Insulin Market in Iran

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A B S T R A C T

Background: The Iranian pharmaceutical market is substantial, comprising a mix of domestically produced and imported medications. Among these, insulin plays a critical role in the treatment of diabetic patients. This study aims to examine insulin from both import and domestic production perspectives within the Iranian pharmaceutical market during the year 2023.

Methods: The research is a descriptive analytical study that investigates the insulin market using statistical data from the Food and Drug Administration of Iran.

Results: The findings indicate that a significant portion of the insulin available in Iran's pharmaceutical market is sourced through imports from European countries.

Conclusion: Given the importance of this medication for diabetes management and the current conditions in the country, it is essential for drug policies to shift towards increasing domestic production of insulin. The government should remove barriers faced by local manufacturers to enable them to meet the majority of the country's insulin needs effectively.

Keywords: Insulin Market, Import, Domestic Production

Introduction

Diabetes mellitus is a complex, chronic condition characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Among the various types of diabetes, Type 1 and Type 2 diabetes are the most prevalent [1, 2]. Diabetes mellitus affects millions of individuals worldwide, posing significant health risks and economic burdens. Central to the management of diabetes is insulin, a peptide hormone produced by the pancreas that regulates glucose metabolism. Insulin therapy is crucial, especially for individuals with Type 1 diabetes, where endogenous insulin production is absent [3, 4]. In Type 2 diabetes, where insulin resistance is prevalent, exogenous insulin may be necessary as the disease progresses. Insulin Physiology: Insulin is secreted by the β-cells of the pancreatic islets in response to elevated blood glucose levels. It facilitates the uptake of glucose by the liver, muscle, and adipose tissues, promoting glycogen synthesis while inhibiting gluconeogenesis. This hormone also plays a vital role in lipid metabolism and protein synthesis [4]. Dysregulation of insulin secretion or action leads to the pathophysiological changes observed in diabetes, emphasizing the importance of maintaining proper insulin function. Insulin Therapy in Diabetes Management: Insulin therapy has been a cornerstone in diabetes management since its discovery [5, 6]. Various formulations, including rapid-acting, long-acting, and premixed insulins, are used to achieve optimal glycemic control. Recent advancements in insulin analogs have improved the pharmacokinetic profiles of insulin, allowing for better flexibility and convenience in administration. Continuous subcutaneous insulin infusion via insulin pumps has also emerged as an effective strategy for managing blood glucose levels, especially in Type 1 diabetes. [7, 8]. Hypoglycemia, weight gain, and the complexity of treatment regimens are significant issues that require ongoing research. Innovations in glucose monitoring and delivery systems, such as closed-loop systems and smart insulin pens, promise to enhance diabetes management significantly [9-11]. Insulin remains a vital component in the management of diabetes mellitus.

Understanding its physiological role and the evolving landscape of insulin therapy is crucial for healthcare professionals. Continuous research and innovation are essential to address the challenges faced by individuals with diabetes and improve their quality of life[12]. Approximately 11% of the population over the age of 25 in Iran has diabetes. This statistic includes about 10% of men and 11.5% of women. Geographical Distribution: In urban areas, the prevalence of diabetes is 12.8%, while in rural areas it is 8%, indicating a 12% increase in rural areas in recent years. Awareness: About 75% of individuals with diabetes are aware of their condition, which is higher than the global average [13, 14]. More than 90% of the diabetic population consists of individuals with type 2 diabetes. The onset of type 2 diabetes is influenced by individuals' lifestyle, levels of obesity, high-calorie diets, family history, and more. It can also be associated with disorders such as hypertension, cholesterol issues, lipid abnormalities, and others [15]. Although type 1 diabetes can occur at any age, it is more commonly seen in children, adolescents, and young adults. Type 1 diabetes is less prevalent compared to type 2 diabetes, accounting for only about 5 to 10 percent of all diabetes cases [16, 17]. The high prevalence of type 1 diabetes in Iran imposes significant costs on the healthcare system, particularly regarding insulin usage. With over 90% of the diabetic population suffering from type 2 diabetes, the financial burden of managing type 1 diabetes, which is less common but still impactful, is notable. The reliance on imported insulin medications exacerbates this issue due to their high prices [18-20].

The price of insulin in Iran can be substantial, with many of these medications being imported. This leads to increased expenses for both patients and the healthcare system, as insulin is essential for managing type 1 diabetes [21-23]. The need for insulin and related diabetes care places a heavy burden on Iran's healthcare resources, necessitating higher allocations for diabetes management within the national health budget. Despite some efforts to provide insulin at lower prices, many patients still struggle to afford their medications. The

economic situation often forces individuals to ration their insulin or forgo it entirely, leading to severe health consequences [24, 25]. In summary, the combination of a high diabetic population and the reliance on expensive imported insulin creates a challenging environment for diabetes management in Iran, highlighting the need for systemic changes to improve access and affordability. There is a pressing need for health policymakers in Iran to prioritize cost-effective measures that ensure the availability of insulin and other necessary treatments for diabetic patients. This study, therefore, focuses on examining the 2023 insulin market in Iran and analyzes how it works in order to provide a clear perspective for policymakers.

Methods

This research constitutes a descriptive and analytical investigation utilizing data from Iranian statistics (Amarnameh) to examine the insulin market within Iran. The data pertaining to the insulin market was sourced from the statistical records of Iran for the year 2023. A comprehensive examination and analysis were conducted on both imported and domestically produced pharmaceuticals. Data were analyzed using descriptive statistics in Excel software.
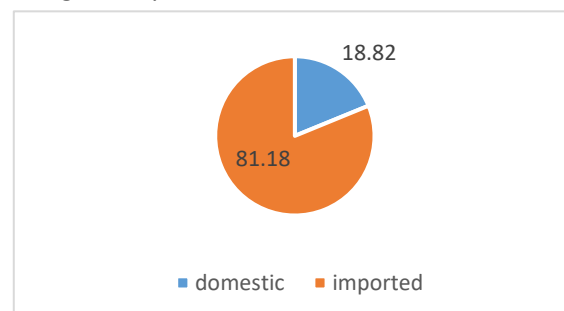

Figure 1. The share of domestic production and import of insulin market

Result

As the results of Table 1 show, more than 80% of Iran's pharmaceutical market consists of domestically produced drugs.

The graphic image of Figure 1 also indicates the high volume of domestic production.

Table 2 and graph 2 show that more than 80% of Iran's insulin market consists of the imported insulins.

Table 1. The total volume of Iran's pharmaceutical market (domestic production and import) (Rial- US dollars)

	Rial	USD*	Percent
Domestic	1,322,541,741,523,660	2,645,083,483	80.91
Imported	311,996,293,013,834	623,992,586	19.09
TOTAL	1,634,538,034,537,490	3,269,076,069	100

* Dollar to Rial exchange rate during the study period: 500,000Rials = 1 USD

As the results of Table 3 and the schematic of
Figure 2 show, more than 50% of insulins are imported from Europe.

Table 2. The size of the insulin market in Iran - domestic production and import (Rail)

	Rial	USD*	Percent
Domestic	8,714,768,736,600	17,429,537	18.81
Imported	37,603,337,177,449	75,206,674	81.18
Total	46,318,105,914,049	92,636,212	100

* Dollar to Rial exchange rate during the study period: 500,000Rials = 1 USD

Figure 3 indicates that China ranks second in the importation of insulin to Iran, accounting for approximately 30% of the total imports.
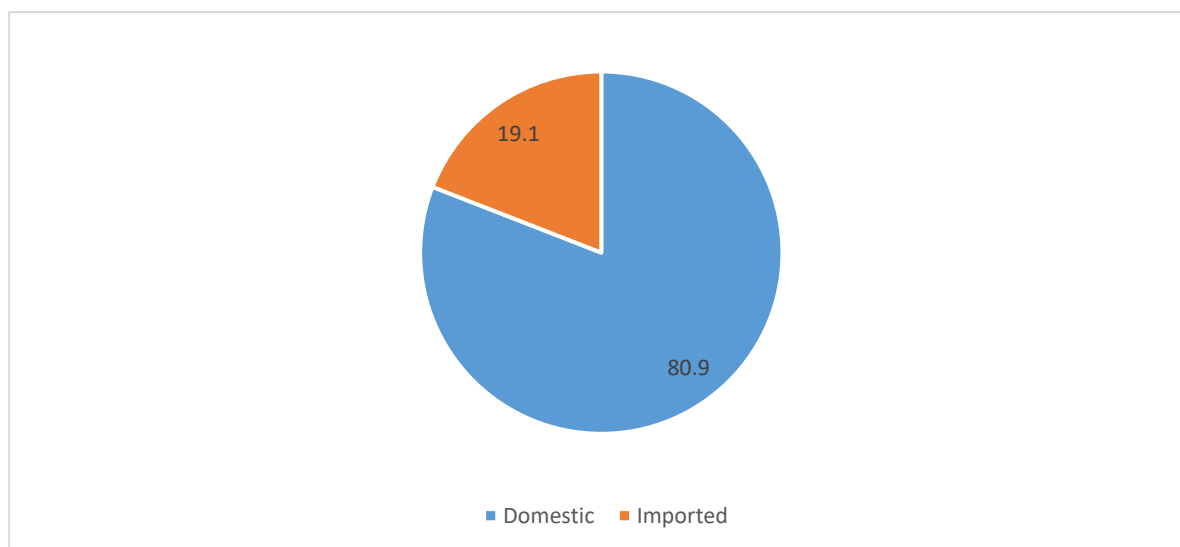
Figure 2. The share of domestic production and import of Iran's pharmaceutical market

Table 3. Share of different countries in imported insulin market

	Country	Cost (Rail)	USD*	Percent
1	Germany	15,218,831,147,932	30,437,662	40.5
2	China	13,842,520,143,879	27,685,040	36.8
3	Denmark	6,938,020,800,000	13,876,042	18.5
4	France	1,412,559,010,500	2,825,118	3.8
5	India	129,744,283,500	259,489	0.3
6	Brazil	61,661,791,638	123,324	0.2

* Dollar to Rial exchange rate during the study period: 500,000Rials = 1 USD
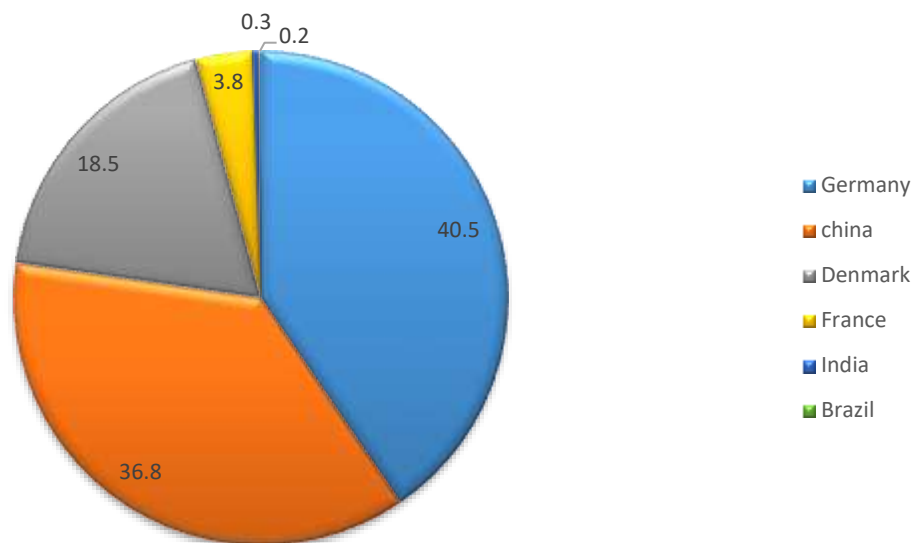
Figure 3. The share of countries in the Iranian insulin market

Table 4 shows different types of pharmaceutical forms of imported and domestically produced insulin.

Table 4. Dosage forms available in the pharmaceutical market of Iran

The most important imported pharmaceutical forms	
1	ABASAGLAR KWIKPEN INJECTION PARENTERAL 100 [iU]/1mL 3 [iU]
2	APIDRA SOLOSTAR INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 [iU]
3	APIDRA SOLOSTAR INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 mL
4	HUMALOG INJECTION PARENTERAL 100 [iU]/1mL 3 mL
5	HUMALOG MIX25 INJECTION, SUSPENSION PARENTERAL 100 [iU]/1mL 3 mL
6	LANTUS SOLOSTAR INJECTION PARENTERAL 100 [iU]/1mL 3 [iU]
7	LANTUS SOLOSTAR INJECTION PARENTERAL 100 [iU]/1mL 3 mL
8	LEVEMIR FLEXPEN INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 [iU]
9	LEVEMIR FLEXPEN INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 mL
10	NOVOMIX FLEXPEN INJECTION, SUSPENSION PARENTERAL 100 [iU]/1mL 3 [iU]
11	NOVOMIX FLEXPEN INJECTION, SUSPENSION PARENTERAL 100 [iU]/1mL 3 mL
12	NOVORAPID INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 [iU]
13	NOVORAPID INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 mL
14	NOVORAPID FLEXPEN INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 [iU]
15	NOVORAPID FLEXPEN INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 mL
16	PERSITUS DP INJECTION PARENTERAL 100 [iU]/1mL 3 [iU]
17	PERSITUS RU INJECTION PARENTERAL 100 [iU]/1mL 3 [iU]
18	RYZODEG FLEXPEN INJECTION, SOLUTION PARENTERAL 70 [iU]/30 [iU]/1mL 3 [iU]
19	TOUJEO SOLOSTAR INJECTION PARENTERAL 300 [iU]/1mL 1.5 [iU]
20	VALVEY INJECTION PARENTERAL 100 [iU]/1mL 3 [iU]
The most important medicinal forms of domestic production	
1	RAPIDSULIN INJECTION, SOLUTION PARENTERAL 100 [iU]/1mL 3 [iU]
2	GLAINE INJECTION PARENTERAL 100 [iU]/1mL 3 mL
3	BASALIN INJECTION PARENTERAL 100 [iU]/1mL 3 mL

Discussion

The findings of the research indicate that Iran's pharmaceutical market is extensive and holds considerable importance. This market encompasses numerous manufacturing and distribution companies, as well as a substantial number of pharmacies, and features over 2,000 pharmaceutical molecules. Notably, a significant proportion of the population suffers from diabetes-related disorders, with approximately 10%—equating to nearly one million individuals—diagnosed with type 1 diabetes, necessitating insulin treatment [13, 19]. Studies conducted in other countries indicate that the costs of treating type 1 diabetes and insulin and other costs related to it are very impressive and significant. The economic burden of insulin for type 1 diabetes (T1D) is significant and multifaceted, impacting both individuals and healthcare systems. In the U.S., the lifetime financial burden of managing type 1 diabetes can reach nearly $500,000 per person. A recent study estimates that the collective cost for individuals currently living with T1D or those who will develop it in the next decade will amount to approximately $813 billion over their lifetimes [26, 27]. On average, diabetes-related costs for T1D patients can total nearly $800 per month, with pharmacy costs making up over half of these expenses. This indicates a substantial economic burden associated with insulin and other diabetes management supplies [28, 29]. Annual Expenditures: Individuals diagnosed with diabetes incur annual medical expenditures around $19,736, with approximately $12,022 directly attributable to diabetes management [30]. The direct costs include expenses for insulin, blood glucose monitoring supplies, and hospitalizations due to complications like severe hypoglycemia or diabetic ketoacidosis.

Families often face catastrophic health expenditures when these costs exceed 10% of their annual income. Given that over 80% of Iran's pharmaceutical market is comprised of imported insulin, with an allocation of $75 million for this purpose, it is imperative to reassess the production of insulin within the country. This necessity arises from the challenging economic conditions in Iran, exacerbated by stringent sanctions that impact the economy. To mitigate the outflow of foreign currency, it is essential to enhance domestic insulin production capabilities. With the allocated funds, there exists a substantial opportunity for collaboration with local industries and small, knowledge-based pharmaceutical companies to produce high-quality insulin products domestically.

Conclusion

The findings of this study indicate that the economic burden associated with the treatment of type 1 diabetes, particularly the expenses related to insulin, is substantial. In light of Iran's economic circumstances and the severe international sanctions impacting its economy, it is imperative to reassess the policies governing drug production. Rather than allocating foreign currency for the importation of pharmaceuticals, resources should be redirected towards universities, research institutions, and knowledge-based enterprises to facilitate domestic drug production. This necessitates a comprehensive evaluation of drug policy by governmental authorities.

Conflict of interest

The author declares that there is no conflict of interests.

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