

FEATURES OF MEDICAL TREATMENTS USAGE IN PEDIATRICS

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Abstract. *The use of drugs in pediatrics has its own characteristics. The properties of the child's body are taken into account here. Medicines that, when used by adults, do not pass through the blood-brain barrier in children, since this barrier is underdeveloped, have undesirable effects. Therefore, when recommending drugs, all these nuances for children are taken into account. In this article, we presented the effects of drugs affecting cholinergic and adrenergic innervation, analgesics, expectorants, drugs used for anemia, cardiac glycosides, hormones and vitamins, antibiotics and sulfonamides.*

Keywords: *pharmacology, pediatrics, cholinomimetics, anticholinergics, adrenomimetics, adrenergic blockers, analgesics, anemia, expectorants, cardiac glycosides, hormonal drugs, vitamins, antibiotics, sulfonamides.*

Pharmacology is one of the most necessary disciplines for the education of a doctor of any specialty. When taking a pharmacology course, students first of all master the basics of theoretical pharmacology with elements of pharmacotherapy. At the pediatric medical institute and at the pediatric faculties of universities and institutes, special attention is paid to the peculiarities of the action of medicinal substances depending on the age of the child. In this regard, such a direction as pediatric pharmacology has developed. Children are more sensitive to the effects of drugs than adults. This is due to the physiological characteristics of the child's body: immaturity of the central nervous system, high permeability of the blood-brain barrier, underdevelopment of liver enzymes involved in the neutralization of drugs, insufficient development of the excretory function of the kidneys. Pediatric pharmacology faces many challenges. This primarily concerns the dosing of medications. Previously, there were various formulas into which age, weight were substituted and doses were calculated, or $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$...adult doses were simply prescribed. But it is necessary to take into account that a child not only differs in weight from an adult, but also has its own developmental characteristics, characteristics of the pathological condition, and currently they prefer to dose medications at the patient's bedside, of course not exceeding the dose of potent substances given in the State Pharmacopoeia. When choosing a dosage form for infants, they prefer the use of oral solutions, crushed, water-soluble powders; Medications are not administered sublingually to young children. When choosing routes of administration, whenever possible, they prefer a route of administration that is easily accessible and does not cause fear or stress in children. Regarding the absorption of drugs: in newborns and children under 3 years of age, the intestinal mucosa is very delicate, abundantly supplied with blood and lymphatic vessels, so the absorption of drugs by passive diffusion occurs faster than in adults. The distribution of drugs in the body is influenced by their binding to blood proteins. In newborn children, the content of albumin is reduced, as a result of which the number of bound forms decreases and the amount of the drug in

the free state and the pharmacological effect of the drug increase. The distribution of drugs is influenced by biological barriers encountered along their path. In young children, the blood-brain barrier is still underdeveloped, its permeability is higher, especially for morphine, sleeping pills and antihistamines. Medicinal substances taken by pregnant women pass through the placental barrier. During pregnancy toxicosis, hypoxic conditions, and endocrine changes, the permeability of the placental barrier increases and substances that do not normally penetrate through it can pass through and have a toxic effect on the fetus.

In young children, especially newborns, the processes of inactivation, excretion, and elimination of medicinal substances occur more slowly than in adults; they remain in the body longer. In nursing mothers, medicinal substances are excreted in mother's milk, so they can have a negative effect on the infant's body (streptomycin, chloramphenicol, anticoagulants, etc.).

Regarding medicines used in pediatrics: astringents, enveloping, adsorbing agents are widely used - alum (alumine), oak bark decoction, chamomile infusion, carbolene.

Irritants such as mustard plasters, ammonia, camphor oil, camphor alcohol selectively excite the endings of the sensory nerves of the skin and mucous membranes and have a local and reflex effect.

From the substances that affect efferent innervation and excite M- and H-cholinergic receptors, carbacholin is used for paroxysmal tachycardia, atony of the bladder and intestines. The body of young children is resistant to anticholinesterase drugs, since in early ontogenesis the total amount of acetylcholine is less than in adults, and cholinesterase activity is high. M-cholinomimetics - pilocarpine, aceclidine are rarely used in pediatrics; aceclidine is contraindicated in children under two years of age. Children are more sensitive to the M-anticholinergic - atropine, especially with malnutrition, diathesis, rickets; they are often poisoned by consuming atropine-containing plants that grow in accessible places.

N-cholinomimetics are also called nicotine group. Due to its high toxicity, nicotine is not used in practical medicine; it is part of cigarettes and causes great harm to the body, especially to the body of adolescents. Under the influence of nicotine, the release of somatotropic and gonadotropic hormones decreases, which slows down the physical and sexual development of adolescents. Nicotine increases the release of endorphins in the central nervous system, which contributes to the development of addiction to it. The use of nicotine during pregnancy has a negative effect on the development of the placenta; pregnant women who smoke often experience miscarriages and the birth of premature babies and children with various anomalies. If a nursing mother smokes, nicotine is released into the milk and has a toxic effect on the baby.

From N - anticholinergic drugs, curare-like drugs are widely used in pediatric anesthesiology, relaxing the muscles, they facilitate surgical operations, they are used for tracheal intubation, bronchoscopy, in traumatology for the reduction of dislocations, for the treatment of tetanus and other convulsive conditions. In newborns and children up to the first year of life, the amount of acetylcholine in the synaptic cleft is greater than in adults, so the effect of muscle relaxants is shorter.

As for substances that excite adrenergic receptors, ephedrine in children under 5 years of age, instead of having a stimulating effect, has a depressant effect on the central nervous system. α -adrenergic agonists naphthyzine and galazolin are used topically for acute rhinitis and nosebleeds. Galazolin acts on the mucous membranes to a greater extent than naphthyzin; in young children, with prolonged use, atrophy and necrosis of the nasal septum is possible as a result of

constant narrowing of the vessels of the nasal mucosa. If naphthyzine is used carelessly, it may be absorbed into the blood, so the drug is contraindicated in children under 1 year of age. Of the β -adrenergic agonists, salbutamol is used to weaken labor during premature birth, while the mother, fetus and newborn may develop tachycardia and hypoglycemia. The sympatholytic reserpine is also used as an antihypertensive agent in pediatrics; children are more sensitive to it, since their mechanisms for accumulating catecholamines are underdeveloped; newborns are especially sensitive to reserpine. If pregnant women with high blood pressure received reserpine in the last days of pregnancy, their child may be born in a state of depression. When reserpine is taken by nursing mothers, it passes through the mother's milk to the baby, who may experience swelling of the nasal mucosa and difficulty breathing.

From the substances that have an effect on the central nervous system, alcohol is not used for its resorptive effect, but alcoholism is terrible, as it develops faster and is more severe in adolescents. Alcohol has a negative effect on heredity. Children conceived while their parents were intoxicated are born with various defects, especially those of the central nervous system. It is not for nothing that people have protected the newlyweds - the bride and groom - from alcoholic beverages since ancient times. In a clinical examination of 1,000 sick children with mental illnesses, it was found that the cause in 50% of cases was the alcoholism of the father, in 7% - the alcoholism of the mother, and in 7% - the alcoholism of fathers and mothers.

Anticonvulsants are widely used in pediatrics, since seizures of various origins occur 5-8 times more often in young children than in adults; they can occur with acute infectious diseases, with increased temperature, with metabolic disorders, and dehydration. The reason for the increased susceptibility of young children to convulsive conditions can be explained by the underdevelopment of certain parts of the central nervous system, increased permeability of the blood-brain barrier, and insufficient functional activity of GABA. When treating convulsive attacks, preference is given to tranquilizers, which depress the respiratory center to a lesser extent. Among the tranquilizers, seduxen (Sibazon) is often used, which even in small doses has an anticonvulsant effect, enhances the inhibitory effect of GABA in the brain and spinal cord, and interferes with the transmission of nerve impulses. Sodium valproate (Depakine) is widely used to treat epilepsy of all forms and for seizures associated with fever, the mechanism of anticonvulsant action of which is explained by inhibition of the GABA transferase enzyme and an increase in GABA content.

The narcotic analgesic morphine is contraindicated in children under two years of age. Morphine is not used as a pain reliever during labor because it crosses the placental barrier and can cause respiratory depression in the fetus. Promedol's analgesic activity is close to that of morphine; its spasmogenic effect and addiction to it develop to a lesser extent; it almost does not depress respiration, therefore it is widely used in pediatrics and obstetrics. Along with the analgesic effect, promedol helps to relax the cervix, the process of its full dilation and delivery is accelerated, and asphyxia in the newborn is not observed.

From the non-narcotic analgesics, paracetamol is widely used in pediatrics, as it is considered harmless, but long-term use may have a negative effect on the liver and the development of allergic reactions. Paracetamol is sold under the name Panadol, Panadol Solubil and is part of Coldrex tablets.

Psychotropic drugs are used to treat mental illnesses and psychoneurological conditions in children that occur with tension, fear, anxiety, and anxiety. Antidepressants used to treat depression are contraindicated in children under 7 years of age and pregnant women.

Nootropic drugs - nootropil - activate mental activity, especially when it is impaired. They are used to restore mental performance in cases of intoxication and neurological deficits in mentally retarded children. Of the GABA-ergic drugs, aminaloni is used to treat mentally retarded children and epilepsy; the drug is low-toxic and can be used for a long time.

In pediatrics, substances that have an effect on the executive organs are widely used. To increase the synthesis of surfactant, glucocorticoids, etimizol, bromhexine, and aminophylline are used. They are prescribed to women in labor 1-2 days before birth; etimizol can also be administered to newborns. Respiratory analeptics - caffeine, etimizol - are used to suppress the excitability of the respiratory center, observed during an overdose of anesthesia, sleeping pills, narcotic analgesics, carbon monoxide poisoning, to improve pulmonary ventilation after anesthesia, with asphyxia of newborns and collapsing conditions in children. Under the influence of etimizol, the release of ACTH from the pituitary gland increases, which, in turn, increases the biosynthesis of glucocorticoids. The latter contribute to the adaptation of newborns to new living conditions, increase the synthesis of surfactant in the lungs and promote the straightening of the alveoli, preventing their collapse. In addition, etimizol activates the synthesis of cyclic AMP, which is a source of energy for metabolic processes.

Expectorants - marshmallow root, breast elixir, sodium bicarbonate, anise, ammonia-anise drops are used in pediatrics, complex prescriptions are prescribed - mixtures, which may include drugs of different mechanisms of action, chemical structure, physical state (solid, liquid). Expectorants are often prescribed along with antitussives. As a result of their intake, the cough becomes rare and subsequent expectoration occurs.

Cardiac glycosides are very effective in acute and chronic failure of the cardiovascular system. Glycosides are excreted from the body of children faster than in adults. Young children are recommended to use drugs that are quickly eliminated from the body - strophanthin K, corglycone, digoxin. Digitoxin is prescribed to children over five years of age. The body of children is less sensitive and more resistant to cardiac glycosides, so per kilogram of weight they are prescribed the same or slightly larger doses of adults. In children under three years of age, therapeutic doses of cardiac glycosides do not cause bradycardia, since the vagus nerve at this age is not sufficiently toned. The appearance of bradycardia in them under the influence of glycosides indicates the development of the toxic effect of the drugs.

In especially young children, hypochromic anemia often occurs, for the treatment of which iron preparations are used - iron sulfate, iron lactate, iron ascorbate, feramide, ferrum Lek, the coordination compound of hyperchromic pernicious anemia is vitamin B12 along with folic acid.

Among the substances that have an effect on the functional state of the gastrointestinal tract, natural and artificial gastric juice and enzyme preparations are used as replacement therapy.

Hormonal drugs are prescribed to children with great caution; they are mainly used as replacement therapy for hypofunction of the endocrine glands. Anabolic steroids are most often used in pediatrics. They increase the biosynthesis of proteins, slow down their breakdown, improve the absorption of amino acids, increase muscle strength, the mass of skeletal muscles and internal organs - heart, liver, kidneys. Anabolizants are used in children with malnutrition, aplastic anemia, cachexia after infectious diseases, osteoporosis, radiation, and long-term treatment with

glucocorticoids. Vitamin preparations are widely used in pediatrics for the prevention and treatment of hypovitaminosis, and also as a means of pathogenetic therapy for other diseases. Forming coenzymes, they actively participate in metabolic processes. B complex vitamins, ascorbic acid, folic acid are used in case of impaired absorption of vitamins from the gastrointestinal tract, with an increased need for them - a growing body, pregnancy, thyrotoxicosis. Vitamins A, D, E are used by premature babies, since their depot is created in the fetal liver at the end of pregnancy, and premature birth deprives the baby of these reserves. Artificial feeding requires the administration of vitamins C, D, E. Vitamin D is used for the prevention and treatment of rickets. For prophylaxis, it is prescribed to premature newborns after 2 weeks, and to those who are bottle-fed - after 2-3 weeks. High doses and long-term administration of vitamin D have a toxic effect on the body - acute and chronic hypervitaminosis develops. Vitamin preparations for children are often prescribed in the form of multivitamins and in combination with microelements. Chemotherapy drugs occupy a major place in the treatment of childhood infectious diseases. Semi-synthetic penicillins that are resistant to β -lactamases (amoxiclav) and have a wide spectrum are widely used. Tetracyclines are contraindicated in children under 8 years of age; chloramphenicol is prescribed with caution to children under one year of age. Aminoglycosides (streptomycin) are contraindicated in pregnant women. Sulfonamides are less toxic than antibiotics; if the rules of administration are followed, side effects are rarely observed, therefore these drugs are widely used in pediatrics. Sulfonamides are used to treat pneumonia, meningitis, sepsis, pyelitis, pyelonephritis, cystitis, biliary tract infections, fungal diseases and others.

Thus, despite numerous scientific studies and practical observations, the problems of pediatric pharmacology have not yet been fully resolved; drugs, along with a therapeutic effect, have a more toxic effect on the child's body and great care must be taken when prescribing them to children, and adhere to the basic rule medicine - do not harm the patient.

REFERENCES

1. Vidal reference book. 2023.
2. Pharmacology. edited by D.A. Kharkevich. Moscow. Publishing group "GEOTAR Media" 2021.
3. Pharmacology. S.S. Azizova. Textbook. T. Publishing House of Medical Literature named after. Abu Ali Ibn Sino, 2002 – 496 pp.
4. The role of anticholinesterase drugs in optimizing the treatment of cerebrovascular diseases (Theoretical background and clinical phenomenology). Jivolupov S.A., Bardanov S.N., Samartsev I.N., Gnevyshev E.N. Journal of Neurology and Psychiatry named after S.S. Korsakov. Special issue 2014; 114/18-2 p. 57-64
5. V.I. Korjov, O.K. Beloshitskaya, A.V. Vidmanenko, M.Zh.Korjov, V.N. Jadan, N.A. Marits, T.V. Loza. Structural and biochemical aspects of the functioning of the nervous system of the lungs. Ukrainian Pulmonary Journal 2010 No. 3. P 62-67
6. Features of receptor interactions of the Beta adrenergic and M anticholinergic systems in the pathogenesis of the development of broncho-obstructive diseases. A.V.Eremko, K.A.Zykov. Journal of Clinical Practice. 2020 volume 11 no. 3. P.68-74.
7. Clinical pharmacology for pediatricians. Edited by Professor E.V. Shikh, Professor V.N. Drozdov. Textbook. Publishing group "GEOTAR Media". 2021