The Range of Semi-Solid Preparations for The Treatment of The Wound Process in The Pharmaceutical Market of Ukraine

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ABSTRACT

To date, ointments are the most common pharmaceutical form and occupy a significant part of the pharmaceutical market, reaching about 450 items. They are widely used not only in dermatology but also in gynecology, proctology, ENT practice, dentistry as urethral, cosmetology, and in other fields of modern medicine. Ointments are used both for treatment and prevention and for the diagnosis of diseases. Every year the range of semi-solid preparations is increasing in the pharmaceutical market of Ukraine. This is due to the widespread of purulent-inflammatory, infectious-allergic diseases of the skin, mucous membranes, and connective tissues, the treatment of which is among the most ancient, but not aging problems of practical pharmacy. All these diseases reduce the working capacity of the population. Every year in Ukraine more than 25 million patients with wounds, inflammatory skin lesions, burns, cuts, which are accompanied by infectious complications, are registered. Studying the range of semi-solid preparations in the pharmaceutical market for the treatment of the wound process is an integral part of the professional work of both doctors and pharmacists, as well as pharmaceutical manufacturers. Our work aimed to investigate and summarize the range of existing semi-solid pharmaceutical forms for the treatment of the wound process depending on the pharmacotherapeutic group. Thus, it has been proved that the largest number of drugs registered in the Ukrainian market is hormonal ointments. It has also been found that, among existing semi-solid preparations, most of them are manufactured by foreign pharmaceutical manufacturers (130) and only 8 pharmaceutical factories in Ukraine. The leader among domestic manufacturers is the "Scientific Production Center "Borschahivskyi CPP" CJSC.

Key Words: *Pharmaceutical market, semi-solid preparations, semi-solid pharmaceutical forms, ointments, wound process.*

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INTRODUCTION

The wounding process is a huge problem in human life and health. The occurrence of complications in its course affects the work and well-being of the patient. With the incorrectly prescribed treatment of this process, in most cases, complications remain for a long time, and in some cases, until the end of life. Therefore, the treatment of the wound process is the most important task facing doctors and pharmacists in stopping the disease at the beginning of the disease. So, optimal and convenient for use are semi-solid pharmaceutical forms that are easy to apply and directly act on the affected area [1-4]. The range of semi-solid pharmaceutical forms is presented in the form of gels, ointments, liniments, pastes, creams that are used in various fields of medicine.

The marketing research of the pharmaceutical market presented in the article is based not only on data collection and processing but also on the specifics of consumers (doctors, pharmacists, patients), market, goods, and activities of interested parties.

MATERIAL AND METHODS:

In the work, marketing research of the Marketing Association of Ukraine, studying the range of semi-solid

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pharmaceutical forms in pharmacies and analyzing literary sources were used. Also, the courses of treatment of the wound process with semi-solid pharmaceutical forms were investigated.\

RESULTS:

The research results are presented in the form of diagrams and tables characterizing the features of research on the pharmaceutical market in traditional areas.

DISCUSSION:

The dynamic development of the pharmaceutical market places high demands on the specialists, who must have information about the availability of the range of certain drugs, their effectiveness, features of use, cost, and others. Today, in the pharmaceutical market of Ukraine, there are more than 450 (586 registered) names of semi-solid preparations [5, 6]. They are mainly represented by ointments, creams, gels, liniments, and pastes (Fig. 1). 59% of these drugs are imported and only 31% are produced by domestic manufacturers (Fig. 1, Fig. 2).

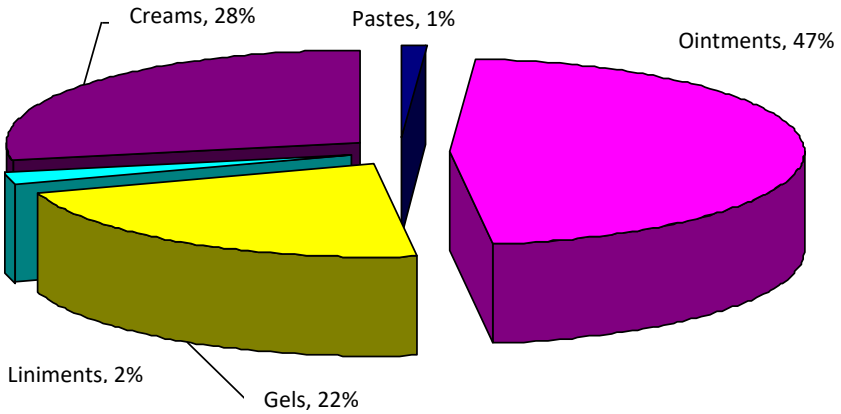

Fig. 1. Semi-solid preparations in the pharmaceutical market of Ukraine

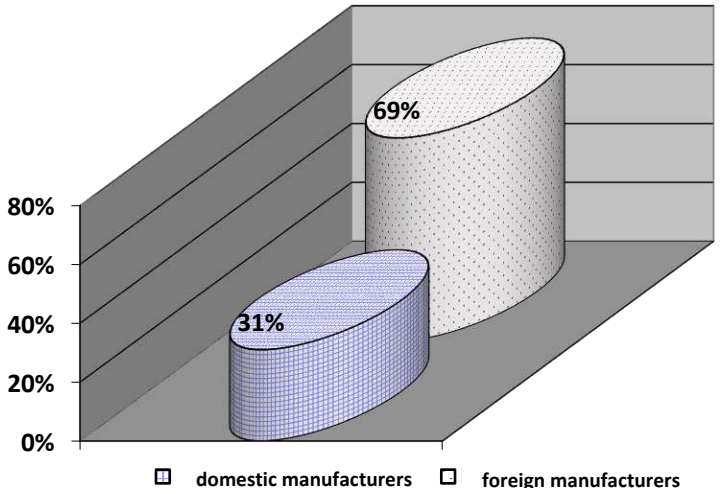

Fig. 2. The ratio of semi-solid pharmaceutical forms of domestic and foreign production registered in the pharmaceutical market of Ukraine, %

They include medicinal substances of more than 20 pharmacotherapeutic groups. The most widely used ointments are hormones and their analogs (14%), anti-inflammatory (11%), antiseptic (11%), antimicrobial (10%), antifungal (8.5%), and other medicinal substances. The large variety of medicinal substances in the composition of ointments causes their use in many diseases (Fig. 3). The most widely used ointments are used in the treatment of inflammatory diseases; wounds and bacterial skin infections; in the treatment of arthritis, neuralgia, radiculitis, diseases of joints of different genesis; fungal diseases of the skin and mucous membranes [7].

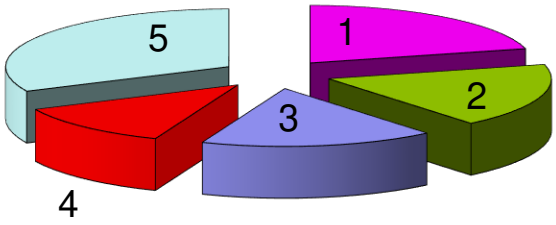

Fig. 3. The use of ointments for various diseases: 1 - inflammatory skin diseases, 21%; 2 - wounds and bacterial skin infections, 18%; 3 - arthritis, neuralgia, radiculitis, diseases of joints of different genesis, 17%; 4 - fungal diseases of the skin and mucous membranes, 12%; 5 - other diseases, 32%

Ointments for the treatment of inflammatory diseases of the respiratory system, proctologic diseases and hemorrhoids, gynecological diseases, viral skin diseases, varicose veins and thrombophlebitis of the extremities; ophthalmic and others are presented in the "Other diseases" segment. The range of homeopathic ointments is about 1.3% [7].

Semi-solid preparations are supplied to the pharmaceutical market by more than 130 foreign firms from 36 countries of the world and 21 firms and 8 pharmaceutical factories of Ukraine. The leading positions are occupied by "Scientific Production Center "Borschahivskyi CPP" CJSC - 26 items, Chervona Zirka CPP - 22, Darnitsa PC - 18, and others. [8, 9].

Thus, the range of ointments in the pharmaceutical market mainly meets the needs of medical practice. However, antibacterial ointments for local treatment of wounds produced in Ukraine and the CIS countries do not fully meet the medical and biological requirements offered by modern medicine. The chemotherapeutic substances that make up these ointments have a narrow spectrum of antibacterial action, are incompetent or ineffective against hospital strains of bacteria, and during treatment, bacterial resistance to them occurs. Ointments in the vast majority of cases are prepared on bases that do not have the necessary dehydrating activity [5].

Analysis of the range of semi-solid preparations in the modern pharmaceutical market of Ukraine showed that the composition of ointments for the treatment of wounds include active substances that belong to different pharmacotherapeutic groups (table. 1). However, the vast majority are preparations of synthetic origin, which have some disadvantages that limit their use [9]. The main disadvantage of these preparations, as medicines for the local treatment of wounds and burns, is associated with the emergence of resistance of microorganisms to antibiotics during treatment and with the emergence of a large number of hospital strains of bacteria [6]. Many patients in this respect suffer from drug allergies.

Table 1: Medicinal substances that are part of ointments

Sr. No.	Pharmacological group	The proportion of preparations (in %)
1.	Hormones and their analogs	14
2.	Anti-inflammatory	11
3.	Antiseptics	10.9
4.	Antibiotics. Fluoroquinolones. 8-oxyquinoline derivatives	10
5.	Phytopreparations	9
6.	Antifungal	8.4
7.	Local irritants	4.6
8.	Regulatory metabolic processes	4
9.	Keratolytic	3.6
10.	Antivirus	3.6
11.	Anticoagulants	3
12.	Angioprotectors. Correctors of microcirculation	3
13.	Locally anesthetized	3
14.	Vitamins and related substances	2.7
15.	Antihistamines	1.7
16.	Antiparasitic	1.3
18.	Adrenomimetic	1.1
19.	Sulfonamides	1
20.	Enzymes	0.6
21.	Antianginal	0.4
22.	Anastaltic, drying	0.4
23.	Stimulating uterine muscles	0.4
24.	Antioxidants	0.2
27.	Speeding epithelialization	0.2
28.	Others	1.7

Wound treatment remains one of the pressing problems of practical medicine. For the rational treatment of wounds, modern ideas about the etiology, pathogenesis, and regularities of the clinical course of the wound process are important.

The wounding process is a set of sequential reactions that occur in the wound as a result of tissue damage, aimed at delimiting the foci of traumatic destruction, removing pathological substrates, and eliminating the effects of trauma. It should be noted that many researchers believed that the mechanism of development of the wound process from the standpoint of general pathology is a special case of inflammation, which is manifested by local destructive and restorative changes in the wound and the general reactions of the body to the wound process.

An important factor influencing the course of the wound process is microbial contamination. Microbes, penetrating the depths of viable tissues, have a pathological effect. A

characteristic feature of this type of wound process is that the microflora breaks the body's natural protective barriers by damaging tissue structures. Primary microbial contamination occurs at the time of injury, and secondary - in the course of treatment, more often as a result of internal hospital infection.

According to the results of experimental and clinical studies, it was found that for the development of the infectious process in the wound, the total number of microbes in 1 g of tissue must exceed a certain "critical level", which amounted to 10^5-10^6 CFU in 1 g of tissue taken from the wound. The main cause of purulent complications of the wound process is the type of microorganism pathogen of the wound process.

According to the analysis of the literature data, the following microorganisms include the most common pathogens of surgical infection: *gram-positive* - staphylococci S.aureus, epidermidis (34-36%, 14-17% respectively), Streptococcus (8,3%); bacteria of the family of Enterobacteriaceae - Escherichia coli (10-18%), Klebsiella (7%), Proteus (8.6%), Enterobacter (6.4%); *gram-negative* rods and cocobacilli Pseudomonas (8-9,3%), E. faecalis (5,7%), Acinetobacter; fungus of Candida genus (Fig. 4).

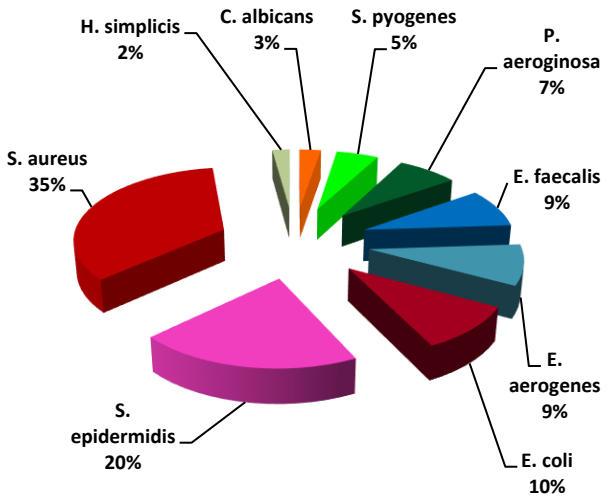

Fig. 4. Causes of surgical infection

An important aspect of the pathogenesis of the wound process is the fact that due to the compression and blocking of blood and lymph vessels, the penetration of microbes and the spread of infection beyond the primary focus of infection are limited. Leukocytes that penetrate with the exudate to the foci of infection form a so-called leukocyte shaft around it, which becomes an antibacterial barrier due to the process of phagocytosis.

The second barrier that prevents the spread of infection is the growth (due to hypoxia in the infiltrated tissues) around the connective tissue membrane (purulent membrane, which turns the local focus of infection into a limited form - an abscess or abscessed phlegmon).

As the local purulent infection develops, the composition of the microflora often changes, especially in cases of ineffective treatment. Not only the addition of new microorganisms, but also the complete change of pathogens. This indicates a secondary infection of the wound process.

Ointments with non-steroidal anti-inflammatory substances (11%), which have anti-inflammatory and analgesic effects (Veral, Diklak, Dolgit, Erazon, etc.), are used in inflammatory diseases of the musculoskeletal system.

Ointments containing antibiotics, derivatives of fluoroquinolones and 8-oxyquinoline, antiseptics, and sulfanilamides have antimicrobial action and are used in purulent wounds, burns, pyoderma, dermatitis complicated by secondary infection.

Most ointments that contain anesthetics are combined (Levosin, Offlokain-Darnitsa, Procto-Glevenol, etc.). They are used in phase 1 of the wound process as well as for the treatment of hemorrhoids.

The composition that has a wound-healing effect (Bepanten, Methyluracil-Darnitsa, Pantestin-Darnitsa, etc.) are used in the 2nd and 3rd phases of the wound process.

Given the disadvantages of antibiotic wound therapy, it is important to search and create a new drug based on the substance of natural origin, which would have sufficient antimicrobial and anti-inflammatory action with minimal side effects.

Ointments of antimycotic action (Clotrimazole, Pimafucin, Tolmitsen, etc.) in most cases, contain azole derivatives, as well as antifungal antibiotics and antiseptics. This group of ointments is presented as one-component and combined formulations, which in addition to the antifungal component contain corticosteroid hormones (Lotriderm, Mikozolon, Travocort, etc.) or keratolytics (Clotrisal-KMP, Mycospor set for treatment nails) [9].

Ointments of antiviral action (Acyclovir, Zovirax, Oxolin ointment, etc.) mainly have one-component formulations and only a few drugs (Bobe Mugos E, Vera Merz Serol) are combined. They are used in the treatment of viral lesions of the skin and mucous membranes.

Most often in ointments, there are hormones and their analogs (14%). Preparation formulations containing corticosteroid hormones have anti-inflammatory, itching, and anti-allergic effects. Registered ointments containing only corticosteroids (Sinaflan, Sinalar, Flucinar, Fluorocort, etc.), corticosteroids, and antibiotics

(Hyoxizon, Diprogent, Corticomycetin, Kuterid G and others), as well as corticosteroids and keratolytics (Betasalik-KMP, Diprosalik, Lorinden A, Prednikarb-Darnitsa, etc.). Ointments containing substances that block H_1-histamine receptors (Histocyte, Loraderm-KMP, Lorizan-KMP, Fenistil gel, etc.) have anti-allergic and antipruritic effects. In dermatological practice, they are used for the treatment of eczema, psoriasis, dermatitis [9]. Keratolytic ointments (Carboderm-Darnitsa, Keratolan, Salicylic ointment, etc.) are used for skin diseases that are accompanied by hyperkeratosis.

CONCLUSION:

Thus, it can be concluded that the range of semi-solid pharmaceutical forms in the domestic pharmaceutical market mainly provides the needs of modern medical practice. However, the unjustified duplication of a large number of forms of this range by some domestic pharmaceutical factories should be noted.

Marketing research of the drug market has shown that the use of soft dosage forms allows you to combine several active substances in one drug with a different mechanism of action and focus of therapeutic effect on the wound process, which is polyetiological and multilocular. The dynamics of general and local changes in the purulent wound give an understanding of the choice of rational therapeutic tactics and pharmaceutical preparation, depending on the phase of the wound process. Therefore, the therapy of the wound process should be comprehensive, aimed at reducing inflammation, suppressing pain, eliminating infection in the wound, accelerating wound healing, reducing the duration of treatment, and restoration of impaired processes in the body.

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