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Letter to the editor

Omicron variant in the current SARS-CoV-2 pandemic

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Two years after the appearance of the severe acute respiratory syndrome-Coronavirus-2 (SARS-CoV-2) in Wuhan Province in China, on November 24, 2021, another novel variant of the virus was reported in South Africa. The World Health Organization (WHO) announced it as the Omicron (B.1.1.529) variant, which belongs to the variant of concern (VOC). Following Alpha, Beta, Gamma, and Delta VOCs, Omicron is the fifth mutation of SARS-CoV-2. Today, this highly mutated variant is spreading rapidly around the globe, while the world is exhausted by the pandemic and is still struggling with the widespread negative social, psychological, and economic effects of the COVID-19.^{1,2} This brief letter focused on Omicron as a novel variant in the current pandemic.

According to the WHO, various laboratories reported that one of the three target genes (i.e., the S gene) is not detected using a PCR test to identify the new variant. Therefore, the lack of the S-gene can be used as a marker for detecting B.1.1.529.³ Compared to the delta variant, Omicron has more than 30 mutations in its spike protein, in which NSP12 and NSP14 proteins are responsible for the replication of Omicron. The transmissibility of B.1.1.529 is rapidly increasing due to its numerous mutations. In this respect, many countries have updated and revised their COVID-19 protocols or imposed partial lockdowns to deal with the issue.¹

In a study conducted by Gu et al., the Omicron variant was identified in two patients who received two doses of the Pfizer-BioNTech vaccine. Case patients A and B arrived in Hong Kong from South Africa and Canada, respectively. Both individuals stayed in the same hotel under strict quarantine. Although their PCR tests were negative 3 days before their arrival in Hong Kong, the PCR tests after symptoms appearance were positive for B.1.1.529 in both individuals A and B after 2 and 5 days, respectively. However, the other individuals staying in nearby rooms and the hotel staff were found negative of COVID-19. Overall, there were two major limitations in the study: 1) a small number of participants and 2) a lack of a booster dose.⁴

There are numerous questions concerning the Omicron variant, two of which are the most important: 1) Does Omicron pose a challenge to vaccine effectiveness? 2) Is Omicron more transmissible than the other variants in causing more severe cases?

Recent studies have addressed these questions and reported the following information: the immune system response to SARS-CoV-2 after vaccination decreases after 3 months. Therefore, a booster dose can mitigate the spread of SARS-CoV-2 regardless of VOC. Due to multiple mutations in Omicron's spike protein, there is an increased concern for its potential immune escape. In addition, using heterogeneous vaccines may reduce the spread of Omicron; however, this assumption requires further investigation.^{1,5} In another work, Pulliam et al. conducted a study in South Africa on 2,796,982 participants who were found positive with SARS-CoV-2 in the last 3 months. The results showed that 35,670 cases were diagnosed with suspected reinfection. Accordingly, it can be inferred that the Omicron variant can lead to an increased risk of reinfection than the primary infection. One of the study's major limitations in South Africa was that the vaccination rate was very low. Therefore, the result cannot be generalized to a nation with higher vaccination coverage.⁶ In this respect, there are many intervention factors related to the severity and mortality rate of the Omicron variant in various countries. Some of these factors include the COVID-19 vaccination rate, quality of the healthcare system, economic situation in each country, and elderly population with comorbidities.⁵

Although there have been conflicting reports regarding the effectiveness of the current vaccines against the four mutations of COVID-19 preceding Omicron, its effectiveness is satisfactory. So far, most vaccines have helped to reduce severe COVID-19 cases, hospitalization, mortality rate, and the spread of the previous mutations. The explanation for this promising result may be the fact that the efficacy of vaccines depends on the T-cell immune responses rather than antibodies.⁷

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In another recent study, Chen et al. through a comprehensive quantitative analysis demonstrated that the Omicron variant might be 10-times more transmittable than the original type. In addition, 132 3D structures of antibody receptor binding domains (RBDs) showed that the ability of Omicron escaping the vaccine might be two times higher than the Delta variant.⁸ On the other hand, vaccines may provide some protection and reduce the spread of COVID-19 even if their full effectiveness against Omicron is not proven yet.⁹

It is debatable whether the Omicron variant is the dark side of SARS-CoV-2. As noted earlier in this letter, the WHO categorized Omicron as VOC. This classification puts the novel variant in the group of high transmissibility (more than 50%) and reduced effectiveness versus vaccines or treatments.³ The variant of high consequence (VHC) is another variant categorization by WHO on SARS-CoV-2. VHC can also significantly reduce the immune system response to the virus, which is already produced by either the vaccine or the antibodies from the previous infection.¹⁰ A noteworthy point in this regard is the lack of any SARS-CoV-2 mutation associated with the VHC up to the publication of this paper.

Preliminary data on Omicron showed that the current treatment protocol is effective against the new variant.^{5,7} However, it is suggested that further research should be performed on the Omicron variant, particularly monoclonal antibodies, to obtain more precise and valid data on the treatment procedures. As a strategy effective in reducing the previous VOC (i.e., SARS-CoV-2), medical masks, physical distancing, hand disinfection, and vaccination can also play an essential role in reducing the spread of B.1.1.529 variant.

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