

Risk evaluation and mitigation strategies for newly detected SARS-CoV-2 Omicron BF.7 subvariant: A brief report

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Abstract

Mutations of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) are always going on. The pathogenic characteristics of a virus are influenced by mutations in the viral genome. Therefore, the recently identified Omicron BF.7 subvariant might harm humans. Here we aimed to evaluate the potential risks of this newly detected variant and identify possible mitigation strategies. The frequent mutation associated with SARS-CoV-2 makes it more concerning compared to other viruses. The Omicron variant of SARS-CoV-2 has unique changes in the structural amino acid. Thus, Omicron subvariants are different from other coronavirus variants in terms of viral spread, disease severity, vaccine neutralization capacity, and immunity evade. Moreover, Omicron subvariant BF.7 is an offspring of BA.4 and BA.5. Similar S glycoprotein sequences are present among BF.7, BA.4, and BA.5. There is a change in the R346T gene in the receptor binding site of Omicron BF.7 than other Omicron subvariants. This BF.7 subvariant has created a limitation in current monoclonal antibody therapy. Omicron has mutated since it emerged, and the subvariants are improving in terms of transmission as well as antibody evasion. Therefore, the healthcare authorities should pay attention to the BF.7 subvariant of Omicron. The recent upsurge may create havoc all of a sudden. Scientists and researchers across the world should monitor the nature and mutations of SARS-CoV-2 variants. Also, they should find ways to fight the current circulatory variants and any future mutations.

KEYWORDS

BA.5.2.1.7, BF.7, coronavirus, COVID-19, Omicron, SARS-CoV-2

1 | BACKGROUND

The healthcare authority in Wuhan, China, detected multiple cases of pneumonia in late 2019.¹ The country identified the novel Coronavirus Disease 2019 (COVID-19) in December 2019.² The virus was called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).³

As of December 23, 2022, SARS-CoV-2 has infected more than 650 million individuals and killed over 6.6 million.⁴ Although the number of reported cases and confirmed deaths lessened during the middle part of the year, the most recent reports suggest an inevitable outbreak of coronavirus infection once again.⁵⁻⁸ However, confirmed cases and deaths in China, Japan, South Korea, and the USA are now

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rising again.⁹ According to a report, the recent upsurge of COVID-19 infection in these regions might be due to the new Omicron subvariant BF.7.¹⁰ As of December 25, 2022, Omicron subvariant BF.7 has spread over 90 countries.¹⁰ Scientists assume that the newer subvariant of coronavirus may soon spread out to every corner of the world and may create havoc once again. Therefore, the healthcare authorities should take the initiatives to tackle this recent outbreak with proper and scientifically sound measures.

2 | SARS-COV-2 MUTATION FROM ALPHA TOOMICRON

Scientists predicted from the beginning of the COVID-19 pandemic that the mutant strains of the virus might elongate the pandemic.^{11–14} Mutations of the SARS-CoV-2 are always going on. The pathogenicity of a virus may influence by mutations in the viral genome.¹⁵ The ability of a virus to elude the defense mechanism can be significantly affected by the modification of amino acids.¹⁶ This change in viral structural protein can alter the effectiveness of vaccines and preventive measures. SARS-CoV-2 may undergo mutation similar to the other RNA viruses as it tries to adapt itself to its host.¹⁶ As a result, several distinct variants may produce from its parental strains.¹⁷ SARS-CoV-2 variants exhibited different characteristics, and some were classified as variants of concern (VOCs) based on their nature. The Alpha (B.1.1.7) strain was the first to be regarded as a VOC in December 2020.¹⁸ Then, the COVID-19-associated mortality toll in the two nations was significantly increased by the Beta (B.1.351) strain in South Africa and the Gamma (P.1) strain in Brazil.¹⁸ However, Delta (B.1.617.2) strain reported by India in December 2020 led to a widespread catastrophe and was the deadliest mutant strain of SARS-CoV-2.¹⁸ In November 2021, the Omicron (B.1.1.529) strain was first reported in South Africa.¹⁸ By this time, the WHO identified eight variants of interest (VOIs) that are not treatable to humans.¹⁸ The recent upsurge of COVID-19 might be attributed to the newer subvariant of Omicron BF.7 (BA.5.2.1.7). The frequent mutation associated with coronavirus makes it more concerning compared to other viruses.¹⁹ The subvariant of Omicron named BA.1 contains more than 30 mutations in the S protein that distinguish it from the original virus. The rapid spread of BA.1 made it a predominant strain globally. At this moment, BA.4 and BA.5 are the variants that may create an upsurge in the coronavirus infection.²⁰ Three hypothetical theories are present to illustrate the evolution of the Omicron variant. At first, it cryptically spread to specific people. The most popular hypothesis states that Omicron can infect fully immunized individuals. Lastly, Omicron might have mutated inside another host other than humans.²¹ The spike protein of the virus is the principal focus of the currently administered vaccines. But several portions of the S protein of the Omicron variant have undergone a mutation that has made it unrecognizable to antibodies produced by natural infection or vaccination.²² Omicron subvariants have better antibody resistance compared to earlier strains. Moreover, Omicron subvariant BF.7 is a descendant of BA.4 and BA.5. Similar S

glycoprotein sequences are present among BF.7, BA.4, and BA.5. The only change is the R346T mutation in the receptor binding domain in BF.7 compared to earlier Omicron subvariants.²³ The emergence of this variant has created an obstacle in current monoclonal antibody therapy. The Omicron mutation in RBD and FCS is to blame for its high infectivity compared to the earlier variants. The only positive of Omicron subvariants is that disease severity, hospitalization, and mortality of Omicron are lower than that of earlier strains.²⁴

3 | RISK EVALUATION OF COVID DANGER DUE TOOMICRON BF.7 SUBVARIANT

Still, China is facing an unprecedented crisis due to the BF.7 variant, which has spread its tentacles across Japan, South Korea, Taiwan, and Hong Kong. The high transmissibility of BF.7 in China may be due to a lack of immunity in the Chinese population and their hesitancy to follow healthcare measures. The recent movement in China against the government suggests that they are not willing to follow proper healthcare measures.²⁵ Due to the rapid transmission of BF.7, COVID-19 cases in China are constantly rising, making it difficult to control. It may also indicate that the vaccine administered by the Chinese people might be ineffective against the new variant.²⁶ Also, the increased daily cases in Japan remind the ineffectiveness of COVID-19 vaccines against the BF.7 variant. It can evade the immune system more easily than the earlier variants. It also has a relatively short incubation period.²⁷ The authorities have predicted that within the next 3 months, a large population in China, India, and South Korea will get infected by this variant. Studies demonstrated that NAb titer against BA.1 significantly increased after two doses of vaccine followed by a booster shot. BA.4 and BA.5 have antibody-resisting capacities.²⁸ Still, reports suggest that the booster dose may help to reduce morbidity and hospitalization against Omicron BF.7 subvariant.²⁹ There has been a suggestion to give the fourth dose to immunocompromised patients in Israel.³⁰ The vaccine is vital to combat the recent upsurge of the BF.7 variant. But the people of developed countries are still hesitant to take vaccines. In America, there are still a lot of people not willing to get vaccinated. Their concern regarding vaccines' efficacy and side effects.³¹ On the contrary, people in poor and developing countries, including health workers, have not received full COVID-19 immunization.³²

4 | POSSIBLE STRATEGIES TO PREVENT FURTHER COVID-19 DISASTERS

The BF.7 outbreak can suddenly become a disaster for the entire world. Hence, we should take precautionary steps as quickly as possible. The equal distribution of vaccines can ensure the protection of people worldwide.³³ The poor people have less privilege to better healthcare facilities, and they should get the vaccine as soon as possible before the outbreak of the new variant. The people hesitant

to take the vaccine should take it quickly to protect themselves from the virus.³⁴ Researchers should discover the effectiveness of existing COVID-19 vaccines against the circulating strains of coronavirus.³¹ Healthcare authorities should increase the vaccination rate across the world. People nowadays tend to avoid healthcare measures due to several factors. But the recent mutation is alarming everyone to continue to follow the health guidelines properly.³⁵ Also, the Chinese protest indicates that people are probably exhausted after following healthcare measures. The authorities can consider mass awareness about the most recent strains, their nature, and potential consequences.^{36–38} Scientists should keep their eyes on continuous mutation and the nature of newly formed variants. They can perform research to understand the mutated BF.7 strain and to identify effective measures accordingly. As the prolonged outbreaks due to previous variants have weakened the economic status of many families, the government authorities must ensure incentives for poor people if the situation arises.^{39,40} To effectively combat the new wave, people might need to do what they previously did in case of earlier strains. The authorities may again impose health safety measures and guidelines due to the health risk of the new Omicron BF.7 subvariant.⁴¹

5 | CONCLUSION

Omicron has mutated since it emerged, and the subvariants are improving in terms of transmission as well as antibody evasion. The globally prevalent Alpha, Delta, and Omicron coronavirus variants evolved suddenly and stochastically. Therefore, the healthcare authorities should pay attention to the BF.7 subvariant of Omicron. The recent upsurge may create havoc all of a sudden. Hence, people of all classes and the respective government authorities should be alert and cautious about the recent Omicron subvariant.

AUTHOR CONTRIBUTIONS

Nazmunnahtar: Conceptualization; data curation; writing—original draft. **Iftexhar Ahmed:** Conceptualization; data curation; writing—original draft. **Md Rabiul Islam:** Conceptualization; supervision; writing—review & editing.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest declared.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

TRANSPARENCY STATEMENT

The lead author Md. Rabiul Islam affirms that this manuscript is an honest, accurate, and transparent account of the study being

reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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