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Features of the circulation of the influenza virus in the conditions of a pandemic

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ABSTRACT: The article is a brief review of the literature, which summarizes information about studies of the influenza virus and its circulation during the COVID-19 pandemic and highlights the issues of interference of the SARSCoV -2 with influenza viruses and their mutual influence on each other. The analysis of cases of influenza virus infection indicates the existence of a threat of deterioration of the epidemic situation, which requires careful monitoring of the pathogen circulation, especially during the period of "imaginary well-being", timely specific prevention in risk groups and early effective antiviral therapy.

KEYWORDS: Influenza, acute respiratory viral infection, pandemic; COVID-19, epidemic situation

The end of 2019 can be considered a historic milestone in the history of epidemiology, as this period marked the emergence of a new virus, which subsequently led to the beginning of the pandemic - SARSCoV2. This virus from the coronavirus family appeared for the first time in China, a country in which extremely dangerous and contagious pathogens, such as influenza viruses of subtypes A(H5N1) and A(H7N9), as well as "Hong Kong" influenza A(H3N2) [1,2,4,9,10], had previously appeared.

On December 31, 2019, an outbreak of pneumonia of unknown etiology in the population of Wuhan city was officially confirmed in China for the first time. By the beginning of January 2020, it was officially announced that the etiological factor in the development of a new form of pneumonia was a previously unknown variant of the coronavirus, which had a high level of pathogenicity and transmissibility [2,3,8]. Soon, the virus was detected on the territory of countries such as Japan, Thailand and China, and then in large countries – Australia, the USA and Russia. On March 11, it was announced in the world that coronavirus had already been detected in 114 countries with a total number of infected reaching almost 120 thousand people, which caused the announcement of the SARS-CoV-2 pandemic [6, 13].

During the first year of the pandemic, at least 40 million confirmed cases of infection were detected in the European region alone. At the same time, among large states, only China managed to cope with the consequences of the pandemic relatively successfully and quickly. Numerous countries of the world have experienced the full negative impact of the coronavirus pandemic on various spheres of life, including the economy. The sphere of medical services has been significantly affected. The emergence of the pathogen required an immediate response from the health systems of developed countries in the form of the development and mass production of vaccines capable of forming sufficiently stable immunity against the new virus [12,14,17].

At the same time, in the context of a pandemic, an increase in the level of epidemiological research is of particular importance. These studies should also focus on the study of possible relationships between microorganisms. In particular, the work on the study of the relationship between the causative agent of COVID-19 and the causative agents of

other common acute respiratory viral infections, which annually cause outbreaks of epidemics, is of interest. The results of such studies will contribute to a better prediction of the course of the pandemic and the development of preventive measures [15,16,18].

According to various sources, the development of the coronavirus pandemic has led to a significant decrease in the degree of circulation of influenza viruses, which was most pronounced in the period 2020-2021, especially in the countries of the Northern hemisphere. In the context of the coronavirus pandemic, an excessively limited number of suitable influenza virus strains have been identified that meet the requirements for influenza vaccines for the new season. This phenomenon was associated with the widespread implementation of anti-epidemic measures in a pandemic. At the same time , the influence of SARSCoV itself2 the effect on the circulation of ARVI pathogens has not been practically studied [17,19,20].

In this regard, there is an assumption of interference between the coronavirus and other pathogens of SARS. The concept of "interference" implies a significant decrease in the intensity of circulation of certain viruses under the influence of other viruses that are in a state of active spread in the population [4,9,13].

A natural decrease in the number of diagnosed cases of influenza by more than 90% was also accompanied by a decrease in flu mortality rates, which in certain countries reached record lows. Some epidemiologists currently fear that such a decrease in the incidence of influenza and other acute respiratory infections may be replaced in the future by a sharp increase in the incidence and the emergence of new strains of viruses. There are even predictions about a new pandemic of influenza A variants, which, as a rule, is the main cause of annual epidemic outbreaks. Epidemic outbreaks of influenza B occur every 2-4 years. There were also theories that real events in the world could lead to a repeat of the adaptation of the H5N1 influenza virus, which was observed in 1918, which would cause a new wave of pandemic [1,4,7,11,15,16].

Pigs play the main role in the mutation of influenza virus strains, since their epithelial cells of the respiratory tract have a high level of affinity to human influenza viruses. In this regard, new strains of the influenza virus appear more often in the countries of Southeast Asia, which is associated with the peculiarities of people's lifestyle [9,10,14].

In 2021, work was carried out to evaluate variants of the influenza virus, the results of which revealed the existence of strains of swine flu A (H1), avian influenza A (H5), etc. In May 2021, cases of influenza A (H5N6) virus infection were detected. In February 2021, Russia officially reported cases of avian influenza A (H5N8) virus in 7 patients. At the same time, the identified cases were directly related to contact with poultry. In June 2021, 2 cases of human infection with influenza A (H9N2) were found in China. In May 2021, a case of human infection with swine influenza A (H1N2) virus was observed in the United States. In June 2021, cases were identified from Canada and Taiwan, where infection with influenza A (H1N2) viruses was established [1,3,7,9,14,16].

The listed cases of infection indicate the existence of a threat of deterioration of the epidemic situation, which requires careful monitoring, especially during the period of "imaginary well-being". However, there are also unresolved questions regarding the effectiveness of seasonal influenza vaccines in terms of their compliance with circulating strains. Separately, it is necessary to address the issue of reducing collective immunity against influenza virus and other ARVI pathogens in a pandemic, which is associated with a decrease in their circulation in the environment [10,15,17,18].

Epidemiologists are interested in the question of how the flu virus will behave next season. A favorable scenario is that the same strain that was circulating at the end of the last season will return next season. Such a course of events is optimal in terms of the effectiveness of seasonal vaccines. However, such a scenario is unlikely, since the number of strains isolated since the beginning of 2020 is extremely limited. According to another scenario, certain variants of the virus may disappear if they do not have large zoonotic reservoirs. The most unfavorable scenario is associated with the possible appearance of a

new strain of zoonotic influenza, which is capable of causing a new pandemic [3,4,9,13].

The listed cases of influenza virus infection indicate the existence of a threat of worsening of the epidemic situation, which requires careful monitoring of the pathogen circulation, especially during the period of "imaginary well-being", timely specific prevention in risk groups and early effective antiviral therapy.

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