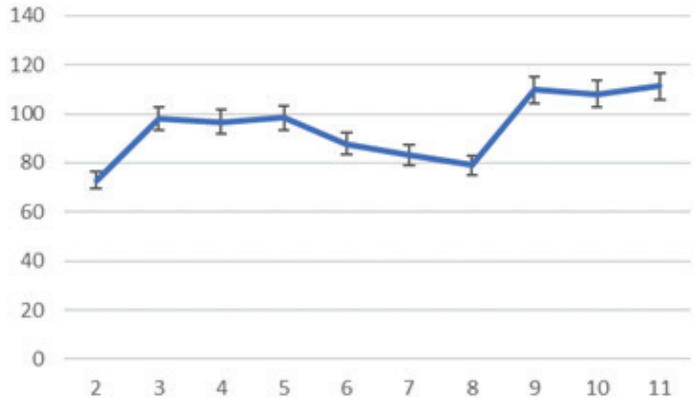

Fig. 3. CK activity depending on the term after the transferred COVID-19, months

COVID-19 remained in 11 people (45%), decreased efficiency - in 8 people (33%). Most often, fatigue is indicated by those surveyed with hypertension, chronic kidney disease, diabetes mellitus, chronic respiratory tract disease, ischemic heart disease. In subjects with complaints of fatigue, the vital capacity of the lungs was lower by 17%. The activity of enzymes of energy metabolism lactate dehydrogenase and creatine kinase is reduced in men with complaints of fatigue. In-depth research is needed to find the causes of persistent long-term symptoms after suffering COVID-19.

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

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УДК 616.988

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The preliminary epidemiological data on coronavirus infection COVID-19 in children in the Republic of Sakha (Yakutia) is presented in the article. Retrospective analysis of 431 cases of coronavirus infection in children who were hospitalized in the Clinical Hospital of Children's Infectious Diseases during the period from March 2020 to December 2020 was conducted. Peaks of the epidemic process were identified in May and November 2020. The COVID-19 virus was identified in 88% of cases, in 54 cases the diagnosis was made based on clinical and epidemiological data. The highest risk group in terms of developing pneumonia are children and teenagers 10-18 years old. Considering of the epidemic process and the peculiarities of the implementation of coronavirus infection, the alertness of pediatricians in the field should be formed.

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

Introduction. Information about a new coronavirus infection first appeared in Wuhan City, Hubei Province, People's Republic of China, in December 2019. [5, 6]. A large-scale epidemic spread in China, the World Health Organization outlined the outbreak as an emergency situation and announced the beginning of the pandemic in March 2020 [7]. In Moscow and St. Petersburg the date of registration of the first cases is March 2, 2020 and March 7, 2020, respectively. In Yakutsk (Republic of Sakha (Yakutia)) the first patient with COVID-19 was registered on March 18, 20 [1]. Today the entire world community is focused on fighting with this threat. Different aspects of the epidemic process are being studied to develop effective countermeasures.

Up to the present time, the researches have appeared on the analysis of the prevalence, diagnosis, clinic, and treatment of coronavirus infection in children. For example, a meta-analysis including

data from 2874 children with COVID-19 showed that the most frequent symptoms of infection were fever 48.5% (95% CI: 41.4-55.6%) and cough 40.6% (95% CI: 33.9-47.5%). Asymptomatic infection was observed in 27.7% (95% CI: 19.7-36.4%) of cases. A severe course was observed in 1.1% of cases (out of 1933 patients). Unilateral (29.4%, 95% CI: 24.8-34.3%) and bilateral lesions (24.7%, 95% CI: 18.2-31.6%) were found with almost equal frequency. The symptom of "frosted glass" was observed in 32.9% (95% CI: 25.3%-40.9%) of cases [4]. Domestic authors have also shown that COVID-19 in children has a number of specific features, in particular the disease is often asymptomatic or with a subtle clinical picture. The outcome of the disease in children is usually favorable [2, 3].

Methodology. Retrospective analysis of medical records of children hospitalized with the diagnosis "Coronavirus infection" was conducted from March to December 2020. The work was performed on the basis of the State Budgetary Institution of the Republic of Sakha (Yakutia) "Children's Infectious Clinical Hospital", Yakutsk, where all children with suspected COVID-19 living in the Republic of Sakha (Yakutia) were hospitalized according to patient routing. All children underwent PCR study for coronavirus infection. A computed tomography scan was performed when indicated.

Statistical calculations were performed with IBM SPSS Statistics 17 software (IBM®, USA). Mann-Whitney, Pearson $\chi 2$ criteria were used to compare groups. Quantitative variables were presented as mean and standard deviation in M (SD) format. The critical value of the significance level for statistical hypothesis testing was assumed to be 5%.

Results. 431 children between the ages of 0 and 18 (191 girls and 240 boys) received inpatient treatment with a diagnosis of coronavirus infection at the Children's Infectious Clinical Hospital of the Republic of Sakha from March to December 2020. 405 children of them were residents of Yakutsk and its suburbs, 25 were children from the districts of the Republic of Sakha (Yakutia) and 2 children were from other regions of the Russian Federation.

As shown in Picture 1, the maximum incidence peaks were observed in May-June and October-November 2020.

The analysis of the age structure of the hospitalized (Pic. 2) showed a slightly higher proportion of older children (53.6% of cases in children 7 years and older).

In 377 cases out of 431 (87.5%), the COVID-19 virus was identified, and in 54 cases the virus was not identified, but COVID-19 was diagnosed clinically or epidemiologically (Table 1). The frequency of virus identification was independent of patient age.

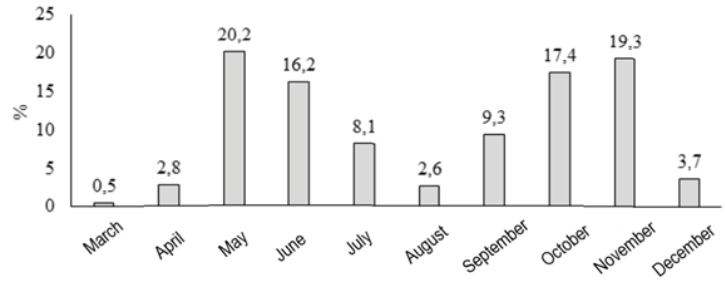

Fig.1. Distribution of patients with COVID-19 by months in 2020

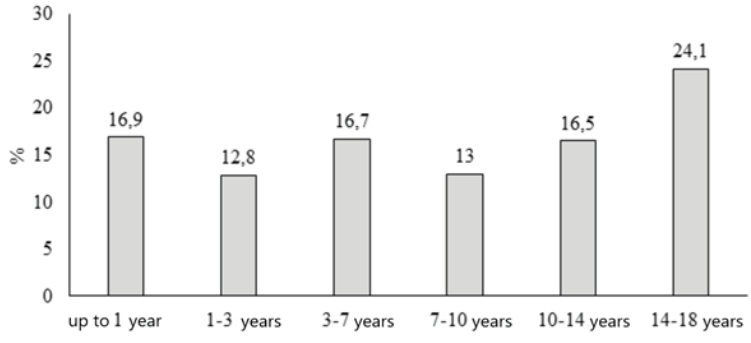

Fig. 2. Age structure of children with COVID-19 in the Republic of Sakha (Yakutia)

In 142 children (32.9%) pneumonia was diagnosed, in some cases it was accompanied by pleurisy. And the most frequently confirmed pneumonia was detected in children 10-14 years (45.1%), 14-18 years (43.3%). In 289 cases there were other manifestations of infection. Pneumonia was statistically significantly more frequent in older children (p=0.005). COVID-19 virus was identified in 90% of pneumonia cases.

On average, children spent 11.4 (4) bed-days in the hospital. The length of stay in case of pneumonia was 12.7 (4.0) days versus 10.8 (3.9) days for other conditions (p<0.001). In 310 cases patients were discharged with recovery, in 119 with improvement, and in 2 cases with no change. In these 2 cases there was a transfer to another medical institutions.

Conclusion. A seasonal increase in the incidence of coronavirus infection in children in the Republic of Sakha (Yakutia) was observed in May and November 2020. During the study period, mainly urban children were hospitalized. The proportion of rural children was 5% (25 children). COVID-19 virus was identified in 88% of cases of clinical picture of new coronavirus infection. Pneumonia was detected in 44% of children aged 10-18 years. The virus was detected in 90% of pneumonia cases. The outcome of the disease was favorable; no cases of death or severe complications were recorded.

Frequency of COVID-19 virus detection and development of pneumonia among children in the Republic of Sakha (Yakutia)*

Age	Virus detected, n (%)	Pneumonia, n (%)
Up to 1 year	65 (89.0)	20 (27.4)
1-3 years	49 (89.1)	13 (23.6)
3-7 years	64 (88.9)	17 (23.6)
7-10 years	44 (78.6)	15 (26.8)
10-14 years	62 (87.3)	32 (45.1)
14-18 years	93 (89.4)	45 (43.3)
All ages	377 (87.5)	142 (32.9)
p	0.436	0.005

Note: * - the data is presented as n (%), where n is the absolute number of observations: p-achieved level of significance in comparing age groups (Pearson's criterion χ^2).

Given the peculiarities of the epidemic process, the high proportion of coronavirus infection in the form of pneumonia in elder children requires the vigilance of pediatricians in the development of the 3rd wave of the pandemic.

The work was performed within the research theme "Monitoring of the health of children in the Republic of Sakha (Yakutia)" (State Registration Number: 0120-128-07-98), within the Government Order of the Ministry of Science and Education of the Russian Federation (FSRG-2020-0016).

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HEART RATE VARIABILITY IN PATIENTS WITH MODERATE AND SEVERE COVID-19

The study of heart rate variability (HRV) in COVID-19 is of undoubted interest, as it allows one to judge about disturbances in the work of the cardiovascular system, as well as about shifts in the state of autonomic regulation of physiological functions. Both of these systems are targets for viral damage.

The aim. To investigate how HRV changes in seriously ill COVID-19 depending on the severity of the disease, as well as to determine the prognostic role of ROC analysis in predicting the outcome of the pathological process. Materials and methods. observations were carried out on 29 patients of moderate severity (age 58.7 ± 6.5 years), and 55 seriously ill (59.4 ± 9.2 years) COVID-19. The control group consisted of 69 people (mean age 62.5 ± 9.6). HRV was studied using the Rehovot Dynamic Light Scattering apparatus (Israel) and using an original algorithmic approach. Statistical processing was performed using the R language version 3.6.2. To assess the relationship between the studied indicators, the Pearson correlation method was applied. To calculate the threshold values for survival and mortality, which have predictive value, an ROC analysis was performed. Results. In patients with COVID-19, HRV parameters significantly decreased. There were no significant differences in the studied values between groups of different severity. The data obtained indicate a violation of the activity of both the sympathetic and parasympathetic divisions of the autonomic nervous system. ROC analysis of HRV did not provide a predictive model for COVID-19 with a high probability of an outcome. Conclusion. In patients with moderate and severe COVID-19, the main indicators of HRV are significantly reduced. Using ROC analysis of HRV, no significant predictors of favorable and fatal outcomes were found in patients with COVID-19.

Keywords: COVID-19, microcirculation, heart rate variability.

It is known that the method of studying heart rate variability (HRV) is subtly responsive to the action of stress stimuli, as well as to any changes in the body of a healthy and sick person. At the same time, HRV in different courses of COVID-19 has practically not been studied. Elucidation of this issue is extremely important not only for theory, but also for practical medicine, because it quite accurately allows us to judge changes in the work of both the cardiovascular system and regulatory mechanisms that ensure a balance in the activity of the sympathetic and parasympathetic divisions of the autonomic nervous system. (ANS) under stress, as well as a wide variety of pathological conditions [22, 26].

The list of target organs affected by the SARS-Cov-2 virus is not limited to the respiratory tract. Alteration of the cardiovascular and central nervous systems is essential in the pathogenesis of the new coronavirus infection. It has now been established that cardiovascular manifestations in patients with COVID-19 include myocardial damage, arrhythmias, cardiac arrest, heart failure, and bleeding disorders [7,8]. They have a fairly widespread character and a protracted course. Moreover, the mechanism of heart damage in patients with COVID-19 includes direct damage to myocardial cells mediated by angiotensin-converting enzyme 2 (ACE2) receptors, as well as systemic inflammation, which causes indirect damage to myocytes [21]. Moreover, patients with COVID-19, whose disease is fatal, always suffer from cardiopulmonary complications [25].

A. Izcovich et al. [19], having analyzed 207 studies by various authors, identified the main factors that provide valuable predictive information about mortality and / or severe disease in patients with COVID-19. Among them, a significant part was associated with lesions of the cardiovascular system, cerebrovascular diseases, chronic obstructive pulmonary disease, cardiac arrhythmia, arterial hypertension, diabetes, dyslipidemia, respiratory failure, etc. Moreover, a decrease in HRV often correlates with an increase in the concentration of C-reactive protein (CRB). There is no doubt that HRV in COVID-19 is primarily influenced by the inflammatory process caused in response to viral invasion. According to the

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