PREVALENCE, IMMUNOLOGICAL AND ALLERGOLOGICAL ASPECTS OF PARASITIC DISEASES IN CHILDREN: REVIEW

Ibrahimova Kh.R., Nuraliyev N.A., Abdullayeva D.K., Matyakubova O.U.
Bukhara State Medical Institute,
Urgench branch of the Tashkent Medical Academy

ABSTRACT

The article provides an analysis of recent literature on the prevalence, morbidity structure, immunological and allergic aspects of various parasitic diseases in children, as well as the degree of occurrence of nematodes, cestodes, trematodes, comorbidity of allergic and parasitic diseases, the basis for the diagnosis and prevention of parasitic infections in children.

Key words: parasitic diseases of children, immunological aspects, comorbidity of allergic and parasitic diseases.

Parasitic diseases are a group of diseases caused by helminths and arthropods, and a parasite is an organism that lives at the expense of the "host" and coordinates its vital activity with its physiology. including protozoanosis and helminthiasis, which account for 99% of all parasitic diseases. 

As you know, parasitic diseases from ancient times remain the most common diseases. Currently, there are 50 thousand species of organisms leading a parasitic lifestyle. More than 342 types of helminths and 18 protozoa cause diseases in humans, as a result of which the invasiveness of the planet's population has reached 2 billion people, among the sick children make up more than 80%. The share of preschool children and schoolchildren accounts for 90-95% of all patients with enterobiasis, 65.1% of patients with ascariasis. Today, the most widespread parasitic diseases include enterobiasis (725.83 per 100 thousand), ascariasis (158.03 per 100 thousand) and trichocephalosis (35.44 per 100 thousand of the population). 200 million are infected with giardiasis annually. and 500 thousand people suffer from clinically expressed forms.

The increase in the incidence of helminthiases in different countries of the world is a consequence of high environmental pollution with helminth eggs as a result of wastewater discharge, increased population migration, increased human contact with animals, low socio-economic standard of living, weakening of the immune system of the population.

It was found that children are the most vulnerable category of the population in relation to parasitic invasions. This is due, first, to a lower level of hygiene compliance; secondly, by more intensive processes of growth and development, which are reduced in conditions of parasitic infections.

In childhood, parasites are often factors contributing to the development of chronic eating disorders, dysfunctions of the gastrointestinal tract (GIT), intoxication, sensitization of the body, weakening of the immune system, increased allergic background. Migratory helminth larvae can damage organs and tissues on their way: visceral membranes, eyes, nervous system, 5-7% of larval migrants enter the brain, larvae of more than 30 types of parasites infect lung tissue.

The interest in parasitic diseases is huge: only on the problem of giardiasis invasion in 2000-2010, according to Medline, more than 1320 articles were published, of which 78 were review.

According to the international classification of diseases - ICD-10 (WHO, 2007), parasitic diseases belong to the 1st class. Helminthiasis occupy the 4th place in the degree of damage to the health of the world's population, after diarrhea, tuberculosis and coronary heart disease.
Depending on the source of invasion, routes of infection and transmission factors, all human helminthiases are divided into 3 main groups [14]:

giohelminthiasis (ascariasis, trichocephalosis, ankylostomiasis, strongyloidiasis);

biohelminthiasis (teniarinchiasis, teniasis, opisthorchiasis, diphyllobothriasis, clonorchiasis, fascioliasis, paragonimiasis, trichinosis, echinococcosis);

contagious helminthiasis (hymenolepiasis, enterobiasis, in some cases strongyloidosis and cysticercosis).

Taking into account the biological characteristics of pathogens, helminthiases are divided into 3 main classes [14]:

nematodes (infestations by round helminths): ascariasis, enterobiasis, trichocephalosis, ankylostomiasis (ankylostomiasis and noncatorosis), trichinosis and others;

cestodoses (infestations by tapeworms): teniarinchiasis, teniasis, diphyllobothriasis, hymenolepiasis, echinococcosis and others;

trematoses (caused by flukes): opisthorchiasis, clonorchiasis, fascioliasis and others.

By localization in the human body, helminths are classified into intestinal and extraintestinal, including tissue helminthiases.

In the Russian Federation, the frequency of helminthiases infested on average reaches 140-200 cases per 100 thousand of the population, in the Far Eastern Federal District, 330 cases per 100 thousand, in the Khabarovsk Territory, 130.5-180.3 cases per 100 thousand. population. Parasitological examination of 1265 children aged from 6 months to 15 years living in different districts of the Khabarovsk Territory revealed 946 infested children (86.6% of all examined). The presence of 13 monoinvasions by different helminths, 18 mixed invasions was established. The most frequent helminthiases in children were ascariasis, toxocariasis, clonorchiasis, both in the form of monoinvasions and as associates [15].

Starostina O.Yu. et al. [22] presented an analysis of the incidence rates of helminthiases and protozoses in the Omsk region of the Russian Federation. There was no tendency to a decrease in the incidence of opisthorchiasis, an increase in serological indicators of the incidence of toxocariasis, and the existence of a high risk of mixed parasitosis formation among the rural population.

The group of rare helminthiases includes helminthiases, endemic in the local territory, the pathogens of which circulate in the country. But because of biological barriers, human infection with pathogens is rare, as well as imported helminthiases, due to the lack of natural and climatic conditions [6].

Materials on the serological diagnosis of trichinosis in the population of the Tyumen region of the Russian Federation indicate the high significance of this biohelminthiasis in all territories of the region, with a greater danger for the population of the northern territories due to the presence of active natural foci [19].

Chistenko G.N., Vedenkov A.L. [28] found that in the structure of parasitic diseases helminthiases accounted for 90.5-94.0%, protozoses 6.0-8.5%. The total annual incidence rate of parasitic diseases in Belarus amounted to 210.32 per 100 thousand population.

In Belarus, the complex of natural conditions and the species composition of natural hosts create favorable conditions for the existence of natural foci of trichinosis and determine the endemicity of the country's territory for this invasion [8, 9].

During parasitological examinations of 84 patients, 87% revealed opisthorchiasis, 3.5% had pseudamphistomiasis, 9.5% had a combination of opisthorchiasis and pseudamphistomiasis. Instrumental examination methods helped to identify indirect signs of damage to the organs of the hepatobiliary system [27].

Studies in preschool children in East Africa have shown a strong, direct correlation between hookworm disease and anemia. In children in coastal Kenya, anemia has been associated with hookworm infestation (> 200 eggs per gram) in all age groups, in both sexes, regardless of socioeconomic factors. In Zanzibar, Tanzania, low
hemoglobin concentrations have been associated with hookworm infections in children aged 30-71 months. Importantly, this study showed an association between the extent of hookworm infestation and rates of serum iron-ferritin and erythrocyte protoporphyrin deficiency. Currently, a significant number of studies have been carried out that demonstrate how geohelminthiases worsen the nutritional status of children [30].

Helminthiases are one of the most common diseases in Uzbekistan, accounting for more than 90% of the total number of parasitic diseases. The level of long-term incidence of the population remains stably high [23].

More than 200 thousand infested people are registered in Uzbekistan every year - out of 7,580,703 people examined for helminthiasis, 263,167 were identified (3.5%). According to a study carried out in the Samarkand region, the invasion of children in individual children's institutions was more than 50%, the frequency of mixed invasions was 39.6% [17].

The prevalence of helminths varies across the regions of Uzbekistan. Enterobiasis and hymenolepiasis are ubiquitous, both in urban and rural areas. The foci of ascariasis are registered in the mountain-foothill zones of the Fergana, Namangan and Surkhandarya regions, the Khorezm region is the focus of the teniarinchosis. Uzbekistan belongs to the regions endemic in relation to echinococcosis. In some preschool institutions and general education schools, the invasion of children with Enterobius vermicularis, Hymenolepis nana, Lamblia intestinalis was 30-35%. Analyzing the situation in terms of the prevalence and clinical manifestations of parasitoses, one can note a certain role of helminthiases and parasitoses in the formation of background conditions in children [17].

Mukhitdinov Sh.T., Zhuraeva F.R. [16] for the first time in the Bukhara region of Uzbekistan, the indicators of infestation with helminthiases among children under 14 years old were studied. A general incidence of helminthiasis in children under 14 years of age at the level of primary health care was revealed, and a structural analysis of helminthosis among children in this region was carried out.

According to other researchers [13, 14, 18], the pathogenic effect of the influence of helminths on the body of children is as follows: mechanical effect on the mucous membranes, which leads to damage to the gastrointestinal tract; toxic-allergic effects of metabolic products and excretion of helminths, which leads to the development of allergic reactions; the use of nutrients of the human body by helminths, which leads to a lag in physical, mental and mental development, the formation of asthenovegetative syndrome; their migration to vital organs and tissues of the body disrupts the normal function of the body; they contribute to chronicity, lengthening the treatment of diseases with which they are combined (intestinal infections, disorders of the intestinal biocenosis, skin diseases and others); reduce the effectiveness of vaccinations, a sufficient protective level of the immune response is not achieved during vaccination and revaccination against tetanus, measles, diphtheria, whooping cough; helminthiases are accompanied by nonspecific clinical manifestations: weakness, fatigue, irritability, sleep disturbance, dyspeptic symptoms, growth retardation and weight gain, decreased activity of the immune system; decreases the production of insulin-like growth factor and an increase in tumor necrosis factor-α, as well as a decrease in collagen synthesis, which helps to reduce appetite, a decrease in absorption processes in the intestine; chronic constant micro blood loss, in particular from the intestine with ankylostomiasis and through the bile ducts with trematodes of the liver, in which there is also a loss of amino acids with bile.

AV Sannikova [21] published the results of studies on the comorbidity of allergic and parasitic diseases, revealed the clinical and diagnostic features of pathological conditions in children.

According to Clark H.R. [18] the increase in the prevalence of parasitosis, the emergence of latent parasitic invasion to some extent is due to the use of pollutants in industry and their ingestion into the human body. Dyes, preservatives start the process of microinvasion. For many parasites, pollutants are catalysts entering the metabolic cycle; they can accelerate the reproduction of certain parasites due to the mutual combined action of parasites and pollutants. This leads to an increase in the allergic background.

The pathological action of parasites is due to the modulating effect on the human immune system. Eosinophilia, overproduction of IgE, release of mediators by mast cells, hypersecretion of mucus, synthesis of interleukins are a protective reaction and a manifestation of the body's mobilization in the fight against parasites. An inverse relationship between the presence of parasitic invasion and the activity of the inflammatory process in allergic
diseases has been proven; on the other hand, parasites and their metabolic products are allergens, have a sensitizing effect, which initiates the development of chronic allergic diseases [21].

Evolutionarily, the phenomenon of an allergic reaction was formed due to the molecular similarity of parasite antigens and antigens entering the body from the outside (dust, pollen, food), which determines the development of nonspecific sensitization in those infected with parasites [13, 21].

According to Bodnya E.I., Bodnya I.P. [4] the nature of the immune response induced by helminths is determined by their morphological and biological characteristics (the complexity of the antigenic composition, the large size of the helminth, a certain cyclical development). The authors believe that the acquired antiparasitic immunity is due to both increased polymorphism of the biological properties and antigenic composition of the pathogen, and the complex mechanisms of development of the immune system itself, the constant adaptation of the pathogen to avoid factors of the host's immunological defense.

Growth retardation in children with geohelminthiasis is associated with various mechanisms, including decreased nutrient intake due to malabsorption and/or decreased appetite. The study, which was conducted among children in northeastern Brazil, showed that in a cohort of children aged 2-7 years under the condition of helminth infestation in early childhood, there was a growth deficit of 4-6 cm at the age of 7 years. It was found that low levels of serum vitamin A are associated with ascariasis and trichocephalosis. A study in Nepal showed that the prevalence of xerophthalmia (eye manifestations of vitamin A deficiency) is 3 times higher in children with ascariasis at the age of 6–120 months than in the group of children who were not infected with ascaris [14].

Most parasitic diseases have a chronic course associated with the long-term presence of the pathogen in the patient's body due to the lack of specific treatment. Diseases caused by helminth larvae, which are unusual for humans, require great attention in modern megacities. Larval invasions are caused by representatives of all 3 classes of helminths - nematodes, trematodes and cestodes. The source of invasion in larval helminthiasis is the definitive hosts. Man plays the role of an intermediate host, its epidemiological role is comparable to that of animals [4].

In persons infested with Strongyloides stercoralis, with the addition of HIV infection or other conditions associated with immunosuppression, hyperinvasive syndrome develops due to overproduction of larvae in the intestine, followed by severe ulcerative intestinal lesions, perforated peritonitis, central nervous system damage, respiratory organs, the development of hypoproteinemia, anemia with mortality reaching up to 80% [13].

Isaeva N.S. [10] studied dental morbidity in children with nematodes. Ascariasis was found in 38.3%, enterobiasis in 4.97%, giardiasis in 26.6% of cases. Combined parasitic lesions were diagnosed: ascariasis and giardiasis occurred in 22.1%, enterobiasis and lambliasis in 2.7%, ascariasis and enterobiasis in 2.2%, ascariasis, enterobiasis and giardiasis in 2.98% of cases. Among children under 3 years of age with nematodes, the prevalence of dental caries was 27.1%. Desquamative glossitis occurred in 8.5%, atopic cheilitis in 19.2%, acute herpetic stomatitis in 23.4% of cases. 25.5% of the parents surveyed complained about an unpleasant smell from the child's mouth, and 40.4% of the parents surveyed indicated bruxism at night.

The wide spread of parasitic diseases among humans and animals contributes to the intensive seeding of various environmental objects with helminth eggs. Failure to comply with the rules of personal hygiene, the lack of preventive measures among people and animals, the contamination of environmental objects with eggs and larvae of parasites leads to an increase in the number of cases of parasitic morbidity [1].

In the clinic of helminthiasis, neurological and autonomic symptoms often predominate, which is due to the pathogenetic characteristics of intoxication. The authors describe the effectiveness of a broad-spectrum anthelmintic agent - albendazole (Vormil). It inhibited the polymerization of beta globulin, which led to the disruption of the formation of cytoplasmic microtubules of helminth cells [7].

Halafli H.N. [26] believes that in solving the problem of intestinal parasitosis and the health of children, it is important to rationalize the approaches to the comprehensive examination of children for intestinal parasitosis; assessment of the incidence of intestinal parasitosis in children; assessment of the influence of intestinal parasitoses on the physical and mental development of children; identification of epidemiological patterns of the incidence of intestinal parasitosis in children; evaluation of the effectiveness of combinations of the main antiparasitic agents in the treatment of children; development of ways to rehabilitate the health of children with
intestinal parasitosis; approbation of regional epidemiologically grounded preventive measures to reduce the risk of infection of children with intestinal parasitosis.

It was found that the leading sign of a number of parasitic lung lesions (according to CT, MRI and ultrasound) is the identification of fluid contents, cloisonne structures (echinococcosis, cysticercosis, alveococcosis), no changes in the bronchi in the affected area, the absence or insignificant accumulation of contrast agent in the pathology area with bolus enhancement (paragonimiasis, schistosomiasis, toxoplasmosis, pneumocystosis). The authors concluded that dynamic CT monitoring is one of the leading methods in the recognition and differential diagnosis of atypical manifestations of parasitic lung lesions [12].

A retrospective study was carried out to assess the influence of parasitic diseases on the characteristics of the development of tuberculosis in children. A lower risk of developing parasitic diseases in children with tuberculosis was characteristic of girls. At the same time, preschoolers most often suffered from parasitic diseases, rarely children 12-14 years old with active tuberculosis. Secondary forms of tuberculosis were more often recorded in children who did not have parasitic diseases [20].

Akhatova G.Kh. et al. [2] determined the effectiveness of preventive work to reduce helminthiasis in children in preschool institutions.

Kozlovsky A.A. [11] highlights the specific and non-specific prevention of helminthiasis. Non-specific prophylaxis includes: a healthy lifestyle; observance of sanitary and hygienic skills in the family, children's institutions, medical and preventive institutions; correct culinary processing of food products; use only boiled, bottled, filtered water; prevention of faecal pollution of the environment; proper keeping of pets; early detection of patients, timely treatment. Specific prophylaxis includes: chemoprophylaxis of helminthiasis for children at risk of infection, as well as for children with persistent eosinophilia in a general blood test (1-2 times a year, in spring and / or autumn).

Thus, a deep analysis of the literature of recent years shows that there is enough research on the clinic, diagnosis, and treatment of parasitic diseases. There are rare works on the study of the combined course of parasitic and allergic diseases, as well as the immunoallergic aspects of this pathology. In this regard, we believe that research work on allergological and immunological, as well as prophylactic aspects of parasitic diseases in children, as well as still remains relevant and their results will be of great practical and theoretical importance.

**LIST OF USED LITERATURE**

32. Information about authors:
    33. Ibrahimova Khamida Rustamovna - senior lecturer of the Department of Infectious Diseases and Phthisiology of the Urgench branch of the Tashkent Medical Academy.
    34. Nuraliyev Nekkadam Abdullaevich - Doctor of Medical Sciences, Professor, Vice-Rector for Research and Innovation of the Bukhara State Medical Institute.
    35. Abdullayeva Difiza Kadamovna - Assistant of the Department of Infectious Diseases and Phthisiology of the Urgench branch of the Tashkent Medical Academy.
    36. Matyakubova Oyisha Urinovna - Assistant of the Department of Infectious Diseases and Phthisiology of the Urgench branch of the Tashkent Medical Academy.