ISSN: 2181-3337 | SCIENTISTS.UZ
INTERNATIONAL SCIENTIFIC JOURNAL SCIENCE AND INNOVATION
ISSUE DEDICATED TO THE 80TH ANNIVERSARY OF THE ACADEMY OF SCIENCES OF THE REPUBLIC OF UZBEKISTAN

CHARACTERISTICS OF THE IMMUNE SYSTEM IN PATIENTS CHILDREN WITH HIV AND CHRONIC TONSILLITIS

Suleymanov S.F.
Bukhara State Medical Institute, Bukhara, Uzbekistan

https://doi.org/10.5281/zenodo.8366770

Abstract. *The article studied the immune parameters in children with a combined course of HIV pathology and chronic tonsillitis. In both groups of patients with chronic tonsillitis on the background of HIV infection there was a significant suppression of cellular parameters. We can also highlight the disorder of B(CD19)-the cellular link of the immune system. If in the 1st group there was a tendency towards a decrease in IgA and IgG levels and an increase in IgM, then in the 2nd group only a decrease in the IgA content was found. In contrast, the levels of IgM ($p<0.05$) and IgG in patients of the 2nd group were higher than those of the control group. If in the 2nd group there were more intense disorders of immunological parameters, in the 1st group of patients clinical symptoms were more pronounced.*

Patients of the 1st group with prenatal infection by characteristic symptoms of chronic tonsillitis were common bacterial infections, generalized lymphadenopathy, viral infections, etc. against the background of deep prematurity. In patients of the 2nd group with a vertical pathway of HIV infection, chronic tonsillitis was accompanied by a more pronounced depression of the immune system and a relatively lower occurrence of clinical symptoms.

Keywords: *chronic tonsillitis, children, HIV–infection, immunological parameters, cellular immunity, humoral immunity, prenatal pathway of infection, vertical infection.*

Аннотация. *В статье изучены иммунные показатели у детей с сочетанным течением ВИЧ-патологии и хронического тонзиллита. В обеих группах больных хроническим тонзиллитом на фоне ВИЧ-инфекции отмечалось значительное угнетение клеточных показателей. Также можно выделить нарушение B(CD19) - клеточного звена иммунной системы. Если в 1-й группе наблюдалась тенденция к снижению уровня IgA и IgG и повышению IgM, то во 2-й группе обнаружено только снижение содержания IgA. Напротив, уровни IgM ($p<0,05$) и IgG у больных 2-й группы были выше, чем в контрольной группе. Если во 2-й группе отмечались более выраженные нарушения иммунологических показателей, то в 1-й группе больных клиническая симптоматика была более выраженной.*

У пациентов 1-й группы с внутриутробным инфицированием характерными симптомами хронического тонзиллита были распространенные бактериальные инфекции, генерализованная лимфаденопатия, вирусные инфекции и др. на фоне глубокой недоношенности. У больных 2-й группы с вертикальным путем ВИЧ-инфекции хронический тонзиллит сопровождался более выраженным угнетением иммунной системы и относительно меньшей встречаемостью клинических симптомов.

Ключевые слова: *хронический тонзиллит, дети, ВИЧ-инфекция, иммунологические показатели, клеточный иммунитет, гуморальный иммунитет, внутриутробный путь заражения, вертикальная инфекция.*

Annotatsiya. *Maqolada OIV patologiyasi va surunkali tonzillitning kombinatsiyalangan kursi bo'lgan bolalarda immunitet ko'rsatkichlari o'rganildi. OIV infektsiyasi fonida surunkali tonzillitli bemorlarning ikkala guruhida ham hujayra parametrlarining sezilarli darajada bostirilishi kuzatildi. Shuningdek, immun tizimining hujayra aloqasi bo'lgan B (CD19)*

buzilishini ham ta'kidlashimiz mumkin. Agar 1-guruhda IgA va IgG darajasining pasayishi va IgMning oshishi tendentsiyasi kuzatilgan bo'lsa, 2-guruhda faqat IgA tarkibining pasayishi aniqlandi. Aksincha, 2-guruhdagi bemorlarda IgM ($p<0.05$) va IgG darajasi nazorat guruhiga qaraganda yuqori edi. Agar 2-guruhda immunologik ko‘rsatkichlarning kuchliroq buzilishlari kuzatilgan bo‘lsa, 1-guruhdagi bemorlarda klinik belgilar ko‘proq namoyon bo‘lgan.

Surunkali tonzillitning xarakterli belgilari bilan prenatal infektsiyaga chalingan 1-guruhdagi bemorlar chuqur prematüre fonida keng tarqalgan bakterial infektsiyalar, umumiy limfadenopatiya, virusli infektsiyalar va boshqalar. OIV infektsiyasining vertikal yo'li bo'lgan 2-guruhdagi bemorlarda surunkali tonzillit immunitet tizimining yanada aniq depressiyasi va klinik belgilarning nisbatan kamroq namoyon bo'lishi bilan birga keldi.

Kalit so'zlar: *surunkali tonzillit, bolalar, OIV-infeksiya, immunologik ko'rsatkichlar, hujayra immuniteti, gumoral immunitet, infektsiyaning prenatal yo'li, vertikal infektsiya.*

It is known that chronic tonsillitis (CT) is a common pathology - 4-15% of cases from all diseases of ENT organs. CT refers to multifactorial diseases, and the inflammatory process in the tonsils leads to pathological changes in them and the tonsils themselves become a source of infection [1, 2].

CT is also the most common bacterial infection in children with a normal immune system, but the features of the course of chemotherapy are still poorly understood. It has been demonstrated that with any form of chemotherapy, certain immune genetic functions of the tonsils are preserved. Damage to the immune system during HIV infection is systemic, manifested by deep suppression of the T– and B – units of cellular immunity, shifts in humoral immunity and non-specific defense factors, and the functional activity of lymphocytes and monocytes [3–5].

In the past two decades, the determining cause of secondary immunodeficiency in children has become HIV infection, the pandemic of which continues to increase. HIV/ IDS is a kind of viral infection, the first acquired immunodeficiency in the history of medicine associated with a specific pathogen and characterized by an epidemic spread. The first human epidemic disease caused by retroviruses that exclusively infect T-helpers [6–9].

It has been shown that chemotherapy in acute, chronic and recurrent forms is often found in HIV-infected children. And although in most cases the etiology, symptoms and course of chemotherapy for both HIV-infected children and children with a normal immune system are the same, the protracted, severe or unusual course of this pathology with frequent relapses or the release of atypical pathogens (including opportunistic infections) should alert the doctor about possible HIV infection [10–12].

Purpose of research: to study the immunological parameters in HIV-infected children with CT.

Material and methods

For the period from 2017 to 2019 we observed 39 children with CT and HIV from the age of 10 months to 15 years who were registered with the Bukhara Regional AIDS Center. Of these, the 1st group consisted of 21 patients infected prenatally (IPW). In the 2nd group there were 18 patients with a vertical path of infection (VPI). In the control group there were 19 practically healthy children of a similar age who did not have a history of CT and HIV.

HIV diagnosis was based on the detection of specific antibodies in standard serological tests (ELISA analysis, Western-blot modification immunoblotting) and a comparison of epidemiological and serological data.

Immunological studies were carried out jointly with the Research Institute of Immunology of the Academy of Sciences of the Republic of Uzbekistan. (Tashkent). The study included patients with HIV infection and CT whose parents gave informed consent to participate in this study (the work was carried out in accordance with the Helsinki Declaration of the World Medical Association (World Medical Association Declaracion of Helsinki, 1964) and approved by the Ethics Committee of the Bukhara State Medical Institute).

Phenotyping of lymphocytic cells was carried out by an indirect immunofluorescence method using monoclonal antibodies to CD receptors manufactured by Sorbent-Servis Ltd, FSBI State Research Center "Immunology" FMBA of Russia (Moscow) using a Luminal R-8 microscope. T cells were determined (general population - CD3); T-helpers (subpopulation of Th – CD4); T-suppressors (subpopulation of Ts – CD8); T-killers (subpopulation of Tk - CD16), B-lymphocytes (subpopulation of CD19). The immunoregulatory index (IRI), the ratio of CD4/D8, was calculated.

The concentration of serum immunoglobulin (Ig) A, M and G was determined by radial gel immune diffusion according to G. Mancini et al. (1965) using mono specific serums against human immunoglobulin and standard blood serum.

The data obtained were subjected to statistical processing using the Microsoft Excel 2003 computer program on an LG-Pentium IV computer. The significance of differences when comparing average values was determined by the criterion t of student. Data are presented as M ± m. Differences were considered significant at $p<0.05$.

Results and discussion

It should be emphasized that in the Bukhara region and in Bukhara city, there has been a steady increase in both the rate of HIV-infected children and the number of pregnant women infected with HIV, as well as children born to HIV-positive mothers.

In approximately 70% of children with HIV infection, clinical symptoms of CT are identified after the diagnosis of HIV infection in the form of severe lymphadenopathy, hepatomegaly, recurrent acute respiratory infections complicated by sinusitis, bronchopneumonia. In 14 of them, AIDS-related diseases were recorded. Approximately 30% of patients had asymptomatic infection.

During the research, 8 children died. It is important to note that, as the disease lasted, a lesion of the tonsils occurred in the spectrum of clinical manifestations in our patients.

In children with mixed pathology of CT and HIV of the first group, such pathologies as generalized lymphadenopathy, hepatosplenomegaly, bacterial pneumonia occurred with a frequency of 100%. In the same category of patients, the presence of herpes simplex virus and cytomegalovirus infection was significantly more often observed in 41% and 16% of cases, respectively. A specific lesion of the parotid glands of a non-inflammatory etiology in the form of sialadenitis, which was also characteristic of HIV infection, was rarely observed in only 3 (14%) children.

The parameters of the cellular component of the immune status in HIV-infected children with chemotherapy are presented in table 1. Our data indicate that patients of both groups show significant shifts in the functioning of their immune system, namely, patients of the 2 groups

have a deep immunodeficiency of most parameters of the cellular component of the immune system.

Table 1. Cellular parameters of the immune system in HIV-infected children with CT.

Indicator	**Healthy (n = 19)**	**1st group (n = 21)**	**2nd group (n = 18)**
White blood cells, cells/μl	6100 ± 187	3446 ± 283***	3261 ± 247***
Lymphocytes,%	30,9 ± 1,4	21,4 ± 3,5*	18,8 ± 3,1**
Lymphocytes, abs.	1884 ± 41,3	712 ± 84***	612 ± 63***
T(CD3), %	58,6 ± 2,1	33,1 ± 3,2***	30,5 ± 3,8***
T(CD3), abs.	1071,5 ± 53	243 ± 36,4***	176 ± 24,7***
Th(CD4), %	32,6 ± 1,7	14,6 ± 2,7***	12,4 ± 2,1***
Ts(CD 8), %	20,3 ± 1,2	24,8 ± 2,3*	23,1 ± 2,9
IRI (CD4/CD8)	1,6 ± 0,13	0,57 ± 0,26***	0,51 ± 0,21***
Tk(CD 16), %	16,5 ± 1,4	18,1 ± 2,3	18,8 ± 3,1
B(CD 19), %	26,3 ± 3,2	20,4 ± 2,9	22,7 ± 2,3
B(CD 19), abs.	485,7 ± 31,6	147,3 ± 33,5***	132,7 ± 31,7***
Note: in the numerator data before treatment, in the denominator - after treatment; * - p<0.05; ** - p<0.01; *** - p<0.001 - compared with the control group.			

They revealed significant suppression of the total pool of T(CD3)-lymphocytes and its subpopulation - Th with the CD4 marker in relative and absolute terms with a high level of confidence - p<0.001. In patients of the 2nd group with VPI, these two parameters were even lower compared to the 1st group (Table 1).

It is also possible to distinguish the inversion of the IRI parameter in the downward direction in both groups, which was associated with a significant decrease in cells with the Th(CD4) phenotype and a parallel increase in the relative proportion of Ts(CD8)-cells with suppressor function, and this, in turn, indicates on the adverse course of immune processes in the immune system in HIV-infected children with CT. An increase in Ts(CD8) cells and inversion of IRI can be attributed to negative immune predictors that have a definite effect on the immune system of patients with this mixed pathology in children. Our data are completely consistent and confirmed by data of other authors in assessing the role of Th(CD4) lymphocytes as the central pathogenesis link in HIV infection in children. They investigated the evidence in favor of such a version that the rapid development of deep immune suppression in children with HIV infection contributes to the transition of the disease to stage 4B. After 4-6 years from the onset of HIV infection, against the background of a significant decrease in Th(CD4) lymphocytes, attachment of various nosological forms of opportunistic infections and then its generalized forms was noted, which caused the formation of severe multiple organ failure and death [4–9].

In relation to Tk(CD16) in patients of both groups, their slight increase can be noted, which can be explained by the fact that this type of cell takes on a certain protective function due to the inadequate functioning of other types of cells.

It is also possible to isolate the disruption of the B (CD19) -cellular component of the immune system, but this was not statistically confirmed (Table 1).

Table 2. Humoral parameters of the immune system in HIV-infected children with CT

Indicator	**Healthy (n = 19)**	**1st group (n = 21)**	**2nd group (n = 18)**
IgA, mg%	121,3 ± 11,7	89,4 ± 14,5*	79,7 ± 12,2**
IgM, mg%	90,1 ± 12,3	134,2 ± 20,7*	127,8 ± 23,3*
IgG, mg%	1093,2 ± 65,6	876,7 ± 44,52**	1084,3 ± 60,6
Note: in the numerator data before treatment, in the denominator - after treatment; *- p<0.05; ** - p<0.01; *** - p<0.001 - compared with the control group.			

It should be noted that the immune deficiency in the B-cell system of immunity was reflected in the spectrum of immunoglobulins. So, for example, in the 1st group, we revealed a tendency to a decrease in IgA and IgG with different levels of confidence (p<0.05 and p<0.01, respectively) and an increase in the level of IgM, then only a decrease was observed in the 2nd group IgA (Table 2).

A comparative analysis with the data of other researchers showed that in children suffering only chemotherapy (without mixed pathologies), the level of IgA was within normal limits, i.e. here, as it were, "there was no second pathology in the form of AIDS," which would affect the values of this IgA immunoglobulin and reduce it [3, 4].

On the contrary, the IgM level in patients of the 2nd group with VPI was higher compared with the control group, which was probably of a compensatory nature.

So, in sick children with mixed pathology of HIV and CT there are serious changes in their immune system, characterized by deep immune suppression and immune deficiency, with the development of a variety of clinical symptoms.

Thus, the presented results indicate the specific features of the clinical and immunological course of chemotherapy in HIV-infected children, depending on the route of infection. In patients of the 1st group with PPI, the characteristic symptoms of CT were frequent bacterial infections, generalized lymphadenopathies, viral infections and other symptoms against the background of deep prematurity. In patients of the 2nd group with VPI, chemotherapy was accompanied by more pronounced immune suppression and a relatively lower frequency of occurrence of clinical symptoms.

REFERENCES

1. Ababiy I.I., Danilov L.A., Vinogradova T.V., Manyuk M. K. Features of humoral immunity in children with chronic compensated tonsillitis // Russ**.** Bull**.** of Perinatol**.** and Ped**. –** 2011.– № 5. – P. 72–75. *(In Russian)*
2. *Akimkin V.G., Briko N.I., Malinovsky A. A. et al. Clinical and epidemiological characteristics of streptococcal (group a) infection in military collectives // Epidem. and Inf. Dis.. – 2011. – № 2. – P. 18–20. (In Russian)*
3. Denisenko V.B., Simovan'yan E.N. Clinical and immunological characteristics of opportunistic infections in children with HIV infection // Childh. inf. – 2013. – *№* 2. – P. 12–20. *https://doi.org/10.22627/2072-8107-2013-12-2-16-20 (In Russian)*
4. Denisenko V. B., Simovan'yan E. N. Clinical and immunological characteristics of early stages of HIV infection in children infected with parenteral pathways / / Medic. Bull. of the South of Russ. – 2015. – *№* 2. – P. 20–24. *https://doi.org/10.21886/2219-8075-2015-2-20-24.*

5. Human immunodeficiency virus-medicine / Pod. edited by N. A. Belyakov and A. G. Rakhmanova. – SPb.: Baltic medical educational center, 2010. - 752 p. *(In Russian)*
6. *Iacovou E, Vlastarakos PV, Papacharalampous G.* et al. *Diagnosis and treatment of HIV-associated manifestations in otolaryngology // Infect Dis Rep – 2012. – Vol. 4. – № 1. – P. 22–29. DOI https://doi.org/10.4081/idr.2012.e9*
7. Selik R.M., Mokotoff E.D., Branson B. et al. Revised Surveillance Case Definition for HIV Infection – United States MMWR. – 2014. – Vol. 63. – № 3. – P. 1–12.
8. *Rzewnicki I., Olszewska E., Rogowska–Szadkowska D. HIV infections in otolaryngology // Med Sci Monit. – 2012. – Vol. 18. – № 3. – RA 18–21. PMID 22367140*
9. Narzullaev N.U., Suleymanov S.F. Characteristics of the immune status in HIV-infected children with acute rhinosinusitis // Immunopathology, allergology, infectology. – 2013. – № 1. – P. 59–63. *(In Russian)*
10. Suleymanov S.F., Kurbat M.N., Suleymanova M.F. Parameters of the immune system in HIV-infected children with acute rhinosinusitis // Journal of the Grodno State Medical University. – 2013. – № 4. – P. 108–110. *(In Russian)*
11. 11. Suleymanov S.F., Narzullaev N.U. Characteristics of ENT organs in HIV–infected children: monograph // Saarbrüken, Germany: Lambert Academic Publishing RU – 2017. – 246 p. *(In Russian)*
12. Suleymanov S.F. Characteristics of the Immune System Parameters in Children with Comorbide Pathology HIV and Chronic Tonsillitis // European Science Review.–2020. – № 1–2. January – February.– P. 36–40.