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ANALYSIS OF THE PHARMACEUTICAL MARKET OF ANTISPASMODIC DRUGS OF DOMESTIC PRODUCTION

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Assortment composition of the medicines with antispasmodic action in the Republic of Uzbekistan was analyzed on the basis of the corresponding numbers 24, 25 and 26 of the State Register of Medicines and Medical Products for 2020, 2021, 2022.

KEYWORDS: *simetikon, drotaverine hydrochloride, antispasmodic, combined drug, market analysis.*

INTRODUCTION

Spasm plays an important role in the pathogenesis of many diseases of smooth muscles of visceral organs. Spasm interferes with the blood supply of the injured organ or tissue and leads to the development of the pathological process. It is often accompanied by pain of varying intensity. Spasms caused by organic pathology (pylorospasm in gastric ulcer disease, spasm of the neck of the gallbladder, etc.) are secondary, and the main severe pain is caused by inflammation or neoplastic process [1].

In functional disorders, spasm of smooth muscles can be the main symptom of the disease, which is the main cause of pain and causes dysfunction of the gastrointestinal tract.

Drotaverine hydrochloride has a great role in the correct diagnosis and effective treatment of functional disorders of the gastrointestinal tract, and it is considered the most recommended drug for this type of disease. There are combinations of Drotaverine hydrochloride with non-steroidal anti-inflammatory

drugs, which are included in the range of anti-spasmodic and anti-pain agents in diseases of various etiologies [2].

The combination we recommend is the combination of drotaverine hydrochloride with simethicone, which has an anticonvulsant effect. This combination is used in gastrointestinal spasms, which appear due to reasons such as sedentary lifestyle and improper diet, which are global problems of the present time.

Nowadays, functional diseases of the gastrointestinal tract occur in 15-20% of the population and are characterized by the high cost of diagnostic procedures necessary for differential diagnosis of organic pathology of the digestive tract [1].

The pharmaceutical market of Uzbekistan is the largest market in the CIS after Russia and Ukraine. The growth dynamics is 8-10% per year, and it is among the fastest growing markets in the CIS region[7].

In the United States, the direct costs of diagnosing and treating this group of diseases range from 1.7 to 10

billion dollars, and the indirect costs exceed 20 billion dollars per year [8].

Various factors, such as adapting to a sedentary lifestyle, lead to an increase in gastrointestinal diseases. According to research and consulting reports of Data Bridge Market Research, the need for antispasmodic drugs will grow by 10% in the period 2022-2030. This growth is due to an increasing elderly population, with the share of the world's population aged 60 and over almost doubling from 12% to 22% between 2015 and 2050. By 2030, the number of people aged 60 and over will exceed the number of young people under the age of 5. By 2050, 80% of the world's elderly are expected to live in low- and middle-income countries [8].

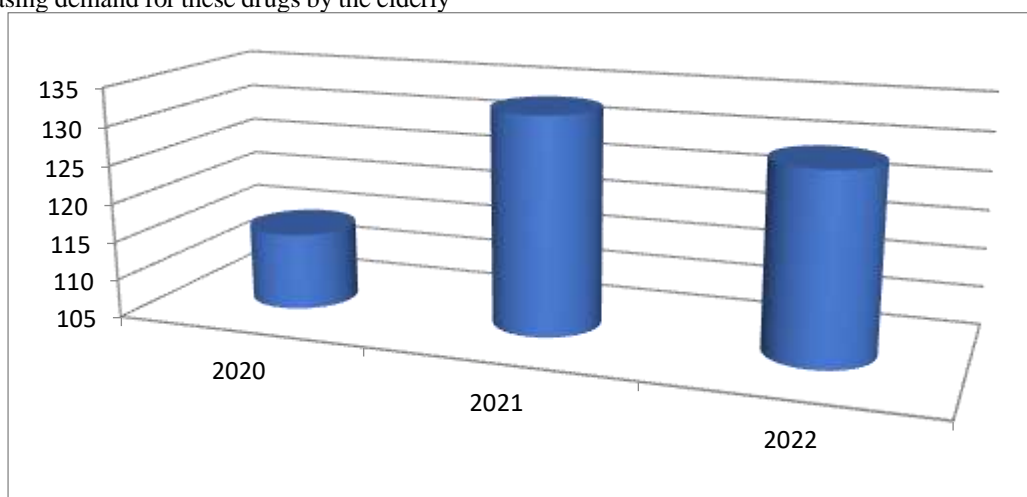
The growth of the antispasmodics market is attributed to the increasing demand for these drugs by the elderly

population. At the same time, it is one of the important tasks of the pharmaceutical industry to provide the population with high-quality, local and affordable medicines necessary for first aid.

The Aim of the research To study the state of production and assortment of drugs with spasmolytic effect in the Republic of Uzbekistan. Analysis of Factors Affecting Demand and Supply of Antispasmodics.

Research Object. In our research, we analyzed the relevant numbers #24,25,26 of the State Register of Medicines and Medical Products for 2020-2022.

Experimental Part. We started our research with the nomenclature of antispasmodic drugs registered in the Republic of Uzbekistan (Fig. 1).

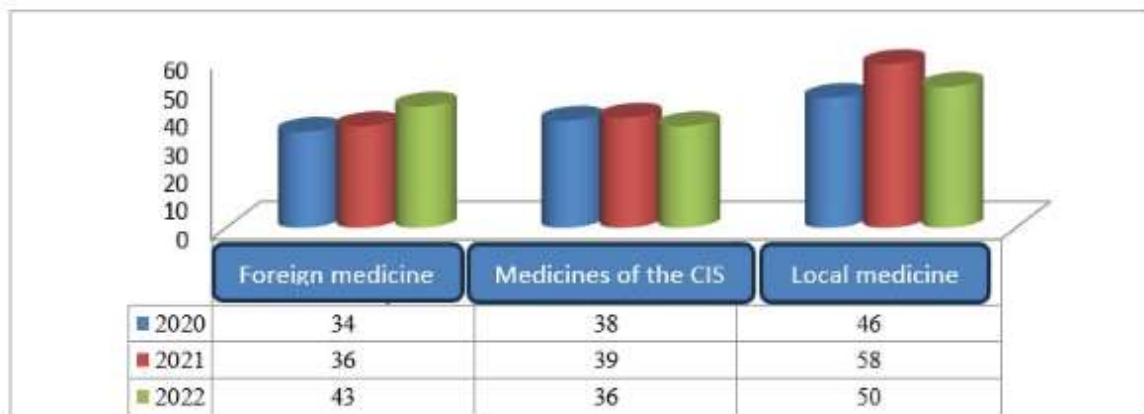


Picture 1. Analysis of the domestic pharmaceutical market for antispasmodic drugs for 2020-2022

As can be seen from Picture 1, according to the State Register of Medicines and Medical Products No. 24, 25, 26, drugs with smazmolytic effect registered in the Republic of Uzbekistan will be -118 in 2020, -133 in 2021, and 129 by 2022 with different compositions and patented names listed [3,4,5].

At the next stage of our research, we conducted a comparative study of the regions of production enterprises of antispasmodic drugs registered in the state register and presented the results in Picture 2.

As can be seen from the figures presented in Figure 2, according to our regional analysis, locally produced drugs showed a maximum level in the year 2021 of the research period. But even in 2023, although these indicators decreased, the number of antispasmodics produced by domestic manufacturers increased and was recorded compared to other countries. This, in turn, indicates that the demand for these drugs has increased in our republic.



Picture 2. Results of a comparative study of manufacturers of antispasmodic drugs

Table 1 presents the results of the study of the share of production of antispasmodic drugs by the number of local enterprises participating in the leadership in the production of antispasmodic drugs.

**Table 1
On the production of drugs with spasmolytic effect the results of the study of the share of local enterprises**

| № | Manufacturing enterprises | The number of drugs registered in the state register | | |
|-----|------------------------------|--|---------|---------|
| | | 2020 y. | 2021 y. | 2022 y. |
| 1. | Merrymed farm, JV LLC | 7 | 7 | 7 |
| 2. | Jurabek Laboratories, JV LLC | 3 | 5 | 5 |
| 3. | Remedy KK MЧЖ, Uzbek-British | 5 | 6 | 4 |
| 4. | Dentafill Plyus, LLC | 3 | 3 | 3 |
| 5. | Namangan Pharm Plant, LLC | 3 | 3 | 3 |
| 6. | Radiks, MCHJ | 2 | 3 | 2 |
| 7. | Uzgermed pharm, JV LLC | 2 | 0 | 2 |
| 8. | Novopharma plus, JV LLC | 2 | 0 | 2 |
| 9. | Neogalenpharm, LLC | 2 | 2 | 0 |
| 10. | Reka-Med Farm, JV LLC | 0 | 0 | 2 |
| 11. | ATM Pharm, LLC | 0 | 0 | 1 |

According to the results obtained, the pharmaceutical enterprises Merrymed Farm, Jurabek Laboratories (in 7 names) and Remedy Group (in 6 names) are the leaders in the production of antispasmodic drugs. In the next places are pharmaceutical enterprises Dentafill Plus (3 names) and Namangan Pharm Plant (3 names) and h.o. This, in turn, indicates the great need for these drugs in our republic [3,4,5].

It is known that, along with the therapeutic effect of the drugs produced by new technology, the method of their introduction into the body is very important. Therefore, at the next stage of our research, we studied the comparative analysis of the dosage forms of antispasmodic drugs registered in the State Register.

The obtained results are presented in Table 2.

**Table 2
Results of comparative analysis of antispasmodic drugs registered from the state register by drug forms**

| № | Drug forms | The number of drug forms registered in the state register | | |
|----|------------|---|------|------|
| | | 2020 | 2021 | 2022 |
| 1. | Tablet | 41 | 44 | 50 |
| 2. | Capsule | 12 | 15 | 15 |
| 3. | Candle | 9 | 10 | 11 |
| 4. | Injection | 45 | 50 | 53 |
| 5. | Suspension | 0 | 2 | 0 |
| 6. | Sashes | 11 | 12 | 0 |

According to the data presented in Table 2, the largest number of drugs with spasmolytic effect correspond to the forms of tablets (41, 44 and 50, respectively) and injection (12, 15 and 15). This, in turn, can be considered as an advantage in the production and use of these drug forms.

In recent years, the achievements of pharmacy and pharmacology and the rapid development of the chemical and pharmaceutical industry have significantly expanded the arsenal of domestically produced drugs, the number of which continues to grow.

Multicomponent drugs today occupy a large share of the pharmaceutical market, which is due to the increase in the number of diseases per patient. In addition, the combination of several drugs in one drug allows to reduce side effects, get a synergistic effect

from the drug, and save the patient from the need to take several monopreparations. Spasmolytics form a separate group of drugs, they differ in the mechanism of action on various organs, depending on the mechanism of action, spasmolytics are divided into two groups: neurotropic and myotropic. Antispasmodic drugs differ in different mechanisms of action and chemical structure. Analyzing factors such as localization of spasm and severity or lightness of the sensation of pain, its short or long duration, monotherapy may not give the expected result in highly effective relief of these symptoms [1,2].

Based on the above, in the next stages of our research, we analyzed combinations of drotaverine hydrochloride and simethicone with other substances.

The obtained results are presented in tables 3 and 4.

Table 3
Combined Preparations Based On Drotaverine Hydrochloride Analysis Results

| № | Combinations | The name of the drug | Drug Form | Country Of Manufacture | Years Studied | | |
|----|---|----------------------------------|---------------|------------------------|---------------|------|------|
| | | | | | 2020 | 2021 | 2022 |
| 1. | Drotaverine hydrochloride Aceclofenac | "Dispavirin (Dispavirin)" | Coated tablet | India | | | 1 |
| 2. | Drotaverine hydrochloride Ibuprofen | "Ibuklin® Lady". (Ibuklin Lady)" | Coated tablet | India | | | 1 |
| 3. | Drotaverine hydrochloride Mefenamic | "Spanish plus." (Spanish plus)" | Coated tablet | India | | | 1 |
| 4. | Drotaverine hydrochloride Paracetamol | "Yunispaz® N (Yunispaz N)" | Tablet | India | 1 | 1 | 1 |
| 5. | Drotaverine Hydrochloride Caffeine Naproxen Paracetamol Pheniramine | "Pentalgin® (Pentalginum)" | Coated tablet | Russia | 1 | 1 | 1 |
| 6. | Drotaverine hydrochloride Metamizole Diphenylhydroamine | "Bolnox (Bolnox)" | Tablet | Uzbekistan | | 1 | 1 |

In Table 3, there are 6 different combinations of drugs of drotaverine hydrochloride registered in the State Register in 2020-2022, and it was found during the analysis period that the number of those registered during the last 3 years of study was 11. Also, among the drugs registered in our republic and having their place in the local pharmaceutical market, only 1 belongs to local manufacturing enterprises. These combined antispasmodic combined preparations are

mainly manufactured in India. only 1 corresponds to the Russian state [3,4,5].

From the above indicators, it can be seen that the entry of these drugs into our republic has decreased from year to year. Coated tablets manufactured in India are listed in the state register under the name of "Unispaz® N" in 2020 and under the name of "Pentalgin®" of Russia in 2020-2022, while drugs with other names are registered mainly by 2022.

Table 4
Results of the Analysis of Combined Preparations Based On Simethicone

| Combinations | Name of the Drug | Drug Form | Country Of Manufacture | Years Studied | | |
|---|--------------------------------------|--------------------------|------------------------|---------------|-------|------|
| | | | | 2020 | 22021 | 2022 |
| Simethicone Aluminum hydroxide Magnesium hydroxide | Remetic ® | Suspension | Uzbekistan | 1 | 1 | 1 |
| | Almagel®neo | Suspension | Bulgaria | 1 | 1 | 1 |
| | Dijion plus | Suspension | India | - | - | 1 |
| | Kusid plus | Suspension | India | 1 | 1 | 1 |
| | Alusit | Suspension | Uzbekistan | 1 | - | 1 |
| | Isimag | Suspension | Uzbekistan | 1 | 1 | 1- |
| Simethicone Aluminum hydroxide Magnesium hydroxide Magnesium carbonate | Diovol | Tablet | India | - | 1 | 1 |
| Simethicone Domperidone | Bigetric® | Tablet | Аргентина | 11 | 11 | 11 |
| Simethicone Nifuroxazid Pectin | Doprokin-S | Suspension | Туркия | 11 | 11 | 11 |
| Simethicone Diclomine | Dialin | Suspension | Turkey | 11 | 11 | 11 |
| Simethicone Loperamide | Disitikon | Suspension | India | -- | 11 | 11 |
| Simethicone Alverine Citrate | Klosim | Suspension | India | 11 | 11 | -- |
| Simethicone Fennel oil | Kombispasm | A coated tablet | India | 11 | 11 | 11 |
| Simethicone Papain Alpha amylase | Loflatil® | A coated tablet | India | 11 | 11 | 11 |
| Simethicone Magaldrad | Meteospasmil | Capsule | France | 1 | 1 | 1 |
| | Simespasmil | Capsule | Turkey | - | - | 1 |
| | Avarin | Capsule | Thailand | - | - | 1 |
| | Babycol | Drop | India | 1 | 1 | 1 |
| | Kolikvel | | India | - | 1 | 1 |
| | Ishazim zing | Tablet (fast dissolving) | India | 11 | 11 | -- |
| | Kulanta | Tablet | India | - | 1 | 1 |
| Total | Preparations with 22 different names | | | 14 | 17 | 19 |

The figures presented in Table 4 showed that Simethicone-based combination drugs were mainly manufactured in India and most of them were in the form of suspension formulation. In domestic manufacturing enterprises, only one drug in the form of a suspension was registered.

CONCLUSION

Thus, based on the results of the research, the analysis of the situation of drugs with spasmolytic effect in the local pharmaceutical market showed that it is necessary to increase the arsenal of drugs belonging to this group, especially easy-to-use, stable drug forms, as well as the feasibility of localization of production.

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