ORIGINAL ARTICLE

RATIONAL PHARMACOTHERAPY ON THE BASIS OF PHARMACOECONOMIC JUSTIFICATION AND MARKETING RESEARCH ON THE APPLICATION OF IMMUNOMODULATORY PHYTOPREPARATIONS

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ABSTRACT

The aim: Pharmacoeconomic substantiation and marketing research of immunoprotective phytopreparations in Ukraine to substantiate rational pharmacotherapy of the effectiveness of immunomodulatory drugs of plant origin and pharmaceutical care of patients to strengthen individual immunity.

Materials and methods: Research materials - data from the State Register of Medicinal Products of Ukraine; information content of the Public Health Center of the Ministry of Health of Ukraine; data of the State Register of Wholesale Prices for medicines declared in Ukraine under the international non-proprietary or common name as of 01.01.2023. Research methods: theoretical analysis of scientific sources, systematic, retrospective, descriptive and frequency analysis of information resources of databases; pharmacoeconomic analysis, marketing analysis of positioning in the pharmaceutical market of Ukraine to substantiate rational pharmacotherapy and the effectiveness of immunomodulatory drugs of plant origin to strengthen individual immunity.

Results: Theoretical analysis and pharmacoeconomic substantiation of rational pharmacotherapy of efficiency of application of drugs of immunomodulatory action of plant origin and pharmaceutical care for strengthening of individual immunity of patients is carried out. The algorithm of pharmacoeconomic analysis of the use of immunomodulatory phytopreparations to ensure rational pharmacotherapy and pharmaceutical care of outpatients is substantiated. To substantiate the availability of effective immunomodulatory phytopreparations for patients, marketing research on the use of immunomodulatory phytopreparations in Ukraine has been conducted.

Conclusions: The theoretical analysis shows that the use of immunomodulatory drugs of plant origin is appropriate in rational pharmacotherapy to strengthen the individual immunity of patients, which is especially relevant in an exacerbation of the epidemic situation caused by the spread of infectious diseases of viral origin. An algorithm of pharmacoeconomic substantiation has been developed, which provides an opportunity to confirm the therapeutic efficacy and pharmacoeconomic feasibility of immunomodulatory phytopreparations for rational pharmacotherapy and pharmaceutical care of patients. The results of marketing research provide an opportunity to determine the availability (positioning and price range) for patients of effective immunomodulatory phytopreparations in Ukraine and outline the prospects for pharmaceutical development and registration on the pharmaceutical market of Ukraine of new effective immunomodulatory drugs of plant origin.

KEY WORDS: pharmacoeconomic substantiation, marketing researches, pharmaceutical help to patients, immunomodulatory phytopreparations, combined phytopreparations, plant extracts

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INTRODUCTION

Among the current challenges and threats to the health of the population of Ukraine, one of the most threatening is the spread of infectious diseases of viral origin. With the spread of the COVID-19 epidemic, this challenge poses a threat not only to Ukrainian society, the health care system, but also to the entire European and World community.

The speed and contagiousness of the spread of infectious diseases of viral origin determines the severity of a new challenge to modern society – the formation of social and individual immunity. Under such conditions, the effectiveness of antiviral vaccines is undeniable. However, provided that patients have individual contraindications to vaccination, the presence of systemic diseases, to strengthen individual immunity, it is necessary to find alternative ways of rational pharmacotherapy of patients and pharmaceutical care.

Infectious diseases of viral origin have for many years outweighed the prevalence of all other infectious diseases. According to the Center for Public Health of the Ministry of Health of Ukraine, the annual statistics

of the incidence of infectious diseases of viral origin in Ukraine is 25-30% of the total incidence. With the spread of the COVID-19 epidemic, the number of deaths from complications caused by systemic diseases and ineffective pharmacotherapy of pneumonia caused by SARS-COV-2 infection is increasing [1, 2].

Scientists summarize that the course of acute respiratory diseases combines two interdependent and interdependent processes: the growth of infectious pathology, reduced immunological reactivity of the patient's body. Therefore, in rational pharmacotherapy it is necessary to achieve the optimal therapeutic effect of complex therapy with the use of immunomodulatory drugs [3, 4].

In the context of the spread of the COVID-19 epidemic, the activities of family physicians should also be focused on immunoadaptation – a set of measures aimed at optimizing immune responses in healthy people, but at high risk of developing chronic diseases.

These include immunomodulatory – drugs of natural or synthetic origin, which in therapeutic doses restore the functions of the immune system [5, 6].

Natural immunomodulatory include phytopreparations that are effective and safer than synthetic drugs, have a wide therapeutic range, fewer adverse reactions and less interaction with other pharmaceuticals. In this regard, phytopreparations are currently the safest immunomodulatory, which is acceptable for the adult population and especially acceptable in gerontological and pediatric practice [5, 7].

In general, immunomodulatory drugs of plant origin provide immunomodulatory, anti-inflammatory and hemostatic effects; prevent excessive activation of free radical oxidation and restore the functional activity of the body's natural antioxidant system; increase the body's resistance to the effects of adverse environmental factors, stimulate regeneration processes; increase the phagocytic activity of neutrophils and macrophages, stimulate the synthesis of interleukin-1, the transformation of B-lymphocytes into plasma cells, improve the function of T-helpers. The pharmacologically active biological substances inulin, laevulose and betaine improve metabolic processes. High molecular weight polysaccharide, which belongs to the class of hexose glycosides (which includes glucose, rhamnose, arabinose, mannose, xylose, galactose, uronic acids) provides antiviral action due to inhibition of viral protein synthesis. Ukraine). The vast majority of immunomodulatory drugs of plant origin also have antibacterial and antifungal effects (drugs of Echinacea purpurea, Pinus silvestris). Liquid extract Proteflazid obtained from a mixture of herbs (1:1) Herba Deschampsia caespitosa L. and Herba Calamagrostis epigeios L. (extraction solvent - ethanol 96%), equivalent to at least 0.0035 mg of flavonoids in terms of rutin is a complex of active substances Immunoflazid, in the form of syrups, capsules, Ukraine, which inhibit the replication of DNA and RNA-viruses both in vitro and in vivo. Preclinical and clinical studies have shown inhibitory activity of the drug against influenza viruses and acute respiratory infections, herpes viruses. It is proved that the mechanism of direct antiviral action is to inhibit the synthesis of virus-specific enzymes – DNA and RNA polymerases, thymidine kinase, reverse transcriptase, neuraminidase and induction of endogenous interferon synthesis. It is established that the drug normalizes the synthesis of endogenous α- and γ-interferons to a physiologically active level, which increases the non-specific resistance of the organism to viral and bacterial infections [5,7,8].

Phytoimmunocorrection is relevant in the format of modern medical technologies and standards of appropriate medical care for patients. Therefore, the list of original immunomodulatory phytopreparations and analogues on the Ukrainian pharmaceutical market is growing [6, 9-11].

In comparison with the world practice of immunoprotective phytopreparations the tendency of steady growth of demand of patients to use of medicines of a plant origin is noted [12].

Pharmaceutical manufacturers are expanding the range of immunomodulatory phytopreparations. Some manufacturers specialize in the production of phytopreparations. Thus, in the range of Bionorica drugs registered on regulated markets, the share of immunomodulatory phytopreparations is more than 20% of total sales [13].

THE AIM

Pharmacoeconomic substantiation and marketing research of immunomodulatory phytopreparations in Ukraine to substantiate rational pharmacotherapy of the effectiveness of immunomodulatory drugs of plant origin and pharmaceutical care of patients to strengthen individual immunity.

MATERIALS AND METHODS

Research materials - data from the State Register of Medicinal Products of Ukraine; information content of the Public Health Center of the Ministry of Health of Ukraine; data of the State Register of Wholesale Prices for medicines declared in Ukraine under the international non-proprietary or common name as of 01.01.2023. Research methods: theoretical analysis of scientific sources, systematic, retrospective, descrip-

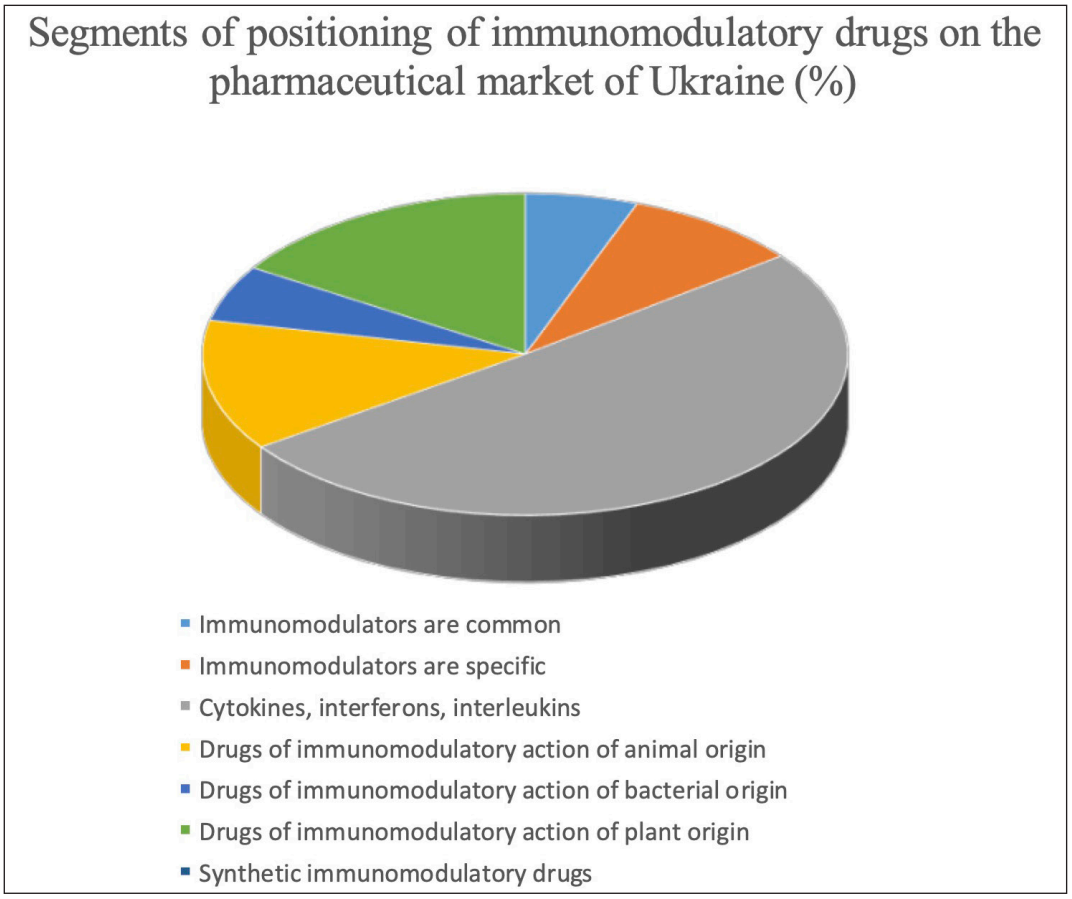

Fig.1. Results of comparative analysis of the share of positioning of immunomodulatory phytopreparations among immunomodulatory in the pharmaceutical market of Ukraine (for the period 2016-2022).

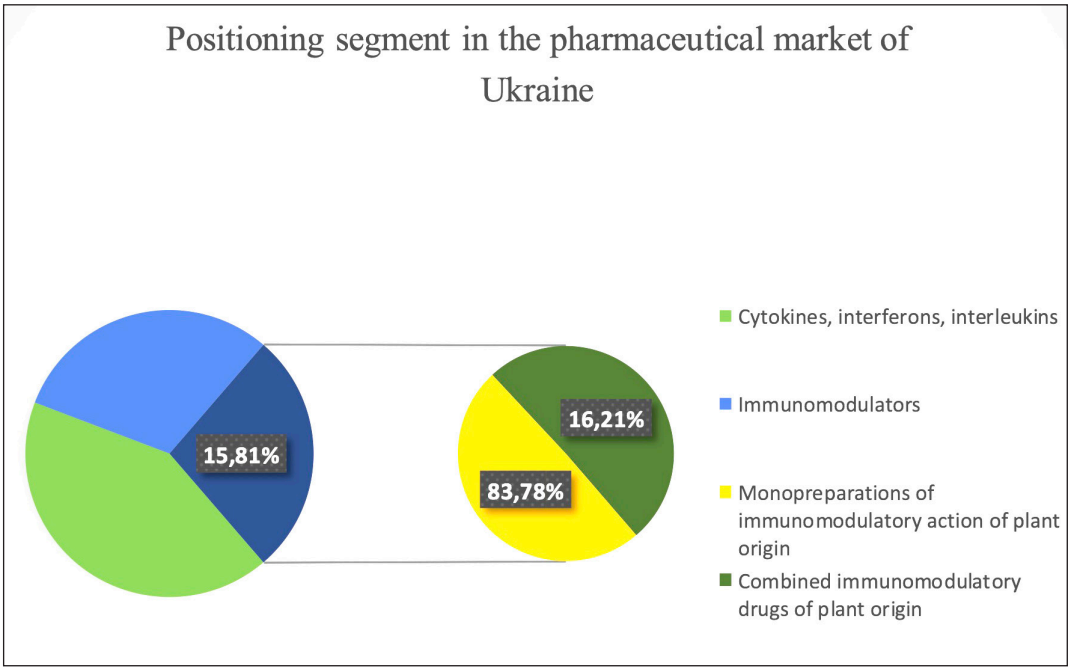

Fig. 2. Distribution of mono and combined phytopreparations with immunomodulatory action.

tive and frequency analysis of information resources of databases; pharmacoeconomic analysis, marketing analysis of positioning in the pharmaceutical market of Ukraine to substantiate rational pharmacotherapy and the effectiveness of immunomodulatory drugs of plant origin to strengthen individual immunity.

RESULTS

To substantiate rational pharmacotherapy and pharmaceutical care of outpatients with immunomodulatory phytopreparations, cost-effectiveness analysis (CEA), which involves comparing the cost and effectiveness (direct and indirect clinical effects) of treatment, is

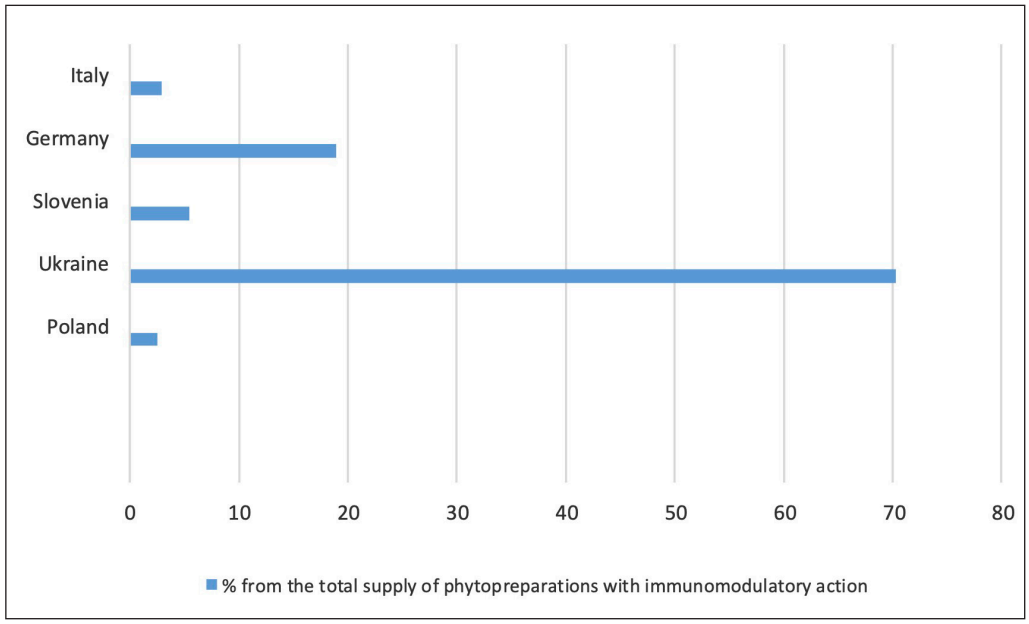

Fig. 3. Distribution of phytopreparations of immunomodulatory action by producer countries on the pharmaceutical market of Ukraine (for the period 2016-2022).

Table I. Algorithm of pharmacoeconomic analysis of immunomodulatory phytopreparations for substantiation of rational pharmacotherapy and pharmaceutical care of outpatients

№	Stages of pharmacoeconomic analysis based on integrated application of methods	Legend
1	Determination of direct costs of pharmacotherapy.	DC_1
2	Determination of indirect costs of pharmacotherapy.	IC_1
3	Determining the total cost of therapy.	COI
4	Determining the cost per unit of efficiency	CER, calculation formula: $CER = \frac{DC + IC}{Ef}$, *(1)*
5	Determination of the usefulness due to treatment	QALY
6	Comparison of the cost-benefit ratio	CUR, calculation formula: $CUR = \frac{DC + IC}{Ut}$, *(2)*
7	Selection of rational purpose of pharmacotherapy with the use of immunomodulatory phytopreparations.	

primarily effective. This analysis allows you to evaluate the effectiveness, in particular to assess the unit cost of treatment. In the end, it is not the cheapest method of treating the disease that is determined, but the optimal one in terms of efficiency and cost. Indicators of the effectiveness of the drug in treatment can be direct clinical effects: changes in physiological, biochemical, physical and other indicators of the patient's body, suppression of symptoms, improvement, well-being, indirect clinical effects (reduction of complications, re-hospitalizations), changes in health in the studied groups of patients, changes in quality of life. Carrying out a cost-effectiveness analysis provides an opportunity to determine the optimal amount of pharmacotherapy for the patient. Determination of the cost-effectiveness ratio (CER), the cost per unit of efficiency according to formula *1*, given in the algorithm in Table I, where CER is the cost-effectiveness ratio; DC – direct costs; IC – indirect costs; Ef – an indicator of the effectiveness of treatment allows you to choose the optimal method of treatment using immunomodulatory phytopreparations.

Therefore, reducing the cost per unit of efficiency in each case has a positive effect on patients, so pharmaceutical care provided by modern masters of pharmacy in pharmacies and medical institutions should be based on proof of therapeutic efficacy and pharmacoeconomic feasibility of immunomodulatory herbal medicines.

It is also effective to use the method of pharmacoeconomic analysis "cost-utility (utilitarianism") - cost-utility analysis (CUA) - a kind of cost-effectiveness analysis, which compares the cost of treatment in monetary terms and its effectiveness in terms of utility (utilitarianism) – treatment outcomes expressed in quality of life indicators. The usefulness index is most often expressed in QALY (quality adjusted life year), but you can use the usefulness index, which is determined by other methods accepted in medicine. The application of

the cost-benefit analysis provides the determination of the most acceptable for the patient method of treatment from the standpoint of cost and benefit, in comparison with the cost-benefit ratio (CUR), the cost per unit of utility of the treatment method 2, given in the algorithm in table I, where CUR is the cost-benefit ratio; DC – direct costs; IC – indirect costs; Ut – utilitarianism. According to the pharmacoeconomic justification, the method of treatment with a lower CUR value is more acceptable for patients. A well-founded algorithm for pharmacoeconomic analysis of the use of immunomodulatory phytopreparations to ensure rational pharmacotherapy and pharmaceutical care of outpatients is shown in Table I.

To substantiate the availability of effective immunomodulatory phytopreparations for patients, marketing research on the use of immunomodulatory phytopreparations in Ukraine (for the period 2016-2021) has been conducted. The results of comparative analysis of the share of positioning of immunoprotective phytopreparations among immunomodulatory in the pharmaceutical market of Ukraine (for the period 2016-2021) are shown in Fig.1. It is established that the share of positioning of immunomodulatory drugs of plant origin is 15.81%.

In turn, phytopreparations with immunomodulatory action are divided into original mono and combined preparations. The distribution of phytopreparations with immunomodulatory action of the original mono and combined preparations is shown in Fig.2. The share of original mono drugs is 83.78%; the share of combined phytopreparations with immunomodulatory action is 16.21%.

To determine the affordability of immunomodulatory phytopreparations for patients, a comparative analysis of marketing research and analysis of the State Register of Medicines of Ukraine and the State Register of Wholesale Prices for medicines declared in Ukraine (for the period 2016-2021) under the international non-proprietary or common name as of 01.01.2023 [14,15].

The distribution of immunomodulatory phytopreparations by producer countries in the pharmaceutical market of Ukraine is shown in Fig.3. It is established that the positioning of immunomodulatory phytopreparations of domestic producers dominates, their share is 70.26%; immunomodulatory phytopreparations of German manufacturers – 18.92%; Italy – 2.86%; Poland – 2.54%; Slovenia – 5.41%.

DISCUSSION

The conceptual basis is the theoretical generalization of scientists about the course of acute respiratory diseases, which combines two interdependent and mutually determined processes: the growth of infectious pathology, the decrease in the immunological reactivity of the patient's body. Therefore, to achieve the optimal therapeutic effect in complex therapy, it is necessary to use immunomodulatory drugs [3-4].

Immunomodulatory are drugs of natural or synthetic origin, which in therapeutic doses restore the functions of the immune system [5-6].

Therefore, in the conditions of an epidemic situation, the use of immunomodulatory drugs of plant origin should be part of a set of measures aimed at optimizing immune reactions in practically healthy people, but with a high risk of developing chronic diseases.

Phytopreparations of immunomodulatory action act effectively and safer than synthetic drugs, have a wide therapeutic range, a smaller number of adverse reactions and a lower level of interaction with other pharmaceutical drugs and are the safest immunomodulatory, acceptable both for the adult population and in gerontological and pediatric practice [5-7].

Acceptability for use in the pharmacotherapy of infectious diseases in patients of various ages is ensured by the fact that immunomodulatory drugs of plant origin have immunomodulation, anti-inflammatory and hemostatic effects; prevent excessive activation of free radical oxidation and restore the functional activity of the body's natural antioxidant system; increase the body's resistance to adverse environmental factors, stimulate regeneration processes [8].

According to the results of the research, it is determined that the range of wholesale and retail prices of immunomodulatory phytopreparations of domestic and foreign manufacturers is acceptable for Ukrainian consumers. However, effective imported phytopreparations of immunomodulatory action of manufacturers in Germany, Italy, Poland, Slovenia are not analogues of domestic products, their original composition provides specific pharmacological activity and therapeutic efficacy. The imported drugs are dominated by combined phytopreparations that provide a complex immunomodulatory effect [10, 14].

Domestic manufacturers supply the pharmaceutical market with original mono- immunomodulatory phytopreparations, dosage forms acceptable for patients of all ages predominate: extracts, tinctures, syrups, hard capsules, tablets [14].

CONCLUSIONS

The theoretical analysis shows that the use of immunomodulatory drugs of plant origin is appropriate in rational pharmacotherapy to strengthen the individual immunity of patients, which is especially relevant in an exacerbation of the epidemic situation caused by the spread of infectious diseases of viral origin.

An algorithm of pharmacoeconomic substantiation has been developed, which provides an opportunity to confirm the therapeutic efficacy and pharmacoeconomic feasibility of immunomodulatory phytopreparations for rational pharmacotherapy and pharmaceutical care of patients.

The results of marketing research provide an opportunity to determine the availability (positioning and price range) for patients of effective immunomodulatory phytopreparations in Ukraine and outline the prospects for pharmaceutical development and registration on the pharmaceutical market of Ukraine of new effective immunomodulatory drugs of plant origin.

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The Authors declare no conflict of interest.

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