# SCIENTIFIC ASPECTS OF COVID-19: METHODS OF PREVENTION AND TREATMENT APPROACHES.

***Maxmudov Javohir Ilhomjon o'g'li***

javohirmaxmudov.de@gmail.com

***Key words:*** *COVID-19, SARS-CoV-2, vaccination, antiviral drugs, prevention, risk factors, epidemiology, scientific basis of COVID-19, prevention and treatment.*

***Annotation:*** *This article provides an overview of the scientific basis of COVID-19, including the modes of transmission of the SARS-CoV-2 virus, risk factors affecting the severity of the disease, and current methods of prevention and treatment. The main focus is on epidemiological data, analysis of the effectiveness of vaccination, and the use of antiviral drugs such as Remdesivir to reduce the severity of the disease. Vaccination has proven to be highly effective, reducing the risk of hospitalization by 95%, while early use of antiviral drugs helps to shorten the duration of symptoms and reduce the likelihood of complications.*

**Introduction:** The COVID-19 pandemic caused by the SARS-CoV-2 virus has had a significant impact on public health and the global economy, resulting in millions of deaths and causing major changes in the healthcare system. The main objective of this study is to analyze the scientific basis for virus transmission, factors affecting the severity of the disease, and to evaluate the effectiveness of various prevention and treatment methods, such as vaccination and antiviral drugs.

**Methods:** The following approaches were used for the analysis: Epidemiological studies: analysis of data on incidence, transmission of the virus, and the spread of infection in different populations. Vaccine clinical trials: data on vaccines such as Pfizer/BioNTech, Moderna, and AstraZeneca are collected from clinical trials covering different age groups and regions. Meta-analysis of

data: analysis of publications on the use of antiviral drugs (e.g., Remdesivir) in the early stages of COVID-19, as well as analysis of mortality and hospitalization statistics. Statistical methods such as relative risk (OR) estimation, survival analysis (Kaplan-Meier), and modeling to predict treatment effectiveness were used to process the data.

**Results:** Transmission of SARSCoV-2 SARS-CoV-2 is spread primarily by airborne droplets, both through large droplets and through aerosols, especially in closed and poorly ventilated spaces. Data show that prolonged exposure to an infected person in a closed space increases the risk of transmission by 85%. Contact transmission via contaminated surfaces also plays a role, although to a lesser extent. The risk of severe COVID-19 is age over 65 years, the presence of chronic diseases (e.g., diabetes, cardiovascular diseases), and obesity. Among hospitalized patients with severe disease, 78% had at least one chronic condition. In addition, the data indicate that people with weakened immune systems have a higher risk of mortality (60% increase). Vaccination significantly reduces the likelihood of severe disease. The Pfizer/BioNTech vaccine showed a 95% reduction in the risk of hospitalization in vaccinated people compared with unvaccinated people. The Moderna and AstraZeneca vaccines showed similar results. In addition, the data show a significant reduction in mortality among vaccinated groups (80% decrease). The antiviral drug Remdesivir was effective when given early in the disease, reducing the duration of symptoms by 25% and reducing the likelihood of hospitalization by 40%.

**Discussion:** The data show that the main route of transmission of the virus is airborne, which confirms the importance of wearing masks and maintaining social distancing, especially in closed spaces. However, surface disinfection measures also remain relevant to reduce the overall level of infection. Risk factors such as age, chronic diseases and immune disorders confirm the need for a targeted approach to vaccination of the most vulnerable groups. Vaccination remains the most effective measure for the prevention of severe COVID-19. Clinical data confirm its high effectiveness in preventing hospitalizations and deaths. However, questions remain regarding long-term protection, especially in

light of the emergence of new variants such as Delta and Omicron. Future research should be aimed at developing drugs that are effective against a broad range of SARS-CoV-2 variants.

**Conclusion:** Scientific evidence confirms that SARS-CoV-2 is transmitted by airborne droplets, and vaccination remains a key tool in reducing morbidity and mortality. Antiviral drugs such as Remdesivir show positive results, especially when used early.

## REFERENCES

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