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FEATURES OF THE CLINICAL COURSE OF COVID-19 CORONAVIRUS INFECTION IN CHILDREN OF THE REPUBLIC OF SAKHA (YAKUTIA)

The article presents the results of retrospective analysis of the clinical histories of children hospitalized from March 23, 2020 to December 27, 2020 in the Republic of Sakha (Yakutia) "Children's Infectious Clinical Hospital" with the diagnosis of “Coronavirus infection caused by COVID-19" (ICD-10 code U07.1, U07.2). The features of the clinical course of a new coronavirus infection in 358 children were described. It was shown that during the first and second waves of COVID-19 in the Republic of Sakha (Yakutia) 56% of hospitalized children had respiratory tract infections. 36% were cases of pneumonia without respiratory failure. In 2 cases, a multisystem inflammatory syndrome with symptoms of incomplete Kawasaki syndrome was observed. In the remaining cases coronavirus infection caused by COVID-19 occurred against a background of intestinal infections of different etiology and concomitant diseases. Accumulation of epidemiological and clinical data will make it possible to find ways to prevent and treat the new infection, taking into account regional and population characteristics.

Keywords: coronavirus infection (COVID-19), pneumonia, children, North, Arctic, Yakutia.

Introduction. According to many authors, the clinical course of COVID-19 in children has its own peculiarities. The disease is often asymptomatic or has a subtle clinical picture [3,4,8]. The most common clinical manifestations are cough, febrile fever, and catarrhal manifestations [1]. According to the results of large-scale clinical and epidemiological studies, the main clinical manifestations of COVID-19 in children are upper airway lesions, pneumonia without or with respiratory failure, acute respiratory distress syndrome, sepsis, septic shock [6,7,8,9]. One of the most severe manifestations of COVID-19 in children is considered to be the occurrence of multisystem inflammatory syndrome [5].

The lack of etiotropic treatment and prophylaxis for COVID-19 in children is of concern. Only symptomatic therapy and instrumental means for managing patients with severe manifestations of the disease are available. There is enough information about the peculiarities of the pathogenesis and clinical course of COVID-19 in children. However, there are few studies in the literature devoted to the peculiarities of the course of coronavirus infection in harsh conditions of

circumpolar regions of the world, which makes it important to further summarize and analyze the results of scientific studies concerning the problem of COVID-19 in children in the Far North.

Materials and methods. The work was performed on the basis of the State Budgetary Institution of the Republic of Sakha (Yakutia) "Children's Infectious Clinical Hospital", Yakutsk, which is the head institution for children with COVID-19 in the Republic of Sakha (Yakutia). All 358 cases of children hospitalized at the Yakutsk Children's Clinical Hospital with the diagnosis of "Coronavirus infection caused by COVID-19" (ICD-10 codes U07.1, U07.2) during the period from March 23, 2020 to December 27, 2020 were included in the analysis. From the case histories, anamnesis data, complaints, description of clinical picture, results of laboratory and instrumental methods of examination, information on treatment and outcomes of each case were entered into the database.

Statistical processing of the material. Statistical calculations were performed using IBM SPSS Statistics 22 software. Pearson's criterion $\chi 2$ was used to compare groups. Quantitative variables were presented as median and interquartile range in Me format (Q1-Q3). The critical value of the significance level for statistical hypothesis testing was assumed to be 5%.

Results

In 2020, according to the Department of the Federal Service for Supervision of Consumer Rights Protection and Human Welfare in the Republic of Sakha (Yakutia), 24441 people (21151 adults and 3288 children) fell ill with coronavirus infection. The primary incidence was 2,531.0 per 100,000 of the population (3,015.2 in adults and 1,244.5 in children, respectively). Among the pediatric population, the highest incidence rates per 100,000 population were in adolescents (1,792.0), followed by children under one year old (1,444.7) and children 7-14 years old (1,249.8).

According to the routing scheme during the first wave of coronavirus infection, all children with a respiratory infection clinic and PCR-positive results for COVID-19 were hospitalized at the Children's Infectious Clinical Hospital of the Republic of Sakha (Yakutia). From 23.03.2020 to 27.12.2020 there were 358 children with coronavirus infection (ICD-10 codes U07.1, U07.2) undergoing hospital treatment. Among them there were 21 children from districts of the republic and 2 from other regions of Russia.

Analysis of the age structure showed

Table 1

Characteristics of patients by age and sex

Age group	Boys N=201		Girls N=157		Both boys and girls N=358	
	n	%	n	%	n	%
to 1 year	22	14.0	36	17.9	58	16.2
from 1 to 3 years	21	13.4	22	10.9	43	12.0
from 3 to 7 years	23	14.6	36	17.9	59	16.5
from 7 to 10 years	22	14.0	25	12.4	47	13.1
from 10 to 14 years	26	16.6	35	17.4	61	17.0
14-18 years old	43	27.4	47	23.4	90	25.1
P	0.762					

Note: p- reached significance level of differences (Pearson's criterion $\chi 2$).

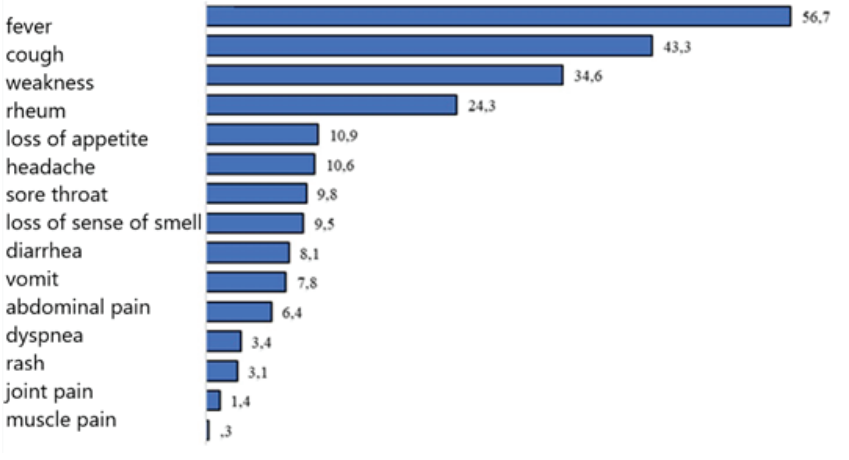

Fig.1. Frequency of patient complaints on admission (%)

Table 2

Symptoms detected during objective examination on admission

Symptoms	N (%)
Subfebrile body temperature (37-38°C)	51 (14.2)
Febrile body temperature (38-39° C)	26 (7.3)
Pyretic body temperature (39-40°C)	5 (1.4)
Nasal discharge	45 (12.6)
Pale skin	23 (6.4)
Sloppy stools	20 (5.6)
Bloating or painfulness on palpation	17 (4.8)
Enlarged lymph nodes	16 (4.5)
Abnormal muscle tone	11 (3.1)
Rattling in the lungs	9 (2.5)
Conjunctival hyperemia	8 (2.2)
Cyanosis	7 (2.0)
Liver enlargement	6 (1.7)
Dyspnea	4 (1.1)

that 25% of them were adolescent children (Table 1). There were no statistically significant differences in the age structure depending on sex (p=0.762). There was a history of exposure in 255 patients (71.2%). In 245 cases it was family contact, in 7 cases it was school contact, and in 3 cases it was contact in a place of temporary stay of children. The virus was identified in 344 (96.1%) cases (ICD-10 code: U07.1). The median duration of inpatient treatment was 12 (10-13) bed-days. 74 patients spent 14 to 31 days in the hospital.

The most common complaints on admission (Fig. 1) were fever (203), cough (155), rheum (87), and symptoms of general intoxication: weakness, lethargy (124), loss of appetite (39), headache (38), sore throat (35), and loss of sense of smell (34). In 133 of 155 cases of cough, patients and their parents noted dry cough.

On admission, the condition of 259 (72.3%) children was assessed as moderate severity, and 5 (1.4%) as severe. On examination, 82 (22.9%) children had elevated body temperature (Table 2). Some children showed signs of gastrointestinal disturbances: fluid stools (5.6%), bloating or painfulness when palpating the abdomen (4.8%). Intestinal bacterial infection (ICD-10 codes: A02.0; A04.0; A04.8; A04.9), and viral enteritis (ICD-10 codes: A08.0; B34.1; A08.1; A08.4; A08.2) were found in 16 children as concomitant diseases.

56% of children with COVID-19 had signs of respiratory tract involvement (Table 3). In 56 (16%) patients, only the upper respiratory tract was affected. Acute nasopharyngitis (pharyngitis) was the most common.

126 cases involved only lower airways, including bronchitis (8), laryngotracheitis (4), and pneumonia (114). In 17 children there was a combined lesion of the upper and lower respiratory tracts.

Computed tomography of the chest organs in 130 children (36.3%) revealed pneumonia (Fig. 2). Pneumonia was more frequently observed in older children, probably due to the fact that children of this age were hospitalized with more pronounced symptoms of the disease.

In 65 (50%) cases pneumonia was bilateral, in 28 (21.5%) - left-sided, 37 (28.5%) - right-sided. The degree of severity of pneumonia in all patients was defined as "moderate", without respiratory failure. In 120 (92.3%) patients with pneumonia the virus was identified.

Two children had multisystem inflammatory syndrome with symptoms of incomplete Kawasaki syndrome. At that, in a 4-year-old girl COVID-19 virus was identified, CT scan revealed signs of fluid in the pleural cavities on both sides against the background of no fresh focal and infiltrative changes. The second case of Kawasaki-like syndrome was detected in a 6-month-old boy, COVID-19 virus was not identified. The child had a clinic of acute bronchitis.

Outcome analysis showed that 211 children were discharged with recovery, 134 with improvement, 13 children were transferred to other departments (5 of them to the ward for patients with mild COVID-19, 8 to the main disease).

Conclusion. According to the results of our study in children hospitalized in the State Budgetary Institution of the Republic of Sakha (Yakutia) "Children's Infectious Clinical Hospital" from 23.03.2020 to 27.12.2020 with the diagnosis "Coronavirus infection caused by COVID-19" the main clinical symptoms were increase in body temperature and signs of lesions of upper and lower respiratory tract. On admission to the hospital, common clinical manifestations were catarrhal symptoms, increased body temperature, and general intoxication. It should be noted that often enough gastrointestinal manifestations were revealed: liquid stool, vomiting and abdominal pain or discomfort in the abdominal area.

COVID-19 was associated with respiratory lesions in 56% of cases. In 16% of cases only upper airways were affected, in 36.3% of cases it was pneumonia without respiratory failure. Two cases of multisystem inflammatory syndrome with symptoms of incomplete Kawasaki syndrome were detected. In the remaining cases coronavirus infection caused by COVID-19 virus occurred against the background of intestinal infections of different etiology and concomitant diseases.

Pneumonia in children was bilateral only in half of the cases. According to the literature, changes on radiographs or computed tomography of the lungs observed in children infected with SARS-CoV-2 include mostly bilateral lesions [3].

The data obtained characterize the

Table 3

Signs of airway lesions in children with COVID-19

Condition/Sign	N (%)
Frequency of individual conditions	
Acute rhinitis	13 (3.6)
Acute sinusitis	1 (0.3)
Acute nasopharyngitis	48 (13.4)
Acute pharyngitis	9 (2.5)
Acute tonsillitis	5 (1.4)
Acute laryngitis (laryngotracheitis)	4 (1.1)
Acute bronchitis	8 (2.2)
Acute pneumonia	130 (36.3)
Level of involvement	
Signs of lesions of the upper respiratory tract only	56 (15.6)
Signs of lower respiratory tract involvement only	126 (35.2)
Combined upper and lower respiratory tract involvement	17 (4.8)
Signs of upper or lower respiratory tract involvement, or both	199 (55.6)

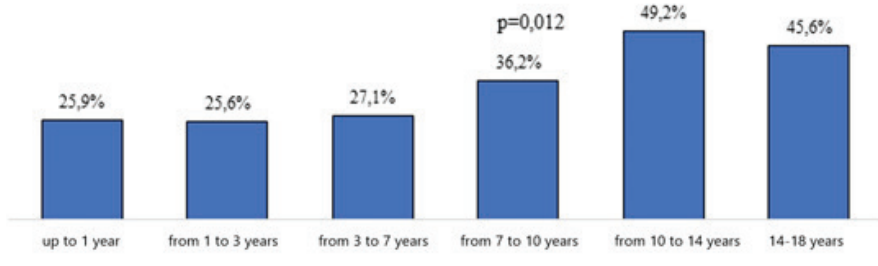

Fig. 2. Frequency of pneumonias as a function of patient age: p- reached significance level of differences (Pearson's criterion χ2)

course of new SARS-CoV-2 coronavirus infection in children of the Republic of Sakha (Yakutia) during the first and second waves of COVID-19. Accumulation of epidemiological and clinical data will make it possible to find ways of preventing and treating the new infection, taking into account the peculiarities of the region and the population.

The work was performed within the research theme "Monitoring of the state of health of children in the Republic of Sakha (Yakutia)" (State Registration No. 0120-128-07-98), within the state assignment of the Ministry of Science and Education of the Russian Federation (FSRG-2020-0016).

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CARDIOVASCULAR PATHOLOGY AND COVID-19 IN RESIDENTS OF YAKUTSK

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A study was conducted on 161 citizens of Yakutsk who had a new coronavirus infection in the period from March to December 2020. A high incidence of arterial hypertension, obesity, and lipid-metabolic disorders was revealed. The relationship of lipids, glucose and uric acid in blood serum, arterial hypertension, waist circumference with the severity of the new coronavirus infection was shown. The high prevalence of cardiovascular pathology and its risk factors among study participants requires long-term follow-up of patients with post-COVID syndrome, which prevents premature death from diseases of the circulatory system.

Keywords: cardiovascular pathology, arterial hypertension, lipid disorders, new coronavirus infection, COVID-19, Yakutsk.

In recent years, the world has been agitated by the prolonged outbreak of the new coronavirus infection COVID-19, causing huge social and economic losses. At the time of submission of the article on 02/03/2022, there are 388,100,320 confirmed cases of the disease in the world, 5,713,256 people died [3]. In Russia, 12,284,564 cases were confirmed, 333,357 people died [2]. Numerous studies demonstrate the influence of cardiovascular pathology on the severity of COVID-19, causing high mortality among these patients [6;7;8]. There is also evidence of cardiovascular complications after COVID-19. The pandemic affected the course of the existing pathology or contributed to its appearance, causing long-term consequences in the form of the post-covid syndrome. The relevance of the research is to identify the aggravating effects of COVID-19 on human health in order to develop new recommendations for the management of patients with post-covid syndrome in order to prevent cardiovascular disasters.

The aim of the study was to research cardiovascular pathology in residents of Yakutsk who had suffered the new coronavirus infection COVID-19.

Materials and methods of research. A pilot single-stage study was conducted in March 2021 of residents of Yakutsk, geographically attached to the YSC CMP clinic, with a history of new coronavirus infection COVID-19 in the period from March to December 2020 (1st wave). The response rate was 78%. The object of the study were 161 people, 68 of which were men (42.2%), and 93 were women (57.8%). The average age was 51 [44, 57] years for men and 54 [48, 57] years for women.

Inclusion criteria: adult population of Yakutsk from 30 to 70 years old, attached to the Clinic of the YSC CMP, with a history of COVID-19, voluntary consent to the study.

Exclusion criteria: malignant neoplasms, acute infectious diseases, exacerbations of chronic diseases, acute myocardial infarction, acute cerebrovascular accident.

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