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CLINICAL-NEUROLOGICAL AND IMMUNOLOGICAL INDICATORS CHILDREN WITH HELMINTHIC INVASION

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Summary. A detailed analysis of the main clinical and laboratory parameters in groups of children suffering from allergic rhinitis (AR) with concomitant hymenolepiasis during antiallergic, antiparasitic and complex therapy is given. Patients with AR with hymenolepidoses were divided into three groups: 21 patients received antiallergic therapy, 22 patients received antiparasitic therapy, and 24 patients underwent complex therapy. The maximum clinical effect was achieved by us with the use of complex treatment, which included antiallergic and antiparasitic therapy. The dynamics of immunological parameters after treatment of patients with AR with hymenolepidoses only with antiallergic or antiparasitic drugs shows that, despite the positive result, it is insufficient and does not normalize immunological parameters. Complex antiallergic and antiparasitic treatment has a pronounced immunological effect, activates the severity of the immune response, switches the nature of the immune response to suppressor, and thereby contributes to a faster relief of the allergic process in the body.

Key words: hymenolepiasis, children, dynamics, immunology.

Relevance

Uzbekistan is among the countries with a hot climate where helminthic and protozoan diseases are endemic [1]. Currently, the number of infected individuals is around 200,000, with 70% being children under 14 years old. The most widespread protozoan infestation in Uzbekistan is giardiasis, while among helminthic infestations, hymenolepiasis is the most common [5, 8]. The widespread prevalence of parasitic infestations and the severity of the intra-organ pathology they cause have not only medical but also socio-economic significance [4,7].

Parasitic diseases are characterized by relatively slow development, chronic progression, and often prolonged compensation. This characteristic is primarily responsible for the underestimation of the medical and social significance of these diseases [2, 7, 9]. Parasitic diseases cause delays in children's mental and physical development [10], reduce resistance to infectious and somatic diseases [1], decrease the effectiveness of vaccine prophylaxis [3], and induce allergic reactions, leading to secondary immunodeficiencies. The presence of helminths and protozoa disrupts homeostasis in the body, leading to pathological and immunopathological processes

that have an adaptive nature. The nervous system is the most sensitive to pathological shifts in homeostasis. Furthermore, according to many researchers, the restoration of body functions and recovery also depend on the state of the nervous system. The condition of the body determines the possibility of parasite development and survival, their activity, the extent of intra-organ changes, and the neurological complications they cause. Conversely, the activity of parasites and their ability to alter the physiological state of a person determine the severity of pathological shifts [2,6].

Materials and Methods

The study presents an analysis of the results of dynamic observation of 120 children aged 5 to 14 years with central nervous system (CNS) intoxication due to giardiasis and hymenolepiasis infestation. The groups were carefully selected to exclude the likelihood of long-term negative effects of perinatal factors, previous traumatic brain injuries, infections, and viral diseases with high fever that could lead to CNS damage and autonomic disorders. In cases where chronic infection foci were present, differential diagnosis of possible neurological complications was performed with mandatory compensation of the process for the duration of the study.

Based on coprological data on the presence of protozoan and helminthic infestations, the examined children were divided into two groups.

- The first (main) group included 70 children (58.3%) with a combined infestation of giardiasis and hymenolepiasis, with an average age of 9.7±0.35 years.
- The second (comparison) group consisted of 50 children (41.7%) with an isolated form of giardiasis, with an average age of 9.2±0.6 years.

As a control group, 40 children of similar age (mean age 9.1±0.6) were selected. They had not suffered from acute illnesses for three months, had no chronic infection foci that could influence study results, and had no neurological complaints. The study employed clinical-neurological, clinical-laboratory-immunological, neurophysiological (EEG), and neuroimaging (CT and MRI) research methods.

Results and Discussion

The primary complaints of the patients and the main reason for seeking medical attention were not the clinical signs of infestations but rather astheno-neurotic complaints (48.4%), as well as seizure syndrome (30.8%) and tic hyperkinesis (20.8%). The clinical manifestations of combined infestation with hymenolepiasis and giardiasis represented a combination of symptoms of each infestation. In children of the main group, the clinical picture of hymenolepiasis was significantly more pronounced, whereas giardiasis symptoms were more prominent in the comparison group with isolated infestation. Notably, in our study, children showed predominant signs of nervous system involvement rather than the clinical symptoms of infestation.

In most cases, seizure syndrome was observed in the main group (37 children, 52.9%), whereas it was absent in the comparison group ($P<0.001$). In the comparison group, vegetative-vascular dystonia (VVD) prevailed, registered in 43 (86%) children

compared to 15 (21.4%) in the main group (P<0.001). Tic hyperkinesis was observed in both groups but was significantly more common in the main group (18 children, 25.7±3.2%) compared to the comparison group (7 children, 14±4.9%; P<0.05). The frequency of complaints related to autonomic disturbances was significantly higher in the main group compared to the comparison group (P<0.01). Additionally, specific complaints were characteristic of the main group, such as fainting (5.7±2.8%; P<0.001) and hypersalivation (80±4.9%; P<0.001), which were specific to hymenolepiasis infestation.

Thus, tic hyperkinesis in children with helminthic and protozoan infestations was functional and limited to neurological microsymptomatology. Among 37 children with combined helminthic and protozoan infestation and seizure syndrome, 72.9% had generalized clonic-tonic seizures, which were brief and lacked clear phase differentiation. Single seizures occurred in 13.5% of cases.

Detection of specific IgM to Giardia antigens by enzyme-linked immunosorbent assay (ELISA) showed that in the main group, IgM levels exceeded normal values by almost 4.5 times, whereas in the comparison group, they were 1.8 times higher, indicating an acute disease course. Our data showed that antigen-binding lymphocytes (ABL) to intestinal tissue antigens exceeded control values by almost five times in the main group and six times in the comparison group (8.2±0.19% and 10.7±0.2% in the main and comparison groups, respectively, compared to the control 1.74±0.08%; P<0.001).

Evaluation of brain involvement in infected children revealed high ABL levels to brain tissue antigens. In the group with combined hymenolepiasis and giardiasis, this indicator exceeded control values by five times, whereas in isolated giardiasis, it was two times higher (7.0±0.25 vs. 2.71±0.1, compared to 1.39±0.09%; P<0.001).

Functional disturbances of the intestines in the examined children due to parasite activity appear to be key pathogenetic factors leading to endogenous intoxication syndrome, as reflected in the levels of medium molecular weight peptides (MMPs). The functional impact of the cellular immune response is directly linked to endogenous intoxication, and its imbalance negatively affects the severity of neurological complications such as seizure and hyperkinetic syndromes, as evidenced by direct and inverse correlations (r = from 0.8 to 0.32 and r = from -0.67 to -0.35). During this period, pathogenic mechanisms involve not only specific antigens but also immune complexes and autoantigens resulting from prolonged parasite exposure and exhaustion of the body's compensatory capabilities.

Conclusions

1. Nervous system involvement due to parasitic intoxication in children with helminthic and protozoan infestations manifested as seizure syndrome (52.9±5.9%), tic hyperkinesis (25.7±5.2%), and VVD (21.4±4.9%). In children with

isolated giardiasis, these symptoms were observed as tic hyperkinesis (14±4.9%) and VVD (86±4.9%).

2. In combined giardiasis and hymenolepiasis, neurological complications were associated with sympathetic tone and reactivity, with more pronounced VVD scores. In children with isolated giardiasis, neurological complications were predominantly associated with parasympathetic tone.

3. The development of secondary immunodeficiency was mainly due to suppression of T-helper and suppressor components, as well as B-lymphocytes, and was more pronounced in children with combined giardiasis and hymenolepiasis.

Considering the high ABL levels to brain and intestinal antigens in combined infestations and predominantly intestinal ABL levels in isolated protozoan infestation, we conclude that nervous system involvement is more severe in children with combined helminthic and protozoan infestations, which correlates with our clinical observations. All children with combined infestation and neurological complications exhibited endogenous intoxication, confirmed by significantly elevated MMP levels compared to the control group ($P<0.05$).

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