

ANALYSIS OF PRESCRIPTION PATTERNS OF ANTIDIABETIC MEDICATION IN A COUNTY FROM NORTH-WESTERN ROMANIA

Cosmin Mihai Vesa^{1,2,3}

1. Faculty of Medicine and Pharmacy, University of Oradea, Romania

2. SC Elias Invest Medimages SRL, Oradea, Romania

3. Doctoral School of Biomedical Sciences, University of Oradea, Romania

Address for correspondence: v_cosmin_15@yahoo.com

Rezumat

Analiza modelului de prescripție a antidiabeticelor la pacienții cu diabet zaharat tip 2 este de mare importanță, având în vedere faptul că noile substanțe active analogii de GLP-1 și inhibitorii de SGLT-2, cu multe beneficii cum ar fi protecția cardiovasculară, continuă să fie puțin prescrise din cauza a numeroase motive cum ar fi: costurile, teama de efecte secundare, inerția clinică sau lipsa de înțelegere a efectelor lor. Studiul nostru a analizat tiparele de prescripție medicală ale antidiabeticelor din centrul de diabet al unui spital clinic și al unei clinici private din județul Bihor.

Din analiză putem observa că prescripția inhibitorilor de SGLT2 a crescut semnificativ statistic, prescripția analogilor GLP-1 a crescut semnificativ statistic, prescripția de insulină premixată a scăzut semnificativ statistic și combinația de analogi GLP-1 cu insulină a crescut semnificativ statistic. Toate aceste date demonstrează că tiparele de prescripție ale antidiabeticelor orale și injectabile continuă să se îmbunătățească și să adere la recomandările date de ghiduri. În studiul nostru, de exemplu, 2024 a fost primul an în care inhibitorii de SGLT2 și combinațiile inhibitori de SGLT2 cu doză fixă au fost mai frecvent prescriși decât sulfonilureicele.

Cuvinte cheie: antidiabetice orale, antidiabetice injectabile, pattern-uri de prescripție

Abstract

Analysis of diabetes medication prescription pattern in type 2 diabetes mellitus patients is of high importance, taking into account the fact that novel drugs with numerous side- benefits such as cardiovascular protection continue to be under prescribed, the main causes being costs, fear of potential side effects, clinical inertia or lack of a clear understanding of their effects.

Our study analyzed the prescription patterns of antidiabetic medication prescribed in a diabetes center of a clinical hospital and from a private clinic in Bihor County. From the analysis we observed that SGLT2 inhibitors prescription registered an increase, statistically relevant, GLP-1 analogues prescription increased also, premixed insulin prescription decreased



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statistically significant and combination of GLP-1 analogues with insulin increased statistically significant. All these data demonstrate that diabetes prescription patterns continue to improve and to adhere to the recommendations provided by the guidelines. In our study identified the year 2024 as the first year that SGLT2 inhibitors and fix dose SGLT2 inhibitors combinations was more prevalent than sulfonylurea prescription.

Key words: oral antidiabetic drugs, injectable antidiabetic drugs, prescription patterns

Introduction

Diabetes mellitus is a disease that greatly impacts the health of the affected individuals, numerous chronic complications appearing during the disease progression, the cardiovascular ones being the most frequent and reducing the life expectancy of the patient ⁽¹⁾. Numerous novel medications have appeared in the past decade that have greatly improved the outcome of diabetes patients such as sodium glucose transporter 2 (SGLT-2) inhibitors and glucagon like peptide 1 (GLP-1) agonists. These medications have demonstrated both cardiovascular and renal protection in large clinical trials. SGLT2 inhibitors have demonstrated beneficial effects in reducing the risk of hospitalization for heart failure as well as reducing albuminuria risk and reducing the risk of chronic kidney disease progression for the diabetic and non-diabetic patient ⁽²⁾. As a consequence, SGLT2 have

been included in the current guidelines of heart failure management regardless of the ejection fraction degree ⁽³⁾. GLP-1 agonists have demonstrated also numerous other beneficial effects additional to the glucose lowering effects: weight loss, atherosclerosis protection, blood pressure improvement, improvement of lipid profile, inflammation reduction ⁽⁴⁾.

However, the price of novel antidiabetic treatment is higher compared to older medication, numerous studies demonstrating the financial burden due to increased costs of switching from older medication to SGLT-2 inhibitors or GLP-1 agonists ⁽⁵⁾. Treatment inertia is another reason why these classes are under prescribed by diabetologist/ endocrinologists many patients are left on older drug (metformin, sulfonylurea, DPP4 inhibitors) because they attain glycemic control and this is enough for the doctor. ⁽⁶⁾. Numerous other reasons can contribute to low prescription of novel antidiabetic medication such as: fear of

Parameter	No	%
total cases of diabetes mellitus 2023	9883	
type 1	533	5,39
type2	9350	94,61
urban	6032	61,03
rural	3851	38,97
male	4639	46,94
female	5244	53,06
oral antidiabetics	6424	65,00
insulin	1899	19,21
oral antidiabetics and insulin	1560	15,78

Table 1. Description of patients diagnosed with diabetes mellitus in evidence of the Clinical County Emergency Hospital

Type of medication clinical hospital	Number of prescriptions January- March 2024	Number of prescriptions January- March 2023	Number of prescriptions January- March 2022
Total number of prescriptions	3703	4132	3993
Total number of prescriptions containing			
Biguanides	1481	1541	1541
Sulphonyl urea and fix dose sulphonyl urea combinations	609	651	638
SGLT2 inhibitors and fix dose SGLT2 inhibitors combinations	634	304	534
Thiazolidinedione	2	1	2
Metiglinides	14	15	13
DPP4 inhibitors	282	229	352
Alpha-glucosidase inhibitors	2	3	2
GLP-1 analogues	400	349	204
Rapid acting insulin	584	657	576
Premixed insulin	115	158	190
Intermediate acting insulin	9	18	18
Long-acting insulin	1500	1652	1652
Insulin and GLP-1 combination	93	93	7

Table 2. Prevalence of prescription of antidiabetic drugs in three period of times in type 2 diabetes mellitus patients



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side effects from the patients or doctors perspective , treatment interruption because of inadequate compliance to drug protocol, insufficient understanding of drug benefits, interruption of the drug because of an acute illness and deprescription of an older drug ^(7,8).

The aim of this present study was to analyze the situation of prescription patterns of antidiabetic medication in Bihor County considering the fact that these types of studies are rarely performed and to emphasize the importance of utilization of novel antidiabetic medication in clinical practice.

Material and method

The study is a retrospective one structured in two parts: the analysis of prescription patterns of antidiabetic medication for type 2 diabetes mellitus patients from a clinical hospital and from a private clinic. Data was gathered from the diabetes ambulatory of the Bihor County Clinical Hospital electronical archives and from SC Elias Invest Medimages SRL clinic electronic archives. From the hospital information regarding the prescription of antidiabetic medication was collected from three years in the same time interval: January - March 2024, January-March 2023, and January -March 2022.

The time interval, namely 3 months was chosen because the average prescription covers three months duration of treatment.

From the private clinic data was analyzed regarding prescription patterns in January-March 2024 and January - March 2021. The study was done with the approval of the Ethics Committee of Faculty of Medicine and Pharmacy of Oradea, number 5/30.10.2023. Data was expressed and number and percentage. A p-value <0.05 was considered statistically significant.

Results and discussions

Table 1 and Table 2 describe the patients in evidence of the Clinical County Emergency Hospital diabetes ambulatory. Table 2 describes the type of antidiabetic drugs prescribed to type 2 diabetes mellitus patients in three periods of time the first semester of year 2022, 2023 and 2024. We can observe that type 2 diabetes mellitus is predominant in the studied cases, most patients come from urban environment, female patients have a higher prevalence in our study and the great majority of patients are on oral antidiabetics.

In Table 3 it can be observed that concerning oral antidiabetic medication, namely biguanides were prescribed in similar proportions (39,99% vs.38.59%, $p=0.20$), sulfonylurea and fix dose sulfonylurea combinations (such as glimepiride metformin combination and glibenclamide metformin combinations) were also prescribed in similar

Total number of prescriptions containing	Number of prescriptions January-March 2024 (%)	Number of prescriptions January-March 2022 (%)	Magnitude of increase 2024 compared to 2022	p-value
Biguanides	39,99	38,59	1,40	0.20
Sulphonylurea and fix dose sulphonylurea combinations	16,45	15,98	0,47	0,5762
SGLT2 inhibitors and fix dose SGLT2 inhibitors combinations	17,12	13,37	3,75	< 0.0001
Thiazolidinedione	0,05	0,05	0,00	1,0000
Metiglinides	0,38	0,33	0,05	0.7122
DPP4 inhibitors	7,62	8,82	-1,20	0,0558
Alpha-glucosidase inhibitors	0,05	0,05	0,00	1,0000
GLP-1 analogues	10,80	5,11	5,69	< 0.0001
Rapid acting insulin	15,77	14,43	1,35	0.1
Premixed insulin	3,11	4,76	-1,65	0,0002
Intermediate acting insulin	0,24	0,45	-0,21	0,1186
Long-acting insulin	40,51	41,37	-0,86	0,4434
Insulin and GLP-1 combination	2,51	0,18	2,34	< 0.0001

Table 3. Analysis of prescribing patterns 2024 vs.2022 in the clinical hospital

Type of medication	Number of prescriptions January-March 2024	%	Number of prescriptions January-March 2021	%
Total number of prescriptions	87		92	
Total number of prescriptions containing				
Biguanides	52	59,77	58	63,04
Sulphonyl urea and fix dose sulphonyl urea combinations	12	13,79	28	30,43
SGLT2 inhibitors and fix dose SGLT2 inhibitors combinations	32	36,78	20	21,74
Thiazolidinedione	0	0,00	2	2,17
Metiglinides	0	0,00	4	4,35
DPP4 inhibitors	12	13,79	23	25,00
Alpha-glucosidase inhibitors	0	0,00	2	2,17
GLP-1 analogues	18	20,69	8	8,70
Rapid acting insulin	12	13,79	21	22,83
Premixed insulin	2	2,30	8	8,70
Intermediate acting insulin	0	0,00	0	0,00
Long-acting insulin	20	22,98	30	32,61
Insulin and GLP-1 combination	2	2,30	0	0,00

Table 4. Analysis of prescribing patterns in the private clinic 2024 vs. 2021



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proportions and DPP4 inhibitors were also prescribed in similar proportions. We observed a low degree of prescription of thiazolidinediones, metiglinides and alpha-glucosidase inhibitors.

The modifications that were statistically significant were the prescription of SGLT2 inhibitors and fix dose SGLT2 inhibitors combinations (dapagliflozin plus metformin or empagliflozin plus metformin), which were statistically significant more prescribed in 2024 compared to 2022 (17,12% vs. 13,37%, $p < 0.0001$) and the prescription of GLP-1 analogues which were statistically significant more prescribed in 2024 compared to 2022 (10,80% vs. 5,11%, $p < 0.0001$). There were no significant variations regarding the prescription of rapid-acting insulin analogues and long-acting insulin analogues. Premixed insulin was statistically significant less prescribed in 2024 compared to 2022. Basal insulin and GLP-1 analogues combinations were statistically significant more frequently prescribed in 2024.

In the private clinic although the low number of patients treated does not show any statistical significance. It can be observed that the number of SGLT2 inhibitors and GLP-1 agonists increased as shown by Table 4. We can observe that the prescription practice in the public sector correspond with the prescription pattern in the private sector, obviously at a smaller scale in the last one, a

fact which can be attributed to numerous medical educational events at the local and national level as well as promotion of international guidelines by diabetes societies from our country.

The use of modern antidiabetic medication can be costly regarding the fact that average prescription cost is higher when including SGLT2 inhibitors, GLP-1 analogues, long-acting insulins compared to older medication. However, the beneficial effects of these drugs in reducing associated complications such as heart failure decompensation, myocardial infarction, stroke end stage kidney disease represents itself a measure for reducing costs for the medical system. Data from numerous studies support the cost-effectiveness of SGLT2 inhibitors and GLP-1 agonists ^(9, 10). Several strategies can be implemented in order to increase the novel antidiabetic prescription: continuous medical education of diabetologist regarding their beneficial effects of SGLT2 inhibitors and GLP-1 agonists, permanent screening of cardiovascular risk factors of the treated patients, education of health personnel to permanently reevaluate the therapeutic scheme of a patient, patient education about the side effects of the novel medication, how to avoid the side effect, when to interrupt the treatment and when to restart it. Data from literature demonstrates low knowledge about novel antidiabetics among doctors off different specialties ⁽¹¹⁾. It is of very

high importance to educate clinicians of all medical fields about the role of novel antidiabetic medication in different pathologies because now these clinicians have the right to prescribe SGLT2 inhibitors or GLP-1 agonists to certain categories of patients (with heart failure, chronic kidney disease, etc.) whether the patient is a diabetic or not.

Conclusions

In Bihor County the patterns of antidiabetic medications prescription have modified in the recent period. More SGLT2 inhibitors and GLP-1 agonists are being prescribed a fact that is beneficial for the general health of diabetes mellitus patients as well as for reducing the further risk of complications.

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