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ANALYZING THE SELECTION OF PARACETAMOL PREPARATIONS AVAILABLE IN THE UKRAINIAN PHARMACEUTICAL MARKET

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Summary. *The article presents the results of a comprehensive marketing analysis of the structure of the domestic pharmaceutical market of the assortment of drugs with the active ingredient paracetamol by producing countries and the variety of dosage forms. Taking into account the wide range of use of paracetamol in clinical practice, the ratio of the use of paracetamol in monotherapy and in combination with other drugs was analyzed, as well as the provision of the population with these drugs.*

Key words: *paracetamol, analgesic-antipyretic, marketing analysis, assortment.*

Relevance to the issue.

Paracetamol was introduced into the pharmacological market in 1955 by McNeil Laboratories as a prescribed analgesic and antipyretic drug for children under its trade name Tylenol Childrenís Elixir, the name of it derives from its chemical name ñ N-acetyl-p-aminophenol. Paracetamol is a non-narcotic analgesic, a first-line drug in the treatment of fever and pain syndrome of mild and moderate intensity of various genesis. Paracetamol/acetaminophen is one of the most popular and widely available over-the-counter pain relievers and antipyretics in both mono- and multi-component formulations [1]. This drug is drug of choice in category of patients who can't use for treatment non-steroidal anti-inflammatory drugs (NSAIDs), for example, ailments with bronchial asthma, virazova ailment, hemophilia, sensitization to salicylates, children under 12 years of age, or women who are breastfeeding. According to the British

National Formulary (BNF), paracetamol has good analgesic properties and, unlike other NSAIDs, has a less irritating effect on the gastrointestinal tract [2]. The mechanism of action is complex and includes effects on both peripheral (COX inhibition) and central (COX, serotonergic descending neuronal pathway, L-arginine/NO pathway, effect on the cannabinoid system) antinociceptive processes and "redox" mechanism [3].

The aim of the study is to conduct a marketing analysis of the range of mono- and combined paracetamol preparations registered on the pharmaceutical market of Ukraine of domestic and foreign production.

Research materials and methods.

The object of the study was the nomenclature of medicines with the active ingredient paracetamol, which are presented on the pharmaceutical market of Ukraine. We took into account paracetamol drugs, which according to the international ATS classification belong to the pharmacological group - Analgesics-antipyretics. The research used the methods of marketing analysis of the assortment of medicines and statistical processing of the obtained data.

Research results and their discussion.

The range of use of paracetamol in clinical practice is quite wide and includes its use in pain syndrome of weak and moderate intensity of various genesis (headache, migraine, toothache, neuralgia, myalgia, algodismenorrhea, pain in injuries, burns), fever in infectious-inflammatory diseases, ect.

According to the results of the market research, it was established that 194 names of medicinal products with the active ingredient paracetamol are registered on the pharmaceutical market of Ukraine, most of which are drugs of foreign production, 59.8%, while about 40% of consumers are provided with domestic products (Fig. 1).

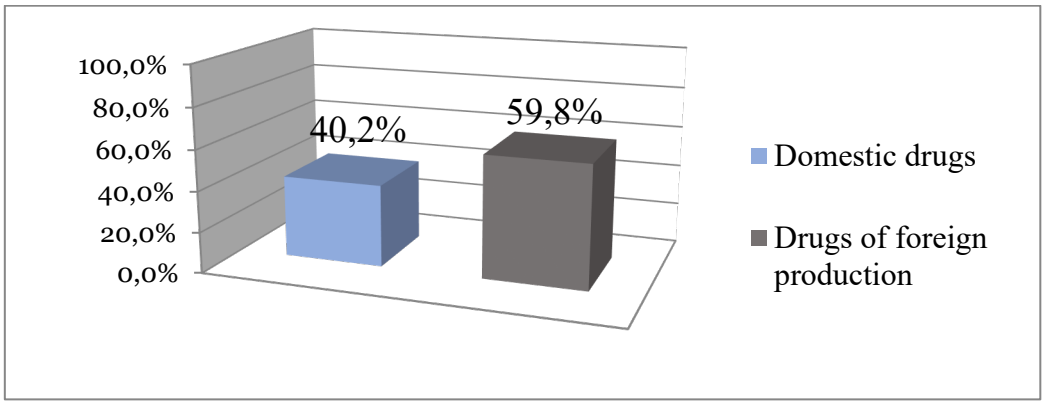

Fig. 1. The pharmaceutical market for paracetamol preparations is segmented by producing countries

Among drugs manufactured abroad, the leading place is occupied by drugs manufactured in India (41.4%), approximately the same specific weight belongs to drugs from Spain, France, Italy - 7.8% and 6.9%, respectively, and a small number of drugs (4 .3% and less) is manufactured by pharmaceutical enterprises of other regions in the ratio (Fig. 2).

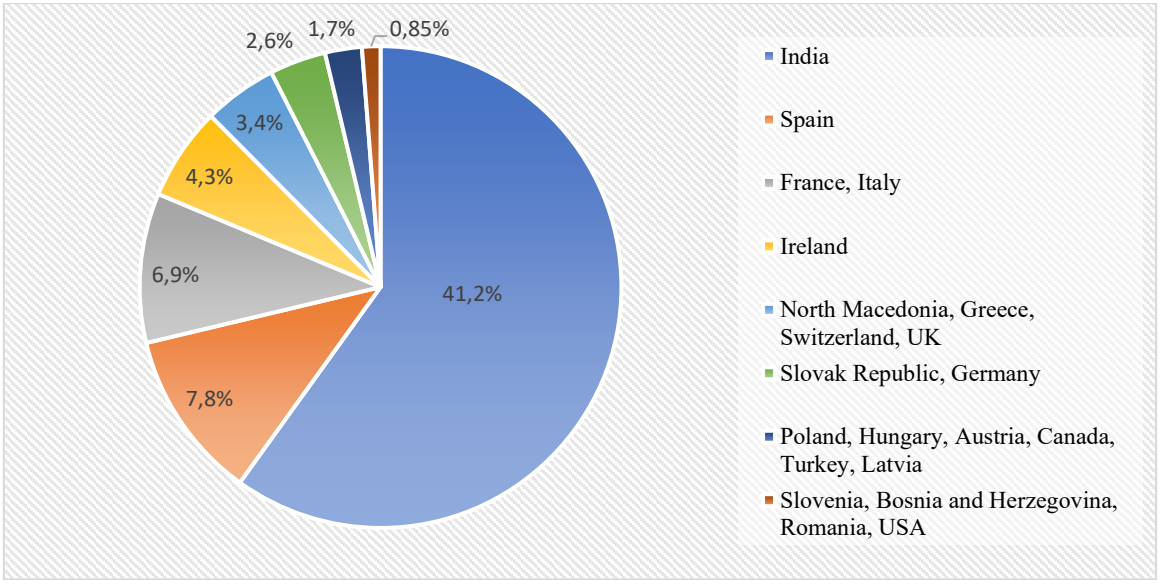

Fig 2. The structure of the domestic market for paracetamol drugs of foreign production by producing countries

The research of the pharmaceutical market in terms of the contribution of different dosage forms of release showed that paracetamol drugs are presented in 7 different dosage forms (Fig. 3), among which the largest share is taken by the dosage form - tablets (46.4%) (of which a large share is occupied by enteric tablets - 24.8%), powders for oral use occupy 34.5%, capsules - 24.2%, solutions for injections (17.1%) and rectal suppositories (10.5%). Other dosage forms are presented in lower percentage ratios.

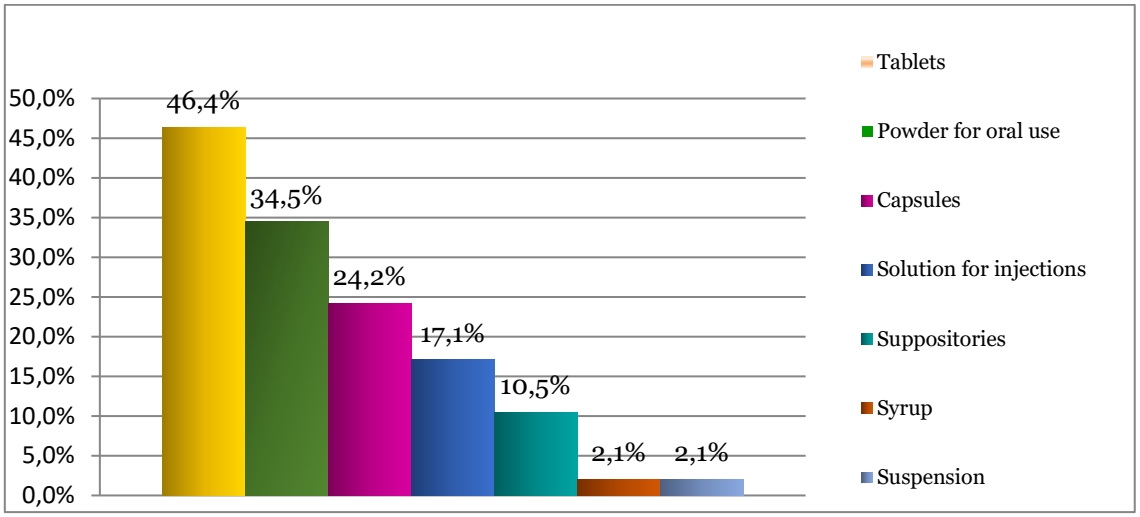

Fig. 3. A variety of medicinal forms of paracetamol on the pharmaceutical market of Ukraine

Among all drugs of paracetamol, the majority of names are combined forms (82.4%). The most effective and widely used combinations are the combination of paracetamol with caffeine, drotaverine hydrochloride, aspirin, ibuprofen, diclofenac sodium.

The effectiveness of the combination of paracetamol with non-steroidal anti-inflammatory drugs is due to the fact that NSAIDs, such as ibuprofen, diclofenac, aspirin, have analgesic, antipyretic and anti-inflammatory effects. They suppress the

synthesis of prostaglandins by inhibiting cyclooxygenase (COX), represented as COX-1 and COX-2. Their analgesic and anti-inflammatory effect is a consequence of COX-2 inhibition. Instead, Paracetamol has minimal anti-inflammatory activity, but a pronounced centralized analgesic effect. The combination of two analgesics with different modes of action leads to an additive effect, which is primarily pharmacodynamic, since the combined use of NSAIDs and paracetamol does not significantly change the pharmacokinetics of any of the drugs [4, 5].

Paracetamol as an antipyretic is presented in combinations of powder for preparation of an oral solution to eliminate the symptoms of acute respiratory infections: elevated body temperature, headache, nasal congestion, runny nose, pain and muscle aches. The most common and often used are the combination of paracetamol with ascorbic acid, caffeine, phenylephrine hydrochloride - a sympathomimetic that mostly stimulates alpha-adrenoceptors, has a vasoconstrictor effect, reduces swelling of the mucous membrane of the nose and paranasal sinuses, and Pheniramine maleate - an antihistamine, a blocker of histamine H_1 receptors on the effect on mast cells, reduces the permeability of blood vessels, prevents the development of tissue swelling, reduces the severity of local exudative processes, eliminates lacrimation, itching in the area of the eyes and nose [6].

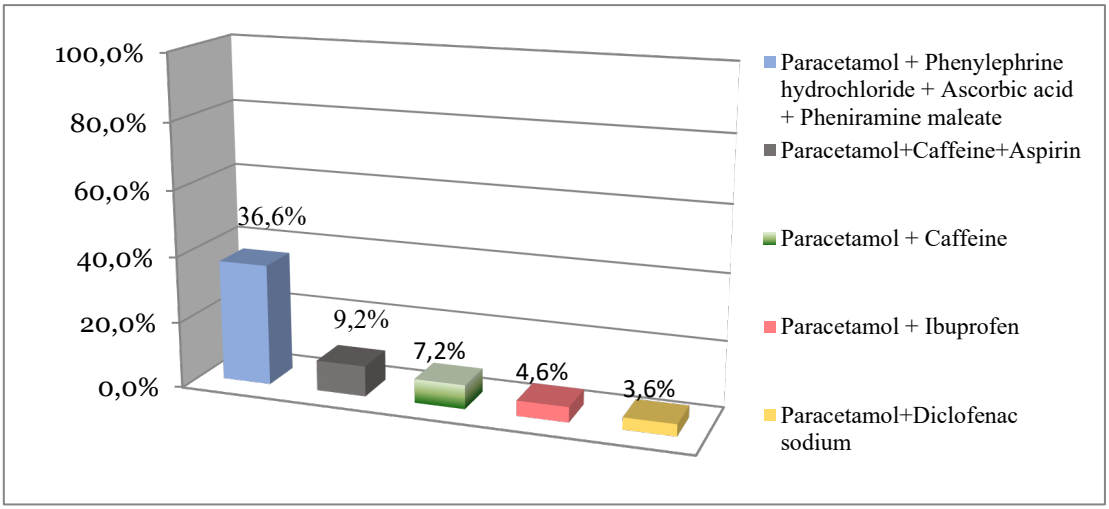

Fig. 4: A range of medicinal forms of paracetamol used with other drugs (in % ratio) in combination

About 10% of the entire assortment with paracetamol is a combination with caffeine and aspirin. Caffeine is used as an adjuvant in the treatment of both pain and headache [7]. Caffeine itself exhibits analgesic properties in some clinical pain conditions (for example, headache after dural puncture). A 2014 Cochrane review analyzed studies comparing analgesics (eg aspirin, ibuprofen or paracetamol) without and with 100-130 mg. caffeine in acute pain conditions and found a significantly higher response rate to analgesics with caffeine. In studies, the combination of aspirin + caffeine + paracetamol was superior to monotherapy with aspirin and paracetamol in the treatment of acute tension-type headache and migraine [7, 8].

Taking into account the wide range of use of paracetamol, especially its combinations in medical practice, it can be considered that the latter belong to the drugs

of first choice for the elimination of pain syndromes of various genesis and the most effective antipyretic and according the results of a comprehensive marketing analysis of the range of the domestic market, it should be noted their significant share among other medicinal means, however, when prescribing drugs, it is important also to evaluate the effectiveness/safety and price/quality ratio, which is important for the patient [9].

However, despite the powerful analgesic activity and the low risk of developing side effects from the gastrointestinal tract, there is a steady increase in the number of registered cases of paracetamol liver intoxication in the world. The use of paracetamol in normal therapeutic doses rarely causes intoxication, however, intentional or unintentional use of high doses of the drug leads to centrilobular necrosis of hepatocytes and, as a result, death. Dangerous hepatotoxic reactions can be caused by taking paracetamol in a dose of more than 4-10 g/d for adults. Therefore, it is worth remembering that paracetamol is not a panacea for pain relief and excessive use can also lead to undesirable consequences, especially in the elderly or patients with hepatobiliary pathology [10].

Conclusions.

Paracetamol preparations are represented by a considerable assortment of dosage forms, a variety of combinations, which allows their wide use for pathogenetic or symptomatic treatment of a number of diseases. Further conducting a pharmacoeconomic analysis of the use of paracetamol drugs will allow us to assess the use of drugs by consumers and the degree of supply of these drugs to the pharmaceutical market of Ukraine.

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