

# The SARS-CoV-2 Omicron (B.1.1.529) variant and effectiveness of existing vaccines: What we know so far

The SARS-CoV-2 Omicron (B.1.1.529) variant first emerged in early November 2021, has prompted worldwide fear due to its contagiousness and immunity escaping capacity.<sup>1,2</sup> Omicron has gotten a lot of attention in a short amount of time because it has more mutations (>30) in the spike protein than any other variants.<sup>3</sup> The World Health Organization (WHO) has identified this variant as a variant of concern (VOC). On November 29, 2021, WHO published a statement mentioning the Omicron variant as a “very high” danger for the world. Also, preliminary research suggested that it might be a more transmissible variety, potentially resulting in infection outbreaks. Omicron may have the ability to impair the effectiveness of vaccines as the number of mutations on the spike protein of this variant theoretically suggests that the efficacy of antibodies produced by COVID-19 vaccinations will be diminished.<sup>4,5</sup> Monoclonal antibodies are useful antiviral drugs for patients with a high risk of developing severe COVID-19. However, the spike protein of the Omicron variant has been changed extensively.<sup>6</sup> Therefore, this variant has created huge concerns among the scientific communities.<sup>7–9</sup> According to South African inquiry findings, this variant may be responsible for higher hospitalization rates in children than prior SARS-CoV-2 variants. However, this increased infection rate in children may be due to lower rates of previous coronavirus infection and immunizations. At the same time, it can be the result of this variant's high mutation rate.<sup>10</sup> The scientific community knows very little about the infectivity, antibody resistance of Omicron, and vaccine breakthrough information. Nevertheless, early genomic data reveal immune evasion capabilities, quick transmission ability, reinfection rate, high disease morbidity or mortality, and severity, while conclusive immunological and clinical evidence is still unavailable.<sup>4,11</sup> All of this information has the potential to pique our attention in this highly mutated variety.

According to some laboratory studies, the Omicron variant may have the ability to evade immunity induced by some COVID vaccines. As per published data from UK Health Security Agency, the current vaccines could not give similar protection against the Omicron variant as they gave against other SARS-CoV-2 variants. However, the finding was preliminary to determine the exact role of existing vaccines against Omicron.<sup>12</sup> Till now, little evidence suggested that a booster dose of COVID-19 vaccines provided an additional layer of protection against the disease. However, doubts remain about how much assistance they would offer and how frequently they would be required. Booster vaccines appear to improve protection against COVID-19 infections, but proof of their long-term effectiveness, impact, and ability to combat the new strains is still lacking.<sup>11</sup>

On December 8, 2021, Pfizer and BioNTech claimed after a laboratory test that a three-course of their mRNA vaccine could combat effectively with Omicron variant, indicating that booster shots may be required to protect against infection with the newly identified variant. Similar to Pfizer and BioNTech findings, another study in Israel found that booster dosages may be crucial to prevent the Omicron variant. The study compared the immunity levels in the blood samples of 20 people who had received two vaccine doses about 5–6 months earlier and another 20 people who had received two vaccine doses about 5–6 months earlier, along with a booster dose about 1 month earlier. According to the study, people who had not taken booster dose could not neutralize Omicron. As the Israeli scientific team dealt with the actual virus, the results may indicate the genuine need for a booster jab.<sup>5</sup> Another study exhibited that those with immune systems boosted with mRNA vaccinations were more effective at neutralizing Omicron, indicating that boosters increase immunity against this variant.<sup>2</sup> As per the prediction, these findings show that the Omicron variant can avoid mRNA vaccine-induced immunity in vivo. Nonetheless, in those who have taken total or booster dosages, the protection against serious illness is likely still present.

There is no option but to increase the vaccination rate to combat the newly emerged Omicron variant.<sup>13–15</sup> Also, we recommend ensuring booster dose for the susceptible population as this additional dose gives an extra layer of protection. As the booster dose of the mRNA vaccine can reduce the complications related to COVID, it is necessary to ensure the booster shots as early as possible. As recently published data exhibited that mRNA vaccines can protect Omicron.<sup>5</sup> Therefore, WHO should take initiatives to ensure the availability of these mRNA vaccines worldwide, especially for poor and developing countries. The vaccine invented organization should take a step to investigate to find out variant-specific vaccines to fight against existing SARS-CoV-2 VOC. Also, WHO should prioritize all existing vaccines according to their variant-specific effectiveness. The vaccine manufacturers should think about the customization of their vaccines against heavily mutated coronavirus strains. These approaches should be followed immediately as a new mutated variant of the coronavirus may emerge in the future. We have fought against multiple variants of coronavirus and experienced a variety of approaches such as lockdown, quarantine, travel restrictions, and so forth. We have also experienced the negative consequences of such strategies on our day-to-day life along with psychology.<sup>16–21</sup>

Many people had to deal with poor economic conditions, severe food insecurity, intimate partner violence, and so on due to sudden COVID-19 responses.<sup>22,23</sup> Therefore, we do not encourage the countries to follow movement restrictions and travel bans to avoid such negative consequences. Global healthcare authorities should ensure equal distribution of COVID-19 vaccines in developed and underdeveloped countries and provide logistics to frail healthcare authorities to prevent existing and upcoming coronavirus variants. The vaccine manufacturers, regulators, and global leadership should emphasize the common fate of people across the world to overcome this global crisis. Also, the healthcare authorities should encourage people to follow health safety guidelines, avoid public gatherings, and wear face masks.

### CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.


### AUTHOR CONTRIBUTIONS

Md. Sohan conceived and wrote the first draft. Md. Jamal Hossain revised and gave intellectual inputs to the manuscript. Md. Rabiul Islam supervised, edited, and revised the manuscript. All the authors approved the final version for submission.

### DATA AVAILABILITY STATEMENT

Data sharing are not applicable to this article as no datasets were generated or analyzed during the current study.

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