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Original Scientific paper

Evaluation and comparison of trends in insulin utilization for period 2019-2023 in Skopje

Anife Shabani[1*], Zorica Naumovska[2], Iskra Sadikarijo-Pecijareva[3], Zoran Sterjev[2]

[1]PHI Health center, bul. Krste Misirkov bb, 1000 Skopje, RN Macedonia
[2]Faculty of Pharmacy, Ss. Cyril and Methodius University in Skopje, Majka Tereza 47, 1000 Skopje, RN Macedonia
[3]Agency for Drugs and Medical Devices of the Republic of Northern Macedonia - MALMED, str. Ss. Cyril and Methodius no. 54, 1000 Skopje, RN Macedonia

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Abstract

Diabetes affects an estimated 537 million adults aged 20–79 globally, with prevalence projected to rise to 643 million by 2030 and 783 million by 2045. In North Macedonia, data from 2018–2021 show a growing number of individuals with diabetes, with 6.6% of the population affected in 2021.

This study evaluates insulin consumption trends in Skopje, Republic of North Macedonia, from 2019 to 2023, comparing local patterns with global data. Using a retrospective design, insulin utilization data were obtained from the national e-health system, My Term (Moj Termin). Analysis of the National Register for Diabetes Mellitus confirmed an increasing prevalence of diabetes in Skopje during the study period.

A significant decline of nearly 50% in the use of human bolus insulin was observed, while long-acting insulin analogs have increased utilization. Insulin glargine (Lantus) was the most widely used basal insulin in 2021, coinciding with the introduction of its biosimilar, Abasaglar. Additionally, insulin detemir (Levemir) is being progressively replaced by insulin degludec (Tresiba), which offers a superior therapeutic profile and a reduced risk of hypoglycemia. In 2021, Rizodeg, an innovative insulin combination, was introduced to the Macedonian market.

These findings reflect a global trend of declining human insulin use and increasing adoption of long-acting insulin analogs, driven by their improved efficacy and safety profiles. The transition towards newer insulin formulations highlights a shift in diabetes management aimed at improving patient outcomes and reducing diabetes-associated complications.

Key words: diabetes, insulin, hypoglycemia, adults, insulin utilization

Introduction

Globally, an estimated 537 million adults aged 20–79, or approximately 1 in 10 people, are living with diabetes. This number is expected to rise to 643 million by 2030 and 783 million by 2045. More than three-quarters of adults with diabetes reside in low- and middle-income countries. The prevalence of diabetes in Europe is approximately 9.2%, with around 61.4 million people living with the condition. This is expected to rise to 10.4% by 2025 (IDF Atlas10th Edition 2021). The results for the Republic of North Macedonia, covering the period from 2018 to 2021, confirmed an increase in the number of individuals with diabetes. Official data indicates that in 2021, 6.6% of North Macedonia's population was affected by the condition. In 2019, the estimated prevalence of diabetes in Macedonia, as reported by the International Diabetes Federation,

*email: anife.shabani2017@gmail.com

exceeded the global average at 11.44%. This equated to approximately 188.800 individuals aged 20–79, meaning that roughly one in nine adults in the country had diabetes. By 2021, the national prevalence in North Macedonia had risen to 12.44%, representing 180 180 individuals with both diagnosed and undiagnosed diabetes mellitus. Among them, 43.8% were on insulin therapy (Naumovska and Recica, 2024).

The economic impact of diabetes mellitus is enormous, placing a heavy burden on patients, healthcare providers, and national healthcare systems, especially in low- and middle-income countries. In 2017, the total estimated cost of managing diagnosed diabetes reached $327 billion, comprising $237 billion in direct medical expenses and $90 billion due to lost productivity (www.diabetesatlas.org). As the prevalence of diabetes continues to increase, the global economic burden of the disease is expected to reach up to 2.2% of global GDP by 2030 (Bommer et al., 2018). Hypoglycemia rates are estimated to be as high as 3.5–3.6 events per month in individuals with type 1 diabetes (T1DM) and 2.2–3.7 events per month in those with type 2 diabetes (T2DM) (Abusnana et al., 2019; Khunti et al., 2016; Munro and Barnett, 2014; Pathan et al., 2018; Surrati et al., 2023). Chronic complications are the primary result of type 2 diabetes mellitus (T2DM) progression, leading to a marked decline in patients' quality of life, increased healthcare system strain, and elevated mortality rates. When adjusted for age, the mortality rate for individuals with T2DM is nearly twice that of those without diabetes. Between 50% and 80% of all diabetes-related deaths are attributed to cardiovascular diseases, cerebrovascular events, and kidney failure, which rank as the leading causes of mortality among these patients (IDF_Atlas_10th_Edition_2021; LeRoith et al., 2005; Smith and Herman, 1995; Solli et al., 2010). Inadequate disease management often leads to higher rates of hospital admissions, which account for more than 40% of the total costs associated with diabetes(American Diabetes Association, 2008).

Diabetes was responsible for 6.7 million deaths in 2021—equivalent to one death every five seconds. The published data from the Republic of North Macedonia also highlights a significant increase in mortality among diabetes patients, rising from 1,935 deaths in 2018 to 9 730 in 2021. Globally, approximately 541 million adults have impaired glucose tolerance (IGT), placing them at high risk for developing type 2 diabetes. In 2021, 50.1% of people with diabetes (mainly type 2) were undiagnosed, representing 231.9 million individuals worldwide and in our country, the undiagnosed diabetes rate was 39.6% (Naumovska and Recica, 2024).

The American Diabetes Association (ADA) consensus report emphasizes a comprehensive, multifaceted, and patient-centered strategy for managing type 2 diabetes (T2D), acknowledging it's chronic and lifelong nature. Treatment decisions are guided by individualized goals for glycemic control and weight management, consideration of medication effects on weight and hypoglycemia risk, cardiorenal protection, physiological factors, and the side effect profiles of therapies. The complexity of the treatment regimen is also crucial, with a focus on optimizing medication adherence and minimizing the likelihood of treatment discontinuation. Furthermore, practical aspects such as medication accessibility, cost, and availability play a significant role. Effective T2DM management requires balancing the benefits of glycemic control against the risks of hypoglycemia, which can improve patient adherence, enhance quality of life, and reduce both morbidity and healthcare resource use (Bartley et al., 2008; DeWitt and Hirsch, 2003; Holt et al., 2021; Home et al., 2015; Pickup, 2013; Tricco et al., 2014; Yeh et al., 2012). Insulin should be considered early if there are signs of ongoing catabolism (such as weight loss), symptoms of hyperglycemia, or if A1C levels are >10% or blood glucose is >300 mg/dL (16.7 mmol/L). For individuals with type 2 diabetes who also have atherosclerotic cardiovascular disease, kidney disease, or heart failure, the use of SGLT2 inhibitors and/or GLP-1 receptor agonists with established cardiovascular benefits is recommended, alongside glucose-lowering therapy, to provide comprehensive cardiovascular risk reduction and additionally GLP-1 receptor agonists are preferred over insulin when possible in adults with T2DM. According to ADA recommendation the medication regimen and patient behavior should be reevaluated every 3–6 months, adjusting the treatment plan based on changing needs and specific factors where diabetologists should monitor for over-basalization in insulin therapy, which may be indicated by a basal dose >0.5 units/kg/day, high glucose variability, or hypoglycemia, condition that emerge prompt reevaluation and further individualization of therapy. Treatment intensification should not be delayed for individuals who are not meeting their treatment goals (ElSayed et al., 2023).

Starting insulin therapy early in patients with T2DM offers key benefits, such as reducing the harmful effects of high blood sugar, preserving insulin-producing cells, improving insulin sensitivity, and protecting against long-term complications (Buckingham et al., 2015). In Table 1 and Table 2 are summarized all available insulins described and calcified based on their type, duration and pattern of action. In practice, the decision to begin insulin is mainly based on how long the person has had diabetes and whether blood sugar targets have been met with oral medications (alone or combined) or other injectable treatments.

The aim of this study is to evaluate insulin consumption in the city of Skopje, the Republic of North Macedonia, from 2019 to 2023 and to compare the patterns of insulin use with data from other countries, providing insights into trends, treatment practices, and regional differences in diabetes management.

Table 1. Summary of Insulin Classification

Type	Rapid-Acting	Short-Acting	Intermediate-Acting	Long-Acting	Ultra-Long-Acting	Premixed Insulin
Examples	Humalog (Lispro), NovoMix (Aspart), Apidra (Glulisine)	Humulin R	Humulin N	Lantus (Glargine), Toujeo, Abasaglar, Levemir, Tresiba	Tresiba (Degludec), Toujeo (Glargine U-300)	Humulin 70/30, Novo Mix 70/30, Humalog Mix 75/25
Onset	10-30 minutes	30-60 minutes	1-2 hours	1-2 hours	1 hour	Varies
Peak	30-90 minutes	2-5 hours	4-12 hours	None (steady)	None (steady)	Varies
Duration	3-5 hours	5-8 hours	12-18 hours	18-24 hours	24-42 hours	Varies

Table 2. Summary of Insulin Classification with description of major characteristics

Source	Type of Insulin	Examples	Description
Human Insulin	Regular Insulin	Humulin R	Produced using recombinant DNA technology (E. coli or yeast) to create insulin identical to human insulin.
	NPH (Intermediate-Acting)	Humulin N	A suspension of regular insulin, with a longer duration of action due to the addition of protamine.
Insulin Analogs	Rapid-Acting Insulin Analogs	Humalog (Lispro), NovoRapid (Aspart), Apidra (Glulisine)	Modified versions of human insulin with faster onset and shorter duration, ideal for mealtime coverage.
	Long-Acting Insulin Analogs	Lantus (Glargine), Toujeo, Abasaglar, Levemir (Detemir)	Modified to provide a long duration of action, used for basal insulin coverage throughout the day.
	Ultra-Long-Acting Insulin Analogs	Tresiba (Degludeg) Toujeo (Glargine U-300)	Modified for even longer action, up to 42 hours, ideal for extended basal coverage.
	Premixed Insulin Analogs	Humalog® Mix25, NovoMix 30	A combination of rapid-acting and intermediate-acting insulin in one injection to cover both mealtime and basal needs

Material and methods

The study employed a retrospective approach where utilization data of insulins in four-year period 2019-2023 in the city of Skopje, the Republic of North Macedonia. were obtained by the national e-health system (electronic data base My Term (Moj Termin)). For comparative analysis comprehensive literature search was conducted using relevant medical databases, including PubMed, MEDLINE, and Embase, to identify peer-reviewed articles related to insulin consumption in different countries. The search strategy included the use of keywords such as 'diabetes', 'insulin', and 'guidelines for diabetes treatment', and was limited to articles published between 2015 and 2024. Studies were included based on relevance to review articles clinical trials and observational studies.

Results and discussion

Human insulins are considered an older generation of insulin treatments. Current guidelines generally recommend replacing them with insulin analogs for improved blood sugar management. The number of human insulins dispensed during the four years evaluated period in Skopje is presented on Table 3 and Figure 1. Continuous decrease is observed in short acting human insulin for approximately 50%, intermediate acting human insulin with protamine for 32% and premixed human insulin for 37%. This observation is in line with practices observed in many other countries, where human insulins are substituted with insulin analogs.

During the evaluated period, we observed a significant decrease of almost 50% in the use of human bolus insulin. At the same time, there was a modest increase of approximately 12% in the dispensation of rapid-acting insulin analogs, specifically insulin lispro. Notably, there was a substitution of insulin aspart (NovoRapid) with insulin aspart (Fiasp), which present a 30% increase in usage from 2019 to 2023. Additionally, the dispensation of insulin glulisine (Apidra) increased from 22 684 to 29 023 pens. These results are summarized in Table 4 and illustrated in Figure 2.

Table 3. Number of dispensed pens in period 2019-2023 of human insulins in city of Skopje

ATC	INSULIN	2019	2020	2021	2022	2023
A10AB01	human insulin (Insuman Rapid)	12 427	11 049	10 235	8 951	6 125
A10AC01	protamine-crystallized human insulin (Humulin N)	71 764	70 918	70 656	58 614	52 363
A10AD01	human insulin 25% and protamine-crystallized human insulin 75% (Insuman Comb 25)	178 614	165 087	157 112	132 897	112 851

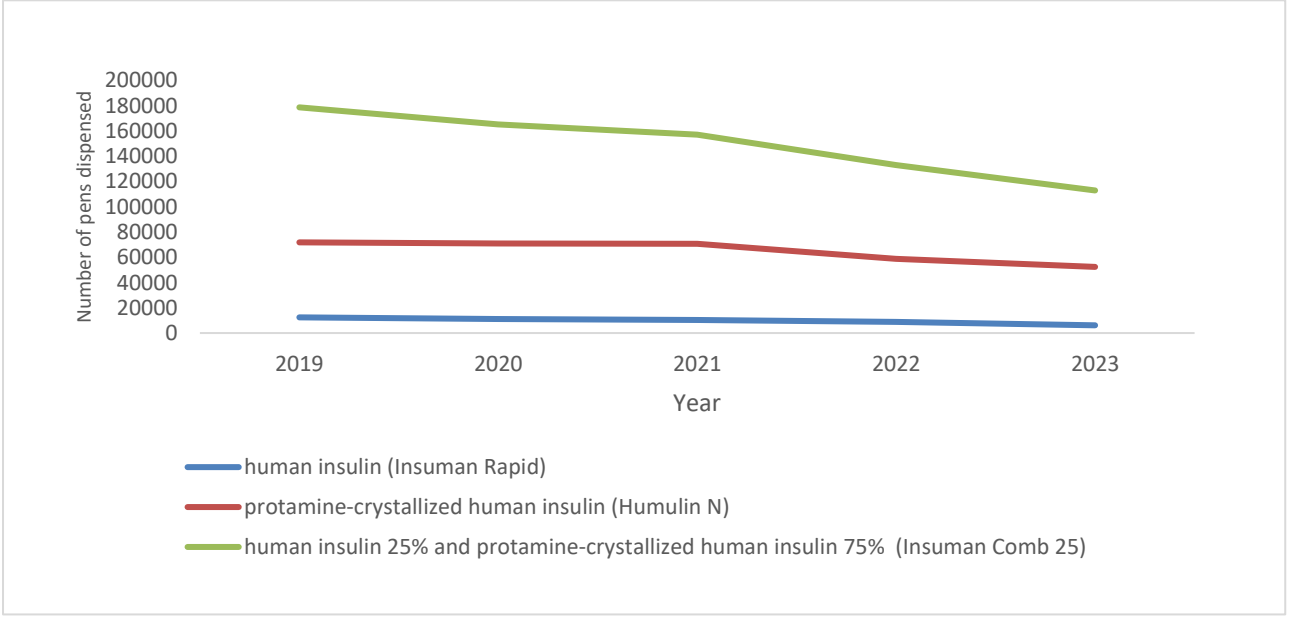

Fig. 1. Number of dispensed pens in period 2019-2023 of human insulins in city of Skopje.

Table 4. Number of dispensed pens in period 2019-2023 of bolus insulins in city of Skopje

ATC	INSULIN	2019	2020	2021	2022	2023
A10AB01	human insulin (Insuman Rapid)	12 427	11 049	10 235	8 951	6 125
A10AB04	insulin lispro (Humalog)	4 646	4 152	5 736	5 374	5 536
A10AB05	insulin aspart (NovoRapid)	39 031	40 383	4 443	0	0
A10AB05	insulin aspart (Fiasp)	1 304	5 683	45 059	53 059	57 324
A10AB06	insulin glulisine (Apidra)	22 684	23 015	28 869	28 646	29 023

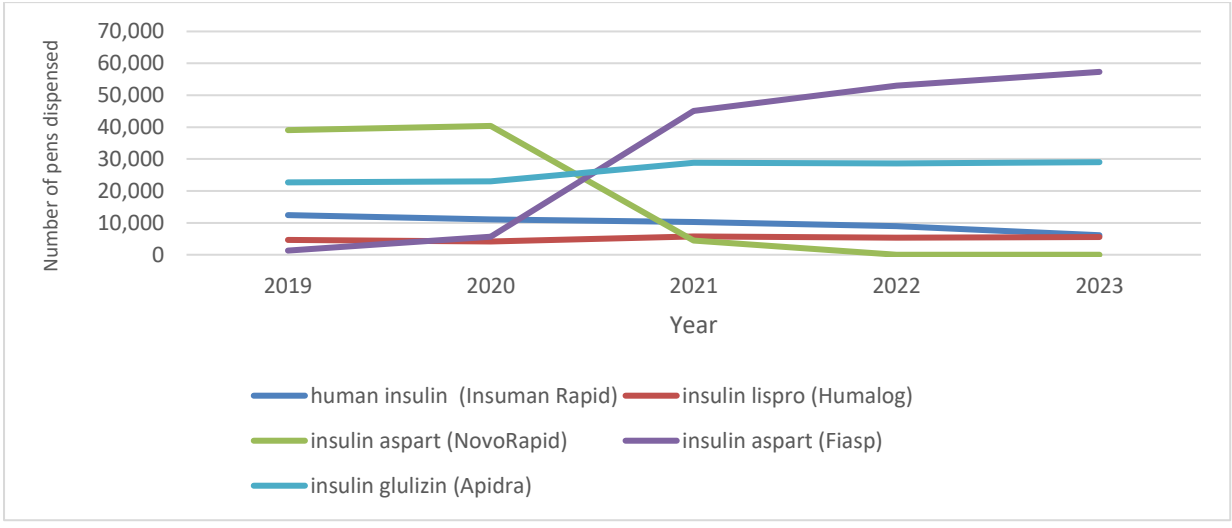

Fig. 2. Number of dispensed pens in period 2019-2023 of bolus insulins in city of Skopje.

In Table 5 and Figure 3, we present the evaluated results for the dispensing of basal insulins in the city of Skopje from 2019 to 2023. Long-acting insulin analog insulin glargine (Lantus) was the most widely used basal insulin in 2021, coinciding with the introduction of its biosimilar, Abasaglar. However, the use of the biosimilar remained limited, with only 1 204 pens dispensed in 2021 and 2 406 pens dispensed in 2023. The utilization of ultra-long-acting insulin analog glargine U-300 (Toujeo) showed a notable increase, rising more than tenfold from 750 pens in 2019 to 9 070 pens in 2023. Additionally, during the evaluated period, insulin detemir (Levemir) was entirely replaced by insulin degludec (Tresiba), which demonstrated a nearly 40% increase in utilization, with a total of 63 792 pens of Tresiba in 2023 dispensed in Skopje.

As presented in Table 6 and Figure 4, the highest utilization of pre-mixed insulins in Skopje occurred between 2019 and 2023. The use of insulin lispro 25%/insulin lispro 75% protamine sulfate (HumalogMix 25) remained stable throughout the four-year period, showing no significant fluctuations. In contrast, the use of insulin lispro 50%/insulin lispro 50% protamine sulfate (HumalogMix 50) decreased by 40%, likely due to the high proportion of rapid-acting insulin, which deviates from the physiological needs of the patient population; only a small subset of patients are eligible for this insulin combination. Similarly, we observed a 37% decrease in the use of pre-mixed human insulin (human insulin 25%/protamine sulfate 75%, Insuman Comb 25) and a 34% decrease in the use of insulin aspart 30%/protamine 70% (NovoMix 30). In contrast, a significant increase was seen in the utilization of Ryzodeg (insulin degludec and insulin aspart), a novel insulin formulation introduced in 2021, which demonstrated a threefold increase in use by 2023. Many patients previously treated with NovoMix 30 were transitioned to Ryzodeg from 2021 to 2023.

Table 5. Number of dispensed pens in period 2019-2023 of basal insulins in city of Skopje

ATC	INSULIN	2019	2020	2021	2022	2023
A1OAE04	insulin glargine (Abasaglar bs)	0	0	1 204	2 101	2 406
A10AE04	insulin glargine (Lantus)	52 336	51 490	59 933	55 560	55 978
A10AE04	insulin glargine (U-300) (Toujeo)	750	2 429	4 183	5 267	9 070
A10AE05	insulin detemir (Levemir)	38 453	36 379	2 964	0	0
A10AE06	insulin degludec (Tresiba)	6 703	18 444	57 312	59 165	63 792

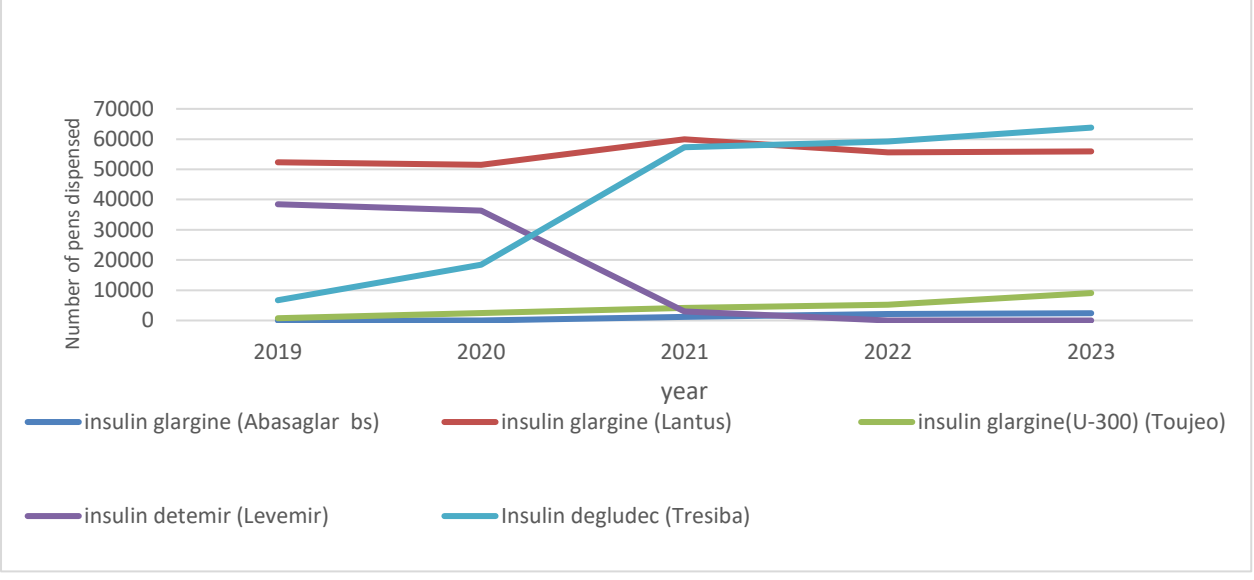

Fig. 3. Number of dispensed pens in period 2019-2023 of basal insulins in city of Skopje.

Table 6. Number of dispensed pens in period 2019-2023 of pre-mixed insulins in city of Skopje

ATC	INSULIN	2019	2020	2021	2022	2023
A10AD01	25% human Insulin and 75% protamine-crystallised human insulin (Insuman Comb 25)	178 614	165 087	157 112	132 897	112 851
A10AD04	25% Insulin lispro and 75% protamine-crystallised insulin lispro (HumalogMix 25)	35 412	32 622	34 579	30 238	32 952
A10AD04	50% Insulin lispro and 50% protamine-crystallised insulin lispro (HumalogMix 50)	9 301	8 551	8 392	6 936	5 545
A10AD05	30% Insulin aspart (rapid-acting human insulin analogue) and 70% protamine-crystallised insulin aspart (intermediate-acting human insulin analogue) (NovoMix 30)	154 521	151 676	112 368	98 172	101 594
A10AD06	Insulin Degludeg, insulin Aspart (Ryzodeg)	0	0	24 356	75 363	78 393

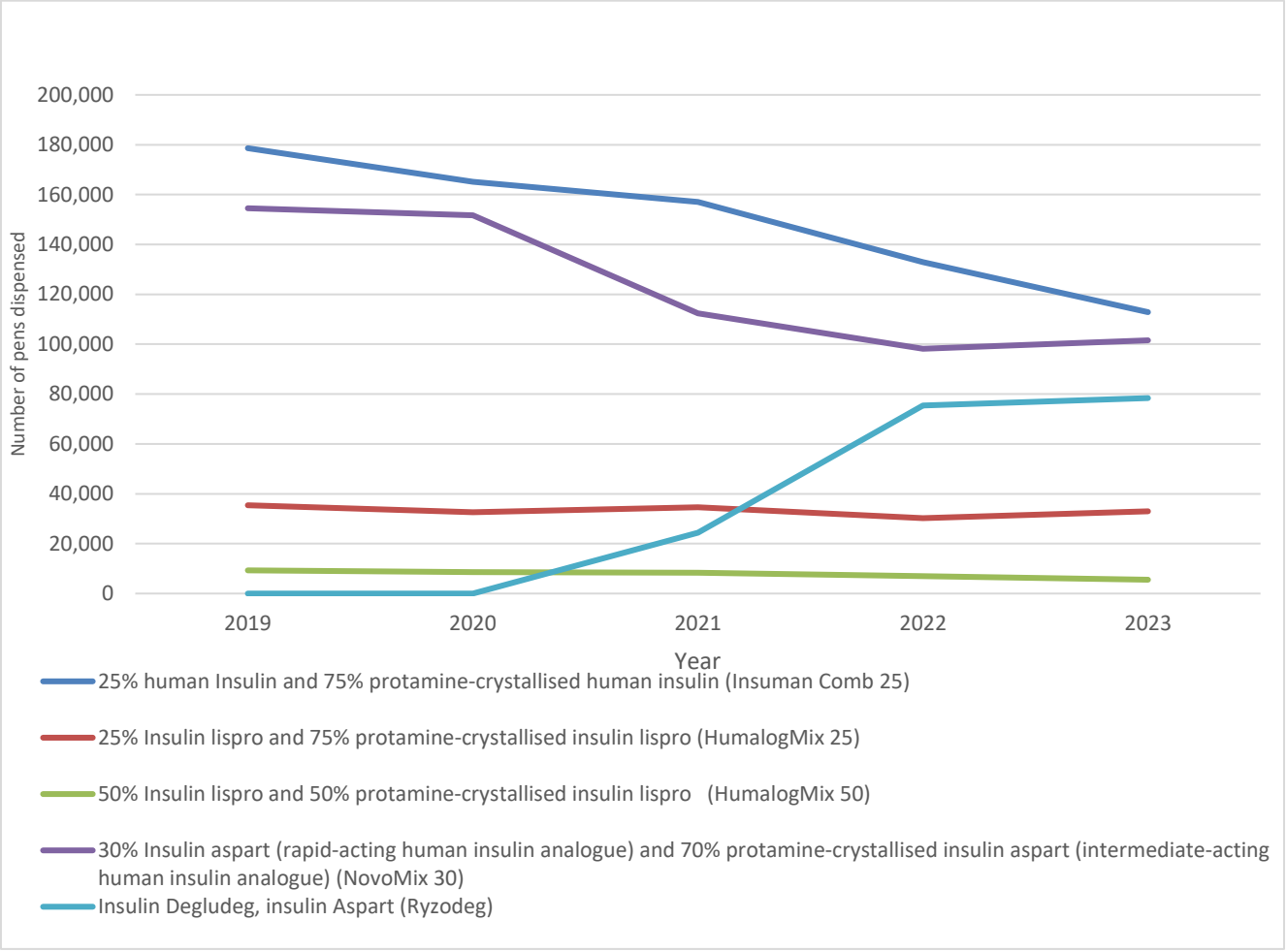

Fig. 4. Number of dispensed pens in period 2019-2023 of pre-mixed insulins in city of Skopje.

As presented in Table 7, in 2019, only 20.64% in 2019 of patients were treated with basal insulins, a figure that increased to 28% by 2023. This trend highlights the fact that the Republic of North Macedonia is recognized for its high utilization of pre-mixed insulins, as demonstrated by data from the largest city, Skopje. This pattern can be attributed to the strategy of delayed insulin introduction in diabetic patients within the country, coupled with a prolonged period of treatment with oral hypoglycemic agents, predominantly sulfonylurea derivatives.

The most recent official data on Diabetes Mellitus in the Republic of North Macedonia, published in 2023, presents an analysis of epidemiological trends from 2018 to 2021. The analysis from the National Register for Diabetes Mellitus showed an increase in the number of diabetic patients, rising from 115 036 in 2018 to 135 690 in 2021, representing 6.6% of the population. The incidence of type 2 diabetes mellitus (T2DM) was higher in women than in men during the evaluated period. Diabetes-related complications, including peripheral circulation (the highest rates, with 110.1 per 100 000 in 2018 and 106.1 per 100 000 in 2021), ophthalmologic, renal issues, ketoacidosis (increased from 72.8 per 100 000 in 2018 to 85.6 per 100 000 in 2021), coma, and other multiple complications, were observed. These microvascular and macrovascular complications are closely associated with elevated morbidity and mortality rates in diabetic patients, and these findings are in agreement with those reported in other cross-sectional studies (Mazidi et al., 2018; Scott et al., 2017).

According to official data from the Ministry of Health in the Republic of North Macedonia for 2021, around 103,420 patients were receiving non-insulin antidiabetic treatment, while 42 000 patients (including 3 000 with type 1 diabetes and 39 000 with type 2 diabetes) were undergoing insulin therapy, and the incidence of new patients indicated for insulin treatment is expanding for 10% yearly. Taking these official data into consideration, our study provides insight into insulin treatment approaches from 2019 to 2023.

Table 7. Percentage of dispensed pens in period 2019-2023 of basal vs. pre-mixed insulins in city of Skopje

	2019	2020	2021	2022	2023
Basal insulin %	20.64	23.30	26.97	25.88	28.00
Pre-mixed inulin %	79.36	76.70	73.03	74.12	72.00

According to current guidelines, human insulins which represent an older generation of insulin therapies are typically replaced by insulin analogs to achieve better glycemic control. Insulin analogs offer a more favorable therapeutic profile, particularly by reducing the risk of hypoglycemic episodes in patients who require insulin therapy. This strategy was confirmed also when we evaluated the utilization of human insulins in Skopje, the Republic of North Macedonia.

In the evaluated period from 2019 to 2023 a substantial decline of nearly 50% in the use of human bolus insulin in Skopje was observed. Concurrently, the dispensing of rapid-acting insulin analogs, particularly insulin lispro, increased modestly by about 12%. Of particular interest was the replacement of insulin aspart (NovoRapid) with insulin aspart (Fiasp), improved therapeutic option, characterized by faster absorption compared to NovoRapid.

Basal insulin is often the first-choice treatment for many patients due to its simplicity and ease of use. It can be combined with metformin and other non-insulin injectables. The starting dose is typically determined by the patient's body weight (usually 0.1–0.2 units/kg/day) and the degree of hyperglycemia, with gradual adjustments over days or weeks to achieve optimal glucose control. The primary function of basal insulin is to manage hepatic glucose production, helping to prevent high blood sugar levels during fasting and between meals. Both human NPH insulin and long-acting insulin analogs are effective for controlling fasting glucose. However, studies have shown that long-acting basal analogs, such as U-100 glargine or detemir, reduce the risk of symptomatic and nocturnal hypoglycemia compared to NPH insulin, although these benefits may be modest and not always consistent. Ultra-long-acting basal analogs, like U-300 glargine or degludec, may offer an even greater reduction in hypoglycemia risk compared to U-100 glargine, particularly when used alongside oral medications (Bolli et al., 2015; Hermansen et al., 2006; Singh et al., 2009; Yki-Järvinen et al., 2015).

Long-acting insulin analogs were developed with the primary goal of minimizing the risk of hypoglycemia, especially during the night, and improving patient convenience by decreasing the number of required injections. This reduction in injection frequency can help improve adherence, which remains a significant challenge in insulin therapy (Ceriello et al., 2020; Chan et al., 2020; Godman et al., 2021; McGovern et al., 2018; Pedersen-Bjergaard et al., 2014; Rys et al., 2015). Long-acting insulin analog insulin glargine (Lantus) was the most widely used basal insulin in 2021 in Skopje, coinciding with the introduction of its biosimilar, Abasaglar. Despite several studies demonstrating no significant differences in effectiveness and safety between the originator and biosimilar insulin glargine, concerns persist regarding the limited or non-use of biosimilars in several European countries, including the Republic of North Macedonia (Altman et al., 2018; Blevins et al., 2020; Yamada et al., 2018). Furthermore, during the evaluated period, insulin detemir (Levemir) was fully replaced by insulin degludec (Tresiba), which saw an almost 40% increase in usage. By 2023, a total of 63,792 pens of Tresiba were dispensed in Skopje. Long-acting insulin detemir (Levemir) is being progressively replaced by insulin degludec (Tresiba) due to its superior therapeutic profile and reduced risk of hypoglycemia. Detemir features a modified amino acid sequence, which alters its structure to enhance absorption and provide more consistent glycemic control, while minimizing the risk of hypoglycemic episodes. In countries with open insulin markets, it is anticipated that sales of insulin glargine will decline, with newer, more advanced insulins gaining a larger share of the market. A recent systematic review and network meta-analysis suggests that long-acting insulin analogs are more effective than intermediate-acting insulins in key areas, particularly in reducing major, serious, and nocturnal hypoglycemia (Tricco et al., 2021). The growing preference for long-acting insulin analogs, which now surpasses the use of human insulins in upper-middle and high-income countries and is steadily increasing in lower-middle-income countries including the Republic of North Macedonia, may be attributed to the perceived advantages of these insulins, especially in terms of safety and convenience(Beran et al., 2016; Haque et al., 2021). Additionally, several concentrated insulin formulations are available to enhance dosing efficiency. For instance, U-300 glargine, available in the Republic of North Macedonia, provides higher basal insulin doses per volume and has a longer duration of action compared to U-100 glargin (Riddle et al., 2015, 2014). The utilization of ultra-long-acting insulin analog glargine U-300 (Toujeo) saw a notable increase, rising more than tenfold from 750 pens in 2019 to 9 070 pens in 2023.

The adoption of long-acting insulin analogues has consistently risen in both Western and Central/Eastern European countries, with similar rates of use observed across these regions, despite their higher price. This trend highlights the increasing awareness of the advantages of long-acting insulin analogues in diabetes management, as well as their growing promotion throughout Europe.

The Republic of North Macedonia is generally recognized as country where the patents are dominantly treated with pre-mixed insulins, since the patients are generally treated with oral hypoglycemics for long period, dominantly with sulfonylurea derivate, and they are transferred to insulin therapy in developed diabetic stage when the basal insulins are not sufficient for diabetic control. Only 20.64% of patients in 2019 were treated with basal insulins, a figure that increased to 28% by 2023. Also in 2021 Rizodeg was introduced in the Macedonian market as an innovative combination containing 30% Novo Rapid/ Fiasp and 70% degludec. This innovative option has high prize and it is a limiting factor for higher market share in many countries.

In recent years, the highest utilization rates of long-acting insulin analogues were reported in Estonia (56.5% of total insulin use), the Czech Republic (47.8%), and Malta (40.0%). In 2020, long-acting insulin analogues accounted for 55.2% of total insulin use in Catalonia. However, Malta's utilization rates fluctuate due to procurement practices. Scotland experienced the smallest change in prescribing patterns, with only a 2.7% increase, while Poland saw the largest rise at 210.6%, albeit starting from a low baseline. This sharp increase in Poland could reflect a previous cautious stance on long-acting insulin prescriptions, likely due to cost concerns. Likewise, Slovenia exhibited a modest 10.7% increase in long-acting insulin use between 2014 and 2019, which may also be attributed to cost-effectiveness considerations, though further research is needed to verify these factors. The stable use of long-acting insulin analogues in Scotland is largely due to NHS Scotland guidelines, which recommend initiating treatment with human intermediate-acting insulins and reserve long-acting analogues for patients at higher risk of hypoglycemia. Regular monitoring of prescribing practices ensures adherence to these guidelines and supports appropriate use of long-acting insulins. This strategy has proven successful in improving guideline adherence in other areas of healthcare in Scotland (Morton, 2018; Godman et al., 2015; Leporowski et al., 2018).

Experts highlighted the significance of setting personalized treatment goals, acknowledging that patients' responses to insulin therapy can differ. However, challenges may emerge in applying these recommendations consistently in clinical practice due to variations in healthcare infrastructure and resources between countries.

Conclusion

In conclusion, our study on insulin utilization from 2019 to 2023 reveals a decline in the use of human insulin and an increasing adoption of long-acting insulin analogues. These findings reflect the ongoing efforts to enhance treatment options for insulin-dependent diabetic patients, driven by innovative approaches and the transition to modern insulins that offer improved effectiveness, a better safety profile, and enhanced patient compliance while reducing the risk of hypoglycemia. However, our study also highlights concerns about the limited use of biosimilar long-acting insulin analogues, a trend observed in several other European countries, which may be influenced by various factors.

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Резиме

Евалуирање и споредба на трендовите на примена на инсулин во период 2019-2023 во Скопје

Анифе Шабани[1*], Зорица Наумовска[2], Искра Садикаријо -Печијарева[3], Зоран Стерјев[2]

[1]Здравствен Дом- Скопје, бул. Крсте Мисирков бб, 1000 Скопје, Република Северна Македонија
[2]Фармацевтски факултет, Универзитет „Св Кирил и Методиј, Мајка Тереза 47, 1000 Скопје, Република Северна Македонија
[3]Агенција за лекови и медицински средстсва на Република Северна Македонија- МАЛМЕД, ул. Св. Кирил и Методиј бр. 54, 1000 Скопје, Република Северна Македонија

Клучни зборови: дијабетес, инсулин, хипогликемија, возрасни, употреба на инсулин

Околу 537 милиони возрасни лица на возраст од 20-79 години на глобално ниво се заболени од дијабет, а се предвидува дека преваленцата ќе се зголеми на 643 милиони до 2030 година и 783 милиони до 2045 година. Податоците од 2018-2021 година за Република Северна Македонија потврдуваат раст на број на лица со дијабетес, застапени со 6,6%. од населението во 2021 година.

Оваа студија ги презентира трендовите на потрошувачка на инсулин во Скопје, Република Северна Македонија, во период од 2019 до 2023 година, споредувајќи ги локалните со глобалните податоци. Ретроспективната студија ги обработува податоците за искористеноста на инсулинот добиени од националниот систем за е-здравство, (Мој Термин). Анализата на Националниот регистар за дијабетес мелитус потврди зголемена преваленца на дијабетес во Скопје во текот на евалуираниот период.

Беше забележан значителен пад од речиси 50% во употребата на хумані болус инсулині, додека за аналози на инсулин со долго дејство беше забележен значителен пораст во користењето. Insulin glargine (Lantus) беше најчесто користен базален инсулин во 2021 година, што се совпадна со воведувањето на неговиот биосличен, Abasaglar. Дополнително, insulin detemir (Levemir) постепено се заменува со insulin degludec (Tresiba), кој нуди супериорен терапевтски профил и намален ризик од хипогликемија. Во 2021 година на македонскиот пазар беше претставен Rizodeg, иновативна инсулинска комбинација.

Добиените резултати го одразуваат глобалниот тренд на опаѓање на употребата на хуман инсулин и зголемување на употребата на инсукинските аналозите со долго дејство, поради нивната подобрена ефикасност и безбедносен профил. Примената на поновите формулации на инсулин го истакнува унапредувањето во третамнот на дијабетесот проследено со подобрена контрола на дијабетот кај пациентите и намалување на дијебет-асоцираните компликации.