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TOPICAL ISSUE

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ANALYSIS OF THE EPIDEMIOLOGICAL SITUATION ON COVID-19 : A SECOND WAVE

Summary. The analysis of prevalence, morbidity, mortality and lethality from COVID-19 for the period from September 1, 2020 to January 4, 2021 was carried out. It was revealed that during the analyzed period (18 weeks), the prevalence and incidence rates of new coronavirus infection increased significantly. The highest prevalence of COVID-19 is registered in the USA, Spain, France. China and Thailand have the lowest prevalence and incidence rates for new coronavirus infection.

Key words: new coronavirus infection, COVID-19, epidemiology, prevalence, morbidity, mortality, lethality.

Introduction. On December 31, 2019, the Chinese authorities informed the World Health Organization (WHO) of an outbreak of unknown pneumonia. The pandemic of the new coronavirus infection began with the detection of a group of cases of idiopathic pneumonia in hospitals in Wuhan (Hubei Province, China) as of December 31, 2019 [3, 4]. Coronavirus 2019 (COVID-19) as an infectious viral disease has spread throughout the world, leading to an ongoing pandemic [9, 13]. As of 01/04/2021, the total number of infected COVID-19 around the world was 83,934,188, and the number of deaths was 1,840,028. [15-23].

It was assumed that the disease would be cyclical in its course for an indefinite time. According to forecasts of epidemiologists, the beginning of the second wave should cover the autumn months [2, 6, 7]. The repeated increase in the number of patients with a new coronavirus infection was associated with the absence of the so-called herd immunity and the weakening of anti-epidemic measures [8, 12]. Since November 2021, vaccination of the population began, primarily from risk groups, which should affect the rate of spread of infection in the future through an increase in the population stratum with persistent immunity [5, 10].

In a previous article, we analyzed the dynamics of the spread of COVID-19 in the Republic of Sakha (Yakutia) in comparison with other regions of the Russian Federation and a number of foreign countries from the beginning of the pandemic to July 31, 2020.The highest prevalence of a new coronavirus infection was registered in the USA - 1433.8 , in Brazil - 1227.7, in Spain - 712.3, followed by Russia with an indicator of 572.4 cases per 100 thousand of the population. Three zones were identified on the basis of the analysis of the spread of infection [1]. As the pandemic continues, we decided to continue our analysis of the COVID-19 epidemiological situation for a "second wave" in the same countries that were included in the previous study.

Aim of the work: to analyze of the dynamics of the spread of COVID-19 during the second wave in the Republic of Sakha (Yakutia) in comparison with other regions of the Russian Federation and a number of foreign countries.

Tasks:

1. Calculate the growth rate of the spread of COVID-19 in different regions during the "second wave"
2. Conduct a comparative analysis of the spread of COVID-19 during the "first" and "second wave"
3. Compare mortality and lethality in the first and second waves of a new coronavirus infection.

Materials and methods. Epidemiological data for SARS-CoV-2 was obtained using an online platform that collects data from government agencies from September 1, 2020 to January 4, 2021 December, the coverage was 18 weeks of observation [15-23]. The study included countries the following countries: China, USA, Spain, Italy, France, Germany, Great Britain, Russia, Brazil, Norway, Finland, Thailand. For the Russian Federation, a comparison was made of data in Moscow, St. Petersburg and the Republic of Sakha (Yakutia). We analyzed the following indicators: the number of confirmed cases, new cases of COVID-19 in 18 weeks, mortality per 100 thousand of the population, lethality in % during the observation period as of 01/04/2021.

Research results. Analysis of the total number of patients in the compared countries in dynamics in terms of 100 thousand of the population (prevalence) for 18 weeks of follow-up (end date 01/04/2021) showed that the highest prevalence of new coronavirus infection was registered in the USA - 6342.8, then

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in Spain - 4210, in France - 4162.6, the UK is in fourth place - 4062, in fifth place Italy - 3593.1 cases per 100 thousand of the population (Figure 1). The lowest prevalence of COVID-19 remains in China, amounting to 6.9 cases per 100 thousand of the population. Compared to the previous analysis, the structure of the leading countries in terms of the number of confirmed cases of COVID-19 has changed: the number of cases in Europe, such as Spain, France, and the United Kingdom, has significantly increased. Overall, there is a widespread exponential increase in the number of patients with COVID-19.

We also calculated new cases of coronavirus infection per 100 thousand of the population weekly (Figure 2). According to the analysis results, the "red" zone included (more than 100 cases per 100 thousand of the population per week): Great Britain, USA, Italy, France, Germany, Russia, Brazil, where there is a steady increase in the number of cases and the highest prevalence rates, trends no decrease in morbidity was noted. In France, at week 10, there was a sharp increase in the number of new cases to 606 per 100 thousand of the population. Norway is in the “yellow” zone (weekly incidence rates range from 40 to 90 cases per 100 thousand). China and Thailand are still in the "green" zone, where the weekly incidence is extremely low. In the first place in terms of incidence are Great Britain, then the USA, Italy.

As can be seen from the data presented, in the second wave of COVID-19, we note a significant increase in both the total number of confirmed cases and new cases. Such an increase in the incidence by the beginning of November can be explained by public protests against quarantine measures with a mass gathering of people at the end of October in most European countries. In the United States, there were also riots in connection with

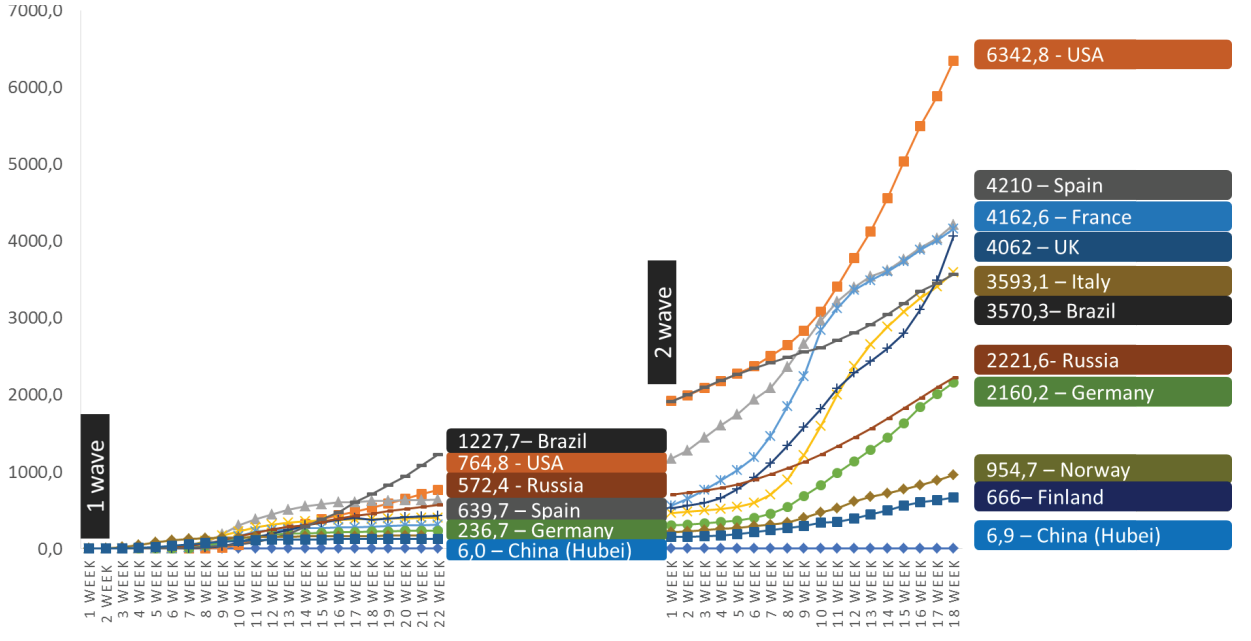

Fig. 1. The number of confirmed cases of COVID-19 (per 100 thousand of the population) in the compared countries (in the first and second wave)

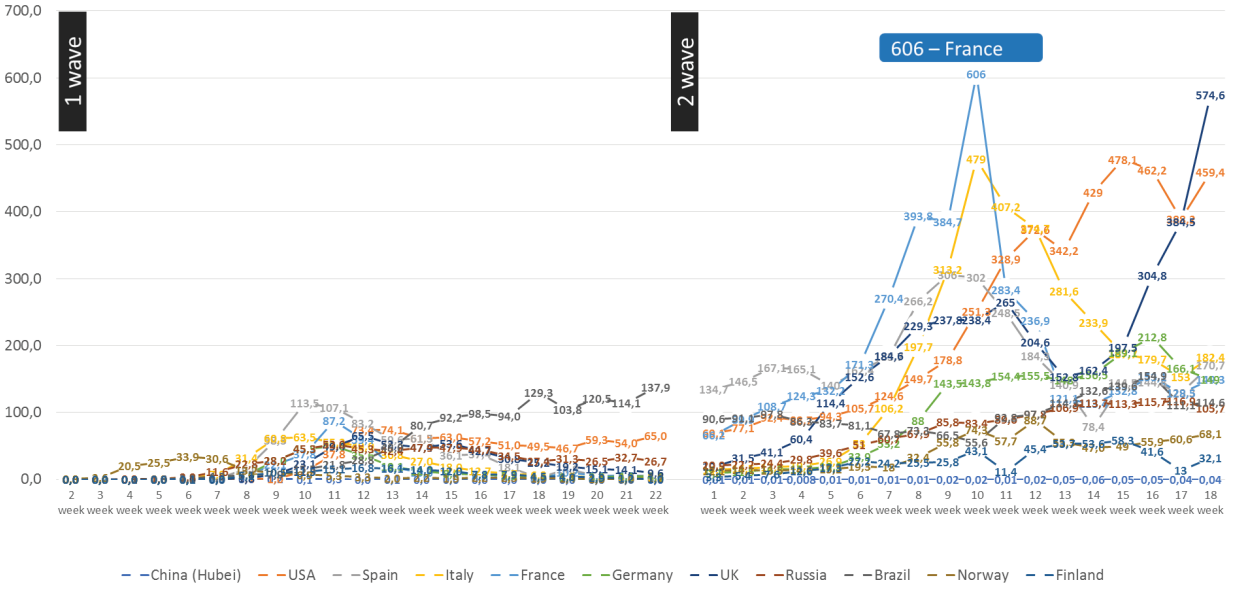

Fig. 2. New cases of COVID-19 (per 100 thousand of the population) over 18 weeks (09/01/2020 to 01/04/2021) in the compared countries

the presidential elections in the country. China and Thailand have the lowest prevalence and incidence rates for new coronavirus infection.

We calculated the mortality and lethality in the compared regions, taking into account the total number of deaths over 18 weeks of observation as of 01/04/2021 (Figure 3). The highest mortality rate in Italy is 55, followed by the United States - 43.8, then Great Britain - with an indicator of 42.8 per 100 thousand of the population. The lowest mortality rates were found in China and Thailand, at 0.004 and 0.003, respectively. It should be noted that in comparison with the mortality rates of the first wave, there is a twofold increase in Italy (from 27.5 to 55 per 100 thousand of the population), 2.8 times in Germany (from 8.9 to 25.2 per 100 thousand.), 2.75 times in Russia (from 8.9 to 24.5 per 100 thousand). Lethality in the countries included in the study ranged from 0.02 to 1.5%, that is, we note a decrease in this indicator during the second wave. The lowest lethality rate in Thailand is 0.02%. Italy is in first place in lethality (1.5%), in second - Germany (1.2%), in third - Great Britain and Russia (1.1%).

During the analyzed period in the

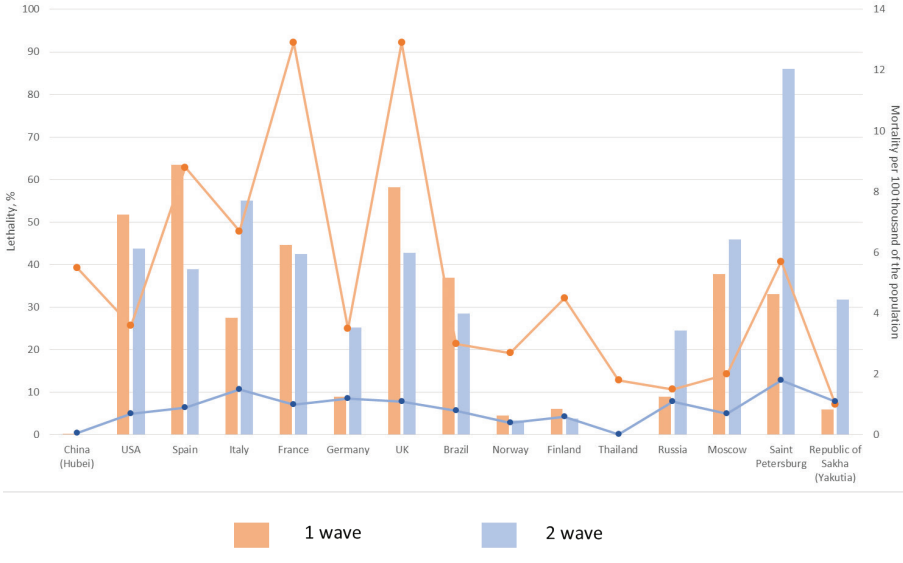

Fig. 3. Indicators of lethality and mortality from COVID-19: lines - lethality in%, columns - mortality per 100 thousand of the population

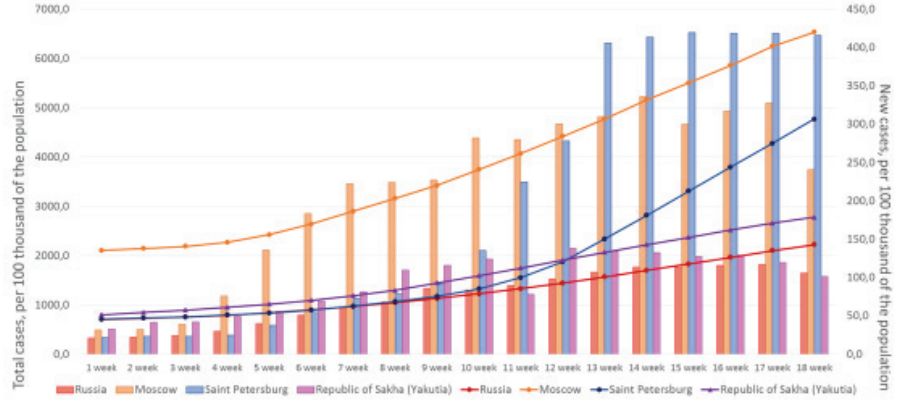

Fig. 4. The number of confirmed and new cases of COVID-19 in the Republic of Sakha (Yakutia) and Russia (per 100 thousand of the population), as of 01/04/2021

Republic of Sakha (Yakutia), the prevalence of COVID-19 by week 18 reached 2,774.9, and the incidence - 101.3 per 100 thousand of the population. When compared with the epidemiological situation in Russia, the indicators of both prevalence and morbidity in the Republic of Sakha (Yakutia) are comparable. In Russia, Moscow and St. Petersburg are in first place in terms of prevalence and incidence of COVID-19. Starting from the 13th week, St. Petersburg was ahead of Moscow in terms of the analyzed indicators (Figure 4).

Conclusion. The analysis of the prevalence and incidence of new coronavirus infection during the first and second waves showed that a significant increase in the number of patients with COVID-19 was registered in the autumn-winter period, which corresponds to the seasonal increase in respiratory infections. Noteworthy is the decline in mortality rates in the analyzed countries as a whole, which was noted against the background of an overall increase in the number of cases. Although in three countries (Italy, Germany, Russia), mortality per 100 thousand of the population has increased. But the lethality rate decreased everywhere, reaching a maximum in Italy (1.5%), while in the first wave the highest lethality rate was in the UK, amounting to 12.9%. This suggests that, despite the widespread increase in the number of patients with COVID-19, the health system has learned to cope with the most severe consequences of the disease since the beginning of the pandemic.

In all likelihood, factors such as mass protests by the population and refusal to comply with quarantine measures played a huge role in increasing the number of patients in Europe and the United States. Another possible reason for the increase in the incidence of COVID-19 is a new variant of coronavirus-19, which was discovered in the UK, where the London government has now imposed quarantine with restrictions on international movement. The new variant of the virus has already infected 1/4 of the total number of cases, and in December 2020 it reached 2/3 of those infected in the UK. It is assumed that the spread of the British variant may exceed 70% of cases compared to the normal SARS-CoV-2 virus [11].

As the experience of China in the fight against the COVID-19 epidemic has demonstrated, the right model of anti-epidemic measures, which includes such principles as adaptive management, a culture of moral standards, reliable cooperation between the government and the public, including through the media, is paramount. As the authors emphasize, the culture of moral observance by the population is a key success factor in the fight against COVID - 19 [14].

The beginning of vaccination of the population presupposes the formation of collective immunity, which should make adjustments to the pandemic process through the formation of collective (population) immunity. In this regard, in the future it will be interesting to analyze the prevalence and incidence of COVID-19 after mass vaccination of the population.

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EPIDEMIOLOGICAL AND CLINICAL ASPECTS OF CARDIOVASCULAR DISEASES IN NOVEL CORONAVIRUS INFECTION

A review of the published data on the epidemiological and clinical aspects of cardiovascular diseases in the novel coronavirus infection is presented. Summarizing the results of studies by many authors, we state that the tropism of the new coronavirus infection to the cardiovascular system is manifested through ACE2 receptors, immune, cytokine inflammation, increased coagulation activity. These pathophysiological characteristics are especially evident in concomitant cardiovascular pathology, leading to decompensation of the existing pathology and often to a fatal outcome. Thus, cardiovascular disease is a dangerous risk factor for the development of fatal consequences in the current pandemic situation.

Keywords: SARS-CoV-2, COVID-19, cardiovascular disease, ACE2, arterial hypertension, myocarditis, arrhythmia.

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The novel coronavirus infection (SARS-CoV-2) was first reported in December 2019 in Wuhan, Hubei province, China. This viral infection quickly spread throughout the world at an alarming rate. The SARS-CoV-2 virus is characterized by high virulence and lethality. The World Health Organization declared COVID-19 a pandemic in March 2020. According to WHO, as of February 15, 2021, 108.2 million confirmed cases of COVID-19 were registered worldwide, with more than 2.3 million deaths [32]. In Russia, according to epidemiological data, as of February 15, 2021, more than 4 million cases and 82 thousand deaths were registered [1].

The standard clinical picture of the novel coronavirus infection was characterized as follows. The incubation period of the disease lasted from 3 to 7 days. The most common symptoms of the disease in patients with COVID-19 were fever (91.7%), cough (75.0%), fatigue (75.0%) and diarrhea (39.6%), and the most common comorbidity was hypertension (30.0%) and diabetes mellitus (12.1%) [54]. 80% of patients suffered from the disease in a mild and asymptomatic form, 15% - in severe and 5% - critical, requiring intensive therapy and mechanical ventilation [36]. One of the main diagnostic signs of the novel coronavirus infection is developing pneumonia with characteristic changes in the computed tomography of the chest - a "frosted glass" seal.

In a retrospective study by Navaratnam AV et al. [2] for the period from March 1 to May 31, 2020, out of 91,541 adult patients who were hospitalized in