

CLINICAL, NEUROLOGICAL AND IMMUNOLOGICAL PARAMETERS IN CHILDREN WITH HYMENOLEPIDOSIS AND PROTOZOAN INVASIONS

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ABSTRACT

The analysis of clinical and immunological parameters in children with hymenolepidoses and neurological complications revealed an increase in antigen-binding lymphocytes and brain tissue antigens in patients with combined invasion of intestinal tissue antigens in the group of children with isolated hymenolepidoses.

Keywords: hymenolepiasis, neurological disorders, children.

INTRODUCTION

Uzbekistan is one of the countries with a hot climate, for which helminth and protozoal diseases are endemic [1]. To date, the number of infected people is about 200 thousand people, 70% are children under 14 years old. The most widespread on the territory of Uzbekistan from protozoan invasion belongs to giardiasis, and from helminthic invasion to hymenolepiasis [2,4,7]. The wide distribution of parasitic invasions and the severity of the intraorgan pathology caused by them is not only of medical, but also of socio-economic significance [3,5].

Parasitic diseases are characterized by relatively slow development, chronic course, often long-term compensation. It is these features that are the main reason for the underestimation of the medical and social significance of these diseases [6]. Parasitic diseases are the cause of delayed mental and physical development of children [8], reduce resistance to infectious and somatic diseases [6,9], reduce the effectiveness of vaccination [10], cause allergization of the body, inducing secondary immunodeficiencies. Under the influence of helminths and protozoa, homeostasis is disturbed in the body, pathological and immunopathological processes develop, which are adaptive in nature. The nervous system is the most sensitive to pathological changes in homeostasis. At the same time, according to many researchers, the restoration of body functions and the recovery of a person also depend on the state of the nervous system. At the same time, it is the state of the body that determines the possibility of the development and vital activity of pathogens of invasions, their activity, the breadth of intraorganic changes, the neurological complications that they cause, and the activity of parasites, their ability to change the physiological state of a person determines the severity of pathological changes. To date, the results of studies show that not isolated, but combined forms of invasions began to occur most often. The main reason for this is the common ways of penetration of helminths into the human body, the decrease in the immune status of the body and the pathology of the gastrointestinal tract. Thus, the relevance of studying neurological complications in the combined course of hymenolepiasis and giardiasis has increased in recent years due to the tendency to increase the incidence of these parasitosis throughout the Republic of Uzbekistan, as well as the lack of knowledge of this problem, and the ineffectiveness of existing drug therapy regimens.

MATERIALS AND METHODS

The study presents an analysis of the results of dynamic observation of 120 sick children aged 5 to 14 years with intoxication of the central nervous system (CNS) as a result of invasion by giardiasis and hymenolepiasis. For the formation of groups, careful selection was carried out in order to exclude the possibility of long-term consequences of the negative influence of perinatal factors, traumatic brain injuries, infectious and viral diseases with high fever, which may result in the development of damage to the central nervous system and autonomic disorders. In the presence of chronic foci of infection, a differential diagnosis of possible neurological complications was carried out, with a mandatory condition for compensating the process for the period of the study. Subsequently, on the basis of the obtained data of coprology for the presence of protozoan and helminthic invasions, the examined children were divided into 2 groups. The 1st group (main) included 70 children (58.3%), with combined invasion of giardiasis with hymenolepiasis, the average age of children was 9.7 ± 0.35 years. Group 2 (comparison) consisted of 50 children (41.7%), infested with an isolated form of giardiasis, the average age was 9.2 ± 0.6 years. As controls, 40 children of the same age (mean age 9.1 ± 0.6) were selected, who had not suffered from acute diseases for 3 months, without chronic foci of infection that could affect the results of the studies, and without neurological complaints. The work used clinical-neurological, clinical-laboratory-immunological, neurophysiological (EEG) and neuroimaging (CT and MRI examination) research methods.

RESULTS AND THEIR DISCUSSION

The main complaints of patients and the main reason for contacting medical institutions were not clinical signs of invasions, but complaints of an astheno-neurotic nature (48.4%), as well as convulsive syndrome (30.8%) and tic hyperkinesis (20, 8%). Clinical manifestations of combined invasion with hymenolepiasis and giardiasis were a combination of manifestations of each invasion, so in children of the main group, the clinic of invasion with hymenolepiasis significantly prevails, and the clinic of giardiasis is more pronounced in children of the comparison group with isolated invasion. It should be noted that in our study, the examined children showed dominance of signs of damage to the nervous system over the clinical symptoms of invasions. In most cases, convulsive syndrome occurred in the main group (37; 52.9%), while it was absent in the comparison group ($P < 0.001$). The comparison group was dominated by vegetative-vascular dystonia (VVD), which was recorded in 43 (86%) children against 15 (21.4%) of the main group ($P < 0.001$). Tic hyperkinesias were registered in both groups, but a significant predominance was in the main group (18; $25.7 \pm 3.2\%$ versus 7; $14 \pm 4.9\%$; $P < 0.05$). The frequency of complaints with vegetative disorders in children in the main group was significantly higher compared to children in the comparison group ($P < 0.01$). However, there were also specific complaints characteristic of the main group, such as fainting ($5.7 \pm 2.8\%$; $P < 0.001$) and hypersalivation ($80 \pm 4.9\%$; $P < 0.001$), which were invasion-specific hymenolepiasis. Signs of asthenia were more pronounced in the comparison group, which is associated with the toxic effect of lamblia on the child's body, while in combination with hymenolepiasis, these signs weakened. At the same time, in the neurological status of children with combined invasion, diffuse microsymptoms were noted in the form of a uniform increase in tendon reflexes (55; $78.6 \pm 4.9\%$), trembling of the eyelids and fingers of

outstretched hands (31; $44.3 \pm 5.9\%$), fibrillar twitching of the tongue (26; $37.1 \pm 5.8\%$), pathological dermographism, deviation of autonomic tone, ortho- and clinostatic tests, Dagnini-Ashner tests towards sympathicotonia. According to our data, of all the examined children, tics occurred in 20.8% (25 children), which were most often observed in the face area - violent involuntary blinking of both eyes or simultaneous winking, frowning of the eyebrows, wrinkling of the forehead, in the head and neck area - twitching of the head, twitching of the shoulders, from the side of the limbs - flexion and extension of the foot, flexion of the knee, etc., which intensified with overexcitation and excitement of the ch I would like to note that in children with isolated giardiasis invasion, tic hyperkinesia occurred only in the face (7 children) and was limited to eye blinking. When examining the neurological status, these children showed a uniform revival of tendon and periosteal reflexes (19 children - 76%), fibrillar twitching tongue (12 children; 48%) and unexpressed trembling of the fingers of outstretched hands (11 children; 44%). Thus, tic hyperkinesias in children with helminth and protozoal invasion were of a functional nature and were limited to neurological microsymptoms.

For 37 children with combined helminth and protozoal invasion with convulsive syndrome, 72.9% were characterized by generalized clonic-tonic convulsions, short-term, without a clear delineation of phases. Single convulsions occurred in 13.5% of cases. In contrast to convulsions of organic origin, parasitic invasion did not have an aura, and the main cause of convulsions was hunger and overwork. Typical absences with cessation of activity and fixation of gaze, without motor impairments for 3-5 seconds occurred in 27.0% of children (10 children). In the behavior of all children with convulsive syndrome, irritability, restlessness, decreased memory and performance, capriciousness, tearfulness, etc. were noted. In all children with convulsive syndrome, convulsions provoked hunger, patients noted pain in the left epigastric region and hypersalivation. The neurological picture of this group of children was characterized by diffuse microsymptoms, which was accompanied by the revival of tendon reflexes. The rapid recovery of consciousness, the absence or a short period after sleep apnea, the absence of severe neurological symptoms in the neurostatus also distinguished these seizures from organic ones. Thus, as a result of the studies, the presence of signs of damage to the autonomic nervous system was revealed in all examined children, both with combined and isolated forms of helminth and protozoal invasion. When conducting tests to study the state of the autonomic nervous system - the Dagnini-Ashner test, ortho- and clinostatic tests, a tendency to shift the measurement parameters towards sympathicotonia in children of the main group and parasympathicotonia in children of the comparison group was revealed. We carried out a comparative analysis of EEG studies in 102 children of the examined groups with neurological complications; 20 practically healthy children were taken as controls. In the main group of children with combined helminth-protozoal invasion, EEG type 1 occurred in 31.4% (22) of children and was characterized by a well-formed alpha rhythm, amplitude from 48 to 100 μV , its index was over 87.5%. There were distinct zonal differences in the distribution of the main EEG rhythms and a moderate number of slow waves, not exceeding the main activity and age norm in amplitude. Whereas in the comparison group this type occurred in 18.8% (6) of cases. Type 2 EEG hypersynchronous occurred in 17.1% (12) of children of the main group and 21.9% in the comparison group, which was characterized by hypersynchronization of the beta rhythm. The main activity was absent, or was represented by single fluctuations or small groups of alpha

waves, both in the comparison group and in the main group. All children with EEG type 2 were characterized by tic hyperkinesia. Type 4 EEG was recorded in most cases in the examined children, so in the main group it was recorded in 48.6% (34) of children and in 59.4% (19) of the comparison group. It was characterized by the dominance of theta and alpha irregular in frequency and amplitude activity (alpha rhythm index below 50%). Moderately pronounced diffuse changes in the bioelectrical activity of the cerebral cortex in both studied groups were statistically significant ($P < 0.01$) in relation to the control group of practically healthy children. It was also found that the incidence of disorganized EEG type 4 in patients in the main group is lower compared to the comparison group, although no reliability was observed. As shown by immunological studies in children of both study groups, there was a decrease in CD3+ and CD20+ (CD3 - (IC = 1.27 and 1.30, respectively; CD20 - (IC = 1.58 and 1.61, respectively; $P < 0.05$) which indicated the inhibition of phagocytosis, mainly with combined invasion. CD4 significantly decreased in both groups compared with the control ((IS = 1.38 and 1.41, respectively; $P < 0.05$), which also proves the inhibition of T and B lymphocytes. According to our data, in infested children, there is a decrease in CD8+ ((IS = 1.14 and 1.18, respectively; $P < 0.05$) against the background of suppression of CD4+, i.e., there is a violation of the regulatory mechanism of the immune system due to a weakening of the function of the T-helper link. As a result of a disorganized decrease in helper and an increase in suppressor potential, the immunoregulatory index decreased to 1.2 ± 0.01 in the main group (CIS = 1.40) and 1.24 ± 0.02 in the comparison group (CIS = 1.04), versus 1.46 ± 0.02 in the control group ($P < 0.05$).

More pronounced changes were observed in the group of children with combined invasion (helminthic and protozoan invasions). Against the background of a significant ($P < 0.05$) deficiency of the total number of lymphocytes, CD4+ and CD8+ levels, i.e. there is a picture of an immunodeficiency state. Detection of specific IgM to Giardia antigens by enzyme immunoassay (ELISA) showed that in children of the main group, IgM values exceeded the norm by almost 4.5 times, while in the comparison group by 1.8 times, which indicated an acute course of the disease. According to our data, the level of antigen-binding lymphocytes (ABL) to intestinal TA exceeded the control figures by almost 5 times in children from the main group and 6 times from the comparison group ($8.2 \pm 0.19\%$ and $10.7 \pm 0.2\%$ in children of the main and comparison groups, respectively, in the control $1.74 \pm 0.08\%$; $P < 0.001$). When assessing brain damage in invasive children, high rates of ASL to brain TA were revealed, so in the group with a combination of hymenolepiasis and giardiasis, this figure exceeded the control figures by 5 times, while in isolated giardiasis, it was 2 times (7.0 ± 0.25 and 2.71 ± 0.1 vs $1.39 \pm 0.09\%$; $P < 0.001$).

Functional disorders of the intestines in the examined children due to the vital activity of parasites, apparently, are the main pathogenetic links that determine the development of the endogenous intoxication syndrome, which was reflected in the indicators of medium molecular peptides (SMPs). The functional influence of the cellular link of immunity is directly related to endogenous intoxication, its imbalance negatively affects the severity of neurological complications in the form of convulsive and hyperkinetic syndrome, which manifests itself in a direct and inverse correlation of indicators ($r =$ from 0.8 to 0.32 and $r =$ from -0.67 to -0.35). During this period, in addition to specific antigens, pathogenetic mechanisms include immune

complexes, as well as autoantigens as a result of prolonged exposure to parasites and the depletion of the body's compensatory capabilities.

CONCLUSIONS

1. Damage to the nervous system as a result of parasitic intoxication in children with helminth and protozoal invasions was expressed as a convulsive syndrome (52.9+5.9%), tic hyperkinesia (25.7+5.2%) and SVD (21.4+ 4.9%), while in children with isolated forms of giardiasis, these manifestations were manifested in the form of tic hyperkinesia (14+4.9%) and SVD (86+4.9%).
2. With a combination of giardiasis and hymenolepiasis, neurological complications were accompanied by a sympathetic direction of tone and reactivity with a higher SVD score. In children with giardiasis in an isolated form, neurological complications in most cases were accompanied by a predominantly parasympathetic direction.
3. The formation of a secondary immunodeficiency state was noted mainly due to the inhibition of the T-helper and suppressor link, as well as B-lymphonitis, more pronounced in children with combined invasion of giardiasis and hymenolepiasis.

Taking into account the high rates of ASL to TAG of the brain and intestines in case of combined invasion and predominantly ASL to TAG of the intestine in case of isolated protozoal invasion, it can be concluded that the nervous system is more pronounced in patients with combined helminthic and protozoal invasion, which in our studies correlated with the results of clinical observations. . All children infested with combined helminth and protozoal invasion with neurological complications are characterized by the presence of endogenous intoxication, which is confirmed by high SMP rates in both groups compared with the control group ($P<0.05$).

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