American Journal of Medicine and Medical Sciences 2024, 14(4): 1003-1006
DOI: 10.5923/j.ajmms.20241404.41

Viral Diarrhea in HIV-Infected Children on the Background of Immunological Changes

Otajanov Shamsiddin Zarifbayevich, Gulnara Karimovna Khudaykulova, Makhbuba Teshaevna Muminova

Tashkent Medical Academy, Uzbekistan

Abstract In this article, the clinical and laboratory features and changes of viral diarrhea in HIV-infected children were studied and analyzed.

Keywords HIV infection, Diarrhea, Rotavirus, Adenovirus, Norovirus

1. Relevance

The spread of HIV infection in the world is one of the biggest threats to the security of humanity today. This problem was recognized by the UN General Assembly in its founding document "Declaration of commitment to fight against HIV/AIDS". According to the WHO Joint Program on Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS), by 2021, 38.4 million people will be living with HIV, 1.7 million and they are children. Babies get HIV from their mothers at three different times: during fetal life (when the baby is in the womb), during delivery, and during breastfeeding [1,5,7].

The problem of acute intestinal infections remains relevant even today, because it is characterized by a wide spread, severe, complicated forms of the disease, and a significant frequency of the development of digestive diseases after an infectious disease. Viral infections of the gastrointestinal system are less known to general practitioners than bacteria: viruses account for 30-40% of acute episodes of diarrhea in young children, among which rotavirus infection plays the first role (60-80%). Viral damage to the gastrointestinal tract in immunocompromised patients: recipients of bone marrow and other organs, patients undergoing chemotherapy, HIV and AIDS is an equally serious problem. In this group, even with proper treatment, death from severe forms of viral infection is alarmingly high. In recent years, there have been publications about the spread of viral diarrhea not of rotavirus etiology. This made it necessary to summarize new information on the most common etiological factors that cause acute gastroenteritis epidemics. Features of viral diarrhea are the acute onset of the disease with rapidly developing ecchymosis; positive dynamics with correct and quickly organized rehydration therapy, high resistance to the external environment and high infectivity despite the measures taken against the epidemic, asymptomatic carriage and continued release of the virus into the external environment after clinical recovery, as well as the still discussed infection spread by aerosol. The pathogenetic feature of the rapid manifestation of dehydration is the breakdown of disaccharides and lipids without changing the levels of sAMF and adenyl cyclase, which leads to damage to enterocytes and the appearance of secondary lactase deficiency in the future [5,8,11].

Many pathogens can cause enteritis or enterocolitis in HIV-infected patients and cause acute, chronic, or recurrent diarrhea. Salmonella spp., Shigella spp., Campylobacter jejuni, G.lamblica, Cryptosporidium parvum, Cytomegalovirus, Adenovirus, Rotavirus, Herpes simplex are the most common causes of intestinal infections in children. According to researches, up to 80% of viruses play the main role in the etiology of intestinal infections in children. The most studied rotavirus causes diarrhea in up to 50%, noravirus up to 30% in developed countries. The list of viruses that cause intestinal infections is constantly growing, when diagnosing these pathogens, astroviruses, adenoviruses, and toraviruses are identified [4,7,14].

To assess the safety of antiretroviral therapy, transaminases, pancreatic enzyme activity, and bilirubin should be monitored continuously. If acute hepatitis, acute pancreatitis is observed under the influence of antiretroviral drugs, it is necessary to change the drug. Thus, GIS damage in HIV-infected children plays an important role in the clinical picture of the disease and determines the course and outcome of the disease. Children infected with HIV may develop diarrhea syndrome due to pathological changes in the intestines in various fecal-oral infectious diseases. In the clinic of HIV-infection, the impact of GIS dysfunction on nutrition and immune status takes a special place, these changes lead to children's growth and physical formation, CNS development lags behind. In HIV-infection, all parts of GIS are affected [6,7].

Received: Mar. 12, 2024; Accepted: Apr. 10, 2024; Published: Apr. 18, 2024
Published online at http://journal.sapub.org/ajmms

2. The Purpose of the Study

To study of clinical and laboratory features of viral diarrhea in HIV-infected children.

3. Material and Methods

During the study, children under 18 years of age were divided into two groups: the main group consisted of 110 HIV-infected children with viral diarrhea, the control group consisted of 70 children without HIV infection with only viral diarrhea.

The diagnosis of HIV infection in children was made on the basis of the "National Clinical Report on the organization and implementation of medical care for persons with confirmed HIV status" No. 206 dated 08/19/2021 of the Ministry of Health of the Republic of Uzbekistan and No. 122 dated 03/25/2015 "On improvement measures to combat typhoid fever, paratyphoid fever, salmonellosis and acute intestinal diseases."

When assessing the severity of acute infectious diarrhea in HIV-infected children, an assessment is made of the degree of dehydration (dehydration according to WHO) that developed as a result of diarrhea in sick children, the daily amount and duration of diarrhea, as well as the shape, consistency, smell, color, amount of stool, existing pathological impurities. The diagnosis was established on the basis of patient complaints, clinical, anthropometric, serological, bacteriological, immunological, virological and instrumental studies.

Table 1. Distribution of patients in the main and control groups by gender

Gender	Main group, n=110		Control group, n=70	
	abs.	%	abs.	%
B	79	71,8	44	62,9
G	31	28,2	26	37,1

In the main group, 79 (71.8%) of the patients were boys, 31 (28.2%) were girls, and in the control group, 62.9% were boys, 37.1% were girls. Most of the patients in the main and control groups were boys.

Table 2. Age distribution of patients in the main and control groups

Age of the patient	Main group, n=110		Control group, n=70	
	abs.	%	abs.	%
0-3	1	0,91	7	10,0
3-7	2	1,8	34	48,6
7-14	42	38,2	29	41,4
14-18	65	59,1	0	0

In our study, when the patients were divided into groups by age, 65 (59.1%) of the patients in the main group were 14-18 years old and 42 (38.2%) were 7-14 years old. 1 (1.8%) and 1 (0.91%) children aged 0-3 years were rarely found. In our control group 1, there were no patients aged 14-18 years old, but children aged 7-14 years and 3-7 years old were more often (41.%:48.6%, respectively), and children aged 0-3 years were less. 7 people (10%) organized.

Table 3. Clinical stages of HIV-infection in the main group

Stages of HIV-infection	Main group, n=110	
	abs.	%
I	0	0
II	28	25,4±6,61
III	82	74,5±4,2
IV	0	0

When the clinical stage of HIV-infection was studied in the patients taken for the study, clinical stages I and IV of HIV-infection were not detected in the patients of the main group. Clinical stage II of the disease was observed in 28 patients (25.4%) in the main group, while clinical stage III was observed in 82 patients (74.5%).

Table 4. Immunological indicators in the main group

CD4+lymphocyte count	Main group, n=110	
	abs.	%
>500	66	60,0±4,7
200-499	40	36,4±4,6
<200	4	3,6±1,8

When studying the immunological parameters of the patients, according to Table 4, 66 (60%) of the patients in the main group had normal CD4+ lymphocytes, and no immunodeficiency was noted, 40 patients (36.4%) had an average immunodeficiency and severe immunodeficiency was found in 3.6% of children.

Table 5. Viral load in the main group

HIV RNA copy	Main group, n=110	
	abs.	%
No viral count	17	15,5±3,5
less than 1000	85	77,3±4,0
1000-10000	2	1,8±1,3
10000-100000	2	1,8±1,3
100000-500000	1	0,91±0,91
500000-1000000	2	1,8±1,3
more than 1000000	1	0,91±0,91

When analyzing the results of viral load from immunological tests in follow-up diseases, according to Table 5, 17 (15.5%) of the patients in the main group did not have HIV RNA copy in the blood, while 85 (77) of the patients with HIV-infected diarrhea were detected. .3%) when the resulting viral load was less than 1000, 1000-10000, 10000-100000, and 500000-1000000 HIV RNA copies were found at equal rates (1.8% of corresponding values, P>0.05). Virus values of 100,000-500,000 and more than 1,000,000 were 2 times lower than those of 1,000-10,000 and 10,000-100,000 (0.91% and 1.8% adaptation of the situation, P>0.05).

Table 6. Occurrence of clinical signs in the main and control groups

Clinical signs	Main group, n=110		Control group, n=70	
	abs.	%	abs.	%
Fever	70	63,6±4,6***	38	54,3±6,0***
Fatigue	110	100,0±0,0	70	100,0±0,0
Headache	35	31,8±4,5*	20	28,6±5,4**
Nausea	31	28,2±4,3	17	24,3±5,2
Vomiting	16	14,5±3,4^	19	27,1±5,4**
Abdominal pain	42	38,2±4,7	24	34,3±5,7
Meteorismus	37	33,6±4,5**	20	28,6±5,4**
Decreased appetite	110	100,0±0,0	70	100,0±0,0
Abdominal cramps	64	58,2±4,7	34	48,6±6,0*

When examining the clinical signs of patients, weakness and loss of appetite were found in all cases (100%) in all the main and control groups. Among the symptoms of intoxication, fever was observed more often in the main and control groups (63.6% and 54.3% of cases, respectively), while headache occurred in almost ⅓ of patients in the main and control groups. Abdominal cramps occurred in almost half of the patients in the main and control groups. Abdominal pain was detected in ⅓ of patients at almost the same rates in all groups, while abdominal rest was 2 times more common than in the control group.

Table 7. General fecal analysis in patients in the main and control groups

Fecal analysis	Main group, n=110		Control group, n=70	
	abs.	%	abs.	%
Leukocyte 10-20 in the field of view	18	16,4±3,5	11	15,7±4,4
Mucus	35	31,8±4,5*	17	24,3±5,2
Iodophilic flora	42	38,2±4,7**^	18	25,7±5,3***
Neutral fat feces +++/+	40	36,4±4,6*	22	31,4±5,6
Soap	28	25,5±4,2	13	18,6±4,7
Fatty acids +++/+	60	54,5±4,8*	29	41,4±5,9
Undigested fiber +++/+	51	46,4±4,8*	26	37,1±5,8**
Non-digestible muscle fibers	43	39,1±4,7	22	31,4±5,6
Starch +++/+	41	37,3±4,6	19	27,1±5,4*
Connective tissue	35	31,8±4,5^	13	18,6±4,7*
Crystals	27	24,5±4,1	11	15,7±4,4*
Epithelium	29	26,4±4,2	12	17,1±4,5*

An increase in the number of leukocytes in the analysis of feces in patients under observation was found in almost the same indicators (16.4% and 15.7% of cases, respectively) in the main and control groups. An increase in the amount of mucus was observed more often in the main and control groups (31.8%, 24.3% of cases, respectively, P<0.05), an increase in the amount of iodophilic flora was noted (38.2% and 25.7% of cases, respectively, P<0.05). Neutral fats, undigested muscle fibers, starch were detected in almost ⅓ of patients in the main and control groups, while fatty acids were more common (54.5% and 41.4% of cases, respectively). An increase in the amount of undigested cells. An increase in the amount of crystals and epithelium in feces was observed in 24.5% and 26.4% of cases in the main group, which was almost 1.5 times more than in the control group (15.7%, 17.1% of cases respectively, P<0.05).

4. Conclusions

1. In the patients in the main and control groups, the disease occurred mainly in boys (71.8% and 62.9% of cases).
2. The second and third clinical stages of HIV infection were established in the main group of patients (in 25.4% and 74.5% of cases).
3. When studying the immunological features in the patients of the main group, severe immunodeficiency was almost not found (3.6% of cases), the viral load was found to be mostly less than 1000 (77.3% of cases).
4. When examining the clinical signs of patients, weakness and loss of appetite were found in all cases (100%) in all the main and control groups. Among the symptoms of intoxication, fever was observed more often in the main and control groups (63.6% and 54.3% of cases, respectively), while headache occurred in almost ⅓ of patients in the main and control groups.

REFERENCES

[1] Даминов Т.А., Худайкулова Г.К., Муминова М.Т., Ашурова С.Б., Хакимов Ж. // Оценка эффективности применения Saccharomyces boulardii у детей с острыми инфекционными диареями./ Журнал инфектологии. Приложение 1. Том 13, № 1, 2021 С. 39.

[2] Дроздов В.Н., Арефьев К.И., Сереброва С.Ю., Ших Е.В. Клиническая эффективность препаратов на основе пробиотических штаммов Saccharomyces boulardii. Медицинский совет. 2020; (5): 104-112. doi: 10.21518/2079-701X-2020-5-104-112.

[3] Колпакова Н.В. // Клинико-анамнестическиеи иммунологические показатели у ВИЧ-инфицированных больных с гастроэнтерологической патологией/ N. V. Kolpakova, A. Kurmangulov, A. A. Melьnikov, N.A. Uvarova, Yu. A. Petrova // ВИЧ-инфекция и иммуносупрессии. – 2018. – № 1 (10). – S. 78-83.

[4] Туйчиев Л.Н., Муминова М.Т. // Острые диареи у ВИЧ-инфицированнкх детей. /Журнал инфектологии, Приложении 1, том 15, №1, 2023, с 168-169.

[5] Ayano G, Demelash S, Abraha M, Tsegay L. The prevalence of depression among adolescent with HIV/AIDS: a systematic review and meta-analysis. AIDS Res Ther. 2021 Apr 27; 18(1): 23. doi: 10.1186/s12981-021-00351-1. PMID: 33906698; PMCID: PMC8077927.

[6] Gary S. Grohmann, Roger I. Glass, Helio G. Pereira, Stephan S. Monroe, Allen W. Hightower, Rainer Weber, and Ralph T.

Bryan N Engl J Med; 329:14-20.

[7] Xudaykulova G. K., Mo'minova M. T. Toshkent tibbiyot akademiyasi axborotnomasi 2022 №7.

[8] Ajibola G, Bennett K, Powis KM, Hughes MD, Leidner J, Kgole S, Batlang O, Mmalane M, Makhema J, Lockman S, Shapiro R. Decreased diarrheal and respiratory disease in HIV exposed uninfected children following vaccination with rotavirus and pneumococcal conjugate vaccines. PLoS One. 2020 Dec 21; 15(12): e0244100. doi: 10.1371/journal.pone.0244100. PMID: 33347474; PMCID: PMC7751865.]

[9] Dilshad O. Jaff, Tariq A. G. Aziz, Natalie R. Smith, published by Journal of Biosciences and Medicines, Vol.4 No.1, 2016.

[10] Zash RM, Shapiro RL, Leidner J, Wester C, McAdam AJ, Hodinka RL, Thior I, Moffat C, Makhema J, McIntosh K, Essex M, Lockman S. The aetiology of diarrhoea, pneumonia and respiratory colonization of HIV-exposed infants randomized to breast- or formula-feeding. Paediatr Int Child Health. 2016 Aug; 36(3): 189-97. doi: 10.1179/2046905515Y.0000000038. PMID: 27595698; PMCID: PMC4673023.

[11] Strehlau R, Donati AP, Arce PM, Lissens J, Yang R, Biguenet S, Cambilargiu D, Hardy H, Correll T. PRINCE-1: safety and efficacy of atazanavir powder and ritonavir liquid in HIV-1-infected antiretroviral-naïve and -experienced infants and children aged ≥3 months to <6 years. J Int AIDS Soc. 2015 Jun 10; 18(1): 19467. doi: 10.7448/IAS.18.1.19467. PMID: 26066346; PMCID: PMC4463476.

[12] Lei Li, Tung Gia Phan, Tuan Anh Nguyen, Kyo Sun Kim, Jeong Kee Seo, Hideaki Shimizu, Eiko Suzuki, Shoko Okitsu, Hiroshi Ushijima Molecular epidemiology of adenovirus infection among pediatric population with diarrhea in Asia 2021 Feb; 49(1): 1-13. doi: 10.1007/s15010-020-01484-7. Epub 2020 Jul 27. PMID: 32720128; PMCID: PMC7962627.

[13] A. Duncan Steele, Nigel Cunliffe, John Tumbo, Shabir A. Madhi, Beatrice De Vos, Alain Bouckenooghe, A Review of Rotavirus Infection in and Vaccination of Human Immunodeficiency Virus–Infected Children, The Journal of Infectious Diseases, Volume 200, Issue Supplement_1, November 2009, Pages S57–S62.

[14] Moradi-Lakeh M, Shakerian S, Yaghoubi M, Esteghamati A, Shokraneh F, Baradaran HR, Ghanaee RM. Rotavirus Infection in Children with Acute Gastroenteritis in Iran: A Systematic Review and Meta-analysis. Int J Prev Med. 2014 Oct; 5(10): 1213-23. PMID: 25400878; PMCID: PMC4223939.

[15] Sun ZW, Fu Y, Lu HL, Yang RX, Goyal H, Jiang Y, Xu HG. Association of Rotavirus Vaccines With Reduction in Rotavirus Gastroenteritis in Children Younger Than 5 Years: A Systematic Review and Meta-analysis of Randomized Clinical Trials and Observational Studies. JAMA Pediatr. 2021 Jul 1; 175(7): e210347. doi: 10.1001/jamapediatrics.2021.0347. Epub 2021 Jul 6. PMID: 33970192; PMCID: PMC8111566.