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АНАЛІЗ ВАРТОСТІ ЛІКУВАННЯ ХВОРИХ ПІСЛЯ COVID-19 НООТРОПНИМИ ЛІКАРСЬКИМИ ЗАСОБАМИ В УКРАЇНІ

Назаркіна В.

*Доцент кафедри ОЕФ, к.ф.н.,
Національний фармацевтичний університет, Україна*

Куриленко Ю.

*Асистент кафедри ОЕФ,
Національний фармацевтичний університет, Україна*

Попова І.

*Доцент кафедри ОЕФ, к.еко.н., с.н.т.,
Національний фармацевтичний університет, Україна*

Тетерич Н.

*Доцент кафедри ОЕФ, к.ф.н.,
Національний фармацевтичний університет, Україна*

Подколзіна М.

*Доцент кафедри ОЕФ, к.ф.н.,
Національний фармацевтичний університет, Україна*

ANALYSIS OF THE COST OF TREATMENT PATIENTS AFTER COVID-19 WITH NOOTROPIC MEDICINES IN UKRAINE

Nazarkina V.

*Associate professor of the department OEPH,
candidate of pharmaceutical sciences,
National University of Pharmacy, Ukraine*

Kurylenko Yu.

*Assistant of the department OEPH,
National University of Pharmacy, Ukraine*

Popova I.

*Associate professor of the department OEPH,
PhD in Economics, Senior Researcher,
National University of Pharmacy, Ukraine*

Teterich N.

*Associate professor of the department OEPH,
candidate of pharmaceutical sciences,
National University of Pharmacy, Ukraine*

Podkolzina M.

*Associate professor of the department OEPH,
candidate of pharmaceutical sciences,
National University of Pharmacy, Ukraine*

АНОТАЦІЯ

Проведено розрахунки щодо вартості лікування препаратами ноотропної групи, що представлені на фармацевтичному ринку України. Розраховано ємкість ринку для найбільшого району міста Харкова для таких препаратів, як цинаризин, пірацетам, та комбінацій, що включають обрані ліки. Проведено аналіз щодо найбільш вигідного застосування препаратів з позиції їх економічної доступності при умові однакової ефективності.

ABSTRACT

Calculations of the cost of treatment with drugs of the nootropic group, presented on the pharmaceutical market of Ukraine. The market capacity for the largest district of the city of Kharkiv for such drugs as cinnarizine, piracetam, and combinations including selected drugs is calculated. An analysis of the most profitable use of drugs from the standpoint of their affordability, provided the same effectiveness.

Ключові слова: ноотропні ліки, вартість лікування, мозкові порушення, COVID-19.

Keywords: nootropic drugs, the cost of treatment, brain disorders, COVID-19.

Formulation of the problem. The pathogenesis of cerebrovascular disorders involves a complex of disorders: cerebral blood supply, metabolism and functional activity of the brain. Insufficiency of cerebral circulation and the development of local changes in brain tissue lead to a change in the relationship between blood supply and brain needs for oxygen and energy substrates, which, in turn, leads to the gradual death of nerve cells [1].

Congenital or acquired organic brain lesions, various pathological conditions, brain tumors, epilepsy, cerebral atherosclerosis, cerebrovascular disorders, senile dementia, Alzheimer's disease, acute and chronic intoxications, psychosomatic fatigue are often complicated by psychoneurological symptoms. These include disorders of memory, which is one of the basic mechanisms of integration of the brain, the basis of mental functions and intellectual abilities, attention to emotions, will, vigor, as well as the manifestation of symptoms of dizziness, fatigue and others.

To obtain an adequate relationship between the energy needs of brain tissue and the level of cerebral circulation requires the combined use of nootropics and vasoactive drugs [2,9].

In connection with the COVID-19 pandemic, one of the recommendations of the World Health Organization is to take nootropic drugs among patients. This is due to studies that show that a certain percentage (more than 30%) of patients complain of memory loss and reduced thinking processes [].

Nootropics, also known as neurometabolic stimulants, are drugs that have a direct activating effect on learning, improve memory and mental activity. The term "nootropic" is compounded - I will return, interfere, change. It was introduced in 1972 to describe

the effects on the sensory-cognitive sphere of the effects of piracetam. Later, similar effects were observed in other substances or complexes of substances.

Nootropics include 17 different types of substances: from harmless amino acids to memantine, which can cause severe liver damage and acute psychosis with hallucinations in case of an overdose. By 2025, the turnover on the nootropic market worldwide will reach \$ 4.94 billion. Therefore, the topic of calculating the cost of treatment drugs of this group are relevant.

The aim of the study was to calculate the cost of treatment with groups of nootropics for the largest district of Kharkov.

Presenting main material. Due to the worldwide pandemic of COVID-19, the use of N06BX and N07C in the treatment of drugs is necessary, because according to recent studies, most patients with COVID-19 have become more likely to complain of memory impairment, concentration after illness. This is due to the psychosomatic components, with stress and fear, as a result, increased pressure and the risk of vascular problems, can lead to decompensation of chronic or acute ischemia. Doctors also emphasize the neurotoxic effects of coronavirus infection [3,4,10].

In the study, we used the following groups for ATC code N06BX03 – piracetam and N07CA02 – cinnarizine [5,6].

Given that to build an optimal promotion strategy it is necessary to study the market and offers of the drug of the selected group, as well as to identify a competitor's position in the market, we calculated the cost of treatment with drugs containing piracetam (table 1), [7,8].

Table 1

The cost of treatment with drugs containing piracetam

INN	Trade name	Cost of 1 day of treatment	Cost of monthly treatment
Nootropic	Piracetam, caps 0.4 No. 4x15, PlivaKrakow	0.61-1.62	18.20-48.52
Piracetam	Piracetam, caps 0.4 No. 6x10, Farmak	0.27-0.72	8.10-21.60
Lucetam	Piracetam, tbl p / o 400 mg No. 60, Egis	0.91-1.53	27.25-46.00
Piracetam	Piracetam, tbl 0.4 No. 30, Darnitsa	0.25-0.67	7.50-20.00
Piracetam	Piracetam, caps. 0.4 No. 30 Montpharm	0.29-0.76	8.55-22.80

The calculations used the average retail prices (maximum and minimum) for drugs of the selected group. According to the instructions on piracetam, it is necessary to gradually increase the dose over a month to 2.4-3.2 g / day. According to the analysis, the most

expensive course of treatment (1 month) in the drug Piracetam manufactured by Pliva Krakow, Poland from 18.20 to 48.52 UAH, and the cheapest course with the drug Piracetam, "Darnytsia", Ukraine and will be from

UAH 7.50-20.00. Next, we calculated the course of treatment with cinnarizine (Table 2).

Table 2

The cost of treatment with drugs containing cinnarizine

Trade name	Manufacturer	Cost of 1 day of treatment	Cost of monthly treatment
Cinnarizine	Sopharma	0.54 -1.62	16.74-50.22
Cinnarizine	Balkanpharma-Dupnitza	0.63-1.89	19.53-58.59
Stugeron	Gedeon Richter	0.89-1.98	27.50-61.38
Cinnarizine-darnitsa	Darnitsa	0.62-1.64	19.22-50.84
Cinnarizine OZ	HNTSLS	0.75-1.77	23.25-54.87

The initial dose is tablet (25 mg) 3 times a day, gradually increasing to 2-3 tablets 3 times a day. According to Table 3.2, the cost of one package of the drug is the most expensive course of treatment (1 month) in the drug Stugeron manufactured by Gedeon Richter, Germany from 27.50 to 61.38 UAH.

The most budget-friendly treatment will be Cinnarizine manufactured by Sopharma - from UAH 16.74 to 50.22 UAH. As for the production of "Darnitsia", the treatment with the presented drug will

cost from 19.22 to 50.84 UAH. Also, treatment with domestic Cinnarizine OZ will cost from 23.25 up to 54.87 UAH per month of therapy.

Next, we calculated the cost of treatment with drugs containing combinations of piracetam + cinnarizine (table 3). Combination drugs that increase blood circulation and brain metabolism. Piracetam improves the integrative activity of the brain, helps to consolidate memory, improves learning. Cinnarizine is a blocker of calcium ions and histamine H1-receptors.

Table 3

The cost of treatment with drugs containing piracetam and cinnarizine

Trade name	Price, UAH	Cost of 1 day of treatment	Cost of monthly treatment
Fezam, Balkanpharma-Dupnitza	262.79	5.26	162.93
Tsinatropil-Zdorov'ya, Zdorov'ya	60.00	1.20	37.20
Evrizam, Farmak	79.41	1.32	41.03

It has vasodilating activity mainly against cerebral and coronary vessels, due to both the direct effect of the drug on vascular smooth muscle and its antagonism to some endogenous vasoconstrictors (norepinephrine, angiotensin). Both components mutually potentiate the antihypoxic effect of each other. The toxicity of the combination does not exceed the toxicity of the individual components.

According to table 3, we have price indicators for drugs containing cinnarizine + piracetam, depending on the manufacturer. Thus, the price of the drug Fezam is high compared to others and reaches 262.79 UAH, the price of the drug Tsinatropil-Zdorov'ya is the lowest and is equal to 60.00 UAH, the price of the drug Evrizam is UAH 79.41. The course of treatment with Fezam is 162.93 UAH for 1 month, and with the drug Evrizam - 41.03 UAH, ie almost 4 times cheaper. Also, treatment with a combination drug if necessary is much more affordable than treatment with stand-alone drugs.

At the next stage, we calculated the capacity of the market of drugs containing selected groups of drugs. Market capacity is the existing or potential sales volume of a product over a period of time. It can be measured in kind and / or money.

Data on the population of the largest district of Kharkiv - Moskovs'kyi rayon, the number of which

- 1) From them people 45-65 age: $35190 \times 6 = 211140$ unitary enterprise
- 2) From them people 66-75 age: $29070 \times 6 = 174420$ unitary enterprise
- 3) From them people 76-85 years of age: $4590 \times 6 = 27540$ unitary enterprise

The average price of the drug is UAH 262.79 calculate the market capacity:

- 1) From them people of 45-65 age: $211140 \times 262,79 = 55485480.60$ UAH
- 2) From them people of 66-75 age: $174420 \times 262,79 = 45835831.80$ UAH
- 3) From them people of 76-85 years of age: $27540 \times 262,79 = 4483236.60$ UAH

exceeds the number of inhabitants of Poltava were used for calculation. As of 2020, there are 400000 people living in the area. According to the statistics of Kharkiv region, 85% of adults (from 18 to 85 years old) live in the district. Of these, 45% of persons in need of treatment with a group of nootropic drugs (according to the Kharkiv Regional Clinical Hospital).

$$1) 400000 \times 0.85 = 340000 \text{ (number of adults)}$$

$$2) 340000 \times 0.45 = 153000 \text{ (number of people in need of treatment)}$$

Only the following groups take part in the coverage: 45-65 years of age, 66-75 years of age and 76-85 years of age, as they are the largest consumers of the drug in this category. Capacity of the Fezam drug market: we have 153000 people for calculations.

$$1) \text{ From them people 45-65 age (23\%): } 153000 \times 0.23 = 35190 \text{ people}$$

$$2) \text{ From them people 66-75 age (19\%): } 153000 \times 0.19 = 29070 \text{ people}$$

$$3) \text{ From them people 76 -85 years of age (3\%): } 153000 \times 0.03 = 4590 \text{ people}$$

On average, 6 packages of the drug are bought per year:

From these calculations it follows that only for a year consumers need 413100 packages of the drug Fezam, in monetary terms it is equal to 50319068.40 UAH. Next, we calculated the capacity of the market Tsinatropil-Zdorov'ya and Euryzam.

- 1) From them people 45-65 age: $35190 \times 7 = 246330$ unitary enterprise
 - 2) From them people 66-75 age: $29070 \times 7 = 203490$ unitary enterprise
 - 3) From them people 76-85 years of age: $4590 \times 7 = 32130$ unitary enterprise
- The average price of the drug is UAH 60.00. calculate the market capacity:
- 1) From them people of 45-65 age: $246330 \times 60.00 = 14779800$ UAH
 - 2) From them people of 66-75 age: $203490 \times 60.00 = 12209400$ UAH
 - 3) From them people of 76-85 years of age: $32130 \times 60.00 = 1927800$ UAH
- Euryzam drug market capacity, on average, 6 packages of the drug are bought per year:
- 1) From them people 45-65 age: $35190 \times 6 = 211140$ unitary enterprise
 - 2) From them people 66-75 age: $29070 \times 6 = 174420$ unitary enterprise
 - 3) From them people 76-85 years of age: $4590 \times 6 = 27540$ unitary enterprise
- The average price of the drug is UAH 79.41. calculate the market capacity:
- 1) From them people of 45-65 age: $211140 \times 79.41 = 16766627.40$ UAH
 - 2) From them people of 66-75 age: $174420 \times 79.41 = 13850692.20$ UAH
 - 3) From them people of 76-85 age: $27540 \times 262.79 = 2186951.40$ UAH

From these calculations it follows that only for a year consumers need 481950 packages of the drug Tsinatropil-Zdorov'ya, in monetary terms it is equal to 28917000.00 UAH. According to calculations, consumers need 413100 packages of the drug Euryzam for a year, in monetary terms it is equal to 32804271 UAH. It should be noted that the cost of drugs Fezam for the calculated number of 413100 packages for patients is 1.5 times more expensive than the cost of drugs Euryzam for the same number of packages.

Conclusions.

1. According to the analysis, the most expensive course of treatment (1 month) in the drug Piracetam manufactured by Pliva Krakow, Poland from 18.20 to 48.52 UAH, and the cheapest course with the drug Piracetam manufactured by "Darnytsia", and will be from 7, UAH 50-20.00

2. The initial dose is 1 tablet (25 mg) 3 times a day, gradually increasing to 2-3 tablets 3 times a day. The calculation showed that the most expensive course of treatment (1 month) in the drug Stugeron produced by Gedeon Richter, Germany from 27.50 to 61.38 UAH.

3. Price indicators for drugs containing cinnarizine + piracetam, depending on the manufacturer. Thus, the price of the drug Fezam is high compared to others and reaches 262.79 UAH, the price of the drug Tsinatropil-Zdorov'ya is the lowest and is equal to 60.00 UAH.

4. The cost of drugs Fezam for the calculated number of 413100 packages for patients is more expensive than the cost of drugs Euryzam for the same number of packages 1.5 times. Three strategies for promoting the domestic drug Tsinatropil-Health and tactics for compliance with the strategies are proposed.

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