

**CLINICAL FEATURES OF ACUTE DIARRHEA IN CHILDREN WITH HIV INFECTION**

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ABOUT ARTICLE

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Abstract: The article is devoted to the study of clinical features of acute diarrhea in children with HIV infection. A comparative study of 261 children with HIV and 247 children without HIV was conducted. The results showed that children with HIV have a more severe course of diarrhea with frequent and prolonged episodes, marked dehydration, blood, and pus in the stool. These findings highlight the need for differential diagnosis and increased monitoring of children with HIV in acute diarrhea.

INTRODUCTION

Acute diarrhea affects up to 1.4 billion children under 5 years of age worldwide each year, of whom 123 million require emergency care, 9 million require hospital treatment and 1.8 million die from dehydration. Diarrhea in children can be watery (acute gastroenteritis, as defined by ESPGHAN) and mucous-bloody (colitis, enterocolitis). The incidence of acute infectious diarrhea in children of the first 3 years of age in European countries is 0.5-1.9 episodes per year [1, 2].

To date, the spectrum of infectious diarrhea pathogens has been established and sufficiently characterized, which can be caused by many viral (rotaviruses, noroviruses, adenoviruses, etc.), bacterial (shigella, salmonella, E. coli, St. aureus, etc.) and parasitic agents (Cryptosporidium parvum, Cystoisospora belli, etc.) [3-1 2].

In HIV-infected patients, the mucosa of the gastrointestinal tract is both the entry gate and the site of clinical manifestations of many opportunistic and non-opportunistic infections and tumors. The leading symptom in this form of AIDS is persistent or recurrent diarrhea with progressive weight loss, dehydration, and intoxication [7, 9, 11]. It occurs in 30-50% of patients from developed countries and in 90% of patients from developing countries. The mechanism of diarrhoea development in AIDS patients is associated with atrophy of intestinal mucosal villi and increased permeability of the intestinal wall. Increased permeability of the intestinal wall leads to penetration of antigens through it and increased release of various inflammatory mediators. These abnormalities may be related to immunological changes in lamina propria lymphocytes caused by HIV or may develop during an infectious process in the intestine.

All young children are vulnerable to acute intestinal infections, but children living with HIV are more affected by diarrhea because they are infected with a wider range of pathogens and have more severe manifestations of infection [7, 9, 13]. Diarrhea is a major predictor of HIV in children. The severity of diarrhea varies widely according to fluid losses, of particular importance is the accuracy of assessing the degree of dehydration in a child. The presence of blood in the stool is also among the indicators of diarrheal disease severity.

Our study aimed to compare the clinic and course of acute diarrhea in children with HIV infection.

METHODS

During the study, children under 18 years of age were divided into two groups: the main group consisted of 261 HIV-infected children with acute diarrhea, and the comparison group consisted of 247 children without HIV infection with infectious diarrhea only. The clinical stage of HIV infection in children was established by the classification of HIV infection according to the National Clinical Protocol 'National clinical report on the organization and implementation of medical care for persons with confirmed HIV status' № 206 dated 19.08.2021 of the Ministry of Health of the Republic of Uzbekistan, the stage and phase of the disease is established only based on clinical manifestations - by the presence and significance of secondary diseases. The level of viral load (VL) or CD4 is not a criterion for determining the clinical stage or phase of the disease. The diagnosis of 'Acute diarrhea' was made based on the existing order No. 122 of 25.03.2015. Ministry of Health of the Republic of Uzbekistan "On improvement of measures to control typhoid, paratyphoid, salmonellosis, and acute intestinal diseases".

To determine the severity and severity of acute infectious diarrhea in children, the degree of dehydration (WHO criteria), the daily amount and duration of diarrhea, as well as the shape, consistency, odor, stool color, and the presence of pathological impurities were assessed. The diagnosis was established based on patient complaints, and clinical, anthropometric, serological, bacteriological, immunological, virological, and instrumental studies.

Preparation for statistical analysis included studying the types of variables to be analyzed (accounting attributes), the type of distribution of each attribute, and the formulation of the problem. In the second stage, a specific statistical method was selected depending on the three main factors studied at the first stage: the type of accounting characteristics analyzed; the nature of the distribution of the analyzed characteristics; and the number and type of samples studied (dependent or independent). The analysis of the type of distribution of the attribute was carried out using the Microsoft Excel program. The criteria of normal distribution were the following parameters: the mean, mode, and median of the trait are approximately equal; about 68% of the trait values are in the interval $M \pm a$, 95% in the interval $M \pm 2a$, 99% in the interval $M \pm 3a$. The normal distribution of the trait is symmetrical concerning its value. Since more than 80% of the analyzed quantitative signs were normally distributed, the statistical analysis was based on the methods of parametric statistics.

The data obtained in the study were subjected to statistical processing on a Pentium-IV personal computer using Microsoft Office Excel-2012 software package, including the use of built-in functions of statistical processing. The methods of variation parametric and nonparametric statistics with the calculation of arithmetic mean of the studied index (M), mean square deviation (a), standard error of the mean (m), and relative values (frequency, %) were used. The statistical significance of the obtained measurements when comparing mean values was determined by Student's criterion (t) with the calculation of the probability of error (P) when checking the normality of distribution (by the kurtosis criterion) and equality of general dispersions (F - Fisher's criterion). To assess the statistical significance of the calculated criteria, indicators and tables of critical values for acceptable significance levels (P) were used. Four main levels of significance were taken as statistically significant changes: high - $P < 0.001$, medium - $P < 0.010$, low (marginal) - $P < 0.050$, insignificant (unreliable) - $P > 0.050$.

RESULTS AND DISCUSSION

Among 261 HIV-infected children, 7 (2.7%) were diagnosed with stage I HIV infection, 104 (39.8%) children with stage II, 122 (46.7%) children with stage III and 28 (10.7%) children with stage IV, i.e. the majority of children (86.5%) had stage II or III HIV infection. The age distribution of HIV-infected

children was as follows: children under 1 year of age - 22 (8.2%), 1-3 years - 38 (14.6%), 3-7 years - 60 (23.0%), 7-14 years - 83 (31.8%) and aged 14-18 years - 58 (22.2%), i.e. the majority of observed children (77%) with HIV infection were over 3 years of age. The age distribution of children in the comparison group was as follows: children under 1 year - 71 (28.7%), 1-3 years - 62 (25.1%), 3-7 years - 53 (21.5%), 7-14 years - 35 (14.2%) and aged 14- 18 years - 26 (10.5%), i.e. more than half of the children (53.8%) were under 3 years of age.

Signs of dehydration were noted in 70.5% of patients in the main group versus 50.6% in the comparison group. The absence of signs of dehydration in the comparison group was observed 1.7 times more often than in the main group (49.4% and 29.5% of cases, respectively, $P < 0.05$).

Table 1.

Degree of dehydration in acute infectious diarrhea in children with HIV infection

| Degree of dehydration | Main group, n = 261 | | Control group, n = 247 | | P |
|-------------------------|---------------------|------|------------------------|------|--------|
| | Abs | % | Abs | % | |
| No signs of dehydration | 77 | 29,5 | 122 | 49,4 | < 0,05 |
| Moderate dehydration | 135 | 51,7 | 107 | 43,3 | > 0.05 |
| Severe dehydration | 49 | 18.8 | 18 | 7.3 | < 0,05 |

Moderate dehydration was more common in the main group of patients, but no significant differences with the comparison group were found ($P > 0.05$). On the contrary, severe dehydration was 2.6 times more frequent in the main group of patients than in the comparison group (18.8% and 7.3% of cases, respectively, $P < 0.05$) (Table 1).

Diarrhea with a frequency of up to 10 times a day was registered 3.1 times more often in the comparison group (32.8% and 10.7% of cases, respectively, $P < 0.05$). Almost half of the patients in both groups had daily episodes of diarrhea 10-15 times (51.3% and 49.8%, respectively). However, diarrhea with a

frequency of more than 15 times per day was detected in the main group 2.2 times more often than in the comparison group (37.9% and 17.4% of cases, respectively, $P < 0.05$).

Short duration of diarrhea up to 5 days was almost 2 times more common in patients of the comparison group (61.5% and 31.8% of cases, respectively, $P < 0.05$).

In contrast, longer diarrhea was significantly more frequent in children of the main group (6-9 days - in 56.3% and 32.8% of cases, respectively, 1.7 times more frequent, $P < 0.05$; 10-14 days - in 1 1.9% and 5.7% of cases, respectively, 2 times more frequent, $P < 0.05$).

In 82.4% of children in the main group and 66.8% of children in the comparison group, stools were abundant ($P > 0.05$). A small amount of feces was observed 1.9 times more often in the comparison group (33.2% and 17.6% of cases, respectively, $P < 0.05$).

Pathological impurities in feces in the form of mucus were detected in all cases in children of the main group and 95.5% of the comparison group ($P > 0.05$). Blood impurity in feces was detected significantly more often in children of the main group - 3.0 times more often than in the comparison group (37.5% and 12.6% of cases, respectively, $P < 0.05$), and detection of pus - 2.6 times more often (59.8% and 23.1% of cases, respectively, $P < 0.05$) (Table 4). Children in the main group had feces with a greenish tinge 1.6 times more often than in the comparison group (58.6% and 37.2% of cases, respectively, $P < 0.05$), and golden-yellow stool coloring, on the contrary, was 2.8 times less common in the main group (17.2% and 47.8% of cases, respectively, $P < 0.05$).

Watery stools were 1.5 times more frequent in children of the main group than in the comparison group (39.5% and 25.9% of cases, respectively, $P < 0.05$), and, in contrast, ca-lumpy stools were 2.0 times less frequent in children of the main group (17.6% and 34.8% of cases, respectively, $P < 0.05$).

Stinky stool odor was 1.5 times more frequent in children of the main group (45.2% and 29.1% of cases, respectively, $P < 0.05$), and odorless stool, on the contrary, was 2.7 times more frequent in the comparison group (38.1% and 14.2% of cases, respectively, $P < 0.05$). Differences between the frequency of sour stool odor in the groups were not significant ($P > 0.05$).

CONCLUSION

Thus, we analyzed the clinical features of acute infectious diarrhea in a group of patients with HIV infection compared to a group of patients with acute diarrhea without HIV infection. It became evident

that there is no single 'most important' symptom, but it is possible to identify a combination of several features.

The majority of observed children (77%) with HIV infection were older than 3 years of age, and in the comparison group, more than half of the children (53.8%) were under 3 years of age, which is consistent with literature data that acute intestinal infections are more common at this age [2, 10]. In 86.5% of cases, there was stage II or III HIV infection.

In children of the main group with HIV infection diarrhea runs longer and more severe. In 70.5% of cases in children of the main group and 50.6% of children of the comparison group, signs of dehydration were detected, but the severe degree of dehydration was 2.6 times more frequent in children of the main group with HIV infection (18.8% and 7.3% of cases, respectively, $P < 0.05$). The degree of dehydration was influenced by the number of diarrhea episodes per day and its duration. More prolonged diarrhea was significantly more frequent in children of the main group, with a duration of 6-9 days 1.7 times more frequent (56.3% and 32.8% of cases, respectively, $P < 0.05$), and 10-14 days more frequent (11.9% and 5.7% of cases, respectively, $P < 0.05$). Diarrhea with a frequency of more than 15 times per day was 2.2 times more frequent in the main group than in the comparison group (37.9% and 17.4% of cases, respectively, $P < 0.05$). Children in the main group were 1.5 times more likely than in the comparison group to have watery stools (39.5% and 25.9% of cases, respectively, $P < 0.05$), malodorous stool odor (45.2% and 29.1% of cases, respectively, $P < 0.05$) and greenish tint (58.6% and 37.2% of cases, respectively, $P < 0.05$).

Pathological inflammatory impurities in feces in the form of blood - 3.0 times more often than in the comparison group (37.5% and 12.6% of cases, respectively, $P < 0.05$), and pus - 2.6 times more often (59.8% and 23.1% of cases, respectively, $P < 0.05$) were detected in children of the main group.

Thus, we found significant differences in diarrhea in children with HIV infection in terms of the following characteristics: the presence of dehydration and its severity, the frequency of diarrhea episodes per day of more than 15 times and its duration of more than 6 days, the watery nature of stools, the foul smell of stools, the green color and the presence of pathological impurities in the form of blood and pus.

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