

# Analysis of the assortment of drugs used in Parkinson's disease in the pharmaceutical market of the republic of Uzbekistan

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**Abstract:** In the Republic of Uzbekistan, special attention is paid to modern approaches to the treatment of Parkinson's disease and the prospects of new drugs. Given the advances in Parkinson's disease research and the emergence of new drugs, it is important to conduct an analysis of the range of drugs used in Parkinson's disease. Assortment analysis of the pharmaceutical market is aimed at studying the offer of drugs used in the treatment of Parkinson's disease. This article analyzes the assortment of drugs used in the treatment of Parkinson's disease registered in the years 2013-2023 of the State Register of drugs, medical products and medical equipment authorized for use in medical practice in the Republic of Uzbekistan [1,2,3]. The results of the assortment analysis are presented in the context of patient needs and quality requirements, which can be useful for manufacturers, distributors and researchers in the pharmaceutical industry.

**Keywords:** Parkinson's, range analysis. pharmaceutical market, marketing analysis.

**Introduction:** Worldwide, Parkinson's disease occurs in 120-150 people per 100,000 population, meaning 1–3 out of every 1,000 individuals (0.1–0.3%) are affected. It is the second most common neurodegenerative disease after Alzheimer's disease. According to the WHO, more than 6 million people worldwide suffer from Parkinson's disease, and their number is expected to increase to 8.7-9.3 million by 2030. The prevalence of Parkinson's disease in the world is 120 to 180 per 100,000 population and is 1% in people over 60 years old and 4% in people over 80 years old. In Russia, the total incidence is 1.88-16.3 per 100,000 population per year. In recent years, the number of people diagnosed with Parkinson's disease in Uzbekistan has been increasing. Parkinson's disease symptoms worsen over time. There is no cure for the disease, but its symptoms

can be alleviated with various therapies and medications. The most common symptoms of Parkinson's disease include tremors, pain, involuntary muscle contractions, and slurred speech. The disease usually occurs in the elderly, but it can also occur in young people. It affects men more than women.

In recent years, foreign drugs for the treatment of Parkinson's disease are increasingly used in the pharmaceutical market. Deep research on this topic has not yet been conducted in Uzbekistan. Despite this, the production of such drugs in our country increases every year and fills the markets of Uzbekistan.

## Purpose of work

The purpose of our work is to analyze the pharmaceutical market of the Republic of Uzbekistan

and to analyze the range of drugs used in the treatment of Parkinson's disease. Determining the scarcity or limitation of medications needed to treat Parkinson's disease, their imported or domestically produced quantities. The breadth of the range of medications necessary for patients was determined. In addition, a comparative analysis of the range of drugs used in Parkinson's disease in the domestic pharmaceutical market during the period 2013-2023 y. This study aims to improve the quality of life of patients with Parkinson's disease, systematically develop the pharmaceutical market, and increase the volume of domestic drug production.

### Experimental section.

#### Research materials and methods

The main sources of information for this article include:

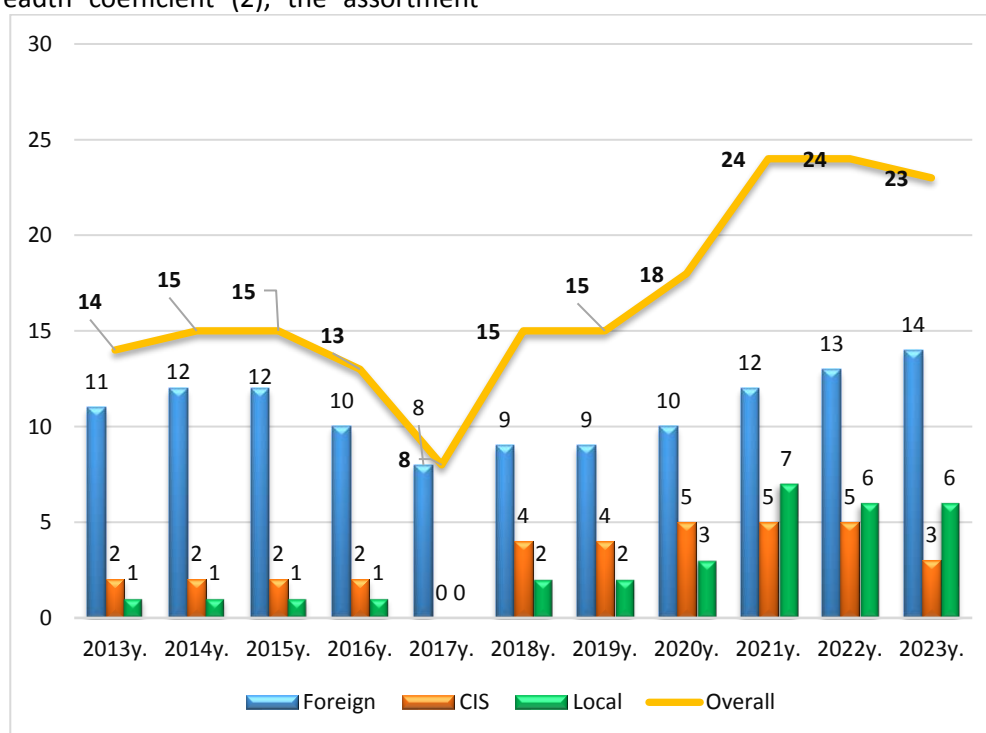
- State Register of medicines, medical supplies and medical equipment approved for use in medical practice in the Republic of Uzbekistan (2013-2023).

Content analysis methodology and logical abstract comparison method were chosen as research methods [4,5]. In addition, the research employed methods of statistical data processing: correlation, regression, analytical processing, comparison, and average growth. The following formulas were used for calculations: the formula for determining the renewal index (1), the assortment breadth coefficient (2), the assortment

depth (3), and the assortment structure (4), where:  $IO=m/M$  (1),  $m$  – the number of new product names,  $M$  – the total number of product names approved for use in the country.  $Kw=W_{fact}/W_{base}$  (2),  $W_{fact}$  – the number of groups or subgroups of products available in the organization or produced by the industry,  $W_{base}$  – the number of groups or subgroups of products approved for use in the country and listed in the State Register of Medicines and Medical Devices.  $Kd=D_{fact}/D_{base}$  (3),  $D_{fact}$  – the number of names of medicinal products within a single active pharmaceutical ingredient (API) or pharmacotherapeutic group available in the studied sector,  $D_{base}$  – the number of names of medicinal products within a single API or pharmacotherapeutic group approved for use in the country. Share of pharmacotherapeutic group (PTG) (%) =  $(A_{ptg}/A_o) \times 100\%$  (4),  $A_{ptg}$  – the assortment of the pharmacotherapeutic group (number of product names),  $A_o$  – the total assortment (number of product names)[6].

### RESULTS

According to the state registry, the following results were released, which will be discussed in more detail below. Not only the numerical values, but also the percentage of results over the last 10 years will be reviewed in detail.



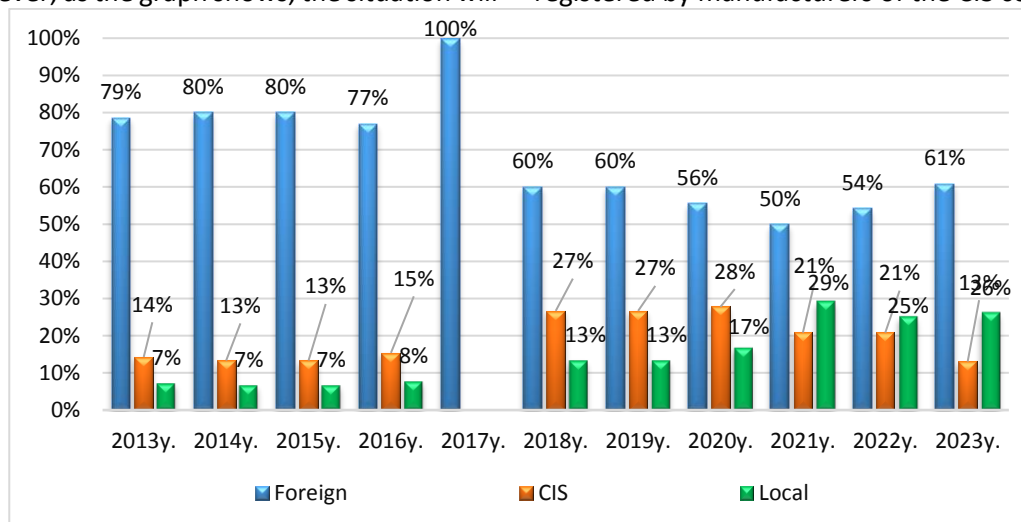
**Figure: 1. The number of drugs used in Parkinson's disease registered according to the State Register of the Republic of Uzbekistan (2013-2023y.)**

As we can see in the picture, a large share of the pharmaceutical market is occupied by drugs used in

Parkinson's disease registered by foreign manufacturers, followed by drugs registered by

manufacturers of the CIS countries, and the smallest part of the market is domestically produced drugs used in Parkinson's disease listed by the manufacturers are correct. However, as the graph shows, the situation will

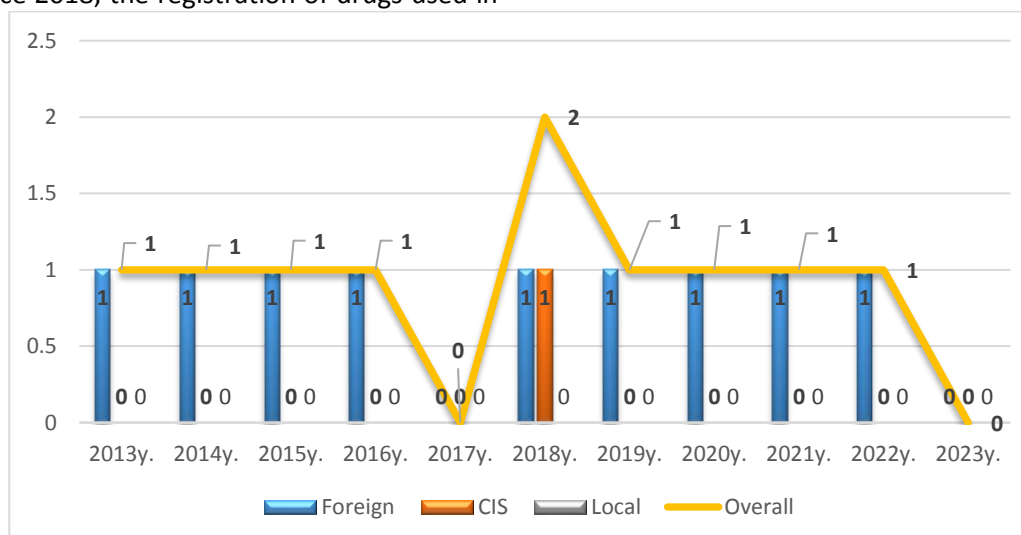
begin to change in 2021, more precisely, we can see that the number of drugs registered by domestic manufacturers will exceed the number of drugs registered by manufacturers of the CIS countries.



**Figure: 2. Width of the assortment of drugs used in Parkinson's disease according to the State Register of the Republic of Uzbekistan in 2013-2023y. (%)**

In this table, you can see the percentage of the indicators discussed above. It can be seen that in 2017, drugs used in Parkinson's disease registered by foreign manufacturers occupied almost 90% of the entire domestic market, which is a very large figure. It can be seen that since 2018, the registration of drugs used in

Parkinson's disease by domestic manufacturers has started to grow significantly. Thus, at the end of 2023, on the market: 61% of drugs used in Parkinson's disease registered by foreign manufacturers, 26% by domestic manufacturers and 13% by manufacturers of CIS countries.

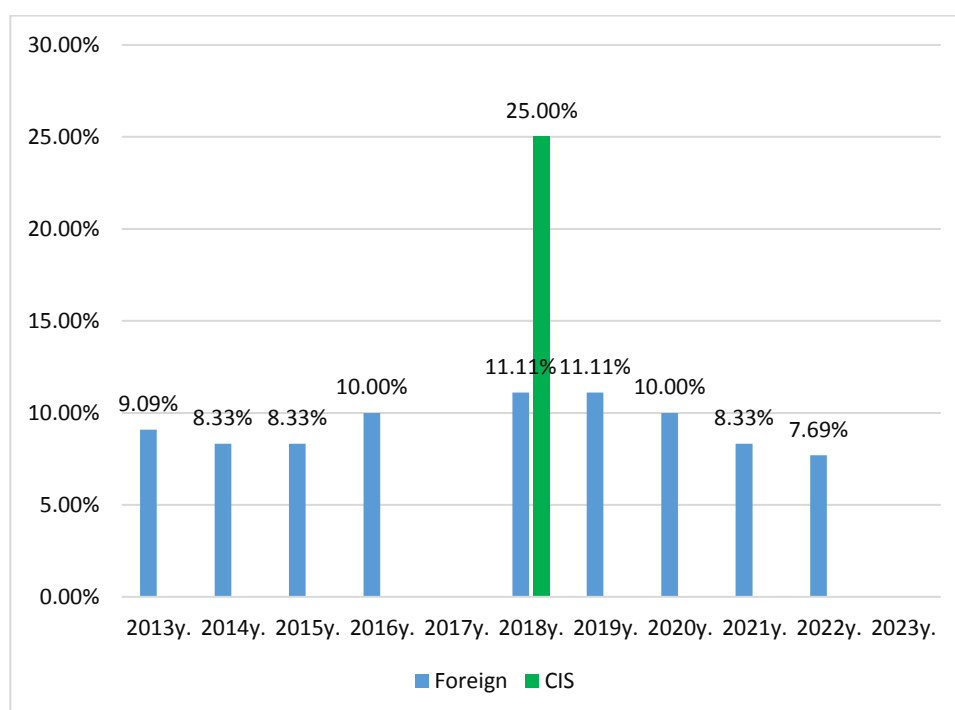


**Figure: 3. The depth of the range of drugs used in Parkinson's disease according to the State Register of the Republic of Uzbekistan (2013-2023y.)**

Given the depth of the range of drugs used in Parkinson's disease, we can say that it is not diverse. And the situation has hardly changed for 10 years and in 2018, only drugs used in Parkinson's disease can be seen from manufacturers of foreign and CIS countries. Until 2022, the range of drugs registered by foreign

manufacturers has not changed. And by 2023, all depth indicators of the range of drugs used in Parkinson's disease will be 0.

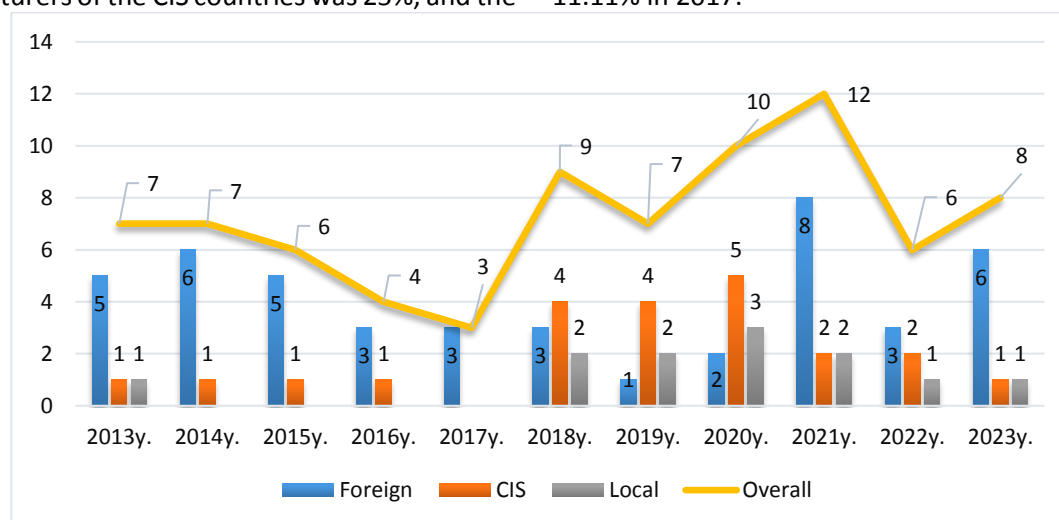
The same indicators can be seen in percentage in the figure below.



**Figure: 4. Depth (%) of the range of drugs used in Parkinson's disease according to the State Register of the Republic of Uzbekistan (2013-2023y.)**

Here, the indicators of the CIS countries in 2018 attract our attention. Depth of assortment In 2018, the depth of the assortment of drugs used in Parkinson's disease by manufacturers of the CIS countries was 25%, and the

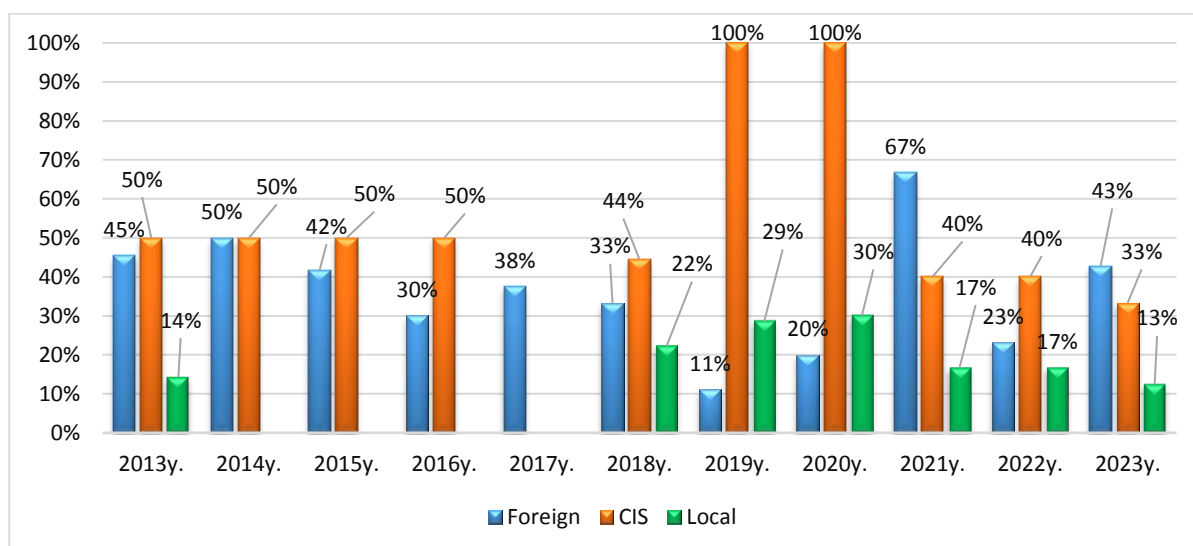
indicators have not been repeated in the period of 2019-2023. The depth of assortment of drugs used in Parkinson's disease by local manufacturers is only 11.11% in 2017.



**Figure: 5. Update index of the range of drugs used in parkinson's disease according to the State Register of the Republic of Uzbekistan (2013-2023 y.)**

The histogram shows that the indicators of the renewal index in the assortment of drugs have changed over 10 years. The maximum total indicators were recorded in 2021. And by 2023, the indicators of 2013 and 2023 are almost similar, differing only by 1 unit. In 2020, the index of renewal of registered medicines by domestic

manufacturers returned to a very high level. However, it should be noted that the renewal index of drugs used in Parkinson's disease, registered by foreign manufacturers, remains unchanged for 10 years, excluding the years 2018-2020 and 2022.

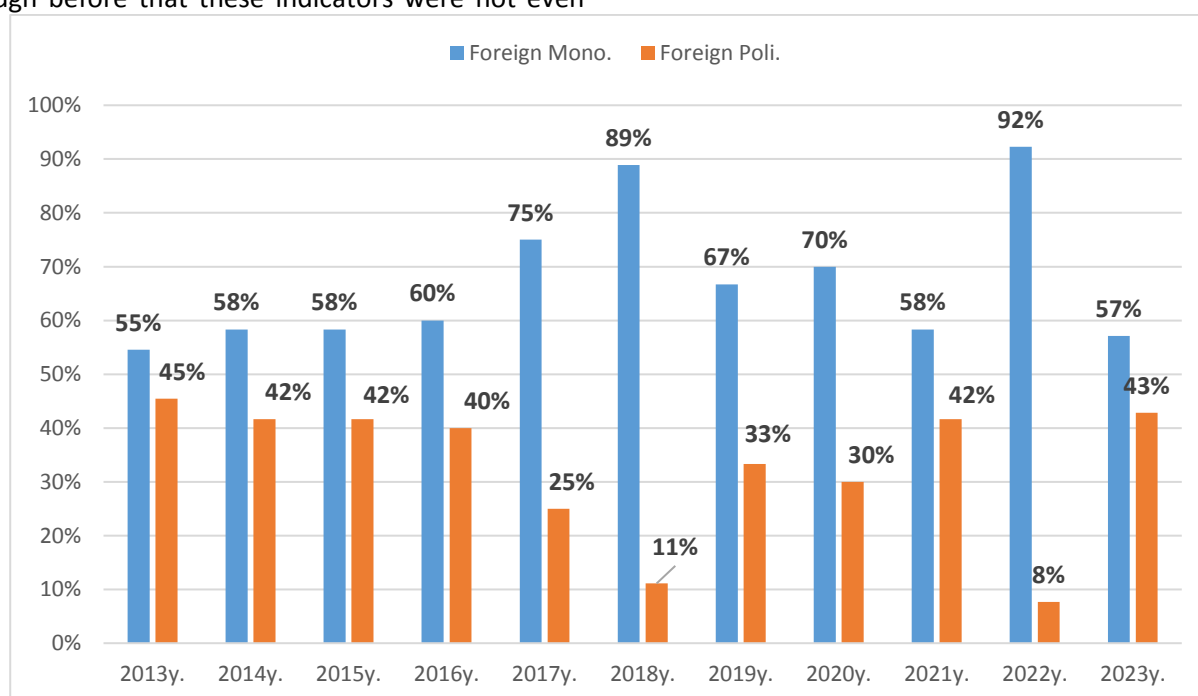


**Figure: 6. Index of renewal of the assortment of drugs used in Parkinson's disease according to the State Register of the Republic of Uzbekistan (2013-2023 y.)**

The percentage of the update index of the range of drugs used in Parkinson's disease shows that in 2019-2020, the drugs of the CIS countries accounted for a large percentage of the change, reaching 100%. It was in these years that the index of these foreign drugs decreased significantly to 11% and 20%, respectively, although before that these indicators were not even

lower than 30%.

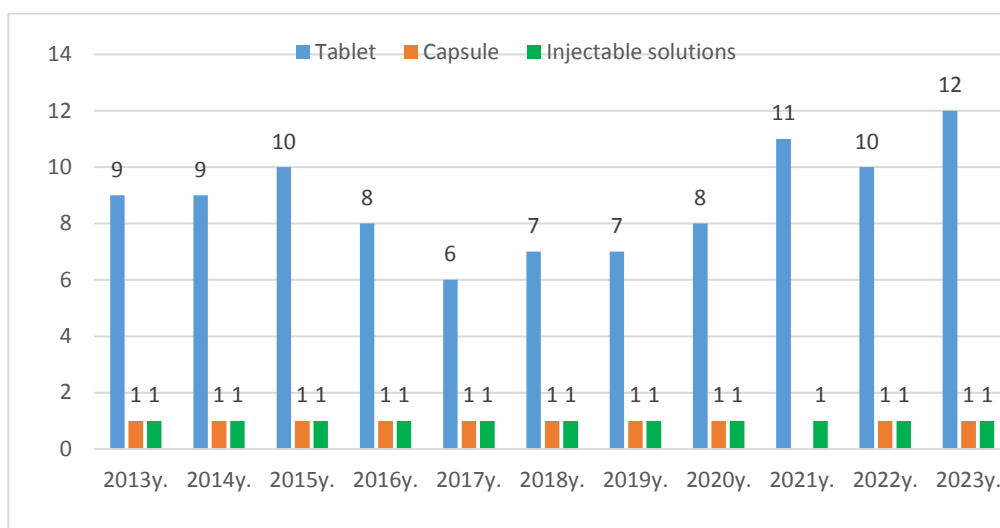
As can be seen from the above tables, over the past 10 years, drugs of foreign manufacturers have almost always been the market leader. Therefore, we decided to consider this aspect in more detail. In particular, these are types of foreign drugs.



**Figure: 7. Mono-component and poly-component Parkinson's drugs registered by foreign manufacturers.**

From the percentages shown in the histogram, we can see that between 2013 and 2023, mono-component drugs registered more than poly-component drugs. In 2018, monocomponent drugs accounted for 89%, and polycomponent drugs accounted for 11%. By 2022, the

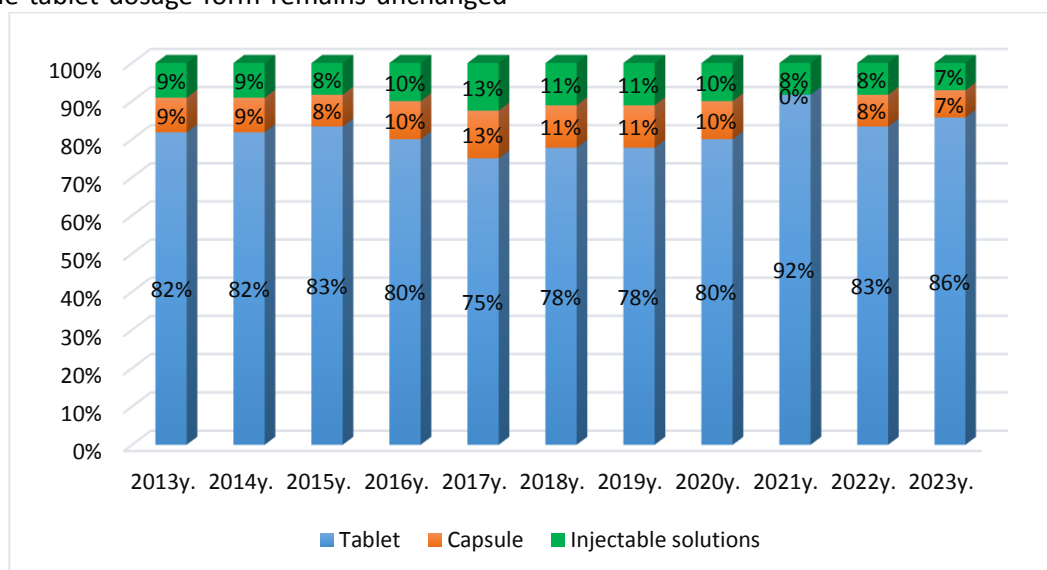
percentage of mono-component drugs registered by foreign manufacturers was 92% and was considered the highest indicator for the period 2013-2023. On the other hand, registration of poly-component drugs returned the lowest rate (8%) (Figure 7).



**Picture: 8. Quantitative indications of drugs used in Parkinson's disease registered by foreign manufacturers by dosage form**

As you can see, most of the drugs used in Parkinson's disease registered in the State Register of Medicines, Medical Equipment and Medical Equipment approved for use in the medical practice of the Republic of Uzbekistan are in pill form. During 2013-2023, a total of 97 drugs used in Parkinson's disease were registered in pill form. The tablet dosage form remains unchanged

as the main dosage form during 2013-2023. During the period 2013-2023, a total of 10 Parkinson's disease medications were registered in capsule form and 11 in injectable form. Solution for injection and capsule drug forms are continuously registered, but we can see that their numbers are less compared to the pill form.

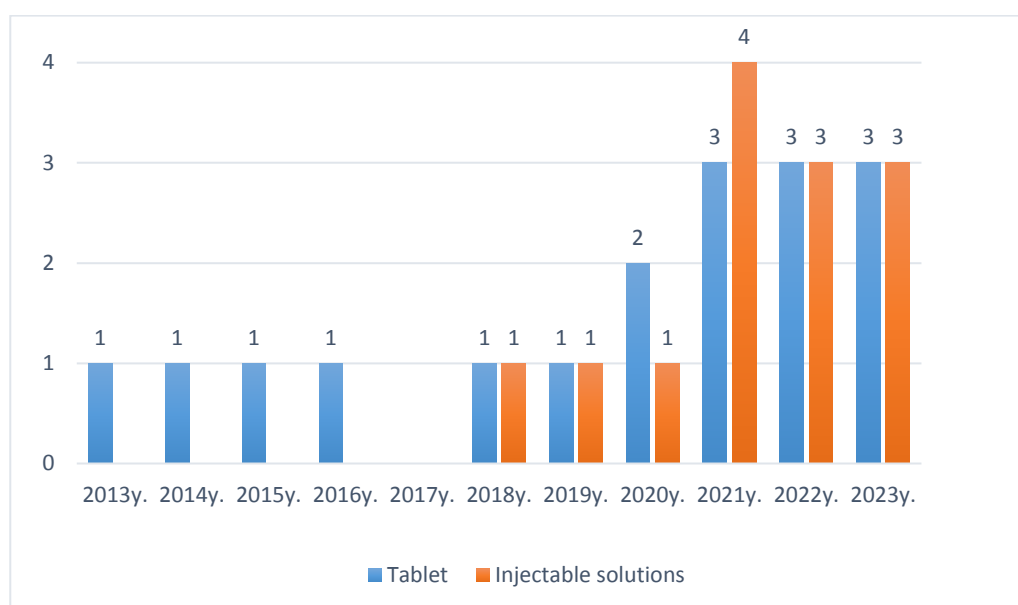


**Figure: 9. Percentage (%) indicators of drugs used in Parkinson's disease registered by foreign manufacturers by drug form**

In this graph, we can see percentage indicators by pharmaceutical forms of drugs used in Parkinson's disease registered by foreign manufacturers in 2013-2023. According to the indicators, the pill form of the drug has seen a general increase since 2013, the most noticeable increase can be seen from 2017 to 2021. By 2023, 86% will be in pill form. 2013 accounted for 9% of the capsule form of the drug, and 2017 saw the highest

growth, i.e. 13%.

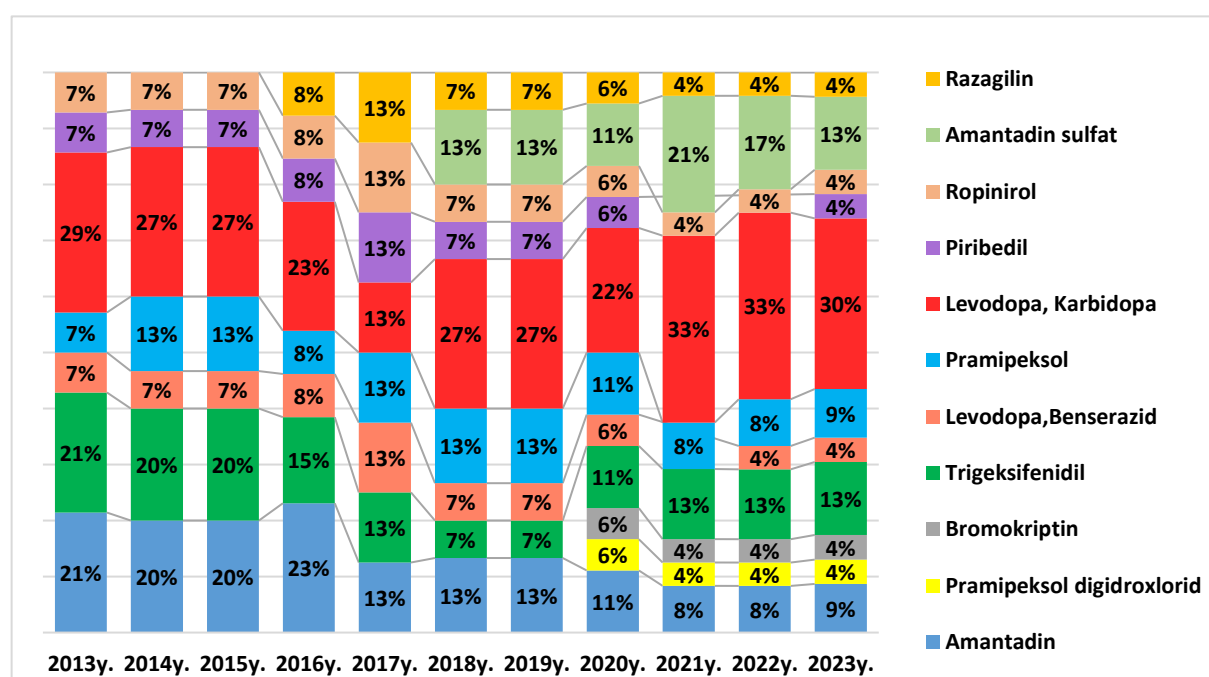
Above, we considered the types of foreign drugs and their percentage indicators. This does not mean that there is no range of drugs and medicines produced in the CIS countries on the market. Their share is significantly smaller, but still present in the market. In the following graph, you can see numerical and percentage indicators by types of local drugs.



**Picture: 10. Numerical indicators of drugs used in the treatment of topical Parkinson's disease by dosage form**

In 2013-2016, all drugs for the treatment of Parkinson's disease produced by local manufacturers in the pharmaceutical market of Uzbekistan were only in the form of tablets. Other drug forms, such as capsules, solutions or injections, were not available in the product range of local manufacturers. Due to unknown reasons, in 2017, drugs used in Parkinson's disease by domestic manufacturers were not registered, and since 2018, the form of the drug solution for injection has

been registered. In 2020, 2 drugs used in Parkinson's disease were registered in tablet form, the number of solutions for injection remained unchanged. In 2021, 3 drugs in the form of tablets and 4 drugs in the form of solution for injection were registered. In 2022-2023, 3 drugs in the form of tablets and 3 drugs in the form of solution for injection were registered. Only tablets and solutions for injection are available in the pharmaceutical form of drugs used in Parkinson's disease registered by local manufacturers.



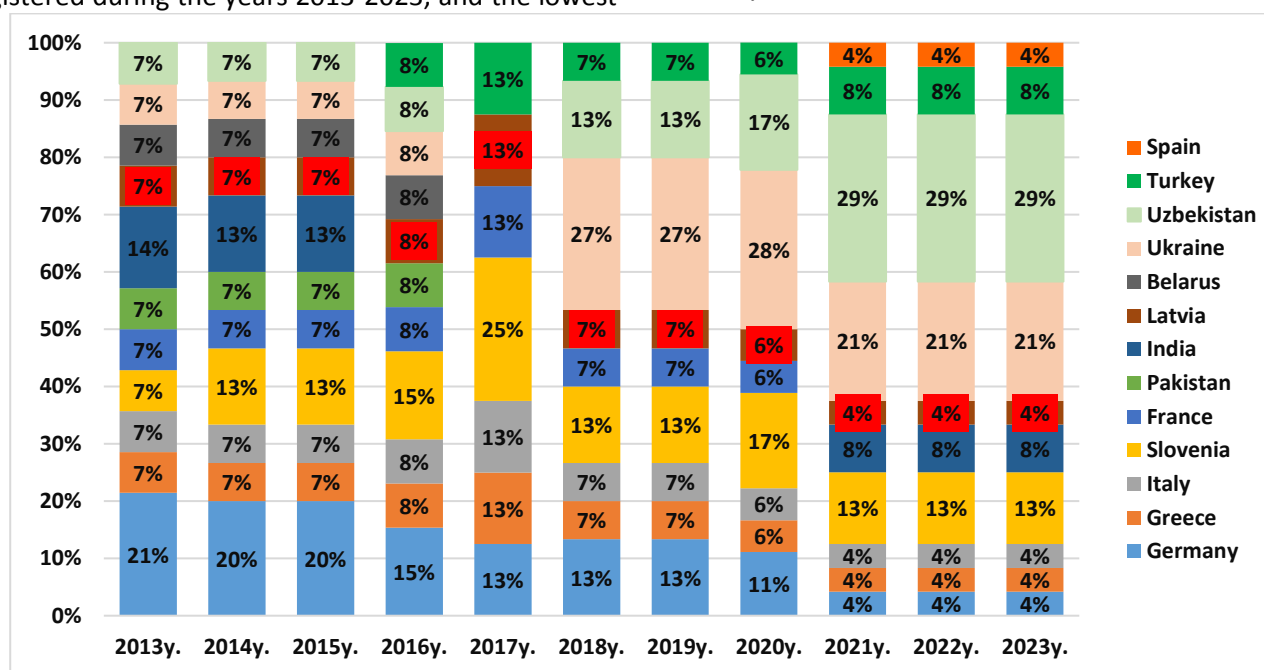
**Figure: 11. Percentages of drugs used in the treatment of Parkinson's disease according to the International non-proprietary designation.**

This histogram shows the percentage of drugs used in Parkinson's disease registered in the State Register of



drugs, medical products and medical equipment approved for use in medical practice in the Republic of Uzbekistan under international non-patented names between 2013 and 2023. you can see the pointers. The share of the drug "Amantadine" was 21-23% from 2013 to 2016, and by 2017 it was significantly reduced, and this figure, which was 13%, did not change until 2019, 11% in 2020, 9% in 2023. The drug "Trihexyphenidyl" contributed 21-20% from 2013 to 2015, 15% in 2016, we can see that this figure has decreased from 13% to 11% in 2017-2020 and remained unchanged in 2021-2023 13 made up %. The drug "Pramipexol", which returned to stable indicators, was also continuously registered during the years 2013-2023, and the lowest

indicator was 7% (2013), and the highest indicator was 13%. The combined drug "Levodopa, Carbidopa" has returned the highest indicators among the drugs used in Parkinson's disease. That is, during the years 2013-2023, the node was registered, and the lowest indicator was 13% (in 2017). ), the highest indicator was 33% (2021), the drugs "Piribedil" and "Ropinirole" have almost the same indicators and the highest rate of these drugs was 13% (2017), 4% in 2023. The rates of "Amantadine sulfate" began to return from 2018, and this rate reached 13% by 2021. 21%, at the end of our research (2023) it was 13% This indicator, registered since 2016 and the highest indicator of 13% (2017), will be 4% by 2023.



**Figure: 12. Indicators (%) of drugs used in Parkinson's disease at the scale of the countries of manufacture.**

The country-level indicators of the manufacturing enterprises of drugs used in Parkinson's disease were analyzed in the period 2013-2023 and a total of 13 states were identified. Among these countries, which are permanently registered in the State Register of Medicines, Medical Devices and Medical Equipment for the period 2013-2023, which produced drugs used in the treatment of Parkinson's disease and are allowed to be used in medical practice in the Republic of Uzbekistan: We can see the countries of Germany, Slovenia, Greece, Italy, Latvia, Ukraine and Uzbekistan. In addition to the countries mentioned above, we can see that the registration of drugs manufactured in Turkey has started since 2018. We can see that the majority of registered Parkinson's disease drugs belong to foreign countries. It should be noted that in recent years, the percentage of registration of drugs produced in the Republic of Uzbekistan has increased.

## CONCLUSION

This article analyzes the range of drugs used for Parkinson's disease. Our analysis mainly focuses on the depth, breadth, range renewal index of drugs used in the treatment of Parkinson's disease registered in the State Register of drugs, medical devices and medical equipment approved for use in medical practice in the Republic of Uzbekistan during 2013-2023, foreign and domestic manufacturers, drug types, and the proportion of all drugs manufactured in specific countries were examined. As a conclusion of the obtained results, drugs used in the treatment of Parkinson's disease are mainly listed in the form of tablets. The main part of the registered drugs was produced by foreign manufacturers, and the registration of drugs produced by local manufacturers began to increase from 2018, which we can see further development of localization. In order to compare these results, we decided to study quantitative indicators of the pharmaceutical market of drugs used in Parkinson's disease.



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