



УДК 615.322:615.454.122

DOI <https://doi.org/10.11603/2312-0967.2020.3.11446>

## ANALYSIS OF THE DOMESTIC MARKET OF MEDICINAL PRODUCTS FOR THE USE IN THE SECOND PHASE OF WOUND HEALING

M. G. Podorozhna, Ie. V. Gladukh, S. V. Stepanenko

*National University of Pharmacy, Kharkiv*

*glad\_e@i.ua*

### INFORMATION

Надійшла до редакції / Received:  
06.08.2020

Після доопрацювання / Revised:  
12.08.2020

Прийнято до друку / Accepted:  
20.08.2020

### Key words:

marketing analysis;  
wounds and ulcers;  
semisolid dosage forms.

### ABSTRACT

**The aim of the work.** Marketing analysis of the market of medicinal products, that promote wound healing, as well as finding directions of market development and further diversification of the range.

**Materials and Methods.** This research used materials from the analytical system PharmXplorer/Pharmstandard of Proxima Research Company, data from the State Register of Medicinal Products of Ukraine, in the State Statistics Service of Ukraine, as well as other official sources of information. Generally accepted system, graphical and cross-section analysis, observation, comparison and generalization methods were used.

**Results and Discussions.** It has been established that in accordance with the WHO's ATC the therapeutic group D03 «Preparations for treatment of wounds and ulcers» is represented by 9 subgroups and includes 64 trade names.

Semisolid dosage forms (ointments, creams, gels, pastes) take the key place in the therapy of the wound process. At present in the State Register of Medicinal Products of Ukraine there are 53 names of D03 group preparations registered for treatment of wounds and ulcers, including 25 drugs of semisolid dosage forms. The domestic manufacturers, such as PJSC "Borshchahivskiy CPP", PRJSC Pharmaceutical company Darnitsa, JSC "Farmak", PJSC "Fitofarm", PJSC Pharmaceutical Factory "Viola", PJSC «Chervona zirka», are the leaders in manufacturing of D03A group medicinal products.

**Conclusions.** The analysis of the market of preparations for treatment of wounds and ulcers has made it possible to establish that in accordance with the WHO's ATC the therapeutic group D03 «Preparations for treatment of wounds and ulcers» is represented by 9 subgroups and includes 64 trade names. As follows from the analysis of the range structure of the preparations for healing (cicatrization) of wounds (group D03A) depending on dosage forms the medicinal products in the form of ointments account for 44.35%.

**Introduction.** The rational therapy of the wound healing is the topical issue in the modern medicine. This is because of increase in the level of traumatism (military, occupational, home, road accident, outdoor, sports-related one), increase in the number of patients with purulent diseases of skin and soft tissues, as well as

purulent-septic postoperative complications. As of today, trauma is the main cause of death of people under 40 years old. According to the WHO, every year 7-8 million people are traumatized, of which 300K people's die [3]. The therapy of the wound healing is complicated by the increase in the number of antibiotic-resistant

microorganism strains, increase in the level of allergization in the population as a consequence of polypragmasy in the medical practice and widespread use of chemical substances domestically and occupationally.

The key moment, which ensures efficiency of the treatment, is the right choice of medicinal products (MP) that correspond to the therapeutic indications and the phase of the wound healing. Thus, the first phase of wound healing (inflammation) is characterized by presence of necrotic tissues and purulent contents in the wound. Thus, MP, used in this case, should exhibit antimicrobial, anti-inflammatory and anesthetic properties, facilitate penetration of active substances into the injured area along with minimum absorption into blood and effectively take up the exudate. The second phase (regeneration) involves removal of purulonecrotic contents from the wound and formation of the granulation tissue; in the third phase (cicatrix epithelialization and restructuring) the process of wound surface regeneration takes place. Due to this, the drugs which are used in the second and third phases of the wound healing should facilitate protection of the granulation tissue from damages, provide consecutive infection prophylaxis and promote the epithelialization [1, 6, 7].

Topical products take the key place in the therapy of wound healing, among which the most commonly used are semisolid dosage forms. The semisolid dosage forms are widely distributed in the domestic pharmaceutical market in the form of ointments, gels, creams, pastes, liniments. Taking into account the contemporary views on pathogenesis of the wound healing it is clinically reasonable to use ointments on hydrophilic and emulsion bases, which have controllable dehydrating effect, as well as are efficient conductors of drug substances deep into the affected area, wound canals and microbial cells.

**The aim of the work.** Marketing analysis of the market of medicinal products, which promote wound healing, as well as finding directions of market development and further diversification of the range.

**Materials and Methods.** This research used materials from the analytical system PharmXplorer/Pharmstandard of Proxima Research Company, data from the State Register of Medicinal Products of Ukraine, the State Statistics Service of Ukraine, as well as other

official sources of information. Generally accepted system, graphical and cross-section analysis, observation, comparison and generalization methods were used.

**Results and Discussions.** According to data in the State Register of Medicinal Products of Ukraine, as of 18.08.2017 there were 13,051 medicinal products registered, of which domestic ones account for 30.5% (3,981 names), foreign ones account for 69.5% (9,070 MP) (Table 1).

The main share (79.6% of the total number of the registered medicinal products) belongs to the finished medicinal products – 10,387 names, including 7,004 drugs of foreign origin and 3,383 drugs of domestic origin. The share of substances constitutes 13.8%, the share of in bulk medicinal products is 5.2% and of packaged in bulk medicinal products is 1.4% [2].

The analysis of the registered medicinal products has been carried out taking into account the pharmacological groups in accordance with the WHO Anatomical Therapeutic Chemical (ATC) Classification System, as revised in 2018. Established that the range of the dermatological medicinal products authorized for use in Ukraine constitutes 366 trade names (315 – excluding dosage forms).

The analysis has shown that the therapeutic group D03 «Preparations for treatment of wounds and ulcers» is represented by 9 subgroups and includes 64 trade names [5]. At present in the State Register of Medicinal Products of Ukraine there are registered 53 names of medicinal products, 100 – taking into account the dosage and form of presentation [2]. As there are 25 names of medicinal products semisolid dosage forms, and most of the drugs (68%) are of domestic origin (Table 2).

Let's consider the dynamics of the market of medicinal drugs for wound treatment for the period from 2014 to 2018. The results of the analysis of D03A group preparations sales volume are shown in Fig. 1 in monetary terms (kUAH).

According to results of the analysis of sales volume of the preparations that promote healing of wounds, the market of preparations in this group (in UAH equivalent) shows a steady ascending trend. Thus, increase in the group of MP being analyzed (in UAH equivalent) in 2015 as compared with the previous period made up 23%, in 2016 – 24%, in 2017 and 2018 – each 22 % respectively.

**Table 1**

Data in the State Register of Medicinal Products of Ukraine as of 18.08.2017

№	Group of medicinal products	Domestic	Foreign	Total
1	Finished medicinal products	3,383	7,004	10,387
2	In bulk	238	434	672
3	Packing from in bulk	43	147	190
4	Substance	317	1,485	1,802
	Total	3,981	9,070	13,051

**Table 2**

Analysis of registered in Ukraine dermatological preparations for treatment of wounds and ulcers in the form of semisolid dosage forms [2, 5]

D03A	Preparations that promote healing (cicatrization) of wounds	
D03A X	Other preparations that promote healing	
ATC code	Active ingredient (INN)	Preparations
D03A X03	Dexpanthenol	Bepanthen ointment, tube 30.0 or 100.0 (Bayer AG, Germany) Bepanthen cream, tube 30.0 or 100.0 (Bayer AG, Germany) Panthenol-Teva ointment, tube 35 g (Merckle GmbH, Germany) Panthecream® cream 5%, tube 30 g (Phytopharm, Ukraine) Panthenol ointment 5%, tube 30 g (Hemofarm, Serbia) Happyderm-Zdorovie cream 5%, tube 15 g, 30 g or 100 g (Zdorovye, Ukraine) Pantexol Jadran ointment, tube 25 g (Jadran, Croatia)
D03A X16**	Methyluracil	Methyluracil ointment 10% (Kyivmedpreparat LLC, Kyiv, Ukraine)
D03A X17**	Kalanchoe preparations	Kalanchoe succus 10 ml, 20 ml in vials № 10 or № 1 (BIOFARMA pharmaceutical plant) (група за даними 2018 р.)
D03A X18**	Calendula (Pot marigold) preparations	Calendula ointment, tube 25 g (DKP Pharmaceutical Factory, LLC, Ukraine) Calendula ointment, tube 30 g (Phytopharm, Ukraine) Calendula ointment, tube 20 or 30 g, container 40 g (Pharmaceutical Factory Viola, Ukraine) Calendula ointment, tube 20 g (Ternopharm, Ukraine)
D03A X19**	Comfrey preparations	Comfrey ointment (DKP Pharmaceutical Factory, LLC) Comfrey tincture (DKP Pharmaceutical Factory, LLC)
D03A X20**	Zinc hyaluronate	Curiozin solution «Gedeon Richter»
D03A X21**	Propolis	Propolis «Lekhim-Kharkov», Propolis tincture «Ternopharm»
D03A X50**	Other preparations, including combinations	Methyluracil & Myramistin ointment, tube 15 g or 30 g (Darnitsa, Ukraine) Levomecol ointment, tube 20 g, 30 g or 40 g, container 25 g (Viola, Ukraine) Levomecol ointment, tube 40 g (Farmak, Ukraine) Levomecol ointment, tube 40 g (Chervona Zirka, Ukraine) Levomecol ointment, tube 25 g (Lubnypharm, Ukraine) Levomecol ointment, tube 30 g or 40 g (BCPP, Ukraine) Solcoseryl ointment, tube 20 g (MEDA Pharmaceuticals Switzerland, Switzerland) Solcoseryl gel, tube 20 g (MEDA Pharmaceuticals Switzerland, Switzerland) Wundahyl ointment, tube 15 g or 30 g (AIM, Ukraine) Vulnusan® ointment, tube 45 g (Sopharma, Bulgaria) Mefenat ointment, tube 15 g or 40 g (Farmak, Ukraine) Thiotriazoline ointment, tube 25 g (Chervona Zirka, Ukraine) Altan ointment, tube 25 g (BCPP, Ukraine)
D03A X53**	Dexpanthenol, combinations	Panhestin-Darnitsa ® gel tube 15 g or 30 g (Darnitsa, Ukraine)

\*\* codes of these groups are not officially approved by the WHO

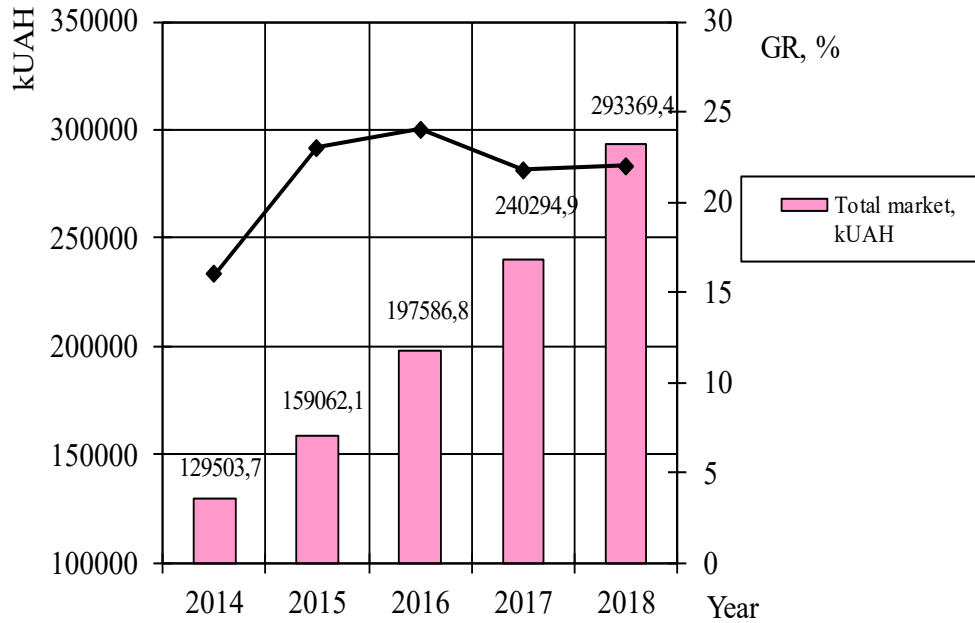


Fig. 1. Dynamics of the market of D03A group preparations «Preparations for treatment of wounds and ulcers» (kUAH) [8]

At year-end 2018, the sales volume of D03A group medicinal products amounted to UAH 293.4 million.

When analyzing dynamics of the market of D03A group preparations in kind (in packs) over 2014-2018, there is a different situation (Fig. 2). Thus, in 2015 there were sold 10.97 million packs of MP belonging to the analyzed group, which is 5.5% higher than in 2014. Over 2016-2017 there was a drop in the sales volumes by 6.5% and 10% respectively. In 2018 the market volume of medicinal products in this group went up by 7.5% and accounted for 9.9 million packs. It should be noted that this is 4.7% lower than the initial value of the volume for the analyzed period (data for 2014).

Therefore, it is possible to conclude that the market growth in UAH equivalent is driven more by an increase in the level of prices than by an increase in the consumption of drugs in this group. When analyzing the market in USD equivalent, there will also be seen a drop in the sales figures due to fluctuations in the currency rates during 2016-2017.

At present, the pharmaceutical market of Ukraine is the second by volume among following Russia through post Soviet Union countries. In 2018 the volume of the pharmaceutical market accounted for UAH 50.6 billion (USD 2.2 billion). 19.8 K pharmacy institutions represent the retail network of pharmacies. The leading distributors

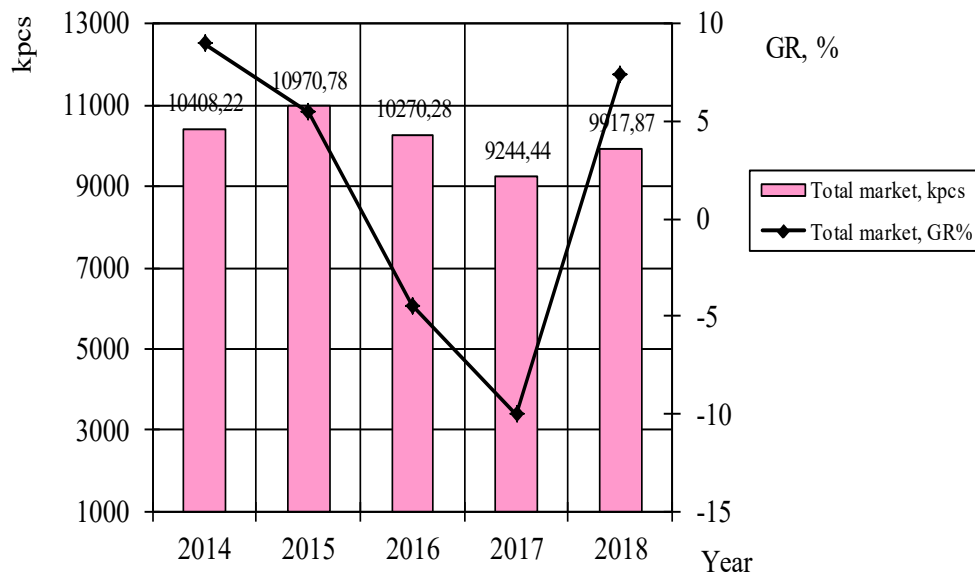


Fig. 2. Dynamics of the market of D03A group preparations in kind (k packs) over 2014-2018 [8]

and importers of pharmaceutical products are as follows: BaDM LLC, JV «Optima-Pharm, LTD», Venta LTD on MP which account 83% of the Ukrainian wholesale market. Among 111 domestic manufacturers of pharmaceutical products, the largest are as follows: JSC «Farmak», PJSC «Borshchahivskiy CPP», Corporation «Arterium», PRJSC Pharmaceutical company Darnitsa, Pharmaceutical Company «Zdorovye» Ltd, JSC «Lekhim» etc. The share of the six leading manufacturing companies accounts for over 50% of the pharmaceutical products that are manufactured in the country. The leading foreign manufacturers, the products of which are distributed in the Ukrainian market, are as follows: Sanofi (France), Berlin-Chemie (Germany), Teva (Israel), Takeda (Japan), «KRKA» (Slovenia), Gedeon Richter (Hungary), Sandoz (Switzerland), GlaxoSmithKline Consumer Healthcare (Great Britain).

We have carried out analysis of the dynamics of the ratio of domestic and foreign origin D03A group preparations over 2014-2018. The results of the analysis are shown in Fig. 3.

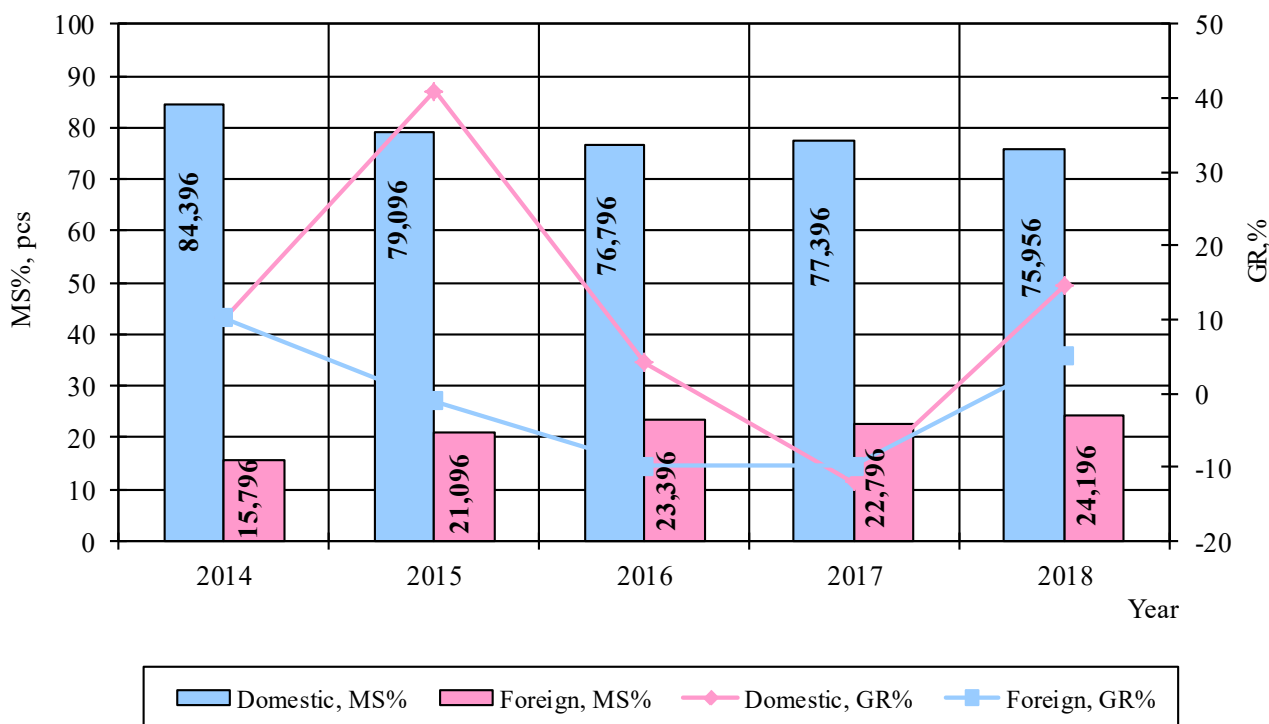
In 2014 the share of D03A group MP of domestic origin accounted for 84.3% of the total sales volume, respectively, MP of foreign origin accounted for 15.7%. In 2015 there was a significant increase observed in the number of imported medicinal products in the group being analyzed (by 40% as compared to the previous period), which accounted for 21% of the total number of D03A group preparations. Such trend was persisting during 2016-2018, and in 2018 the number of

preparations that were manufactured by domestic pharmaceutical companies accounted for 75.9% and the number of imported preparations, respectively, accounted for 24.1% of the total number.

So, the domestic manufacturers (PRJSC Pharmaceutical company Darnitsa, (JSC «Farmak», Pharmaceutical Company «Zdorovye» Ltd, PJSC «Fitofarm», PJSC «Borshchahivskiy CPP», PJSC Pharmaceutical Factory «Viola», PJSC «Lubnypharm», LLC SUC «Pharmaceutical Factory», LLC «Ternopharm», PJSC «Chervona zirka» Pharmaceutical Factory steadily continue to be the manufacturing leaders in the preparations group being analyzed. As for foreign manufacturers of dermatological MP for healing of wounds the leaders are as follows: Bayer AG (Germany), Sopharma (Bulgaria), Merz Pharma GmbH & Co (Germany), Hemofarm (Serbia), Merkle GmbH (Germany), Farmaceutici Damor SPA (Italy), Pharmazeutische Fabrik Montavit GmbH (Austria), Legacy Pharmaceuticals Switzerland GmbH (Switzerland).

We have also carried out analysis of the range structure of the preparations for healing (cicatization) of wounds (group D03A) depending on dosage forms (Fig. 4).

It has been found that in the structure of the range of the preparations group being analyzed, the products in the form of ointments account for 44.35%. The pharmaceutical forms such as drops, liquids and gels account for 26.2%, 10.44% and 7.17% respectively.



**Fig. 3.** Dynamics of the ratio of domestic and imported MP that promote healing of wounds (D03A group) over 2014-2018 [8].

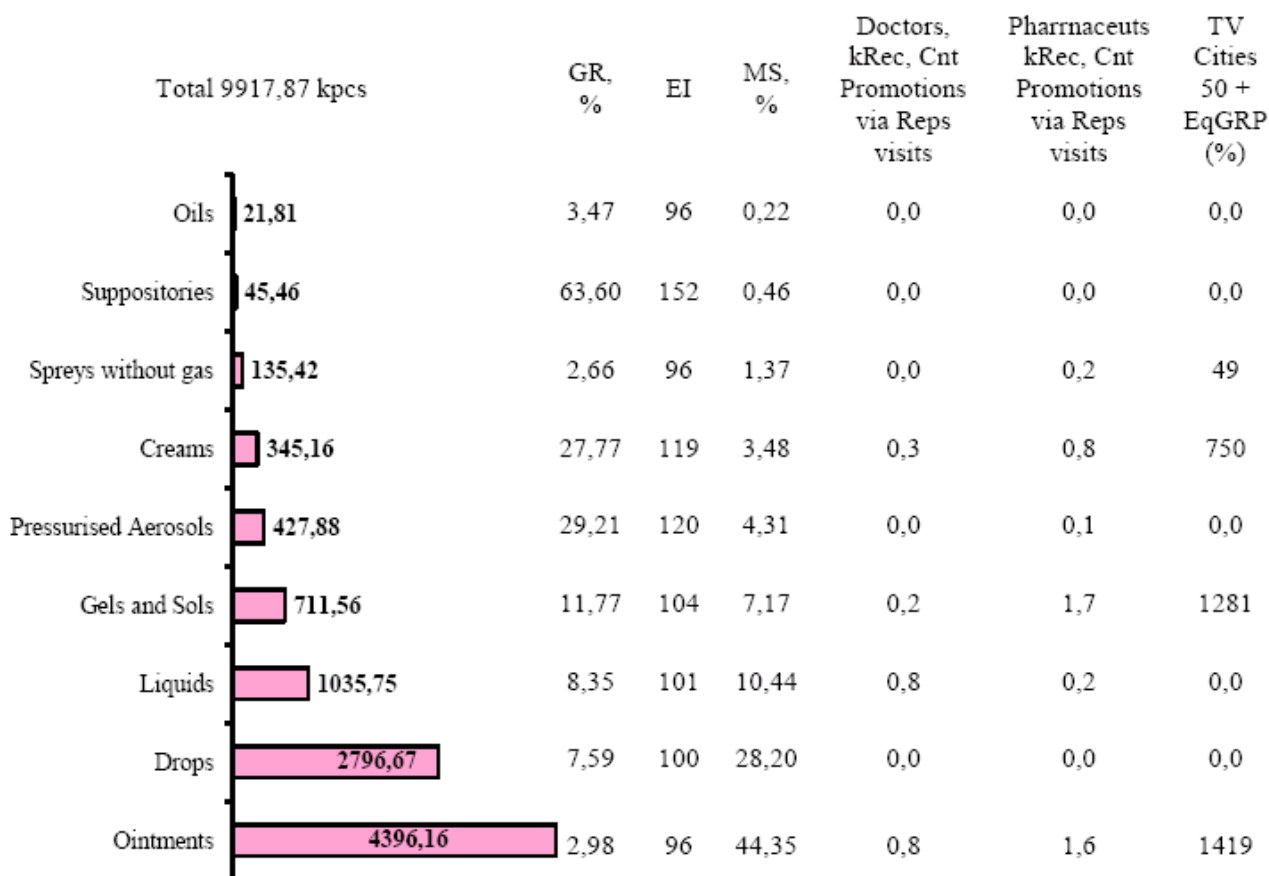


Fig. 4. Analysis of the range structure of D03A group preparations depending on dosage forms [8].

**Conclusions.** The analysis of the market of preparations for treatment of wounds and ulcers has made it possible to establish that in accordance with the WHO's ATC the therapeutic group D03 «Preparations for treatment of wounds and ulcers» is represented with 9 subgroups and includes 64 trade names.

Semisolid dosage forms (ointments, liniments, creams, gels, pastes) take the key place in the therapy of the wound process. At present in the State Register of Medicinal Products of Ukraine there are registered 53 names of D03 group preparations for treatment of wounds and ulcers, including 25 semisolid dosage forms.

As follows from the analysis of the dynamics in the market of D03A group medicinal products over 2014-2018, the sustainable growth of the market in the

monetary terms (k UAH) is driven mainly by rise in prices (market growth rate in UAH is significantly surpassing the growth rate in kind (K packs)).

The domestic manufacturers, such as PJSC «Borshchahivskiy CPP», PRJSC Pharmaceutical company Darnitsa, JSC «Farmak», PJSC «Fitofarm», PJSC Pharmaceutical Factory «Viola», PJSC «Chervona zirka», are the leaders in manufacturing of D03A group medicinal products.

As follows from the analysis of the range structure of the preparations for treatment of wounds and ulcers (group D03A) depending on dosage forms, the medicinal products in the form of ointments account for 44.35%.

**Conflict of interest:** authors have no conflict of interest to declare.

**Конфлікт інтересів:** відсутній.

## **АНАЛІЗ ВІТЧИЗНЯНОГО РИНКУ ЛІКАРСЬКИХ ЗАСОБІВ ДЛЯ ВИКОРИСТАННЯ НА ДРУГІЙ ФАЗІ РАНЕВОГО ПРОЦЕСУ**

**М. Г. Подорожна, Є. В. Гладух, С. В. Степаненко**

*Національний фармацевтичний університет, Харків*  
*glad\_e@i.ua*

**Мета роботи.** Маркетинговий аналіз ринку лікарських засобів, що сприяють загоєнню ран, а також пошук напрямків розвитку ринку та подальшої диверсифікації асортименту.

**Матеріали і методи.** У дослідженні використано матеріали аналітичної системи PharmXplorer / Pharmstandard дослідницької компанії «Проксима», дані Державного реєстру лікарських засобів України в Державній службі статистики України, а також інші офіційні джерела інформації. Використано загальноновизнані системні, графічні та поперечні аналізи, спостереження, порівняння та узагальнення.

**Результати й обговорення.** Встановлено, що відповідно до ВООЗ терапевтична група D03 «Препарати для лікування ран та виразок» представлена 9 підгрупами та включає 64 торгові назви.

Ключове місце в терапії ранового процесу займають м'які лікарські засоби (мазі, креми, гелі, пасту). На сьогодні в Державному реєстрі лікарських засобів України зареєстровано 53 назви препаратів групи D03 для лікування ран та виразок, у тому числі 25 МЛЗ.

Такі вітчизняні виробники, як НВЦ Борщагівський ХФЗ, фармацевтичні фірми «Дарниця», «Фармак», «Фітофарм», фармацевтична фабрика «Виола», ХФЗ «Червона Зірка», є лідерами у виробництві лікарських засобів групи D03A.

**Висновки.** Аналіз ринку препаратів для лікування ран та виразок дозволив встановити, що відповідно до ВООЗ терапевтична група D03 «Препарати для лікування ран та виразок» представлена 9 підгрупами та включає 64 торгові назви. Основну частку структури асортименту препаратів для загоєння (рубцювання) ран (група D03A) складають мазі – 44,35 %.

**Ключові слова:** маркетинговий аналіз; препарати для лікування ран та виразок; м'які лікарські форми.

## **АНАЛИЗ ОТЕЧЕСТВЕННОГО РЫНКА ЛЕКАРСТВЕННЫХ СРЕДСТВ ДЛЯ ПРИМЕНЕНИЯ ВО ВТОРОЙ ФАЗЕ РАНЕВОГО ПРОЦЕССА**

**М. Г. Подорожная, Е. В. Гладух, С. В. Степаненко**

*Національний фармацевтичний університет, Харків*  
*glad\_e@i.ua*

**Цель работы.** Маркетинговий аналіз ринку лікарських засобів, використовуваних для заживлення ран, а також пошук напрямків розвитку ринку та подальшої диверсифікації асортименту.

**Матеріали і методи.** В дослідженні використано матеріали аналітичної системи PharmXplorer / Pharmstandard дослідницької компанії «Проксима», дані Державного реєстру лікарських засобів України в Державній службі статистики України, а також інші офіційні джерела інформації. Використано загальноновизнані системні, графічні та поперечні аналізи, спостереження, порівняння та узагальнення.

**Результати і обговорення.** Встановлено, що в соответствии с ВООЗ терапевтическая группа D03 «Препараты для лечения ран и язв» представлена 9 подгруппами и включает 64 торговые названия.

Ключевое место в терапии раневого процесса занимают мягкие лекарственные средства (мази, кремы, гели, пасты). На сегодня в Государственном реестре лекарственных средств Украины зарегистрировано 53 названия препаратов группы D03 для лечения ран и язв, в том числе 25 МЛЗ.

Такие отечественные производители, как НПЦ Борщаговский ХФЗ, фармацевтические фирмы «Дарниця», «Фармак», «Фітофарм», фармацевтична фабрика «Виола», ХФЗ «Красная Звезда», являются лидерами в производстве лекарственных средств группы D03A.

**Выводы.** Аналіз ринку препаратів для лікування ран та язв дозволив встановити, що в соответствии с ВООЗ терапевтическая группа D03 «Препараты для лечения ран и язв» представлена 9 подгруппами и включает 64 торговых названия. Основную долю структуры ассортимента препаратов для заживления (рубцевания) ран (группа D03A) составляют мази – 44,35 %.

**Ключевые слова:** маркетинговий аналіз; препарати для лікування ран та язв; м'які лікарські форми.

**Список бібліографічних посилань**

1. Абаев Ю. К. Справочник хирурга. Раны и раневая инфекция. Ростов-на-Дону : Феникс, 2006. 427 с.
2. Державний реєстр лікарських засобів України. URL: <http://www.drlez.kiev.ua>.
3. Щотижневик Аптека. URL: <http://www.apteka.ua/>.
4. Довідник «Компендіум». URL: <http://compendium.com.ua>.
5. Кузин М. И. Раны и раневая инфекция: Руководство для врачей. М. : Медицина, 1990. 592 с.
6. Местное лечение ран и раневой инфекции по результатам анонимного анкетирования хирургов России / В. В. Привольнев и др. *Раны и раневые инфекции. Журнал имени проф. Б. М. Костюченко*. 2016. № 3(1). С. 19–24. <https://doi.org/10.17650/2408-9613-2016-3-1-19-24>.
7. Європейська база даних статистичної інформації «Здоров'я для всіх». URL: <http://medstat.gov.ua/ukr/normdoc.html>.
8. Дослідження фармацевтичного ринку України аналітичної компанії «Фармстандарт» компанії «Моріон». URL: <http://www.pharmstandart.com.ua/>

**References**

1. Abaev Yu.K. *A Handbook for Surgeon. Wounds and Wound Infection* [Справочник хирурга. Раны и раневая инфекция]. Rostov-on-Don: Phoenix; 2006. 427 p. Russian.
2. Derzhavnyi reestr likarskykh zasobiv Ukrainy [State register of medicines Ukraine]. Retrieved from: <http://www.drlez.kiev.ua/>.
3. Shchotyzhnevnyk Apteka. Available at: <http://www.ap-teka.ua/>
4. Compendium Directory [Internet]. Available from: <http://compendium.com.ua>.
5. Kuzin M.I. *Wounds and Wound Infection: A Guide for Physicians* [Раны и раневая инфекция: Руководство для врачей]. Moscow: Meditsina; 1990. 592 p. Russian.
6. Privol'nev VV., Paskhalova YuS., Rodin AV., Mitish VA. [Local treatment for wounds and wound infection according to the results of an anonymous survey of surgeons in Russia]. *Wounds and wound infections. The prof. B.M. Kostyuchenok journal*. 2016;3(1):19-24. Russian. <https://doi.org/10.17650/2408-9613-2016-3-1-19-24>.
7. Evropeiska baza danyh statystychnoi informatsii «Zdorov'ia dlia vsih» [The European statistic information database «Health for All»]. Retrieved from: <http://medstat.gov.ua/ukr/normdoc.html>.
8. Doslidzhennia farmatsevtichnoho rynku Ukrainy analitichnoi kompanii «Farmstandart» kompanii «Morion». [cited 2020Feb10]. Available from: <http://www.pharmstandart.com.ua>.

**Відомості про авторів**

**Подорожна М. Г.** – аспірант кафедри технологій фармацевтичних препаратів, Національний фармацевтичний університет, Харків, Україна. E-mail: [uglavamaya@gmail.com](mailto:uglavamaya@gmail.com), ORCID 0000-0003-0345-3075

**Гладух Є. В.** – д. фармацевт. наук, професор кафедри технологій фармацевтичних препаратів, Національний фармацевтичний університет, Харків, Україна. E-mail: [glad\\_e@i.ua](mailto:glad_e@i.ua), ORCID 0000-0002-5739-9257

**Степаненко С. В.** – канд. фармацевт. наук, доцент кафедри технологій фармацевтичних препаратів, Національний фармацевтичний університет, Харків, Україна. E-mail: [step1enko@gmail.com](mailto:step1enko@gmail.com), ORCID 0000-0002-4648-7753

**Information about the authors**

**Podorozhna M. G.** – PhD-student, Department of Technologies of Pharmaceutical Preparations, National University of Pharmacy, Kharkiv, Ukraine. E-mail: [uglavamaya@gmail.com](mailto:uglavamaya@gmail.com), ORCID 0000-0003-0345-3075

**Gladukh Ie. V.** – DSc (Pharmacy), Professor of the Technologies of Pharmaceutical Preparations Department, National University of Pharmacy, Kharkiv, Ukraine. E-mail: [glad\\_e@i.ua](mailto:glad_e@i.ua), ORCID 0000-0002-5739-9257

**Stepanenko S. V.** – PhD (Pharmacy), associate professor of the Technologies of Pharmaceutical Preparations Department, National University of Pharmacy, Kharkiv, Ukraine. E-mail: [step1enko@gmail.com](mailto:step1enko@gmail.com), ORCID 0000-0002-4648-7753