PECULIARITIES OF IMMUNITY IN NEPHROTIC SYNDROME IN CHILDREN WITH COVID-19 AGAINST THE ATOPIC BACKGROUND

Lola K. Raxmanova¹, Umida N. Karimova², Nigora A. Israilova³, Kamola Z. Yaxyaeva⁴, Shahnza A. Latipova⁵

¹Doctor of Medical Sciences, Docent, the Department of Children’s Diseases No. 2, Tashkent Medical Academy, Tashkent, Uzbekistan.
²PhD, Assistant, the Department of Children’s Diseases No. 2, Tashkent Medical Academy, Tashkent, Uzbekistan.
³PhD, Assistant, the Department of Children’s Diseases No. 2, Tashkent Medical Academy, Tashkent, Uzbekistan.
⁴Candidate of Medical Sciences, Senior Lecturer, the Department of Children’s Diseases No. 2, Tashkent Medical Academy, Tashkent, Uzbekistan.
⁵Candidate of Medical Sciences, Senior Lecturer, the Department of Children’s Diseases No. 2, Tashkent Medical Academy, Tashkent, Uzbekistan.

¹diloratayeva@gmail.com, ²nigora99@gmail.com, ³nigora99@gmail.com, ⁴diloratayeva@gmail.com, ⁵diloratayeva@gmail.com

ANNOTATION

It is known that in a series of parenchymal kidney diseases, GN (Glomerulonephritis) is dominant, in which the nephrotic form of chronic glomerulonephritis (CGN) is more than 35% and is one of the most common causes of chronic renal failure (CRF) [10,11,13,19,20].

More attention is paid by scientists to atopy in children, including atopic dermatitis (AD) characterized by genetically associated IgE-mediated allergic reactions with atopy [3,16]. The prevalence of blood pressure ranges from 5.5 to 30.8% in children 6–7 years old and from 6.7 to 20.7% in children 13–14 years old. In this case, almost all organs and systems, including the kidneys, are involved in the pathological process [2,3].

Keywords: Nephrotic syndrome, Covid-19 effects, Atopy, Chronic Renal Failure, ABL, PAN.

I. INTRODUCTION

At present, the attention of scientists is more directed to allergic reactions, which characterized by IgE-mediated genetically associated conditions. At the same time, almost all organs and systems, including the kidneys, are involved in the pathological process. This study shows the features of immunity in nephrotic syndrome in children undergoing COVID-19 against the background of atopy. The study included 30 children aged 7 to 11 years suffering from the nephrotic syndrome of chronic glomerulonephritis who underwent COVID-19. Studies were done on immunological parameters, as well as markers of atopy by the SCORAD index. Assessment of the severity of atopic dermatitis in patients according to the SCORAD index showed that a large percentage of children were patients with moderate and severe forms and a difficult course of nephrotic syndrome with atopic dermatitis, who underwent COVID-19. This explained by the fact that the ability of T-cell clones to maintain the production of IgE by plasma cells is directly proportional to the production of IL-4, and the content of this cytokine in the blood of children with atopic dermatitis correlates with clinical manifestations and the level of IgE in the blood. The triggering role in the development of the immunopathological process in NS probably belongs to the activation of the complement system, overproduction, and impaired elimination of the CIC, accumulating on the basement membrane of glomerular vessels, cause the development of a local inflammatory reaction. There is longer preservation of immunological disorders in the period of remission of diseases, such as an increase in renal ABL, IgE and serum CIC concentration in patients with COVID-19, which can serve as a criterion for diagnosing the severity of nephrotic syndrome with atopic dermatitis.
The aim of the research

The research aims to study peculiarities of immunity in nephrotic syndrome in children with Covid-19 and atopic background.

II. MATERIALS AND METHODS

We observed 30 children aged 7 to 11 years suffering from Nephrotic Syndrome (NS) (a nephrotic form of chronic hepatitis) who underwent COVID-19. The patients divided into Group 1 - NS+AD (15 children); Group 2 - NS (15 children). The control group consisted of 25 practically healthy children of the same age. The clinical diagnosis based on anamnesis, clinical laboratory and functional research methods, immunological parameters, blood pressure markers, and the SCORAD index [2]. Antigen-Binding Lymphocytes (ABL) of the kidneys studied by the method of F.Yu. Garib and coauthors [7,8]. Phagocytic Activity of Neutrophils (PAN) using the nitro blue tetrazolium test using latex particles [5]. Concentrations of immunoglobulin (Ig) studied by ELISA (Enzyme-Linked Immunosorbent Assay) [6], Circulating Immune Complexes (CIC) determined by the method of precipitation [4].

The material for the study was venous blood taken in the morning on an empty stomach. According to the Student test, the numerical data processed by the method of variation statistics to calculate the reliability of numerical differences.

III. RESULTS AND DISCUSSIONS

According to the study results, with NS+AD, 70.0% were boys, 30.0% were girls, which confirms the literature data. Duration of the disease - from the debut of NS in NS-7 years, on average 3.5 ± 1.2 years; with NS + AD -9 years, on average 4.0 ± 2.4. According to the mandatory diagnostic criteria, blood pressure was: hereditary predisposition to atopy - 79.0%, pathological course of pregnancy and childbirth in the mother - 84.0%, onset of the disease in early childhood - 78.1%, skin rashes on the flexor surfaces of the extremities - 74, 5%, Denier-Morgan line - 13.0%, the presence of concomitant diseases of the digestive system (gastroduodenitis) - 46.0%, the nervous system (VVD) - 73.0%, which are consistent with the literature [12,15]. Assessment of the severity of blood pressure in patients according to the SCORAD index showed that in children with NS+AD, a large percentage were moderate and severe; for the complicated course of NS in children, a large percentage was also NS+AD.

Clinical manifestations of NS in NS and NS+AD were characterized respectively: edema (100.0%; 100.0%), oliguria (100.0%; 100.0%), proteinuria (100.0%; 100.0%), decreased appetite (76.0%; 81.0%), increased A/D (24, 2%; 43.7%), hydrothorax (15.0%; 22,5%), tachycardia (79.3%; 86.5%), nausea (32.0%; 44.5%), hepatomegaly (17.5%; 21.5%), headache (54.9%; 69.8%), hypoproteinemia (89.9%; 95.0%), dysproteinemias (79.4%; 87.5%), hypercholesterolemia (39.0%; 47.0%), which were more pronounced in children with a diagnosis of NA+AD. The main disease in children with NS and NS+AD was accompanied by chronic tonsillitis (76.5%; 85.0%), anemia (87.5%; 90.5%), gastroduodenitis (28.5%; 39.0%), bronchitis (43.0%; 57.0%), biliary dyskinesia (9.5%; 16.5%), thyroid hormones glands (27.5%; 29.5%).

According to the results of the study of the partial functions of the kidneys in sick children of both groups, when compared with the control group, there was a statistically significant decrease in daily urine output, relative urine density (P<0.001), an increase in daily proteinuria (more than 2.5-3.0 g / day), erythrocyturia, leukocyturia, (P<0.001-0.01), hyperlipidemia (P <0.001-0.01), increased fibrinolytic blood activity, hypercoagulability (P <0.01), increased serum urea and creatinine (P<0.001) hypoproteinemia, hypoalbuminemia and hypergammaglobulinemia (P<0.01).

The results of immunological studies showed that, compared with the control group, in children with NS (group 1) and NS+AD (group 2) during the exacerbation period (before treatment), there was a statistically significant decrease in the T-lymphocyte count (SD3), T - suppressors (SD8), T - helpers (SD4) and PAN (P<0.001-0.01), a significant increase in the number of B-lymphocytes (SD19) and kidney ABL (P<0.001), increased serum IgE and concentration CIC (P <0.001). Immunopathological changes were more pronounced in children of group 2 compared with group 1 (Table 1).
Impaired immunity in NS in children undergoing COVID-19 against the background of AD explained by the fact that: the ability of T-cell clones to maintain the production of IgE by plasma cells directly proportional to the production of IL-4, and the content of this cytokine in the blood of children with AD correlated with clinical manifestations, and the level of IgE in the blood [1,18]. The triggering role in the development of the immunopathological process in NS probably belonged to the activation of the complement system, overproduction, and impaired elimination of the CIC, accumulating on the basement membrane of glomerular vessels, caused the development of a local inflammatory reaction [17].

After the traditional therapy in dynamics (after 6 months), the patients showed an improvement in the clinical, laboratory and immunological indicators, expressed in an increase in the relative content of SD3, SD4, SD8, PAN (P <0.001-0.01), a decrease in the ASL (Antistreptolysin) of the kidneys, IgE and the concentration of CEC in the blood (P <0.01-0.01) compared with the data before treatment.

During this period, in the 1st group (NS + BP), the exacerbation of the disease was in 7 (46.0%) of 15 patients. In children of group 2 (NS), exacerbation of the disease was in 4 (26.6%) of 15 patients. The results suggest that NS in NS in children with AD undergoing COVID-19 was more complex and challenging to respond to traditional treatment, which required the inclusion of additional adequate therapy methods.

Table Immunity indices in the examined children (M ± m)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Infected children, n=30</th>
<th>Before treatment, n=30</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group, n=25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD 3 %</td>
<td>56,21±0,98</td>
<td>34,16±1,23*</td>
<td>37,18±1,15#</td>
</tr>
<tr>
<td>SD 4 %</td>
<td>34,50±1,40</td>
<td>14,00±1,81*</td>
<td>19,05±1,32#</td>
</tr>
<tr>
<td>SD 8 %</td>
<td>18,64±0,49</td>
<td>11,21±0,85*</td>
<td>13,21±1,08#</td>
</tr>
<tr>
<td>SD 19 %</td>
<td>11,16±0,73</td>
<td>26,03±0,48*</td>
<td>24,02±0,61#</td>
</tr>
<tr>
<td>ABL of blood, %</td>
<td>-</td>
<td>8,88±0,31</td>
<td>6,25±0,41#</td>
</tr>
<tr>
<td>Renal ASL</td>
<td>109,67±60,11</td>
<td>591,68±85,23*</td>
<td>387,71±62,44#</td>
</tr>
<tr>
<td>IgE, ME/μl</td>
<td>0,002±0,004</td>
<td>0,01±0,007*</td>
<td>0,09±0,001#</td>
</tr>
<tr>
<td>CIC</td>
<td>50,50±1,11</td>
<td>32,25±1,45*</td>
<td>36,09±0,38#</td>
</tr>
</tbody>
</table>

Note: * - reliability of differences in comparison with the healthy group; # - reliability of differences between groups 1 and 2, ASLs compared with the pre-treatment difference (P <0.001-0.01).

IV. CONCLUSION
1. Immunopathological changes in NS with AD characterized by a deficiency of cellular immunity in the form of a decrease in SD3, SD4, SD8, PAN, an increase in the number of SD19, renal ASL, an increase in serum IgE, and CIC concentration, which remain preserved during remission.
2. There was longer preservation of immunological disorders in the period of remissions of diseases, such as an increase in renal ASL, IgE and CIC concentration in blood serum in patients with COVID-19, which could serve as a diagnostic criterion for NS with AD.
3. NS in children undergoing COVID-19 comorbid with blood pressure was more difficult and challenging to respond to traditional treatment, which required the inclusion of adequate additional therapy.

CONFLICT OF INTERESTS AND CONTRIBUTION OF AUTHORS
The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article and report on the contribution of each author.

SOURCE OF FINANCING
No funding was required for this research.
LIST OF REFERENCES

3. Базаболкин И.И. Современные аспекты патогенеза и терапии атопического дерматита у детей// Педиатрия. 2015.Том 94.№4.с.177-183.
8. Гариб Ф.Ю. и др. Клиническая ценность определения АСЛ у больных брюшным тифом и другими заболеваниями. Метод. Рек. Ташкент. 1983.
15. Тур И.И., Савченкова Н.Д., Назаров П.Г. Сравнительное исследование IgE-антител, IFN-у и IL-4 у детей с нефротическим синдромом с минимальными изменениями и атипичным дерматитом // Нефрология. — 2007.-№4.-С. 69-74.