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THE PHARMACEUTICAL MARKET OF MEDICINES CONTAINING RETINOIDS FOR THE TREATMENT OF PSORIASIS IN UKRAINE, POLAND AND KAZAKHSTAN

Oksana Shtrimaitis, Oleksandr Kukhtenko, Olga Sadovnyk, Halyna Kukhtenko

The aim of the work *is to analyze the use of medicines containing retinoids for the treatment of psoriasis on the example of Ukraine, Poland and Kazakhstan.*
Materials and methods. *The object of the study was antipsoriatic drugs, which are used for the treatment of psoriasis of local and systemic action, and are included in the official register of drugs of the studied countries. Regulatory documents of the State Expert Center of the Ministry of Health of Ukraine were involved in the analysis of the use of medicines for the treatment of psoriasis in Ukraine.*
The analysis of the availability of the considered medicines on pharmaceutical markets was carried out according to the data of the official websites of the State Register of Medicines (Ukraine), the Register of Medicines of Poland (Republic of Poland), data of the National Center for Expertise of Medicines and Medical Devices of the Republic of Kazakhstan (Republic of Kazakhstan).
The following methods of logical and meaningful formulation of the problem, office marketing research, content analysis of publications in scientific and practically oriented medical and pharmaceutical publications, comparative analysis, tabular and graphic means of visual presentation of the obtained data were used in the work.
The results. *According to the results of the obtained data, an assortment of medicinal products containing retinoids of the studied countries, used for the treatment of psoriasis, was determined. The fate of domestic production in the countries was analyzed, the main active components from the group of retinoids used for the treatment of psoriasis in preparations of systemic and local action were updated.*
Conclusions. *The role of retinoids in the treatment of psoriasis in Ukraine, Poland and Kazakhstan and the need to develop modern domestic medicines containing retinoids for the treatment of psoriasis have been determined*
Keywords: *retinoids, psoriasis, pharmaceutical market analysis, drug register*

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1. Introduction

Psoriasis is a common chronic papulocular disease in the world, which can manifest at any age, regardless of gender, and leads to a significant deterioration of life for the individual and society as a whole. The decisive role in the development of this autoimmune disease is the patient's genetic predisposition (60–70 % of the total number of cases), as well as environmental factors, streptococcal infection, stress, smoking, obesity and alcohol consumption [1, 2].

The pathogenesis of psoriasis is not well studied. The literature describes [3, 4] various epidermal and general (immune, neuroendocrine, metabolic) shifts in the body of patients with psoriasis, but their etiopathogenetic significance is not solved.

In 2014, WHO adopted a resolution that recognizes psoriasis "chronic, non-infectious, painful, distorting disease that causes disability that is not medicated" [2]. Psoriasis occurs with the same intensity in men and women, with an average age of the disease at 33 years. The disease can be manifested earlier, with a bimodal beginning at the age of 16–22 and 55–60 years, which is associated with genetic and immunological features: early onset, up to 40 years (75 % of the disease) and late onset, after 40 years (25 % of cases of disease) [5].

Currently, psoriasis cannot be cured, but treatment should be aimed at minimizing physical and psychological effects on humans through the treatment of patients in the early stages of the disease process, identifying and preventing concomitant multimorbidity, encouraging a healthy lifestyle and using an individual approach to treatment [1].

In the world scientific medical and pharmaceutical fields, considerable attention is paid to the treatment of psoriasis with medicines registered and implemented according to medical regulations.

It is worth noting that not only D05 Antipsoriatic drugs can be used for the treatment of psoriasis today. Antihistamines, hepatoprotective, sedatives, hyposensitizing agents, vitamins and immunomodulators can also be used for the treatment of psoriasis [6].

Today, Ukrainian medicine and pharmacy, like all other areas of our country, focuses on the European approach in the treatment of various diseases. Therefore,

the purpose of our research was to analyze the use of drugs containing retinoids for the treatment of psoriasis on the example of Ukraine, the Republic of Poland and the Republic of Kazakhstan. The choice of countries in which the research was substantiated by the fact that Poland is the country of the European Union and territorially borders with Ukraine; In turn, Kazakhstan is a representative of Asian countries that only develop their pharmaceutical market.

2. Planning (methodology) of research

According to the State Expert Center of the Ministry of Health of Ukraine [5], today, the current regulatory documents for the treatment of psoriasis in Ukraine are:

– unified clinical protocol of primary, secondary (specialized), tertiary (highly specialized) medical care (2015);

– clinical Guideline based on evidence (updated) "psoriasis including psoriatic arthropathy" since 2016.

The use of medicines of different therapeutic orientation on the pathological process in the disease of psoriasis and in different nosological groups makes it possible for the doctor to vary the approaches to the treatment process.

It should be noted that in the development of clinical guidelines "Psoriasis, including psoriatic arthropathy", considerable attention was paid to the use of retinoids in the treatment of this disease. Experts stated that at the time of development of the guidance, some retinoids that were included in the instruction were not registered in Ukraine [7, 8]. The authors of the guidance presented that among the topical retinoids for the treatment of psoriasis in different countries is actively used tazarotene – a molecule of synthetic origin, which demonstrates efficacy in various dermatoses.

According to the tazarotene treatment, only patients with mild or moderate psoriasis can be recommended. Applications should be started with 0.01 % of the gel once in the evening for 1–2 weeks. In the absence or poor severity of the side effects, the course of treatment is continued. The expected beginning of the clinical effect of the tazarotene is after 1–2 weeks of daily applications. As a rule, the average course of treatment with topical retinoids in psoriasis is 12–16 weeks or more. After daily use of 0.1 % of the tazarotene within 12 weeks, 80 % of patients had clinical improvement/reduction of symptoms by 50 % or more (level of evidence A2) [7–10].

The clinical guideline (Table 1) shows a comparative review of the efficacy and tolerability of used local psoriasis treatments [7, 8].

The Guideline provides information on the use of tazarotene retinoid in combination with other active pharmaceutical ingredients. Calcipotriol is prescribed in combination with other means of topical therapy of psoriasis, namely topical retinoids (tazarotene), hydroxyantrones, salicylic acid. Local irritant effect can be enhanced if with vitamin A (tazarotene) derivatives used calcipotriol together.

The use of retinoids (primarily tazarotene) is recommended for both topical and systemic therapy of psoriasis. As an example of the use of retinoids in systemic and local therapy, we can cite the algorithm for the treatment of chronic plaque psoriasis (typical form) given in the Clinical Guidelines (Fig. 1) [7, 8].

Table 1

Comparison of local treatments for psoriasis

Therapy	Efficiency	Suitability to stimulate remission	Suitability as supportive therapy	Acceptance in patients
Tar	+	+	–	–
Corticosteroids[1]	++++	+++	+	++
Ditranol	++	++	–	–[2]
Tazarotene	++	++	++	++
Analogues of vitamin D	+++	+++	+++	++

Note: powerful or very powerful corticosteroids. Also refers to fixed combinations with vitamin D analogues; more suitable for hospital conditions

At the same time, in a systematic review of studies conducted until 1994, the effectiveness of five methods of treatment with systemic means was analyzed (narrow-band phototherapy (NB-UVB – Narrow Band Ultraviolet B Phototherapy), phototherapy with longwave ultraviolet rays and psoralen (PUVA-therapy), methotrexate, retinoids, as well as cyclosporin A), according to the criterion of inducing remission in patients with severe forms of psoriasis. Only 33 % of studies included controlled clinical trials. The frequency of side effects was highest in the retinoid therapy group and lowest in the phototherapy group [11]. The authors of this article did not find data on modern comparisons of the effectiveness of the use of systemic drugs for the treatment of psoriasis.

The Protocol and Guidelines introduced in 2015 [7, 8], as mentioned above, recommended the use of retinoids for the treatment of psoriatic diseases, despite the lack of registered medicinal products containing retinoids on the pharmaceutical market of Ukraine.

The modern global pharmaceutical market constantly responds to changes in treatment approaches and increases the range of medicines, including those containing retinoids. Medicinal products containing retinoids of the second, third and fourth generation [12] are increasingly used as systemic and local medicines for the treatment of psoriasis [13]. This is due to the reduction of the side effects of retinoids both due to the improvement of the formula of the substances of each subsequent generation of retinoids (trifarotene) and based on new technological approaches in the development of preparations containing retinoids (microencapsulation, obtaining microspheres with an active substance) [14–16].

The analysis of medicinal products containing retinoids, which are currently used in the pharmaceutical practice of Ukraine and neighbouring countries, will allow us to approach the development of a Ukrainian medicinal product containing retinoids for the psoriasis treatment.

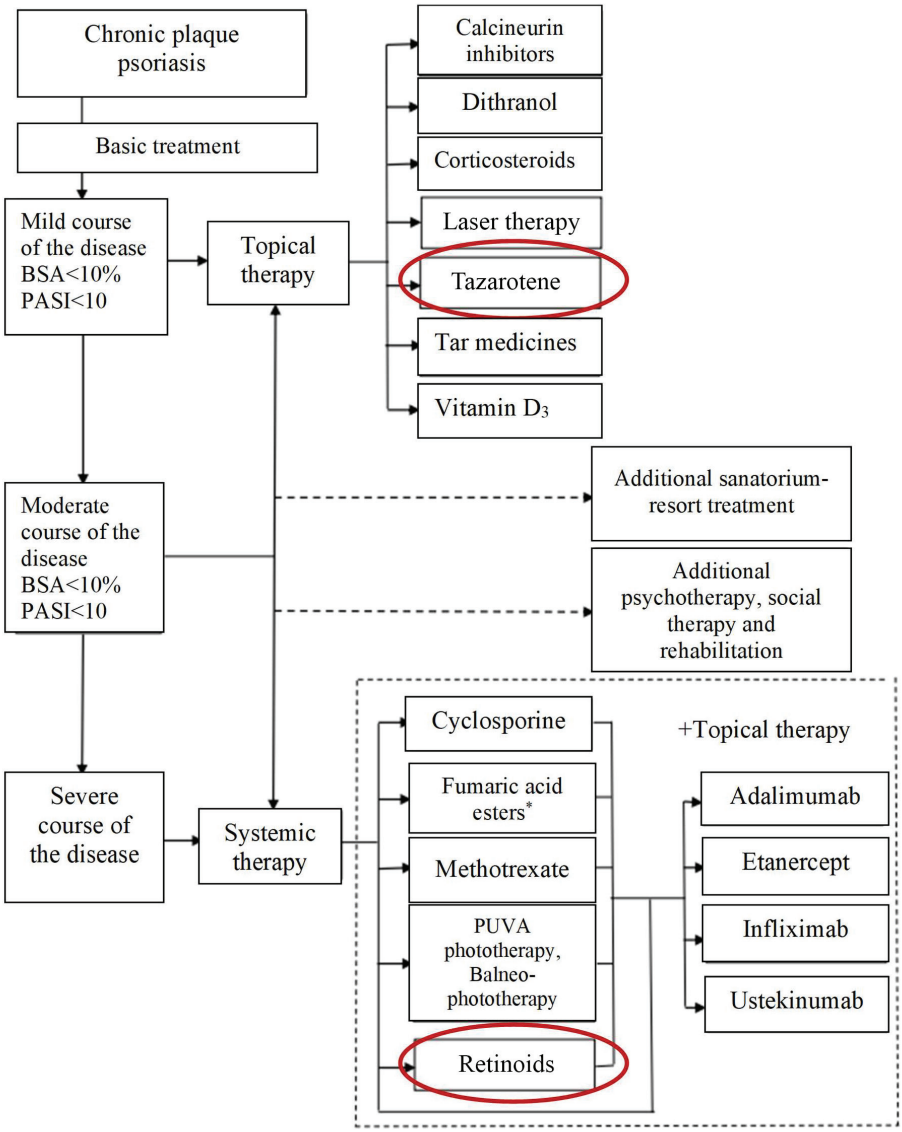

Fig. 1. The general treatment algorithm for chronic plaque psoriasis (typical form) according to the clinical Guidelines [7, 8]

3. Materials and methods

To achieve the specified goal, methods of logical and meaningful formulation of the problem, office marketing research, content analysis of publications in scientific and practically oriented medical and pharmaceutical publications, comparative analysis, and tabular and graphic visual presentation of the obtained data were used. The analysis of the assortment of medicinal products containing retinoids, presented on the Ukrainian pharmaceutical market, was carried out according to the data of the State Register of Medicinal Products of Ukraine [17], the ATC classification system (Compendium 2021) [18], the State Formulary of Pharmaceutical Products [19], the Register of Medicinal Products of Poland (Poland) [20], data of the National Center for the Examination of Medicines and Medical Devices of the Republic of Kazakhstan (Kazakhstan) [21].

4. Research results

According to the State Register of Medicinal Products of Ukraine (as of October 20, 2022) [17], 13 names of medicinal products [17] containing retinoids as an active substance are registered on the Ukrainian market (Table 2).

Out of the medicinal products listed in Table 2, 6 belong to drugs of systemic action and 7 to drugs for local use. Among the active substances used as active components on the pharmaceutical market of Ukraine are registered preparations containing isotretinoin (ROACCUTANE® 10 mg and 20 mg capsules; ACNETREX 10 and 20 mg capsules; ACNETIN® 8 and 16 mg capsules); tretinoin (ALTRENO™ lotion); adapalene (gel EFFEZEL; gels DERIVA gel aqueous, DERIVA C gel, DERIVA C MC); tazarotene (DUOBRII™ lotion) and trifarotene (AKLIEF cream) [18]. Analysis of the instructions for these drugs showed that only DUOBRII™ lotion produced by Bausch Health Companies Inc. (Canada), containing a combination of halobetasol propionate and tazarotene is recommended for the treatment of psoriasis. All other medicines are used for the treatment of mild and severe forms of acne, acne skin diseases.

According to the obtained data, it can be assumed that among all retinoids, only tazarotene affects the pathological process of psoriasis treatment among all retinoids. But, according to literature data [22], isotretinoin, adapalene, and tretinoin also affect such hyperkeratotic diseases as psoriasis and sweating (as an example, isotretinoin according to clinical studies in a dose of up to 2–4 mg/kg/day for the treatment of lesions [22–24]). Therefore, in further studies of the analysis of medicinal products containing retinoids for the treatment of psoriasis, all chemical active ingredients related to this group were considered.

The presence of retinoids on the pharmaceutical market of Poland was conducted using data from the Register of Medicinal Products of the Republic of Poland [20].

Analyzing Table 3, we can say about a significant difference between the retinoid market in Poland and Ukraine. Unlike the Ukrainian market, all generations of retinoids are available on the Polish pharmaceutical market. The number of registered medicinal products is more than 4 times higher (53 versus 13). Retinoid drugs have a wide range of uses: Vesanoid (tretinoin) in combination with arsenic trioxide or chemotherapy is indicated for the treatment of patients with newly diagnosed acute promyelocytic leukemia that has developed after chemotherapy. Toctino

(Alitretinoin) is indicated for use in adults with severe chronic eczema of the hands that does not respond to treatment with potent topical corticosteroids. Targretin (bexarotene) is used if the patient has oncology of the skin (T-cell lymphoma). Preparations containing adapalene and isotretinoin are used to treat blackheads and acne, seborrhea.

Table 2

Medicinal products registered on the pharmaceutical market of Ukraine containing retinoids

No.	Medicine name	Dosage form	Active substances	Manufacturer/country
First generation				
1	ROACCUTANE ® 10 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	F. Hoffmann-La Roche Ltd., Switzerland
2	ROACCUTANE ® 20 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	F. Hoffmann-La Roche Ltd., Switzerland
3	ACNETREX 20	20 mg soft capsules	1 capsule contains 20 mg of isotretinoin	Mega lifesciences public company limited, Thailand
4	ACNETREX 10	10 mg soft capsules	1 capsule contains 10 mg of isotretinoin	Mega lifesciences public company limited, Thailand
5	ACNETIN ® 8 mg	8 mg capsules	1 capsule contains 8 mg of isotretinoin	S.M.B. Technology SA, Belgium
6	ACNETIN ® 16 mg	16 mg capsules	1 capsule contains 16 mg of isotretinoin	S.M.B. Technology SA, Belgium
7	ALTRENO ™	lotion, 0.05 %	1 g of lotion contains: tretinoin – 0.5 mg	Bausch Health Companies Inc., Canada
Third generation				
8	EFFEZEL	gel; 5 g, 15 g, 30 g of gel in a tube	1 g of gel contains adapalene 1 mg and benzoyl peroxide 25 mg	GALDERMA Laboratory, France
9	DERIVA gel aqueous	gel, 1 mg/g in 5 g or 15 g in a tube	1 g of gel contains adapalene 1 mg	GLENMARK Pharmaceuticals Ltd., India
10	DERIVA C gel	gel of 5 g or 15 g in a tube	1 g of gel contains adapalene 1 mg, clindamycin 10 mg	GLENMARK Pharmaceuticals Ltd., India
11	DERIVA C MC	gel of 15 g in a tube	1 g of gel contains adapalene (micronized) 1 mg, clindamycin 10 mg	GLENMARK Pharmaceuticals Ltd., India
12	DUOBRII™	lotion, 0.01 %/0.045 %	1 g of lotion contains: halobetasol propionate – 0.10 mg; tazarotene – 0.45 mg	Bausch Health Companies Inc., Canada
Fourth generation				
13	AKLIEF	cream 0.005 %; 30 g each	1 g of cream contains trifarotene 0,05 mg	GALDERMA Laboratory, France

Table 3

Medicines containing retinoids are registered on the pharmaceutical market of the Republic of Poland

No.	Medicine name	Dosage form	Active substances	Manufacturer/country
1	2	3	4	5
First generation				
1	Aknenormin 10 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Almirall Hermal GmbH (Germany)
2	Aknenormin 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Almirall Hermal GmbH (Germany)
3	Axotret	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Aristo Pharma Sp. z o. o (Poland)
4	Axotret	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Aristo Pharma Sp. z o. o (Poland)
5	Curacne 10 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Pierre Fabre Medicament (France)
6	Curacne 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Delfarma Sp. z o. o (Poland)
7	Curacne 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Pierre Fabre Medicament (France)
8	Curacne 40 mg	40 mg capsules	1 capsule contains 40 mg of isotretinoin	Pierre Fabre Medicament (France)
9	Curacne 5 mg	5 mg capsules	1 capsule contains 5 mg of isotretinoin	Pierre Fabre Medicament (France)
10	Isoderm	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Sun-Farm Sp. z o. o (Poland)
11	Isoderm	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Sun-Farm Sp. z o. o (Poland)
12	Izotek 10 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	InPharm Sp. z o. o (Poland)
13	Izotek 10 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Medezin Sp. z o. o (Poland)
14	Izotek 10 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Pretium Farm Sp. z o. o (Poland)
15	Izotek 10 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Bausch Health Ireland Limited (Ireland)
16	Izotek 10 mg	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Procareplus Pharma SA (Poland)
17	Izotek 20 mg	20 mg capsules	1 capsule contains 10 mg of isotretinoin	Medezin Sp. z o. o (Poland)
18	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Bausch Health Ireland Limited (Ірландія)
19	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Pretium Farm Sp. z o. o (Poland)
20	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	PharmaVitae Sp. z o. o. sp. k. (Poland)
21	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	InPharm Sp. z o. o (Poland)

Continuation of Table 3

1	2	3	4	5
22	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	ModumPharma Sp. z o. o (Poland)
23	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Forfarm Sp. z o. o (Poland)
24	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Pharmapoint SA (Poland)
25	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Procareplus Pharma SA (Poland)
26	Izotek 20 mg	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Laboratorium Galenowe Olsztyn Sp. z o.o. (Poland)
27	Izotziaja	gel	isotretinoin 0.5 mg/g	Ziaja Ltd Zakład Produkcji Leków Sp. z o. o (Poland)
28	Sotret	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Ranbaxy (Poland) Sp. z o. o
29	Sotret	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Ranbaxy (Poland) Sp. Z o. o
30	Tretoskin	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Vitama S.A. (Poland)
31	Acnatac	gel	Clindamycin + Tretinoin (10 mg + 0.25 mg)/g	Mylan Healthcare Sp. z o. o (Poland)
32	Aknemycin Plus	liquid	Erythromycin + Tretinoin (40 mg + 0.25 mg)/g	Almirall Hermal GmbH (Germany)
33	Vesanoid	10 mg capsules	1 capsule contains 10 mg of tretinoin	Cheplapharm Arzneimittel GmbH (Germany)
34	Toctino	10 mg capsules	1 capsule contains 10 mg of alitretinoin	Stiefel Laboratoires Legacy (Ireland) Ltd.
Second generation				
35	Acitren	Hard capsules of 10 mg each	1 capsule contains 10 mg of acitretin	Sun-Farm Sp. z o. o (Poland)
36	Acitren	Hard capsules of 25 mg each	1 capsule contains 25 mg of acitretin	Sun-Farm Sp. z o. o (Poland)
37	Neotigason	Hard capsules of 10 mg each	1 capsule contains 10 mg of acitretin	Actavis Group PTC ehf. (Iceland)
38	Neotigason	Hard capsules of 25 mg each	1 capsule contains 25 mg of acitretin	Actavis Group PTC ehf. (Iceland)
Third generation				
39	Acnelec	gel	1 mg/g of adapalene	Bausch Health Ireland Limited (Ireland)
40	Acnelec	cream	1 mg/g of adapalene	Bausch Health Ireland Limited (Ireland)
41	Belakne Combi	gel	1 g of gel contains adapalene 1 mg and benzoyl peroxide 25 mg	Belupo lijekovi i kozmetika d.d. (Croatia)
42	Differin	gel	1 mg/g of adapalene	Pretium Farm Sp. z o.o. (Poland)
43	Differin	cream	1 mg/g of adapalene	Pretium Farm Sp. z o.o. (Poland)
44	Differin	gel	1 mg/g of adapalene	Medezin Sp. z o.o. (Poland)
45	Differin	cream	1 mg/g of adapalene	Medezin Sp. z o.o. (Poland)
46	Differin	gel	1 mg/g of adapalene	Galderma Polska Sp. z o.o. (Poland)
47	Differin	cream	1 mg/g of adapalene	Galderma Polska Sp. z o.o. (Poland)
48	Differin	gel	1 mg/g of adapalene	InPharm Sp. z o.o. (Poland)
49	Epiduo forte	gel	1 g of gel contains adapalene 0.3 % and benzoyl peroxide 2.5 %	Galderma Polska Sp. z o.o. (Poland)
50	Zorac	gel	0.05 % tazarotene	Allergan Pharmaceuticals International Ltd. Clonshaugh Business & Technology Park (Ireland)
51	Zorac	gel	0.10 % tazarotene	Allergan Pharmaceuticals International Ltd. Clonshaugh Business & Technology Park (Ireland)
52	Targretin	capsules of 75 mg	1 capsule contains 75 mg of bexarotene	Eisai GmbH (Japan)
Fourth generation				
53	Aklief	cream 0.005 %; 3 0 g each	1 g of cream contains trifarotene 0.05 mg	Galderma Polska Sp. z o.o. (Poland)

Regarding the use of drugs for the treatment of psoriasis, according to the instructions for use, such drugs should include systemic action capsules Acitren and Neotigason with acitretin and Zorac gel, which includes tazarotene.

The presence of retinoids on the pharmaceutical market of the Republic of Kazakhstan was conducted using the data of the National Center for the Examination of Medicines and Medical Devices of Kazakhstan [21].

Table 4

Medicinal products registered on the pharmaceutical market of the Republic of Kazakhstan containing retinoids

No.	Medicine name	Dosage form	Active substances	Manufacturer/country
First generation				
1	Acnecutan ®	16 mg capsules	1 capsule contains 16 mg of isotretinoin	S.M.B. Technology SA, Belgium
2	Acnecutan ®	8 mg capsules	1 capsule contains 8 mg of isotretinoin	S.M.B. Technology SA, Belgium
3	Curacne®	10 mg capsules	1 capsule contains 10 mg of isotretinoin	Catalent France Beincheim S.A. (France)
4	Curacne®	20 mg capsules	1 capsule contains 20 mg of isotretinoin	–
5	Roaccutane	20 mg capsules	1 capsule contains 20 mg of isotretinoin	Catalent Germany Eberbach GMBH (Germany)
Third generation				
6	Belakne	Gel	0.1 % adapalene	Belupo, pharmaceuticals and cosmetics d.d. (Croatia)
7	Belakne	Cream	0.1 % adapalene	Belupo, pharmaceuticals and cosmetics d.d. (Croatia)
8	Clenzit	Gel	0.1 % adapalene	GLENMARK Pharmaceuticals Ltd., India
9	Adaclean	Cream	0.1 % adapalene	San Pharmaceuticals Industries Ltd (India)

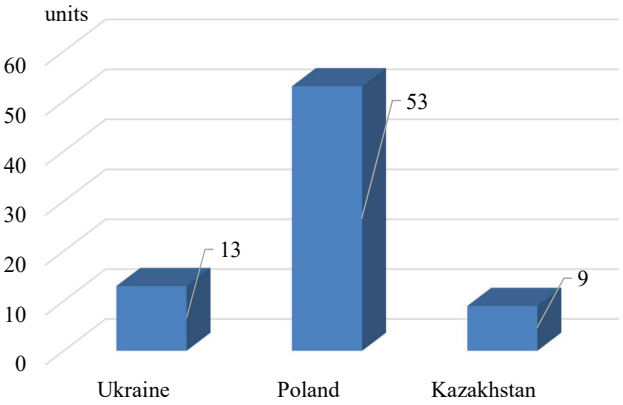

Fig. 2. The number of medicinal products registered on the pharmaceutical markets of countries with the content of active substances of the retinoid group (units)

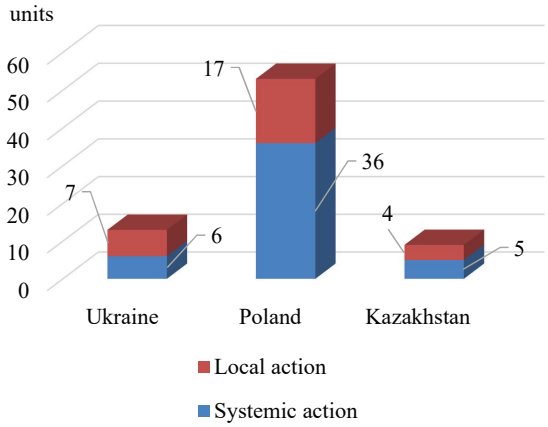

Fig. 3. Distribution of medicinal products with systemic and local retinoids on the pharmaceutical markets of the considered countries (units)

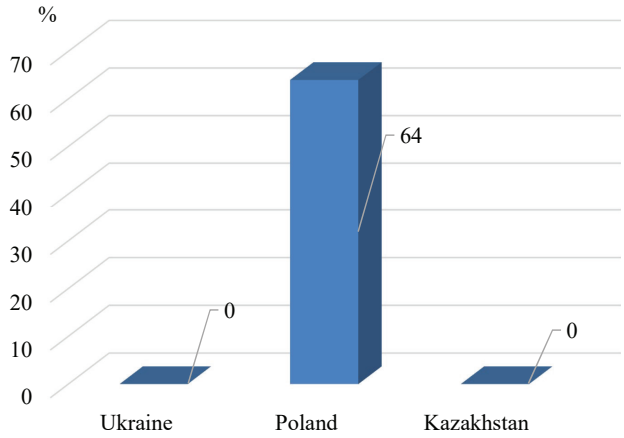

Fig. 4. The share of medicinal products of Ukrainian production with the content of retinoids on the pharmaceutical markets of the countries (%)

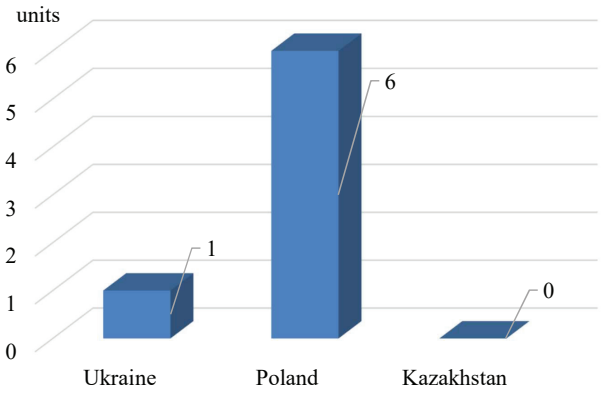

Fig. 5. Number of medicines for the treatment of psoriasis containing active substances of the retinoid group (units)

In contrast to the pharmaceutical market of Poland, the assortment of medicines containing retinol in Kazakhstan is quite limited. 9 medicines are registered and none of them have indications for use in the treatment of psoriasis.

Information on the general type of pharmaceutical retinoid market of Ukraine, Poland and Kazakhstan can be presented in the form of diagrams (Fig. 2–5).

5. Discussion of research results

The analysis of literature data showed that in the treatment of psoriasis, medicinal products of different groups according to the ATS classification can be used, which is confirmed by normative documents on the treatment of psoriasis.

The use of retinoids in medical (pharmaceutical) practice in the treatment of psoriasis is relevant and has

been considered by world medicine for more than 50 years [13, 25–27]. Conducted research on the availability of drugs in the pharmaceutical market is correlated with the data of scientists regarding the trends in the further development of retinoid therapy [13] – their use in developed countries is increasing due to the development of new molecules and technologies for their introduction into medicinal form [15, 16].

According to the obtained data, the Ukrainian pharmaceutical market of retinoids is significantly inferior to the Polish (European) market and somewhat dominates the market of Central Asian countries (Kazakhstan).

In Ukraine, as well as in Kazakhstan, there are no domestic preparations based on retinoids. On the other hand, more than 60 % of the assortment of the Polish pharmaceutical market consists of Ukrainian-made drugs.

Medicines of systemic action on the European market prevail over drugs of local action, which may be related to the mentality of the population and the system of medical care in European countries (working with a doctor, dispensing prescription drugs).

It should be noted that there is currently only one drug containing retinoids registered in Ukraine - DUOBRII™ lotion produced by Bausch Health Companies Inc. (Canada), containing a combination of halobetasol propionate and tazarotene. This is a topical action drug. Medicinal products of systemic action are not represented on the pharmaceutical market of Ukraine.

There are no drugs containing retinoids in the pharmaceutical market of the Republic of Kazakhstan. Limited nomenclature of drugs with retinoids of systemic and local action can be a factor of involvement in the sale of Ukrainian production medicines in the country.

Study limitations. The study of the pharmaceutical market of several European countries and Central and Middle Asia countries, in our view, will correlate with the data given in this publication.

Research on the analysis of the availability of pharmaceutical drugs containing retinoids was conducted on the pharmaceutical markets of developed countries in Asia, North and South America, and Scandinavian countries, which limits the breadth of conclusions.

Prospects for further research consist of research on the development of a Ukrainian drug containing retinoids for the treatment of psoriasis.

6. Conclusions

Based on the conducted research, it was determined that there are no domestic medicines containing retinoids for the treatment of psoriasis on the Ukrainian pharmaceutical market. In general, only one drug registered in Ukraine (DUOBRII™ lotion produced by Bausch Health Companies Inc. (Canada), containing a tazarotene) is recommended for the treatment of psoriasis. This limited market contrasts with European countries (Poland), where the pharmaceutical market is widely represented by retinoids of all generations and drugs of systemic and local action for the treatment of psoriatic diseases.

It is determined that according to the assortment and nomenclature of medicines, the Ukrainian pharmaceutical market of retinoids in all studied parameters dominates the pharmaceutical market of the Republic of Kazakhstan and has prospects for development to the level of filling the retinoids of the pharmaceutical market of Poland.

Due to the analysis of the pharmaceutical markets of Poland, Ukraine and Kazakhstan, data on the list of active components belonging to the group of retinoids used to treat psoriasis as local and systemic drugs was obtained.

Conflict of interest

The authors declare that there is no conflict of interest in this study, including financial, personal nature, authorship or other nature that could influence the research and its results presented in this article.

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Data accessibility

The manuscript does not have related data.

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