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## ANALYSIS OF COMPETITIVENESS OF ANTI-GLAUCOMA MEDICATIONS ON THE MODERN PHARMACEUTICAL MARKET OF UKRAINE

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**Annotation.** *The purpose of the paper is to present the results of the cost-quality evaluation of the SOE group beta-blockers. The criteria influencing the competitiveness of medicines, which determines the affordability of the study medicines for the population, were also specified.*

**Keywords:** *anti-glaucoma medications, competitiveness, beta-blockers, cost-quality evaluation.*

The modern pharmaceutical market is a complex, multifunctional and multi-level organization characterized by high growth rates in production and sales. The reasons of such growth consist in the special features of medicines that meet the specific needs of consumers, the demand for which is growing regardless of economic, political or other reasons. Today, the pharmaceutical sector is one of the leading in terms of capital intensity, research intensity, growth rate, and social significance for the global economy. We have conducted a marketing analysis of the modern pharmaceutical market of anti-glaucoma medications in Ukraine within the framework of scientific work "Pharmacoeconomic evaluation of medical therapy of common ophthalmologic and otorhinolaryngological diseases" DR No. 0114U000936 [1]. This aspect has been gaining a particular topicality due to a 45% annual growth of primary open-angle glaucoma (POAG) prevalence in the world [2]. In previous studies, we found that the domestic market of anti-glaucoma medicines consisted of mainly foreign products, representing 75% of the range. We also discovered the acute shortage of combine medications on the domestic market. All above mentioned reasons open up new prospects for expanding the range of polyvalent domestic combination products S01E - "Antiglaucoma preparations and miotics" in order to achieve both the therapeutic and economic effects that meet all requirements and the needs of evidence-based medicine and pharmacoeconomics [3].

The scientific literature of today involves publications that reflect the rate of antiglaucoma medicines' consumption and the results of the analysis of the range thereof. However, the social space of our country over the past 2-3 years has undergone significant political and economic changes that have left their imprint on the subject segment of the pharmaceutical market, but individual results of S01E "Antiglaucoma

preparations and miotics" marketing research might not fully cover the general trends of the current pharmaceutical market. Therefore, it appears strategically important to determine the integral indicator of the antiglaucoma medicines' competitiveness.

It is well known that the competitiveness of medicinal products is defined as a set of their consumer properties created during the research/development and production, which promotes the fastest selling the medicine on a competitive market at a certain time relying on certain differences from competing analogues [4].

Therefore, the **purpose** of this study was to compare the competitiveness of the first line antiglaucoma preparations for pharmacotherapy of Grade II and III POAG, namely, the medicines from the group of beta-blockers.

**Materials and methods of the study.** In the course of the study, we used the method of marketing analysis and expert evaluation. We assessed the competitiveness of beta-blockers according to a cost-quality method of integral competitiveness calculation [5].

**Study results.** The competitiveness of beta-blockers was evaluated in four consecutive phases. The first phase consisted in making choice of a comparator medicine and functional parameters, which will be compared with a study medicine in a group. As functional parameters we choose the efficiency, weighted average retail price (as of the first half of 2017) and the cost of monthly treatment course of Grade II and III glaucoma. We accepted the qualitative characteristics of the comparator as the maximum value – its efficacy was conventionally estimated as 1 point. The cost parameters of beta-blockers were assessed against their affordability. The weight of qualitative and cost parameters was determined by the method of expert evaluation [6]. Functional characteristics of the comparator drug for a group of beta-blockers are presented in Table 1.

Table 1

**Qualitative and cost characteristics of the comparator drug**

Medicine	Comparator parameter values				
	Qualitative parameters			Cost parameters	
	Number of doses of the drug	Number of dosage forms	Efficacy	Average weighted retail price, UAH	Cost of the course of treatment, UAH/month
Oftan	1	1	1	27.72	22.94
Parameter weight coefficient [7]	0.25	0.25	0.5	0.4	0.6

While assessing the efficiency indicator, we have analyzed the data of the expert evaluation of medicines from the group S01E - "Antiglaucoma preparations and miotics" [6]. Experts evaluated the efficacy, side effects, the actual probability of prescribing a medicine, the promising effect of using medicines, the availability of medicines in the pharmacy network against a scale ranging from 4 (highly effective, safe, widely

prescribed, very promising medicine, the demand in which has been fully met) to 0 points (experts had difficulties with answering questions). In addition, the experts expressed their opinion on the necessity to include these medicines in the National List of Essential Medicines, the cost of which should be compensated for patients, and determined the compliance with the cost-efficacy criterion for AGMs ("+" - 1 point, "-" - 0 points).

If we take the Oftan efficacy as one point, then the efficacy calculations for a number of beta-blockers might be presented as follows: Arutimol - 0.983; Cusimolol - 0.928; Oftimol - 0.963; Timolol Darnytsia - 0,946; and Timolol Farmak - 0.888.

The next phase consisted in conducting calculations of the group indicator of qualitative parameters - the quality index, before calculation of which we determined the values of unit qualitative indicators using the following formula:

$$qi = \frac{Pi}{Pia}$$

where, qi – unit value of quality parameter;

Pi – value of the quality parameter of assessed medicinal product (study medicine);

Pia – value of the same parameter of the comparator drug

Quality index was calculated using the formula:

$$Iq = \sum_{i=1}^n qi \times Vi$$

where, Iq – quality index;

qi – unit value of quality parameter;

Vi – the weighting factor of each quality indicator.

The third phase of our calculations consisted in determination of the group cost parameter - the consumer price index. We calculated the unit cost indicator using the formula:

$$q_{цiни} = \frac{Pi \times \beta_i}{Pia}$$

where, qprice – unit value of cost parameter;

Pi – value of the cost parameter of the assessed medicinal product;

Pia – value of the same parameter of the comparator drug;

$\beta_i$  – coefficient of standardization of the number of doses in a package.

Since the retail price of antiglaucoma preparations was determined proceeding from the number of drops for one day, the standardization factor  $\beta_i$  was not taken into account in the calculation of a unit indicator.

An important indicator of calculated AGMs competitiveness coefficient is their cost.

Thus, on the basis of the information about a wholesale price list for the medicines [[http://www.moz.gov.ua/ua/portal/register\\_prices\\_drugs/](http://www.moz.gov.ua/ua/portal/register_prices_drugs/)], we established that the retail price for the subject beta-blockers varied from UAH 9.30 for Timolol Darnytsia up to UAH 47.63 for Arutimol. The cost of a treatment course for the above-mentioned preparations changes depending on the average retail price, a dosage regimen (OD or BID), and the vial volume, namely, from 9.14. UAH up to UAH 36.17 respectively.

The group cost indicator - the consumer price index - was calculated using the same formula as the quality index:

$$I_p = \sum_{i=1}^n q_{ціни} \times V_{ціни}$$

where,  $I_p$  – consumer price index;

$q_{price}$  – unit value of cost parameter;

$V_{price}$  – the weighting factor of each cost indicator.

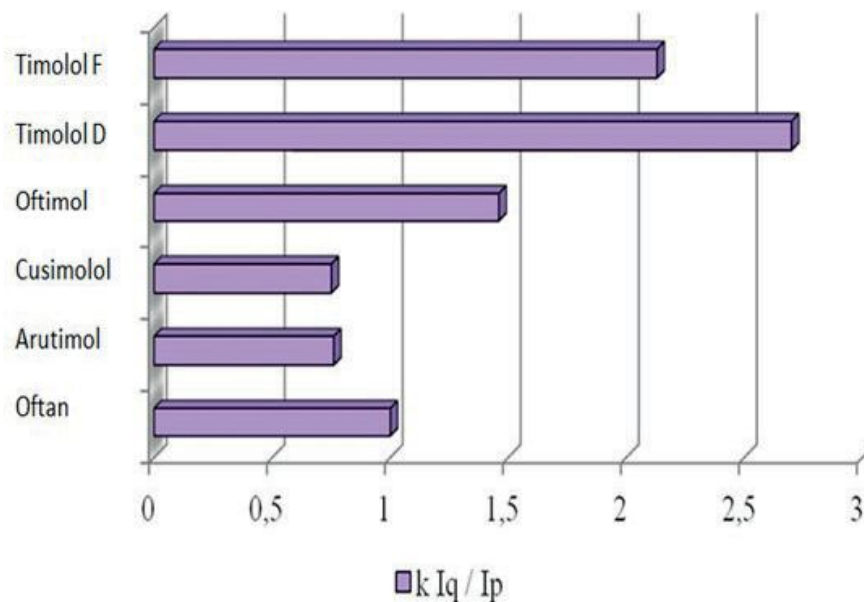
The final phase of our study was to determine the integral index ( $k_i$ ) and assess the competitiveness of the study drugs on the basis of the figures of the quality index and the consumption price index:

$$k = \frac{I_q}{I_p}$$

The values of the group indexes of functional parameters and the integral index of competitiveness are shown in Fig. 1

The difference of the integral index of competitiveness between the study preparations of the beta-blocker group (Timolol mono-preparation) ranged from 0.76 to 2.7. A product may be considered competitive if this index is above 1.0 and not competitive if the index is below 1.0. So, the most competitive beta-blocker in relation to a comparator drug is Oflimol (VAT Farmak), which has high therapeutic efficacy index according to an expert evaluation (0.96 points of maximum 1.0) and a low retail price of 30.0 UAH.

High competitiveness indexes of Timolol D (Darnytsia, Ukraine) and Timolol F (Farmak, Ukraine) are associated with low cost pricing policies, but expert evaluation of ophthalmologists [6] has also revealed an inadequate efficacy of the above medicines. In turn, such preparations as Arutimol (Chauvin Ankerpharm, Germany) and Cusimolol (Alkon Cusi, Spain) are characterized by both high therapeutic efficacy and cost indexes.



**Fig. 1. Competitiveness of beta-blockers (Timolol mono-preparation) among the medicines for treatment of glaucoma**

**Conclusions.** The results of the cost-quality evaluation of the SOE group beta-blockers presented that domestic Oftimol (Farmak, Ukraine) has the highest level of competitiveness among Timolol mono-preparations. The criteria influencing the competitiveness of medicines include the completeness of the production range, dosage forms, retail price and cost of treatment course, which determines the affordability of the study medicines for the population.

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