

# Study of the etiology, pathogenesis, and diagnosis of dermatomycosis of the scalp, nails, feet, hands, smooth skin, and inguinal dermatophytosis

*Estudio de la etiología, patogenia y diagnóstico de las dermatomicosis del cuero cabelludo, uñas, pies, manos, piel lisa y dermatofitosis inguinal*

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## Abstract

**Introduction:** The increased incidence and preponderance of dermatomycosis cause the issue of determining antimycotic agents of systemic and external action to be particularly pertinent, considering the etiology, clinical form, and majority of mycoses, the sensitivity of pathogens to them, and the existence of concurrent conditions. The study aims to analyze the etiology, pathogenesis, and diagnosis of dermatomycosis of the scalp, nails, feet, hands, smooth skin, and inguinal dermatophytosis. **Patients and methods:** To meet the aim of the study, it is attempted to generate an algorithm for pharmaceutical counseling of patients suffering from various types of dermatomycosis. Over the span of five months, a survey was carried out of 25 visitors to the pharmacy with a diagnosis of dermatomycosis. **Results:** Based on the results, it was revealed that most of the visitors suffer from dermatomycosis of the feet - 10 people (40%), the second in terms of incidence is onychomycosis - 5 people (19%), the third in terms of incidence is dermatomycosis of the groin area - 4 people (15%), the fourth in the incidence is dermatomycosis of the scalp - 4 people (14%). **Conclusion:** To treat different types of dermatomycosis, various antifungal drugs in different dosage forms can be used. For each type of disease, a specific course of treatment is selected. The duration of the course of treatment depends on the skin lesion area, the duration of the disease, and the presence of complications.

**Keywords:** dermatomycosis, etiology, pathogenesis, antifungal drugs.

## Resumen

**Introducción:** El aumento de la incidencia y preponderancia de las dermatomicosis hace que el tema de la determinación de agentes antimicóticos de acción sistémica y externa sea particularmente pertinente, considerando la etiología, forma clínica y mayoría de las micosis, la sensibilidad de los patógenos a las mismas y la existencia de condiciones. El estudio tiene como objetivo analizar la etiología, patogenia y diagnóstico de las dermatomicosis del cuero cabelludo, uñas, pies, manos, piel lisa y dermatofitosis inguinal. **Pacientes y métodos:** Para cumplir con el objetivo del estudio, se intenta generar un algoritmo para el asesoramiento farmacéutico de pacientes que padecen diversos tipos de dermatomicosis. Durante cinco meses se realizó una encuesta a 25 visitantes de la farmacia con diagnóstico de dermatomicosis. **Resultados:** Con base en los resultados, se reveló que la mayoría de los visitantes padecen dermatomicosis de los pies - 10 personas (40%), el segundo en cuanto a incidencia es la onicomicosis - 5 personas (19%), el tercero en cuanto a la incidencia es dermatomicosis del área de la ingle - 4 personas (15%), el cuarto en la incidencia es dermatomicosis del cuero cabelludo - 4 personas (14%). **Conclusión:** Para tratar diferentes tipos de dermatomicosis, se pueden utilizar diversos fármacos antifúngicos en diferentes formas de dosificación. Para cada tipo de enfermedad, se selecciona un curso de tratamiento específico. La duración del curso del tratamiento depende del área de la lesión cutánea, la duración de la enfermedad y la presencia de complicaciones.

**Palabras clave:** dermatomicosis, etiología, patogenia, fármacos antifúngicos.

## Introduction

Currently, dermatomycosis is of great interest in dermatology. They are the main leaders in the number of occurrence and distribution among other infectious skin diseases<sup>1-3</sup>.

Infection of the population with these diseases is constantly growing. First of all, the world's population is growing rapidly; as a result of the technical revolution, the sociability of people has increased; a huge number of service objects appeared, in some cases of not very good quality<sup>4-6</sup>. Fungal infections often complicate the treatment of other diseases, and thus can lead to a deterioration in the quality of life, sometimes disability, and in rare cases even death of the patient. It must be remembered that a patient infected with dermatomycosis is always a carrier and distributor of a fungal infection<sup>7-10</sup>.

The high incidence and prevalence of dermatomycosis make the problem of choosing antimycotic agents of systemic and external action especially relevant, taking into account the etiology, clinical form and prevalence of mycoses, the sensitivity of pathogens to them and the presence of concomitant diseases<sup>11,12</sup>.

It should be noted a number of factors that contribute to these diseases, namely: deterioration of environmental conditions; decreased immunity of the population; uncontrolled use of antibiotics<sup>13-15</sup>. Factors such as diabetes, drug addiction, alcoholism, and HIV infection play an important role in increasing the incidence of fungi. The above circumstances indicate to us the need for a deeper study of this problem.

## Methods and Materials

To meet the study's aim, the development of new approaches to the treatment of mycoses using modern diagnostics are considered. Modern antimycotic drugs make it possible to better treat dermatomycosis. The success of the treatment is determined by the correct choice of the drug, in each case.

With a high incidence and prevalence of dermatomycosis, the problem of the selection of drugs, taking into account the clinical form of the disease, the prevalence of the fungus, the sensitivity of the pathogen to it, and the presence of other diseases, becomes very urgent. Since the duration of therapy can be a long time, sometimes even several months, the cost-effectiveness ratio is of particular importance. The patient, given the rationality of antimycotic therapy, both economic and clinical efficiency, can significantly save. In this case, the search for inexpensive and effective drugs for patients with dermatomycosis comes to the fore. Many patients, bypassing medical institutions, go directly to pharmacies. Therefore, it is very important for a pharmacist to provide quality advice and selection of drugs for this disease.

Purpose of the work is to develop an algorithm for pharmaceutical counseling of patients suffering from various types of dermatomycosis.

## Tasks:

1. To study the etiology, pathogenesis, diagnosis of dermatomycosis of the scalp, nails, feet, hands, smooth skin and inguinal dermatophytosis.
2. To consider the classification of antifungal drugs and the features of pharmacotherapy of various types of dermatomycosis.
3. To carry out a comparative characteristic of OTC drugs used in the pharmacotherapy of dermatomycosis.
4. Analyze the results of an anonymous survey of patients suffering from various types of dermatomycosis.

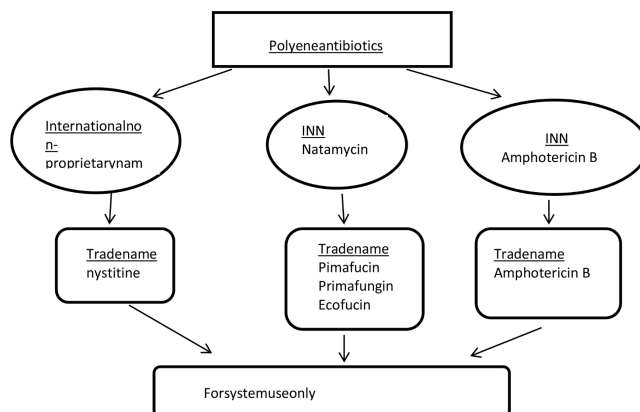
## Pharmacotherapy of dermatomycosis

### Chemical classification of antifungal agents:

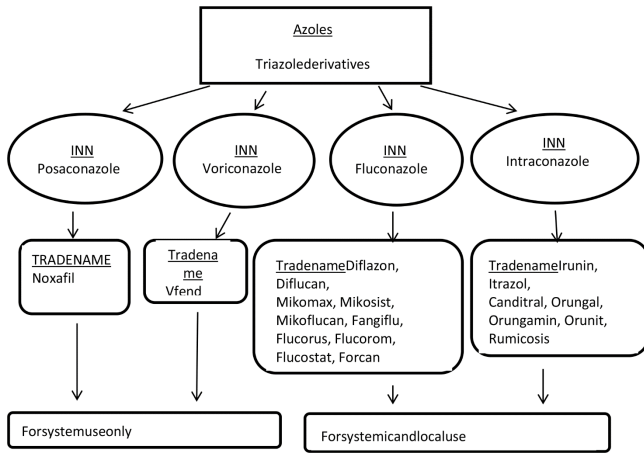
- Polyene antibiotics (Fig. 1)
- Azoles
  - derivatives of imidazole (Fig. 2)
  - derivatives of triazole (Fig. 3)
- Allylamines (Fig. 4)
- Echinocandins (Fig. 5)
- Morpholines (fig. 6)
- Preparations of other groups (Fig. 7)

## Results

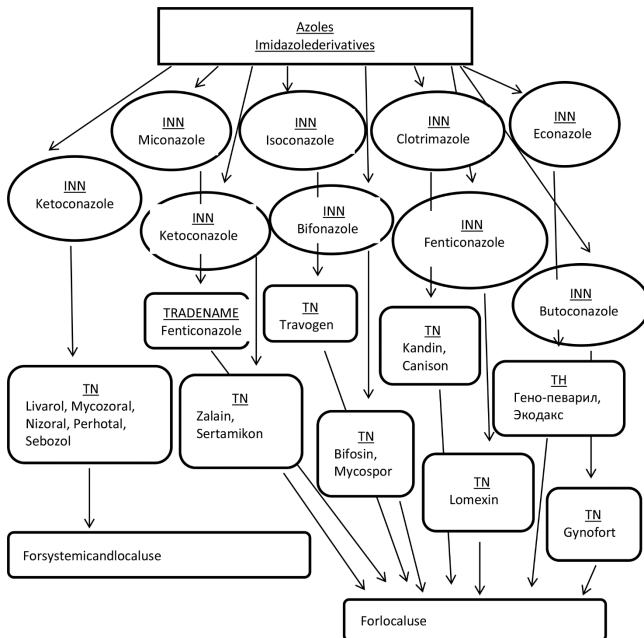
Fig. 1. Polyeneantibiotics



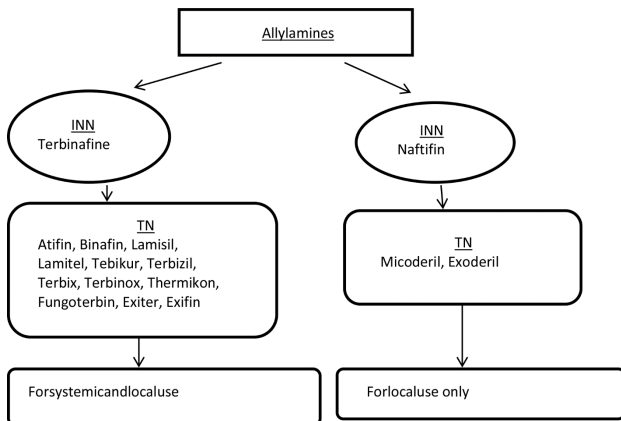
**Fig. 2. Triazolederivatives**



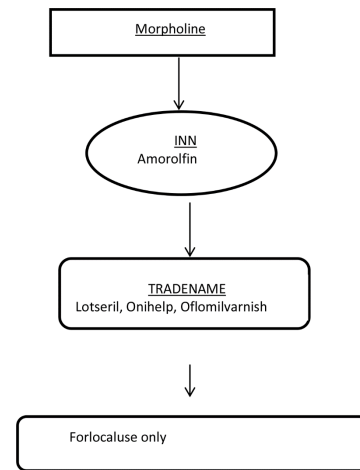
**Fig. 3. Imidazolederivatives**



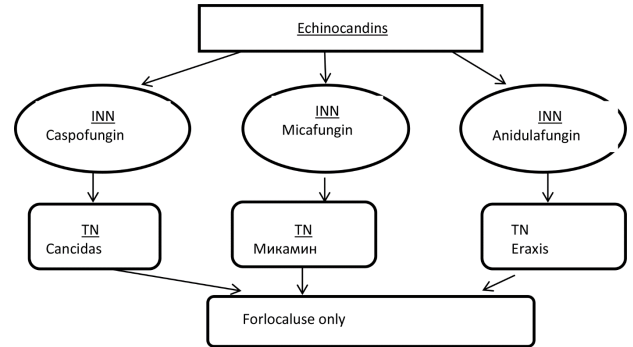
**Fig.4. Allylamines**



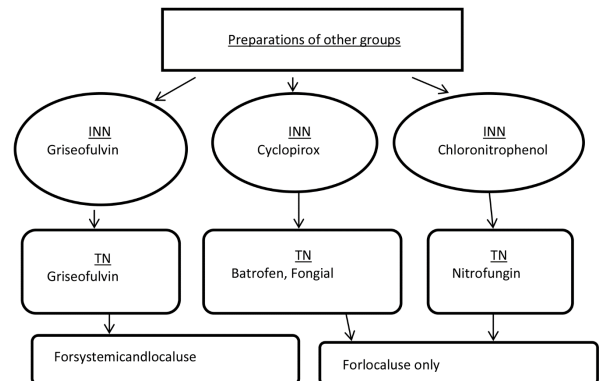
**Fig. 5. Echinocandins**



**Fig. 6. Morpholine**



**Fig. 7. Medical productsclassifications for other groups**



For the treatment of dermatomycosis, drugs are available in various dosage forms, the choice of which depends on the clinical manifestations of dermatomycosis.

	✓ Cream - used for minor itching, peeling	
	✓ Ointment - used for dryness and hyperkeratosis	
used for wet skin	✓ Gel	
	✓ Powder	
	✓ Solution	
	✓ Shampoo - used in case of damage to the scalp	
	✓ Suppositories	
used for vulvovaginal candidiasis	✓ Pills	
	✓ Capsules	
	✓ Gels	
	✓ Vaginal creams	
	✓ Varnishes – used for onychomycosis.	
	The tactics of treating dermatomycosis depends:	
	<ul style="list-style-type: none"> <li>➤ From the causative agent of dermatomycosis;</li> <li>➤ from the duration of the course of the disease;</li> <li>➤ on the severity of the disease;</li> <li>➤ on the degree of spread of infection;</li> <li>➤ from drug allergies;</li> <li>➤ from the presence of concomitant diseases.</li> </ul>	

**Algorithm for pharmaceutical counseling of patients suffering from various types of dermatomycosis.**

**Fig. 8. Algorithm for pharmaceutical consultation of patients with dermatomycosis of smooth skin and groin area.**

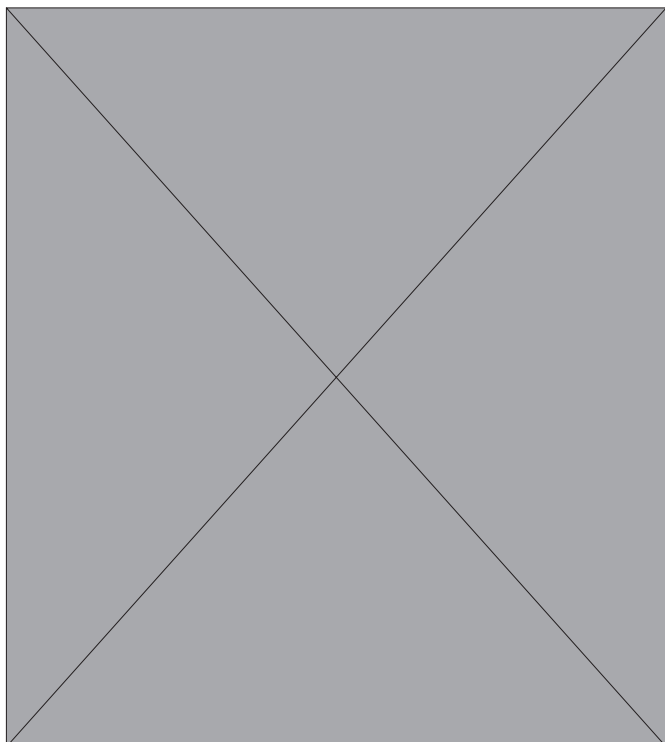


Figure 9 shows an algorithm for pharmaceutical counseling of patients with onychomycosis.

**Fig. 9. Algorithm for pharmaceutical counseling for patients with onychomycosis**

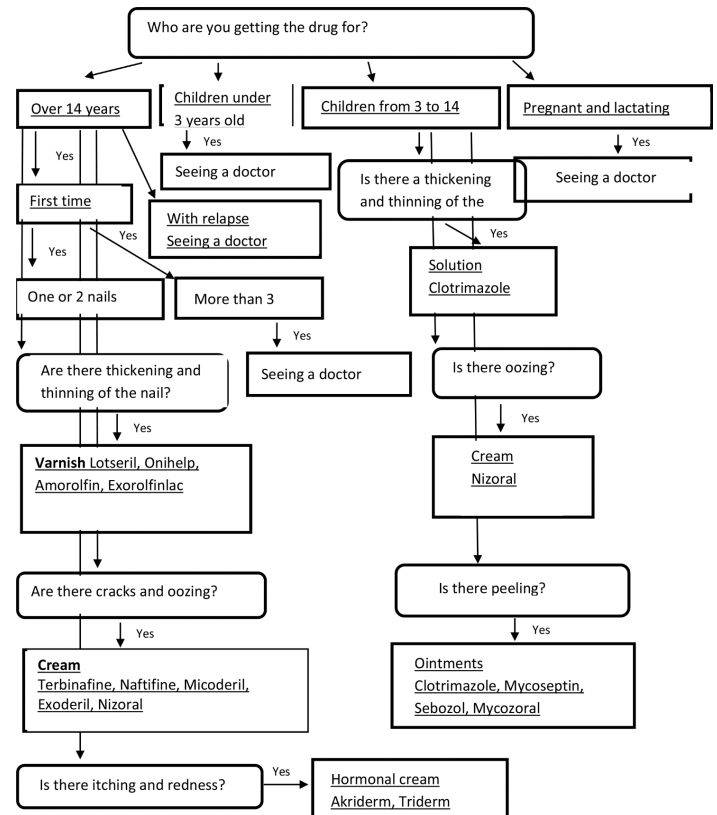
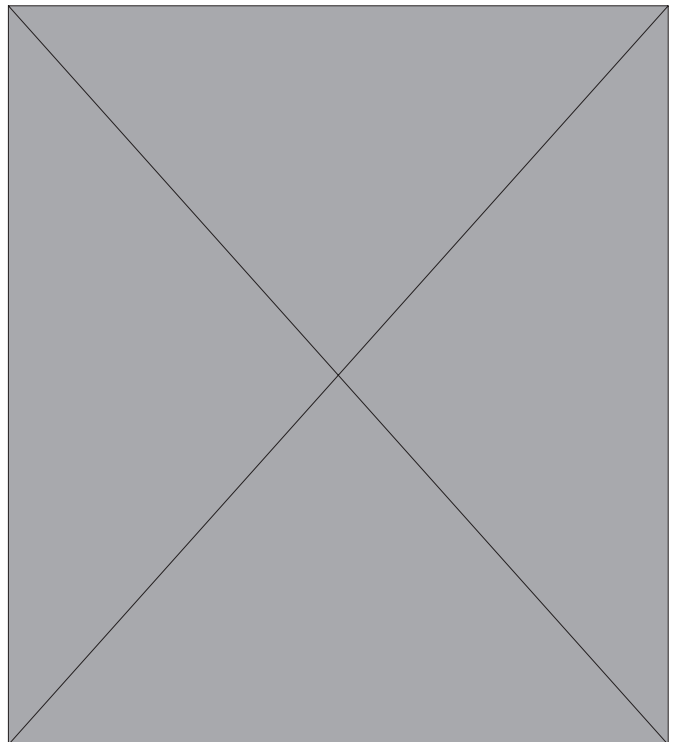
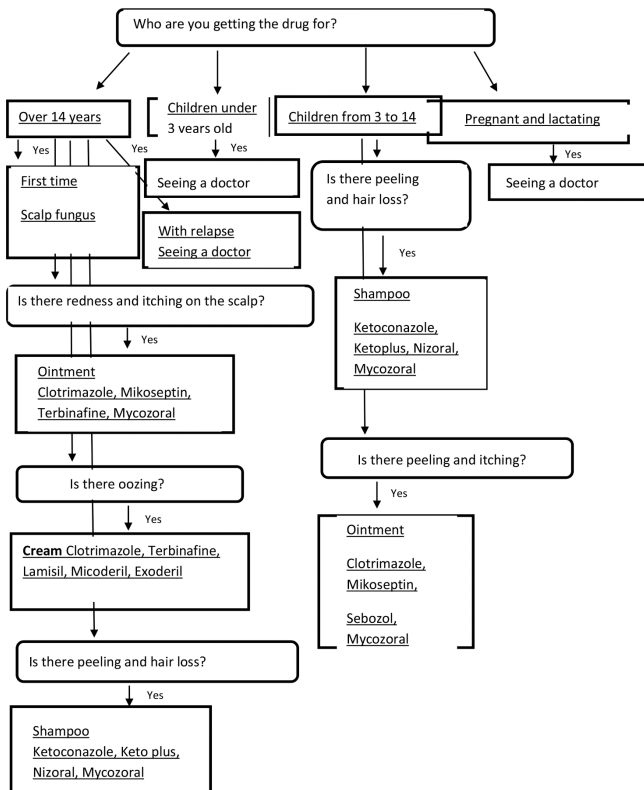


Figure 10 presents an algorithm for pharmaceutical counseling of patients with dermatomycosis of the scalp.

**Figure 10 presents an algorithm for pharmaceutical counseling of patients with dermatomycosis of the scalp.**



**Figure 11 shows an algorithm for pharmaceutical counseling of patients with dermatomycosis of the feet and hands.**



## Discussion

In the course of the work, complex algorithms were developed for each type of ringworm, taking into account risk groups (children under three years old, children from three to 14 years old, pregnant and lactating). Questions have been developed that need to be asked to a patient suffering from ringworm in order to identify a complex need and selection of drugs for a specific type of dermatomycosis. Choosing the right questions will help you deliver quality pharmaceutical consulting<sup>5,6</sup>.

Analysis of the results of an anonymous survey of patients with dermatomycosis.

Within 5 months, a survey was conducted of 25 visitors to the pharmacy with a diagnosis of dermatomycosis. From the survey, it was revealed that most of the visitors suffer from dermatomycosis of the feet - 10 people (40%), the second in terms of incidence is onychomycosis - 5 people (19%), the third in terms of incidence is dermatomycosis of the groin area - 4 people (15%), the fourth in the incidence is dermatomycosis of the scalp - 4 people (14%). The least number of cases of dermatomycosis of smooth skin - 2 people (12%).

In the course of the questionnaire, the choice of various dosage forms by patients for the treatment of five types of dermatomycosis was analyzed.

At the next stage, the choice of dosage forms by buyers suffering from dermatomycosis of the feet and hands was analyzed. More often, these visitors purchased the drug in the form of a cream - 27% of the respondents, then the drug in the form of a gel -25%, the drug in the form of an ointment was chosen-23%, the drug in the form of a spray -17%, drugs for oral administration -8%. The largest choice of buyers fell on drugs in the form of: cream, gel, ointment, tk. these dosage forms are quickly absorbed, penetrating into the upper layers of the skin and creating the necessary fungicidal concentration. Oral medicinal products are less popular with customers because they are they are prescribed for severe disease, in cases of an extensive infectious process or with resistance to topical therapy<sup>2,9</sup>.

Further, an analysis of the choice of drugs in the form of various dosage forms by buyers suffering from onychomycosis was presented. Buyers with onychomycosis most often purchased drugs in the form of varnish -71%, 16% - drugs in the form of a solution for treating the nail plate, 6% - drugs in the form of a cream, 4 % - LP for oral administration and least of all LP in the form of a spray -3%. LP in the form of varnish was purchased more often because it is better able to penetrate the nail plate to remove the fungus. Also, customers purchased drugs in the form of a cream, gel and ointment for onychomycosis to be applied to the skin surrounding the nail, as well as in complex therapy to prevent the spread of fungus from the nail to nearby soft tissues. Oral medicinal products are less popular with buyers, because they must be used strictly as directed by your doctor<sup>11,14</sup>.

In case of dermatomycosis of the groin area and dermatomycosis of smooth skin, buyers made a preference in the choice of dosage forms in favor of drugs in the form of a cream, gel and ointment.

Analysis of the choice of dosage forms by buyers suffering from dermatomycosis of the scalp showed that most of all buyers of drugs in the form of shampoo gave their preference, 30% chose drugs in the form of a cream and 26% chose drugs in the form of an ointment. Medicinal products in the form of shampoos are more popular among buyers, because they are convenient for achieving a therapeutic goal. Medicines for oral administration, as in previous cases, are less popular, because they are available with a doctor's prescription<sup>15</sup>.

## Conclusions

1. When carrying out a comparative characteristic of drugs used in the pharmacotherapy of dermatomycosis, it was concluded that of the drugs for oral use, the drug Grisefulvin has the largest representation in pharmacies, among drugs in the form of a solution - Mikoderil, among drugs in the form of an ointment - Clotrimazole, among the medicinal products in the form of a cream - Exoderil, among the medicinal products in the form of a spray -

Thermicon, among the medicinal products in the form of a shampoo - Keto plus, among the medicinal products in the form of varnish - Lotseril.

2. The most popular among buyers are drugs in the middle and low price categories.
3. When pharmaceutical consultation, it is important to clarify for whom pharmacotherapy is selected, since the use of drugs for the treatment of dermatomycosis in children, pregnant women, as well as during breastfeeding should be decided individually and only after consulting a doctor.
4. As a result of the analysis of an anonymous survey of visitors to pharmacies with dermatomycosis, it was found that most of the visitors to pharmacies suffer from dermatomycosis of the feet - 40%, and the least number of cases of dermatomycosis of smooth skin - 12%.
5. When analyzing the choice of dosage forms by buyers with various types of dermatomycosis, it was found that for dermatomycosis of the feet, smooth skin and dermatomycosis in the groin area, local therapy is most popular: drugs in the form of a cream, gel, ointment. For the treatment of onychomycosis, the preference of buyers fell on the medicinal product in the form of a varnish (71%), and for the treatment of dermatomycosis of the scalp, most buyers purchased the medicinal product in the form of a shampoo (34%).

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