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# CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF CHILDREN WITH PCR-CONFIRMED COVID-19 IN VOLGOGRAD REGION, RUSSIA

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**ABSTRACT** — The paper identifies for the first time for the Volgograd region (Russia) the clinical and epidemiological characteristics of children 0-16 years old with the laboratory confirmed diagnosis of COVID-19 hospitalized in a children's infectious clinic in April-August 2020. The Volgograd Region is one of the biggest territorial entities in Southern Russia; therefore our first published analytical data needs to be compared with relevant Russian/European data. The diagnosis was verified by the nucleic acid amplification: isolation of SARS-CoV-2 RNA by the polymerase chain reaction (PCR) from the upper respiratory tract mucosa. The study did not include outpatients. Rarity of such symptoms as headache and weakness (7.1%), as well as dysosmia (4.1%) in the complete absence of dysgeusia attracted our attention. In none of the patients we were able to identify an exanthem over the course of infection.

**KEYWORDS** — COVID-19 in children, SARS-CoV-2, clinical and epidemiological characteristics.

## INTRODUCTION

Currently, the certain amount of knowledge has been accumulated on the etiology, epidemiology, clinic, diagnosis, treatment and prevention of a new type of coronavirus infection [1]. In the diagnostic aspect, along with molecular genetic research methods, there is the auxiliary possibility of making a diagnosis by the serological methods. In the treatment of COVID-19 in adults, there is a potential for using etiotropic therapy (favipiravir, remdesivir). Two Russian vaccines against this infection have been registered, another domestic development is planned to be registered, and their active introduction into the clinical practice has begun. At the same time, the children's contingent of patients is given slightly less attention than the age categories of the patients. This can be explained by the fact that according to available data, children get sick less often, with less pronounced clinical symptoms,

less often require hospitalization, the disease is easier for them than for age-related patients, which, however, does not exclude cases of severe course. Available Russian data indicate that children account for 6-8% of reported COVID-19 cases [2].

*Aim:*

To analyze clinical and epidemiological indicators in hospitalized children with SARS-CoV-2 infection.

## MATERIAL AND METHODS

The retrospective study was conducted on the basis of the specialized children's infectious diseases hospital providing specialized care to patients with COVID-19 in April-August 2020.

Based on the study of medical documentation, the results of clinical and epidemiological, laboratory (general clinical, serological, molecular genetic) and instrumental methods of research in children aged 0 to 16 years with isolated SARS-CoV-2 RNA by PCR from the upper respiratory tract mucosa were analyzed. The study did not include patients who were on outpatient treatment. The total of 169 medical records of children aged 0-16 years with PCR-confirmed infection caused by SARS-CoV-2 were retrospectively analyzed.

## RESULTS

The results obtained generally coincide with similar Russian and foreign studies [3, 4].

Of the 169 patients studied, the majority were male: 89 (52.7%) boys versus 80 (47.3%) girls. The average age of hospitalized children was  $8.5 \pm 4.2$  years; the largest number of patients was in the age cohort of 10–16 years (72 children).

According to the patient geography, it was expected that the largest number of children lived in the regional center — 66 (39.1%), in the second big city — 17 (10.1%), even less — in the districts of the region.

The distribution by severity of hospitalized children was as follows: 57% of patients had a mild infection, 24% — asymptomatic, 17% — moderate and 2% — severe.

Almost all patients from the group of moderate severity (27; 15.9%) had the disease in pneumonia,

which was verified by X-ray methods and did not require any respiratory support. When trying to differentiate between viral pneumonia and complicated bacterial forms of pneumonia, we found that bacterial changes in CBC (leukocytosis  $>15 \times 10^9/l$  and/or rod neutrophils  $>10\%$ ) were detected in only three patients (11.1%). Since the specific marker of bacterial inflammation — procalcitonin — was not determined, as well as the bacteriological examination of sputum was not performed, we are inclined to conclude that the absolute majority of patients (88.9%) did not show signs of bacterial genesis of pneumonia.

Regarding the duration of the hospital treatment of COVID-19 in children, it was found that the lowest stay time was in the cohort of children aged 1 month – 1 year ( $10.3 \pm 6.4$  days) with a moderate course, and the highest ( $18 \pm 3.7$  days) children 6–9 years old also have a moderate course. Thus, we were not able to identify the relationship between the age of the child, the severity of the disease and the duration of the hospitalization.

The distribution of the patients according to the presence of complaints at admission to hospital was interesting to us. About a quarter (24.3%) of patients had no complaints, as well as clinical manifestations of the infectious process. Most often, patients, or rather their representatives, complained of an increase in body temperature (53.3%), less often of catarrhal manifestations — cough and sore throat (25.4%), as well as runny nose and nasal congestion (20.7%). Attention is drawn to the rarity of such symptoms as headache and weakness (7.1%), as well as dysosmia (4.1%) in the complete absence of dysgeusia. Gastrointestinal symptoms (3.6%) and manifestations of respiratory disorders (2.4%) were also rare. In none of the patients we were able to identify an exanthem over the course of infection.

The analysis of the objective indicators at admission to the hospital generally corresponds to the mild and the asymptomatic forms of the infectious process. The body temperature in almost all age groups was within the normal range of the figures. The highest rates ( $38.1 \pm 0.4$  °C) were found in the group of children 1 month – 1 year with the moderate course. In the laboratory data, we did not notice any significant deviations from the age norms. So in the group of children up to 1 month in CBC with the normal leukocyte levels, the relative lymphocytosis was observed. The parameters of the red blood and the platelets were also intact in the most cases. Only in 2.9% of the cases, the undetected cytolysis was detected with an increase in ALT/AsT in the range of 38.33–95.83 u/l, the violation of the bilirubin metabolism occurred at the level of a statistical error (1.2%). No patients were found to have elevated levels of CRP.

According to the analysis of the conducted pharmacotherapy of sick children, it can be established that in the most cases one or another drug was prescribed, even with an asymptomatic course of the disease. Thus, in 61.5% of the cases, drugs of recombinant interferon-alpha in the intranasal form of release were prescribed, less often (43.8%) — umifenovir in tablet form, 26.6% of children received tablet imidazolethamide of pentanedioic acid. This group of drugs can be attributed to *conditional* etiotropic therapy, since they can only indirectly participate in the elimination of SARS-CoV-2. Drugs with a proven etiotropic effect (favipiravir, remdesivir) are not used in pediatric practice at the time of publication of the article. Other groups of drugs were used much less frequently. Thus, systemic GCS (dexamethasone, prednisone) were used in 2.9% of cases, infusion therapy for detoxification — 3.6%, anticoagulants — 0.6%. Drugs from the NSAID group were prescribed to 15.4% of patients, mucolytic (ambroxol) — 23.5%.

Attention is drawn to the fact that in the fairly large number of the cases (41.4%), the antibacterial therapy was prescribed. Taking into account that only 27 (15.9%) had radiologically confirmed pneumonia, and of these, in turn, the signs of bacterial genesis of pneumonia were determined only in three (11.1%) and none of them showed a picture in the form of pronounced areas of *consolidation*, it can be assumed that in certain cases the appointment of the antibacterial therapy was premature and required the more differentiated approach. The most frequently prescribed antibacterial drugs from the group of the cephalosporins of the 3<sup>rd</sup> generation (68.6% of all prescriptions), much less often macrolides-azithromycin (17.1%), in isolated cases — aminoglycosides (amikacin). One in five received a combination of two or more of these antibiotics.

## CONCLUSION

Analyzing the data obtained, we can conclude the following:

1. About 82% of children infected with SARS-CoV-2 have the mild to asymptomatic disease.
2. In 15.9% of the patients, the disease occurred in a moderate form in the form of uncomplicated pneumonia, which does not require any respiratory support.
3. According to the objective clinical and laboratory indicators, there were no specific deviations.
4. In the treatment of COVID-19 in children, drugs related to conditionally antiviral drugs were most often prescribed: in 61.5% of cases, recombinant interferon-alpha drugs were prescribed, less often (43.8%) — umifenovir, 26.6% of children received imidazolethamide pentanedioic acid.

5. Attention is drawn to the fact that in the fairly large number of the cases (41.4%), the antibacterial therapy was prescribed, the approach to the appointment of which should be more differentiated.

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