Characteristics of drug usage statistics in hypertensive patients with diabetes At saint paul general hospital

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SUMMARY

Objective: *To analyze the characteristics of drug usage statistics in hypertensive patients with diabetes at the outpatient Department of Saint Paul General Hospital.*

Subjects and methods: *A retrospective study based on information collected from the medical records of patients diagnosed with hypertension and diabetes who received outpatient treatment at Saint Paul General Hospital from September 2022 to December 2022.*

Results: *The average age of the study group was 70.28 ± 7.2 years. The gender ratio was nearly equal, with 49% male and 51% female. The most commonly used drug groups were ARBs, followed by CCBs. Most patients used a single diabetes medication, with biguanides (Metformin) being the most commonly used, followed by Sulfonylureas. Insulin was used in nearly one-third of diabetes treatment prescriptions such as: 23.8% of patients (T0); 24.8% of patients (T1); 28.6% of patients (T2). There was 83% of patients in the study sample had lipid disorders. At T0, 63.81% of patients used statins, and 15.24% used Fenofibrate.*

Conclusion: *The study results show that 105 patients were annalyzed regarding demographic, drug usage characteristics. The majority of outpatient patients were hypertention with diabetes, suffering from comorbid lipid metabolism disorders.*

Keywords: *Diabetes, hypertension, medication usage, outpatient, Saint Paul General Hospital.*

INTRODUCTION

Diabetes and hypertension are considered two common comorbidities with a close relationship. Many studies have shown that the risk of morbidity and mortality due to hypertension complications in diabetic patients is twice as high as in non-diabetic patients . The International Diabetes Federation reported that the number of cases of diabetes was estimated to be 463 million in 2019 and would increase to 700 million by 2045 [2]. To contribute to improving the treatment quality of the hospital, especially for patients with hypertension and diabetes, the study "Characteristic of medication usage statistics in hypertensive patients with diabetes at Saint Paul General Hospital in 2022" was conducted with the objective of analyzing the current status of drug use in hypertensive patients with diabetes receiving outpatient treatment at Saint Paul General Hospital in 2022.

SUBJECTS AND METHODS OF THE STUDY

Subjects

Inclusion criteria: Outpatients patients diagnosed with hypertension and diabetes at the Outpatient Department of Saint Paul General Hospital [3], [4] from September 1st to December 31th 2022, meeting the selection and exclusion criteria.

Exclusion criteria: Patients < 18 years old, pregnant women, or breastfeeding women.

Study time and Location

Patients receiving outpatient treatment at the Outpatient Department of Saint Paul General Hospital from September 2022 to December 2022.

Research methodology

Study design: The study was conducted using a cross-sectional retrospective descriptive method based on information collected from the medical records of patients at the Outpatient Department of

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Saint Paul General Hospital from September 1st, 2022, to December 31th, 2022.

Sample Size: The entire sample of hypertensive patients with diabetes receiving outpatient treatment at the Outpatient Department of Saint Paul General Hospital from September 2022 to December 2022, meeting the inclusion and exclusion criteria.

Data collection tools and methods:

** Tools:* Pre-designed research medical records.

** Data Collection Methods:* Determine time point T0 as the point when patients were first included in the study (patients visiting in September 2022). At T0, patient demographic information and drug usage details were collected on information collection forms. Subsequent visits at T1, T2, and T3 (October, November, December 2022) noted drug prescriptions or adjustments.

Research indicators:

Demographic characteristics: Age and gender of patients in the study sample**.**

Drug use characteristics:

- Hypertension medications encountered in the study.

- Number of hypertension drugs per visit.

- Hypertension drug combination regimens in the study sample.

- Diabetes medications encountered in the study.

- Number of diabetes drugs per visit.

- Diabetes drug combination regimens in the study sample.

- Lipid metabolism disorder medications encountered in the study

Data processing and analysis methods

Data were coded, entered, and processed using Microsoft Excel 2016.

Descriptive statistics: Ranked variables were expressed as percentages (%). Continuous variables with normal distribution were presented as mean ± standard deviation (X ± SD), maximum – minimum values (min – max); non-normal distribution variables were presented as median and (min – max) values.

Ethical considerations

All patient information was kept confidential and used only for research purposes. Data collection, processing, and evaluation were objective and honest.

Research was approved by the thesis proposal board of the Pharmacy major at the Vietnam university of Traditional Medicine.

RESEARCH RESULTS

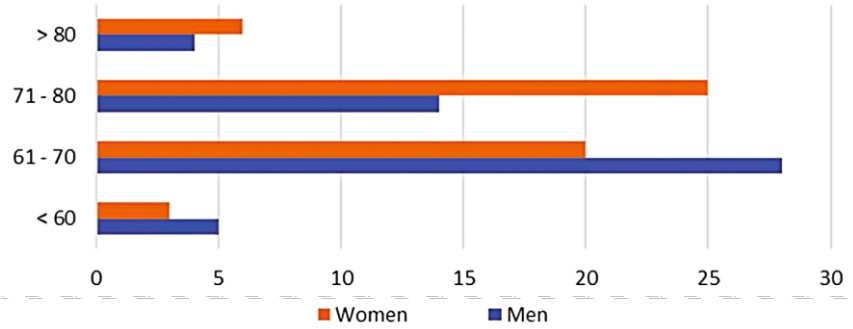

Figure 1. Distribution of patients by age group and gender in the study

The majority of patients in the study sample were elderly people aged 60 years and over, and were divided into 4 age groups. Group 1 (< 60 years old); group 2 (61 - 70 years old); group 3 (71 - 80 years old); group 4 (> 80 years old). The gender distribution of the study subjects is relatively similar, with 49% male and 51% female. The average age of the study subjects was 70.28 ± 7.2, with the youngest and oldest ages in the sample being 53 and 89, respectively. In both genders, the majority of patients were aged 61–80, with less than 10% of patients younger than 60 or older than 80 years.

Table 1. Distribution of patients by group of hypertension medications (n=105)

Drug class	Ingredients	T0 (n, %)	T1 (n, %)	T2 (n, %)
Loop diuretic	Furosemide	5 (4.8)	7 (6.7)	4 (3.8)
Thiazide diuretic	Hydrochlorothiazid	13 (12.4)	11 (10.5)	19 (18.1)
	Indapamide	2 (1.9)	3 (2.9)	2 (1.9)
	Total	20 (19)	21 (20)	22 (23.8)
Potassium-sparing diuretic	Spironolacton	8 (7.6)	11 (10.5)	3 (2.9)
Angiotensin-converting enzyme inhibitors	Captopril	0	0	2 (1.9)
	Enalapril	7 (6.7)	4 (3.8)	1 (1)
	Lisinopril	5 (4.8)	1 (1)	1 (1)
	Perindopril	12 (11.4)	8 (7.6)	16 (15.2)
	Ramipril	0	1 (1)	6 (5.7)
	Total	24 (22.9)	14 (13.3)	26 (24.8)
Angiotensin receptor blockers (ARBs)	Ibersartan	0	1 (1)	0
	Candesartan	7 (6.7)	6 (5.7)	1 (1)
	Irbesartan	4 (3.8)	8 (7.6)	3 (2.9)
	Valsartan	5 (4.8)	2 (1.9)	1 (1)
	Losartan	21 (20)	26 (24.8)	29 (27.6)
	Telmisartan	11 (10.5)	4 (3.8)	1 (1)
	Total	48 (45.7)	47 (44.8)	35 (33.3)
Calci-blocker	Amlodipine	15 (14.3)	28 (26.7)	26 (24.8)
	Felodipine	15 (14.3)	10 (9.5)	3 (2.9)
	Total	30 (28.57)	38 (36.2)	29 (27.7)
Alpha-blocker	Alfuzosin	3 (2.9)	6 (5.7)	3 (2.9)
Beta-blocker	Carvedilol	5 (4.8)	2 (1.9)	8 (7.6)
	Nebivolol	6 (5.7)	12 (11.4)	9 (8.6)
	Metoprolol	5 (4.8)	4 (3.8)	1 (1)
	Bisoprolol	12 (11.4)	8 (7.6)	0
	Nadolol	0	0	1 (1)
	Total	28 (26.7)	26 (24.7)	19 (18.2)

There were 23 drugs from 8 main drug groups prescribed for hypertension treatment. In all three months, the angiotensin receptor blockers (ARBs) group was the most prescribed, followed by the calcium channel blockers (CCBs) group.

Table 2. Distribution of patients by the number of hypertension drugs in the prescription (n=105)

Drug regimen	T0 (n, %)	T1 (n, %)	T2 (n, %)
No use of antihypertensive medications	13 (12.4)	16 (15.2)	13 (12.4)
Single drug	41 (39.1)	35 (33.3)	44 (41.9)
2-drug combination	39 (37.2)	37 (35.2)	38 (36.2)
3-drug combination	12 (11.4)	16 (15.2)	9 (8.6)
4-drug combination	0 (0)	1 (1)	1 (1)
Total	105 (100)	105 (100)	105 (100)

At the initial time, the proportion of patients using a single drug was the highest (39.05%) and decreased in the second month (33.3%), increasing to 41.9% in the third month. The proportion of patients using two-drug combinations did not change much, ranging from 35.2% to 37.2%. The proportion of patients using three drugs was low and decreased from 11.4% (T0) to 8.6% (T2). Only one patient combined four drugs at T1 and T2.

Table 3. Distribution of patients by hypertension treatment regimen (n=105)

Regimen	Drug classes in regimen	T0 (%)	T1 (%)	T2 (%)
No use of antihypertensive medications		13(13.4)	16 (15.23)	13 (13.38)
Single drug	Alpha-blocker	1(0.9)	1 (0.95)	0
	Beta-blocker	4 (3.81)	5 (4.76)	1 (0.95)
	Calci-blocker	5 (4.76)	5 (4.76)	3 (2.86)
	Loop diuretic	1 (0.95)	0	0
	Thiazdie	2 (1.9)	5 (4.76)	11 (10.48)
	ARBs	16 (15.24)	13 (12.38)	19 (18.1)
	ACEs	12 (11.43)	6 (5.71)	10 (9.52)
Total		41 (39.04)	35 (33.32)	44 (41.91)
2 drugs combination	Calci-blocker. beta-blocker	2 (1.9)	2 (1.9)	1 (0.95)
	Potassium-sparing diuretic. Calci-blocker	3 (2.86)	0	0
	Potassium-sparing diuretic ARBs	2 (1.9)	1 (0.95)	0
	Loop diuretic. Beta-blocker	1 (0.95)	0	1 (0.95)
	Loop diuretic. Potassium-sparing diuretic	1 (0.95)	1 (0.95)	0
	Thiazdie, beta-blocker	4 (3.81)	1 (0.95)	4 (3.81)
	Thiazdie, Calci-blocker	1 (0.95)	4 (3.81)	5 (4.76)
	Thiazdie, ARBs	4 (3.81)	3 (2.86)	1 (0.95)

	Thiazdie, ACE	1 (0.95)	0	0
	ARBs, beta-blocker	7 (6.67)	7 (6.67)	5 (4.76)
	ARBs, Calci-blocker	6 (5.71)	11 (10.48)	4 (3.81)
	ACE, alpha-blocker	1 (0.95)	1 (0.95)	0
	ACE, beta-blocker	1 (0.95)	4 (3.81)	2 (1.9)
	ACE, Calci-blocker	4 (3.81)	2 (1.9)	13 (12.38)
	ACE, ARBs	1 (0.95)	0	0
	Alpha blocker, calci-blocker	0	0	1 (0.95)
	ARBs, alpha-blocker	0	0	1 (0.95)
Total		39 (37.12)	37 (35.23)	38 (36.17)
At least 3 drugs combination	Potassium-sparing diuretic, ARBs, Calci-blocker	1 (0.95)	3	0
	Loop diuretic, Potassium-sparing diuretic, ARBs	2 (1.9)	1	1 (0.95)
	Thiazdie, ARBs, Beta-blocker	4 (3.8)	2	1 (0.95)
	ARBs, Calci-blocker, Beta-blocker	3 (2.86)	4	1 (0.95)
	ACE, alpha-blocker, Beta-blocker	1 (0.95)	0	1 (0.95)
	ACE, Calci-blocker, Beta-blocker	1 (0.95)	0	4 (3.81)
	Loop diuretic, Potassium-sparing diuretic, Calci-blocker	0	2	0
	Thiazdie, alpha-blocker, Beta-blocker	0	1	0
	Thiazdie, ARBs, Calci-blocker	0	1	0
	Thiazdie, ACE, Calci-blocker	0	1	0
	ACE, ARBs, Calci-blocker	0	1	0
	Loop diuretic, Potassium-sparing diuretic , ACE	0	0	1 (0.95)
	Loop diuretic, Potassium-sparing diuretic , ACE, Calci-blocker	0	1	0
	Loop diuretic, Potassium-sparing diuretic , ARBs, Calci-blocker	0	0	1 (0.95)
Total		12 (11.42)	17	10 (9.51)

The study recorded that the single-drug regimen was the most used, with the highest proportion of patients using ARBs. For two-drug combinations: There were 17 drug combinations used, showing diverse combinations, but the most common was the combination of ARBs and CCBs, followed by the combination of ACE inhibitors and CCBs. The most common three-drug combination was ARBs, CCBs, and beta-blockers.

Table 4. Distribution of patients by diabetes treatment (n=105)

Drug class	Ingredient	T0 (%)	T1 (%)	T2 (%)
Sulfonylureas	Glimepiride	1 (1.0)	4 (3.8)	1 (1)
	Gliclazide	51 (48.6)	49 (46.7)	46 (43.8)
	Glibenclamide	0	1 (1)	1 (1)
Biguanine	Metformin	77 (73.3)	84 (80)	87 (82.9)
DPP 4	Vildagliptin	1 (1.0)	2 (1.9)	1 (1)
	Linagliptin	1 (1.0)	2 (1.9)	22 (21)
Alpha glucosidase inhibitors	Acarbose	14 (13.3)	5 (4.8)	1 (1)
Insulin	Insuline	25 (23.8)	26 (24.8)	30 (28.6)

Eight drugs from 5 drug classes were used in the study. Throughout all 3 months, biguanide group was the most frequently used, with metformin being the most commonly used active ingredient for treating diabetes.

Table 5. Distribution of patients by diabetes treatment regimen (n=105)

Number of drugs	Regimen dru	T0 (%)	T1 (%)	T2 (%)
No drug	No using drugs	13 (12.4)	17 (16.2)	13 (13.7)
Single drug	Biguanine	21 (20.0)	57 (54.3)	30 (31.5)
	Insulin	5 (4.76)	6 (5.71)	6 (6.3)
	Sulfonylureas	7 (6.67)	0	0
	α-glucosidase inhibitors	0	3 (2.86)	0
Two-drug combination	Biguanine, α-glucosidase inhibitors	2 (1.9)	0	0
	Biguanine, Insulin	11 (10.5)	18 (17.2)	5 (5.25)
	DPP 4, insulin	1 (0.95)	0	3 (3.15)
	Sulfonylureas, α-glucosidase inhibitors	2 (1.9)	0	0
	Sulfonylureas, Biguanine	27 (25.7)	0	26 (27.3)
	Biguanine, DPP 4	0	3 (2.86)	0
	Sulfonylureas, Insulin	0	0	1 (1.05)

At least three drugs combination	Sulfonylureas, Insulin, α-glucosidase inhibitors	1(0.95)	0	0
	Sulfonylureas, Biguanine, α-glucosidase inhibitors	7 (6.67)	0	0
	Sulfonylureas, Biguanine, DPP 4	1 (0.95)	0	11 (11.55)
	Sulfonylureas, Biguanine, Insulin	5 (4.76)	0	5 (5.25)
	Biguanine,DPP 4, Insulin	0	1 (0.95)	0
	Sulfonylureas, Biguanine, α-glucosidase inhibitors, Insulin	2 (1.9)	0	0
	Sulfonylureas, Biguanine, DPP 4, Insulin	0	0	5 (5.25)

The study recorded diabetes treatment regimens consisting of single-drug regimens, two-drug combinations, and regimens with three or more drugs, with single-drug regimens being the most frequently used. In the single-drug regimen, the drug groups used in the treatment of diabetes included biguanides (Metformin), Insulin, Alpha-glucosidase inhibitors, and Sulfonylureas.

Table 6. Distribution of patients by diabetes treatment regimen (n=105)

Regimen	T0 (%)	T1 (%)	T2 (%)
No medication usage	13 (12.38)	15 (14.29)	8 (7.62)
Single drug	33 (31.43)	66 (62.86)	36 (34.29)
2 drugs	43 (40.95)	23 (21.9)	36 (34.29)
3 drugs	14 (13.33)	16 (15.23)	20 (19.05)
4 drugs	2 (1.9)	0 (0)	5 (4.76)

At the initial time point (T0), the highest percentage of patients (40.95%) used 2 medications, while 31.43% used single drug. At T1, 62.86% of patients used only a drug, and 21.9% used exactly 2 medications. At T2, the percentage of patients using either 1 or 2 medications was equal (34.29%).

Table 7. Distribution of patients by lipid-lowering drug groups (n=105)

Drug group	Ingredient	T0 (n, %)	T1 (n, %)	T2 (n, %)
No using drugs		22 (20.95)	26 (24.76)	44 (41.91)
Statin	Atorvastatin	22 (20.95)	25 (23.81)	26 (24.76)
	Ezetimibe	4 (3.81)	5 (4.76)	8 (7.62)
	Simvastatin	26 (24.76)	10 (9.52)	2 (1.9)
	Rosuvastatin	4 (3.81)	11 (10.49)	1 (0.95)
	Pravastatin	4 (3.81)	1 (0.95)	6 (5.71)
	Pravastatin	4 (3.81)	6 (5.71)	4 (3.81)
	Gemfibrozil	3 (2.86)	2 (1.9)	7 (6.67)
Fibrate	Fenofibrat	16 (15.24)	19 (18.1)	7 (6.67)

The statin group consists of 7 drugs used, with statins prescribed to approximately 60% of patients, among which Atorvastatin is the most commonly used active ingredient throughout the three months. The Fibrate group has only one active ingredient used, which is Fenofibrate.

DISCUSSION

There have been many studies on diabetes or hypertension. This study was a preliminary study to determine the characteristics of hypertensive patients with diabetes at SaintPaul General Hospital. The study sample consisted of 105 patients. The youngest was 53 years old and the oldest was 89, with an average age of 70.28 ± 7.2 years. This age is quite similar to the average age in the study by Nguyen Hoai Linh (2020), which was 70.03 ± 9.19 years [5], but higher than the study by Nguyen Thi Hong Diep (2022), which had an average age of 61.9 ± 12.8 years [6]. Regarding gender ratio, the number of male and female patients was nearly equal. This is different from the study by Đoan Thi Thu Huong, where the number of female patients was nearly twice that of male patients (69.32% compared to 30.68%) [7]. This difference could be due to variations in age and living conditions in different geographic areas.

Initially, the proportion of patients using a single drug was the highest (39.05%) and decreased in the second month (33.33%), then increased to 41.9% in the third month. The proportion of patients using a two-drug combination over the three months did not change much, fluctuating between 35.24% and 37.14%. The proportion of patients using three drugs was low, decreasing from 11.43% (T0) to 8.57% (T2). Only one patient used a combination of four drugs at T1 and T2. According to the JNC VIII recommendations, more than two-thirds of hypertensive patients need a combination of ≥ 2 antihypertensive drugs from different groups to control blood pressure [8]. Therefore, combination drug therapy should be emphasized more in treating hypertensive patients with diabetes because using multiple drugs is the best method to achieve good, long-term results and limit side effects.

In the study group, patients used 1- 4 antihypertensive drugs, with the highest proportion using a single drug. There were seven single-drug regimens, 17 two-drug regimens, 14 regimens combining three or more drugs. At T0, 39.04% of patients used a single-drug regimen, 37.12% used a two-drug combination, and 11.42% used three or more drugs. The results were somewhat similar to a study conducted in Canada aimed at describing the pattern of antihypertensive drug use in patients with type 2 diabetes. In that study, patients used single-drug therapy the most (47.0%), followed by two-drug combinations (34.8%), three-drug combinations (12.3%), four-drug combinations (5.5%) [9].

Eight drugs from five drug groups were used in the study sample, including biguanides, sulfonylureas, alpha-glucosidase inhibitors, DPP-4 inhibitors, and insulin. This differs from the ADA 2017 recommendations, which include six drug groups for treatment: biguanides (metformin), sulfonylureas, TZDs, DPP-4 inhibitors, GLP-1 receptor agonists, and insulin [3]. In the study sample, patients were mainly prescribed two oral drug groups, biguanides and sulfonylureas, with insulin being the least prescribed. Metformin was included in all combination treatment regimens. This result further confirms that metformin is always the first and foremost choice in treating type 2 diabetes. Metformin has many advantages, such as effectively reducing blood glucose levels, not causing weight gain, not causing hypoglycemia, having a positive effect on blood lipid indices, and being reasonably priced. In our study, metformin had the highest patient usage rate (73.3% at T0, 80% at T1, and 82.9% at T2), which is a relatively high rate. This result was also consistent with the American Diabetes Association guidelines in 2022, biguanides is the first recommended drug [2].

Sulfonylureas were also used at a very high rate in the study sample. This group included three active ingredients: gliclazide, glimepiride, and glibenclamide. Gliclazide and glimepiride are considered the best in the sulfonylurea group today, with the advantage of selectively acting on pancreatic SUR1 receptors, minimizing unwanted effects. Glimepiride, with a long half-life, can be used once daily and is classified as a third-generation sulfonylurea. However, at our hospital, the use rate of this active ingredient was still low (1-3.8%) compared to gliclazide (48.6% at T0, 51.5% at T1, and 43.8% at T2). This result is similar to the study by Đoan Thi Thu Huong (2015) [7].

In our study sample, most patients (83%) had concomitant lipid metabolism disorders and had not yet controlled their blood lipid levels, so the rate of lipid-lowering drug prescriptions was high (79% at T0). This was very reasonable with treatment guidelines emphasizing the role of controlling blood lipids in patients with diabetes and hypertension to minimize cardiovascular risks and complications [10]. The statin group was used the most, with atorvastatin being the most preferred active ingredient.

CONCLUSION

The average age of the study group was 70.28 ± 7.2 years. The gender ratio was nearly equal, with 49.0% male and 51.0% female.

The difference between the number of patients using a single-drug regimen or a two-drug combination was insignificant. The most commonly used drug groups were ARBs, followed by CCBs.

Most patients used a single diabetes medication, with biguanides (metformin) being the most commonly used, followed by sulfonylureas. Insulin was used in nearly one-third of diabetes treatment prescriptions (T0: 23.8% of patients, T1: 24.8% of patients, T2: 28.6% of patients).

83.0% of patients in the study sample had lipid disorders. At T0, 63.81% of patients used statins, and 15.24% used fibrates (fenofibrate). Atorvastatin was the most commonly used active ingredient.

REFERENCES

1. N. H. Cho và J. E. Shaw. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Res Clin Pract*, 2018, 138, pp.271-281.

2. Hong Sun. IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. *Diabetes Research and Clinical Practice*. 2022, Volume 183, 109119.

3. American Diabetes Association Professional Practice Committee. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes-2022. *Diabetes Care*, 2022, United State.

4. Vietnam National Heart Association. *Recommendations on diagnosis and treatment of hypertension*, 2018.

5. Nguyen Hoai Linh. *Survey on the status of prescribing in patients with type 2 diabetes and chronic kidney disease managed as outpatients at some hospitals,* Graduate thesis of Pharmacist, Hanoi University of Pharmacy, 2020.

6. Nguyen Thi Hong Diep. Situation of using antidiabetic drugs in patients with type 2 diabetes and kidney failure at Can Tho city general hospital in 2020-2021. *Journal of Science and Development Economics*, 2022, vol 16, pp.75-82.

7. Doan Thi Thu Huong. *Analysis of the current status of drug use in patients with hypertension and diabetes at the outpatient clinic of the Traditional Medicine Hospital of the Ministry of Public Security,* Master's thesis, Hanoi University of Pharmacy, Hanoi, 2015.

8. Nicole Abel. Eighth joint national committee (JNC-8) guidelines and the outpatient management of hypertension in the African-American population. *North American journal of medical sciences,* 2015, 7(10), pp.438.

9. Alison L Supina và Lisa M Guirguis. Treatment gaps for hypertension management in rural Canadian patients with type 2 diabetes mellitus. *Clinical therapeutics,* 2004, 26(4), pp.598-606.

10. Kristy Iglay. Prevalence and co-prevalence of comorbidities among patients with type 2 diabetes mellitus. *Current Medical Research and Opinion,* 2016, 32(7), pp. 1243-1252.