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Letter to the Editor

COVID-19: THE OMICRON B.1.1.529 VARIANT

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INTRODUCTION

Since the first outbreak of severe acute respiratory syndrome coronavirus virus 2 (SARS-CoV-2) in China in 2019, variants such as Alpha, Beta, Gamma, and Delta have appeared with mutations in the genome of the virus. Omicron B.1.1.529 is a recent addition to such variants; It was first identified and registered with the World Health Organization (WHO) in November 2021 (1) and has raised concern worldwide due to its high level of transmissibility.

The Omicron B.1.1.529 variant is very contagious, and infects people who have already been immunized, including those who have recovered and have already developed antibodies. Fortunately, for now, vaccination is also effective for this variant. The Omicron variant of SARS-CoV-2 has an increased ability to evade immunity and cause widespread infections, which can be quite serious.

DISCUSSION

Since November 2021, the Omicron variant has spread rapidly in many countries. It features a spike protein that is very different from previously known variants (Delta) and raised concerns that it could escape antibody responses.

There was a spike in Coronavirus disease (COVID-19) mortality due to Omicron following the November outbreak (2). However, these deaths were commonly due to complications in patients with previous illnesses and those with a compromised clinical history. By 2022, the Omicron variant had spread to 135 different countries.

The high number of Omicron mutations lead to diversified BA.1, BA.2, BA.3, BA.4, and BA.5 subvariants with elevated immune escape capacity (3). The Omicron variant generates a highly mutated virus defined by the WHO as "worrying". It was also declared that the Omicron variant of SARS-CoV-2 presents a very high risk of infection. This statement reignited past anxiety concerning the recovery of the economy and social life.

The Omicron variant of the SARS-CoV-2 genome constitutes almost 20,000 mutations (4), and more than thirty amino acid mutations have been found within the spike proteins located primarily in the receptor binding domain that binds to the target cell (5). Globally, over 270 million SARS-CoV-2 infections have been reported and the virus has been seen to evolve over 1,500 times (6).

Numerous factors can influence the high transmissibility of the Omicron variant. The genome sequenced data has demonstrated more than 30 mutations in the spike protein which, as we know, is the gene part that recognizes the host cell. Data analysis of these mutations indicates the possibility of increased viral transmission and the potential to evade

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the immune response. Mutations can increase the binding affinity to the ACE2 receptor, which is one of the main factors influencing increased transmission. This creates a stronger binding affinity and greater ease of entry of the virus into the host cell and has occurred with the Omicron BA.5 variant.

Furthermore, the risk of reinfection with the Omicron variant in patients previously infected with COVID-19 is very high, indicating greater transmissibility and making the virus more contagious. The new Omicron BA.5 subvariant can render a false negative result in molecular polymerase chain reaction tests, complicating the situation and allowing the infection to spread at a faster rate around the world. The Omicron variant has also been identified in patients vaccinated against COVID-19, suggesting viral immune invasion, and resulting in a demand and urgency for updated vaccines (7).

The mRNA booster vaccine doses were moderately effective in preventing Omicron variant infection (8). Although, it has been reported that the estimated effectiveness of the Moderna vaccine is greater than the Pfizer vaccine in both the first vaccination and the booster (9). The validity of vaccines and antivirals against the Omicron BA.4 and BA.5 subvariants needs to be urgently evaluated. Anti-viral drugs such as molnupiravir and nirmatrelvir-ritonavir have yet to demonstrate their effectiveness and safety in the real world and healthcare systems must be adequately adapted for their correct use (10).

The first three doses of the Delta vaccine did not completely cover the infections induced by the Omicron BA.4 and BA.5 subvariants in some cases. The US pharmaceutical company Moderna, which already produces the mRNA vaccine which has, to date, immunized millions of people globally, announced a new version of the vaccine which would cover the Omicron subvariants BA.4 and BA.5.

In March of 2022, new Omicron subvariants were identified. These included XF and XD, recombinant subvariants of the Delta variant and the BA.1 sub-lineage, and XE, a recombinant form of BA.1 and BA.2 Omicron sub-lineages. In particular, the XE subvariant was seen to be highly transmissible due to numerous mutations in the spike protein of this virus (11).

As of today, Omicron sub-lineages have expanded to include the following variants in circulation: BA.4, BA.4.6, BA.5, BA.2.75.2, BQ.1, BQ.1.1, XBB, and XBB.1 (12). These variants have not been seen to cause severe Covid-19 disease, although they can tend to evade vaccines and antibody neutralization, and are therefore, still of concern, especially for people with other illnesses or who are immunocompromised. In August 2022, the Federal Drug Administration permitted the emergency use of updated COVID-19 boosters, which were bivalent forms of the Moderna and Pfizer-BioNTech vaccines (13). This vaccine contains the mRNA components of the original SARS-CoV-2, as well as the Omicron subvariants BA.4 and BA.5.

COVID-19 produces diverse systemic symptoms, including neurological sequelae that affect the CNS such as dizziness, motor delay, depression, anxiety, headaches, myalgia, impaired cognitive function, and more severely, stroke. Neurological symptoms can occur not only in acute infection, but also in the post-infection period, which has been termed long COVID. Structural and functional brain changes have also been demonstrated after infection. Some evidence suggests that incomplete clearance of SARS-CoV-2 infection could contribute to the persistence of symptoms after COVID-19 (14).

Studies have demonstrated that infection with the Omicron variant, like the original and Delta strains, can involve neurological symptoms. One recent imaging study by Y. Du et al. showed altered gray matter thickness and subcortical nuclear volume post-infection in men (15). Another study, using a K18-hACE2 mouse model, found that the Omicron virus can cause brain infection with lymphoid depletion (16).

CONCLUSIONS

The SARS-CoV-2 infection is responsible for a pandemic that has caused millions of deaths across the globe. Over time, the virus has changed its genetic composition, creating new variants that can partly escape vaccination, and therefore has created the need to generate new vaccines. Today, highly transmissible variants such as BA.4, BA.4.6, BA.5, BA.2.75.2, BQ.1, BQ.1.1, XBB, and XBB.1 are spreading quickly and can also infect immunized individuals. It should be underlined, however, that the new sub-lineages are less aggressive and pathogenic than the previous Delta variant. Since the number of variants is numerous, there is a need for close monitoring, and we must always be ready to create updated vaccines that can defend against new viruses that threaten human health.

Conflict of interest

The author declares that they have no conflict of interest.

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