1%) was also prescribed together with oral antidiabetic drugs. Most of the reviewed prescriptions also contained other classes of medications co-prescribed with the anti-diabetics. About 70% of all the prescriptions contained medications for hypertension including lisinopril, candesartan, valsartan, and diuretics (Figure 2). Among the diuretics prescribed in this study, hydrochlorothiazide in doses of 12.5 mg and 25 mg was the most prescribed (Figure 3).

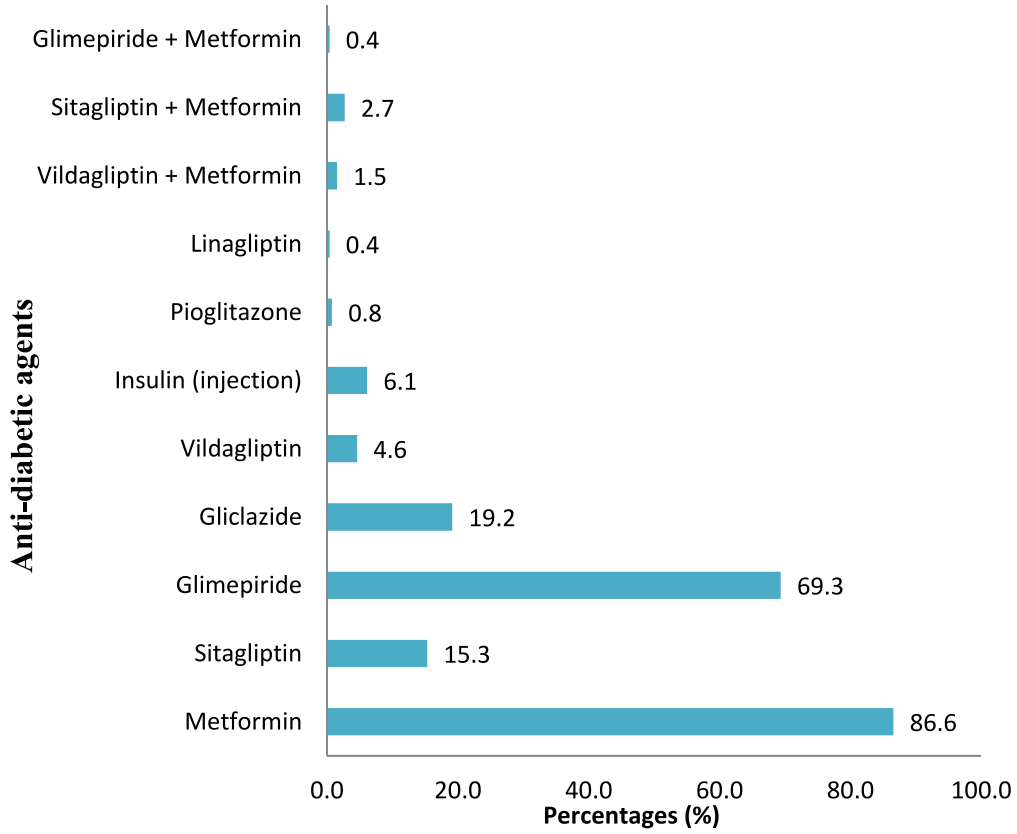

Figure 1. Prescribed anti-diabetic agents in their generic names.

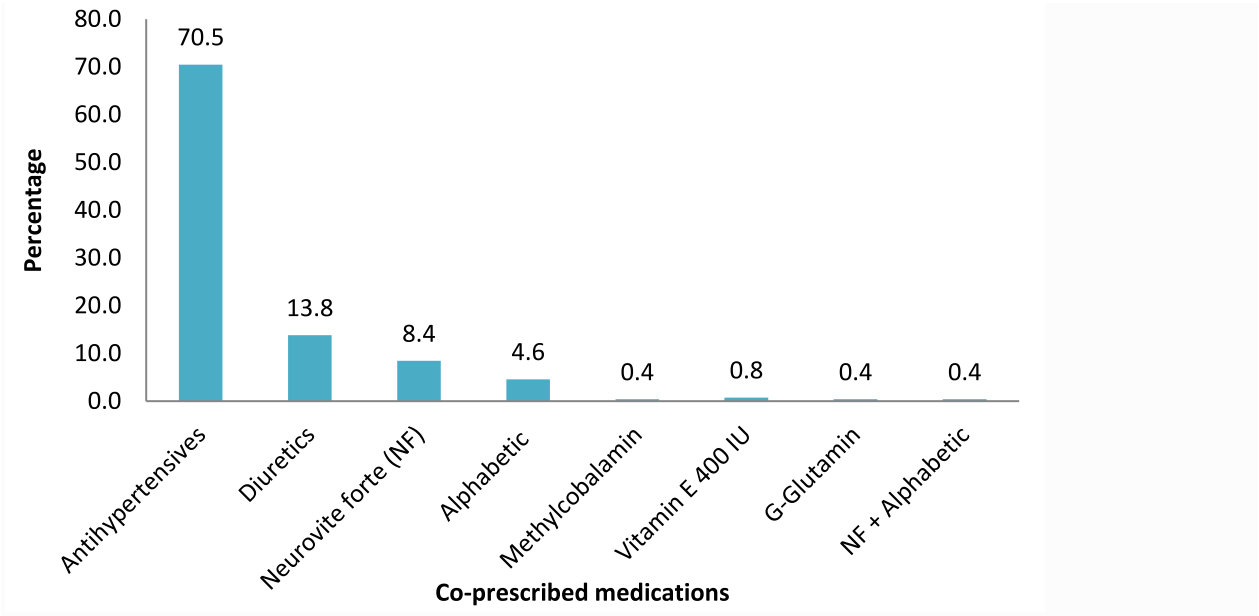

Figure 2. Prescriptions that contained anti-diabetic medications co-prescribed with other medications.

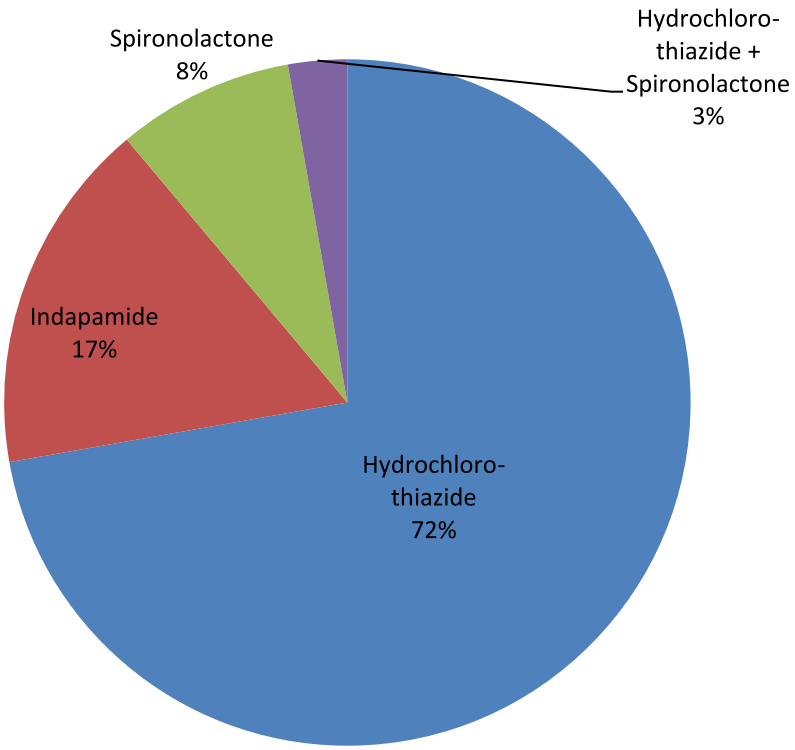

Figure 3. Co-prescribed diuretics.

B. Prescribing errors

Eleven prescribing errors were identified in 4.2% of the total prescriptions studied (Figure 4). Omission errors accounted for 8 of these while the rest were commission errors. The omission errors included omitted duration of therapy, gender, and the dose of medication. All the 3 identified errors of commission involved wrong dose and strength of the prescribed medications.

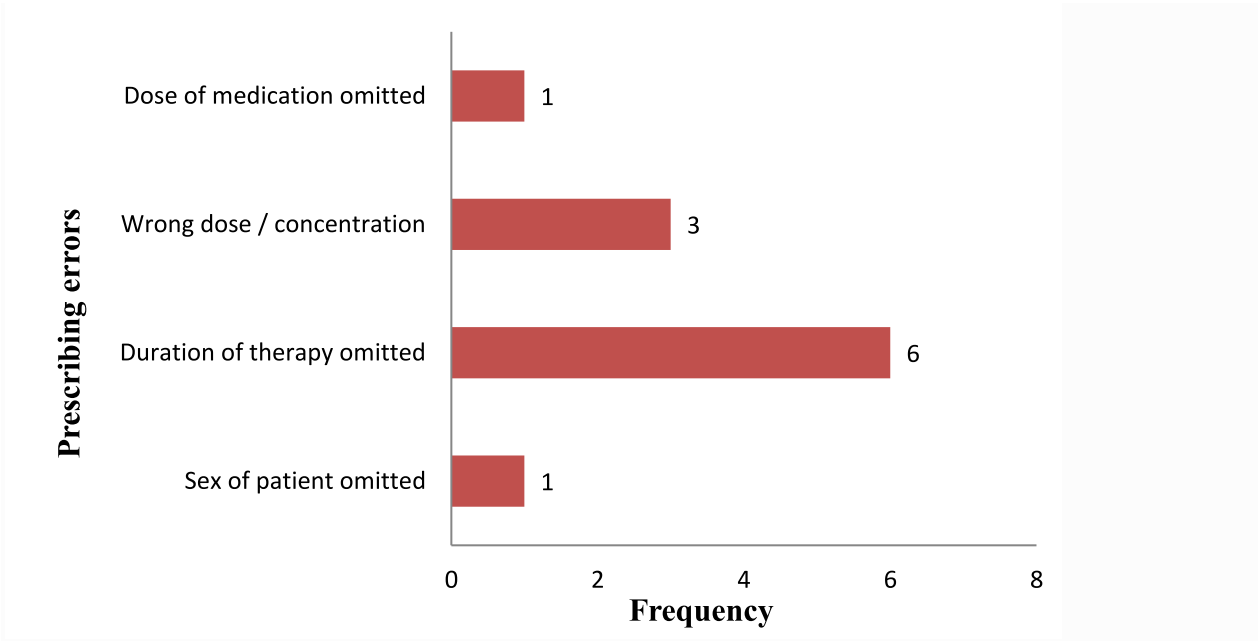

Figure 4. Prescribing errors identified in the study

DISCUSSION

All the patients whose prescriptions were used in this study had their ages described as adults. It is not enough to indicate an individual age as just an adult because some medications work better in a particular adult age group than in others. For instance, sulphonylureas (an example is glimepiride) work best in adult patients who are over 40 years old[10]. Similarly, self-administration of insulin injections by very elderly patients may be more difficult than for someone who is a young adult.

The most commonly prescribed medication in this study was metformin (86.6%). Insulin was also co-prescribed with oral antidiabetics including metformin. This is in line with most DM drug therapy guidelines where metformin is usually the first-line medication in the treatment of T2DM[11]. Insulin is a mainstay treatment in T1DM which is also used in patients with T2DM[10] whose pancreas produces little or no insulin. Chronically elevated blood glucose levels cause pancreatic β-cells to burn out such that endogenous insulin administration is required also in T2DM.

In addition, antihypertensives and diuretics were co-prescribed with anti-diabetic medications in about 70% of the reviewed prescriptions. Hypertension is one of the most common diseases that occur concurrently with DM. This is expected since hypertension is one of the most common diseases that occur concurrently with DM. The use of thiazide diuretics for the treatment of hypertension in patients with DM has been highly debatable because of their ability to exacerbate hyperglycemia. Low-dose thiazide diuretics (e.g. 12.5 to 25 mg daily dose of hydrochlorothiazide) and other diuretics are recommended for use in lowering blood pressure in patients with DM[12,13]. In this survey, hydrochlorothiazide (12.5 mg and 25 mg) was mostly prescribed. Also, common supplements co-prescribed were Neurovite forte®, G-glutamin®, and Alphabetic®. These contain vitamins including cyanocobalamin, thiamine, pyridoxine, L-glutamic acid, and chromium which are useful for controlling glucose metabolism and reducing neuropathy.

Eleven prescribing errors were identified in 4.2% of the total prescriptions studied (Figure 4). Omission errors accounted for 8 of these while the rest were commission errors. The omission errors included omitted duration of therapy, gender, and the dose of medication. All the 3 identified errors of commission involved wrong dose and strength of the prescribed medications. An example of omission error occurred with gliclazide which is commonly available at 30 mg and 60 mg strengths. The prescription merely stated “Diamicron ï daily for 4 weeks”. Although Diamicron® is a common brand name for gliclazide in Nigeria, the dosage given was confusing as it was difficult to know whether 30 mg or 60 mg strength was what the prescriber deemed fit for the patient.

All the 3 identified errors of commission involved the wrong dose or concentration of the prescribed medications. For example, 60 mg glibenclamide was prescribed daily for 4 weeks in a case. While the usual dose for glibenclamide in the treatment of T2DM is 5 mg; the prescribed dose could have been for gliclazide which is usually used at 30 mg or 60 mg once or twice daily. Glibenclamide, a second-generation sulphonylurea has hypoglycemia as its major side effect. An overdose of such magnitude (60 mg instead of 5 mg) would have caused a very severe crash-down in the patient's blood glucose.

The other two commission errors involved a fixed-dose combination of sitagliptin and metformin usually marketed as TreviaMet®. The amount of metformin in the medication is usually 500 mg or 1000 mg while sitagliptin is usually 50 mg or 100 mg. In this study, TreviaMet 1000 mg / 50 mg (indicating 1000 mg sitagliptin and 50 mg metformin) daily was identified in one of the prescriptions. A TreviaMet 50 mg / 100 mg daily dose was also identified in another prescription. Metformin is an insulin sensitizer that reduces glucose production in the liver and increases peripheral glucose update and is used at an initial dose of 500 mg twice daily. Sitagliptin, however, is an inhibitor of dipeptidyl peptidase – 4 (DPP - 4), an enzyme that degrades peptides that stimulate insulin secretion by the pancreatic β-cells. Sitagliptin and other DPP – 4 inhibitors at doses, not more than 100 mg are commonly used together with metformin to improve blood glucose control[10]. The above-cited occurrences could therefore lead to therapeutic failure in the patients.

CONCLUSION

Diabetes mellitus is a chronic disease of public health concern and the prescribing attitudes of healthcare providers can greatly influence how blood glucose control is well achieved. In this study, 88% of the prescriptions were written using the medication's brand names; constituting a bad prescribing practice[4]. Prescribing by generic names of medications has been shown to increase patients' compliance and improvement of health outcomes[14]. It will also reduce confusion during dispensing since generic names are commonly used universally. More than half of the identified prescribing errors were committed by omission, and therapy duration was mostly omitted. This is very costly because more than needed

medications could be dispensed to the patients, thus making necessary medications unavailable to other patients. An insufficient amount of needed medication will also likely impede the patient's medication adherence.

Although these prescribing problems were resolved by the clinical pharmacists' intervention, one cannot rule out the danger they posed to the patients if unidentified. Therefore, regular prescription assessment is a very important tool that will help to identify slips and lapses in drug therapy. It should be done periodically with its outcome communicated to healthcare providers and patients as well.

ACKNOWLEDGEMENTS

Special thanks to the Director and staff of the Pharmacy Department of Obafemi Awolowo University Health Centre for their support and permission to use their facility for the study during my West African Postgraduate College of Pharmacists fellowship program.

REFERENCES

1. Araújo F, Fonte P, Santos HA, Sarmento B (2012) Oral delivery of glucagon-like peptide-1 and analogs: alternatives for diabetes control? *Journal of Diabetes Science and Technology* 6(6):1486-97. DOI: 10.1177/193229681200600630.
2. International Diabetes Federation. IDF Diabetes Atlas. 9th ed. Brussels, Belgium, 2019. https://www.diabetesatlas.org. Accessed January 31, 2021.
3. Cox AR, Ferner RE (2009) Prescribing errors in diabetes. *The British Journal of Diabetes & Vascular Disease* 2:84-8. DOI: 10.1177/1474651409103902.
4. Shrestha R, Prajapati S (2019) Assessment of prescription pattern and prescription error in outpatient Department at Tertiary Care District Hospital, Central Nepal. *Journal of Pharmaceutical Policy and Practice* 12:1-9. DOI: 10.1186/s40545-019-0177-y.
5. Shareef JA, Fernandes JE, Samaga LA, Khader SA (2016) A study on adverse drug reactions in hospitalized patients with diabetes mellitus in a multi-speciality teaching hospital. *Asian Journal of Pharmaceutical Clinical Research* 9(2):114-7.
6. Demoz GT, Berha AB, Alebachew Woldu M, Yifter H, Shibeshi W, Engidawork E (2019) Drug therapy problems, medication adherence and treatment satisfaction among diabetic patients on follow-up care at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. *PloS one* 14(10):e0222985. DOI: 10.1371/journal.pone.0222985.
7. Stepka M, Rogala H, Czyzyk A (1993) Hypoglycemia: a major problem in the management of diabetes in the elderly. *Aging (Milano)* 5(2):117-21. DOI: 10.1007/BF03324137. PMID: 8323998.
8. Arul B, Jitty SM, Lekshimi M, Krishna PTK, Kothai R (2018) Prescription analysis of statins in patients with cardiovascular diseases and other comorbidities in various tertiary care hospitals at Salem district, Tamil Nadu. *International Journal of Research in Pharmaceutical Sciences* 10(1): 668-672. DOI: 10.26452/ijrps.v10i1.1899.
9. Breuker C, Abraham O, Di Trapanie L, Mura T, Macioce V, Boegner C, Jalabert A, Villiet M, Castet-Nicolas A, Avignon A, Sultan A (2017) Patients with diabetes are at high risk of serious medication errors at hospital: Interest of clinical pharmacist intervention to improve healthcare. *European Journal of Internal Medicine* 38:38-45. DOI: 10.1016/j.ejim.2016.12.003.
10. Diabetes Association of Nigeria (2013) Clinical Practice Guidelines for Diabetes Management in Nigeria. 2nd ed. Bendik Printing Press : Port-Harcourt, Nigeria, pp1-77.
11. Mahmood M, Reddy RC, Lahari JS, Fatima S, Shinde P, Reddy SA (2017) Prescription pattern analysis of antidiabetic drugs in diabetes mellitus and associated comorbidities. *Clinical Investigation (Lond.)* 8(1):5-12. DOI: 10.4172/Clinical-Investigation.1000123.
12. Elliott WJ (2012) Effects of potassium-sparing versus thiazide diuretics on glucose tolerance: new data on an old topic. *Hypertension* 59(5):911-2.DOI:10.1161/HYPERTENSIONAHA.112.192542.
13. Scheen AJ (2018) Type 2 diabetes and thiazide diuretics. *Current diabetes reports* 18:1-3.
14. Razmaria AA (2016) Generic drugs. *Jama* 315(24):2746. DOI:10.1001/jama.2016.3990.