



FUNCTIONAL ORGAN DISORDERS IN CHILDREN ASSOCIATED WITH PARASITIC INFECTIONS

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Abstract: Parasitic diseases represent one of the significant problems of modern medicine and are pathological conditions that develop as a result of the жизнедеятельность of helminths and protozoan microorganisms in the human body. The invasion and persistence of parasites in various organs and tissues are accompanied by the formation of a complex of clinical manifestations caused by their mechanical effects, metabolic activity, as well as the development of toxic-allergic and immunopathological reactions. The most important factors contributing to the survival and widespread distribution of parasites are their high reproductive capacity and the presence of complex adaptive mechanisms. These mechanisms enable effective adaptation to the conditions of the host's internal environment, resistance to immune defense responses, and long-term persistence, which contributes to the chronic course of parasitic diseases and the development of functional organ disorders.

Keywords: parasitic diseases, helminths, protozoa, parasitic invasions, children, functional organ disorders, adaptation mechanisms, immune response, chronic parasitosis, epidemiology.

Introduction

Parasitic diseases continue to remain one of the most relevant medical and social problems in modern healthcare, particularly in pediatric practice. The widespread prevalence of helminthic and protozoan infections among the pediatric



population is обусловлена age-related anatomical and physiological characteristics, immaturity of the immune system, as well as the influence of social, sanitary-hygienic, and environmental factors. According to epidemiological studies, children represent the most vulnerable group to parasitic infections, which determines the high relevance of this issue.

Parasites that persist for prolonged periods in a child's body exert multifaceted effects on various organs and systems. Their жизнедеятельность is accompanied by mechanical tissue damage, токсико-аллергическими reactions, metabolic disturbances, and the development of immunopathological conditions. As a result, children may develop functional disorders of the gastrointestinal tract, hepatobiliary system, nervous system, and cardiovascular system, which often present with nonspecific clinical manifestations.

Of particular importance is the study of functional organ pathology associated with parasitic invasions, since these disorders may remain undiagnosed for long periods, contributing to the хронизация of the pathological process and a decline in children's quality of life. Despite the availability of a substantial body of research, the relationship between parasitic diseases and functional organ disorders in children remains insufficiently explored, necessitating further comprehensive clinical and epidemiological studies.

In this context, investigating the prevalence of parasitic invasions in children and their role in the development of functional organ disorders represents an important area of modern pediatrics and parasitology.

The aim of the study was to investigate the prevalence of parasitic infections in children and to determine their impact on the development of functional organ disorders, as well as to assess the clinical and functional characteristics of the course of parasitic diseases in the pediatric population.

Materials and Methods



The study was conducted in the Khorezm region and had a clinical and epidemiological design. The study included children aged 2 to 14 years who sought medical care at outpatient and inpatient healthcare facilities in the region.

The main group consisted of children with laboratory-confirmed parasitic infections. The control group was formed from children of comparable age without signs of parasitic diseases or pronounced chronic somatic pathology. The groups were comparable in terms of age and sex.

Diagnosis of parasitic diseases was performed using standard parasitological methods, including microscopic examination of stool samples for helminth eggs and protozoan cysts, concentration techniques, and perianal scraping for the detection of enterobiasis. When indicated, serological methods, including the determination of specific IgM and IgG antibodies, and enzyme-linked immunosorbent assay (ELISA) were applied.

The functional state of the digestive system was assessed based on the analysis of clinical symptoms, complaints of children and their parents, data from physical examination, as well as the results of laboratory and instrumental investigations. Coprological parameters, biochemical indicators of liver and pancreatic function, enzymatic activity, and gastrointestinal motility were evaluated. Abdominal ultrasound examination was performed when indicated.

Immunological status was assessed according to complete blood count results, including the determination of eosinophil and basophil levels, as well as indicators of humoral immunity, including total immunoglobulin E (IgE). Allergic manifestations were recorded based on clinical findings and medical history.

Statistical analysis of the obtained data was carried out using methods of variation statistics with the use of specialized software. The results were presented as absolute and relative values. Differences were considered statistically significant at $p < 0.05$.



At present, the level of clinical awareness among healthcare professionals regarding parasitic diseases in the population remains insufficient, and prevention of helminthic infections in many cases is limited to the treatment of already identified infected patients. Meanwhile, the results of numerous studies indicate a close relationship between the widespread prevalence of parasitic infections among the pediatric population and the development of functional disorders of the digestive system, which are formed against the background of impaired neurohumoral and immune regulation. The high risk of chronicity of pathological processes, even in cases of spontaneous elimination of the parasite as the child grows older, determines the particular relevance of this problem.

Among the most common and well-studied parasitic diseases are ascariasis, enterobiasis, and giardiasis, which are registered worldwide. Throughout life, almost every individual experiences various forms of parasitic invasions multiple times; however, parasitic infections occur significantly more frequently in childhood. In young children (under 5 years of age), this is facilitated by a high level of environmental contamination with reproductive forms of parasites (eggs, cysts, larvae), as well as insufficient development of sanitary and hygienic skills. Periods of transient weakening of immune protection of the gastrointestinal mucosa also play a significant role.

The significance of risk factors for parasitic infections varies depending on the child's age. In younger children, sanitary and hygienic living conditions play a leading role, whereas in adolescents particular attention should be paid to socio-economic and geographic factors when collecting medical history, including attendance at children's recreational camps, tourist travel, and the presence of younger siblings. Transient suppression of anti-infectious immunity as a risk factor for the development of parasitic infections in children is frequently observed during the convalescent period following viral infections caused by herpesviridae, including cytomegalovirus, herpes simplex virus types I and II, and Epstein–Barr



virus. In addition, it may result from iatrogenic factors, such as the use of immunosuppressive therapy in allergic and autoimmune diseases.

Under modern conditions, a significant proportion of children are in a state of maladaptation, which is accompanied by reduced immune resistance. Immune protection of the gastrointestinal tract can be conditionally divided into nonspecific and specific components. Nonspecific defense factors include the maturity of enzymatic systems, maintenance of the acid–base gradient in different sections of the gastrointestinal tract, functional activity of the normal intestinal microbiota, and adequate intestinal motility.

Disruption of nonspecific defense mechanisms is often associated with a mismatch between a child’s biological and chronological age, which manifests as the phenomenon of delayed enzymatic maturation. This phenomenon is frequently a component of the phenotype of diffuse connective tissue dysplasia, characterized by anomalies of the auricle, a “high-arched” palate, epicanthus, hypertelorism, joint hypermobility syndrome, as well as minor developmental anomalies of the heart, gallbladder, and other organs. Functional insufficiency of enzymatic systems, combined with altered elasticity and strength of the gastrointestinal wall, creates a predisposition to the development of functional disorders of the digestive system.

Results

The study included 150 children aged 2 to 14 years ($n = 150$) who sought medical care at healthcare facilities in the Khorezm region. Among the total number of examined children, parasitic infections were detected in 92 children (61.3%).

The structure of parasitic diseases was dominated by:

- enterobiasis — 44 children (47.8%),
- giardiasis — 31 children (33.7%),
- ascariasis — 17 children (18.5%).

Analysis of age distribution showed that the highest prevalence of parasitic infections was observed in the following age groups:



- 4–7 years — 39 cases (42.4%),
- 10–14 years — 34 cases (37.0%),
- 2–5 years — 19 cases (20.6%).

Functional disorders of the digestive system were identified in 69 children with parasitic infections (75.0%).

The most frequently registered clinical manifestations were:

- abdominal pain syndrome — 48 children (52.2%),
- dyspeptic disorders — 41 children (44.6%),
- unstable stool — 37 children (40.2%),
- signs of biliary dysfunction — 29 children (31.5%).

According to laboratory findings:

- eosinophilia was detected in 56 children (60.9%),
- elevated IgE levels were observed in 49 children (53.3%).

Concomitant allergic diseases were diagnosed in 38 children (41.3%), including:

- atopic dermatitis — 26 children (68.4%),
- recurrent allergic reactions — 12 children (31.6%).

Discussion

The obtained results indicate a high prevalence of parasitic infections among the pediatric population of the Khorezm region (61.3%), which is consistent with data reported in a number of national and international studies. The predominance of enterobiasis (47.8%) and giardiasis (33.7%) can be explained by the high contagiousness of these parasitic diseases and the specific transmission routes typical of child groups and organized childcare settings.

The detection of functional disorders of the digestive system in 75.0% of children with parasitic infections confirms the significant role of parasites in the development of functional gastrointestinal pathology. The high frequency of abdominal pain syndrome and dyspeptic disorders indicates the involvement of



digestive regulatory mechanisms and impairment of intestinal motor-evacuatory function.

Immunological changes identified in the majority of examined children, including eosinophilia (60.9%) and elevated IgE levels (53.3%), reflect activation of the antiparasitic immune response and the presence of a pronounced allergic inflammatory component. The substantial prevalence of allergic diseases (41.3%) further confirms the systemic nature of the effects of parasitic infections on the child's body.

Thus, parasitic infections contribute to the development of persistent functional disorders of the digestive system and may support the chronic course of pathological processes even after elimination of the etiological factor.

Conclusion

Parasitic infections were detected in 61.3% of the examined children in the Khorezm region, with enterobiasis (47.8%), giardiasis (33.7%), and ascariasis (18.5%) being the leading forms. Functional disorders of the digestive system were diagnosed in 75.0% of children with parasitic infections, most commonly manifested by abdominal pain syndrome, dyspeptic disorders, and biliary dysfunction.

Parasitic diseases are accompanied by pronounced immunological changes and a high frequency of allergic manifestations, which confirms their significant role in the development of functional gastrointestinal pathology in children. The obtained data indicate the need for early diagnosis of parasitic infections, a comprehensive approach to treatment, and the implementation of targeted preventive measures in the pediatric population.

Particular attention should be paid to the high frequency of the combination of parasitic infections with allergic diseases and functional disorders of the biliary system, which confirms the systemic nature of the impact of parasites on the child's body. Disorders of enzymatic activity and intestinal dysbiosis create conditions for



chronicity of the pathological process and persistence of functional pathology even after elimination of the infection.

Thus, parasitic diseases in children should be considered not only as infectious processes but also as risk factors for the development of long-term functional disorders of the digestive system, requiring a comprehensive diagnostic and therapeutic approach.

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