

SARS-CoV-2 Omicron (B.1.1.529) Variant: No Time to Wait!

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Abstract. On November 26th, a new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), B.1.1.529, was designated by the World Health Organization (WHO) as a variant of concern (VOC) and named Omicron. The news raised an international alarm about a new wave of coronavirus disease 2019 (Covid-19) outbreak, since Omicron has a large group of mutations, which may affect the way it spread, cause disease, and escape from the immunity. Therefore, it is essential to take a closer look at how it has emerged, how it may sustain the pandemic, and how we can act correspondingly, both nationally and internationally, to help controlling the spread of the disease. (www.actabiomedica.it)

Key words: SARS-CoV-2, coronavirus disease, Covid-19, omicron variant, b.1.1.529, Variant of concern, pandemic, africa, world health organization, mutation, emergence, transmissibility, immune escape, infection, vaccine resistance, healthcare system, hospitalization, preventive strategies, health recommendations, international collaboration

Introduction

About two years after the first cases of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) have identified in Wuhan, China; on November 26th 2021, a new SARS-CoV-2 variant of concern (VOC) was designated by the World Health Organization (WHO). First reported on November 24th from South Africa, it has named Omicron after the fifteens letter of the Greek alphabet. Despite three distinct peaks in coronavirus disease 2019 (Covid-19) reported cases in South Africa, a significant community transmission in the last weeks of 2021 around the world has led to the detection of the new B.1.1.529 variant (1). As of April 7th, a total number of 2,906,606 confirmed genome sequences of Omicron are reported globally from 179 distinct countries and all 6 continents (2). The Technical Advisory Group on SARS-CoV-2 Virus Evolution (TAG-VE) has

advised WHO to categorize Omicron as the variant of concern based on several numbers of mutations that may affect the way it behaves (3). Besides, the fact that it can potentially cause infection in people who have already been infected or fully vaccinated, suggests that it may have been evolved to escape more easily from the vaccine-induced or pre-existing immunity (4, 5). Therefore, it is essential to take a closer look at how it has emerged, how it may sustain the pandemic, and how we can act correspondingly, both nationally and internationally, to help controlling the spread of the disease.

Importance

The first confirmed B.1.1.529 sample was collected in Botswana on November 9th, about 2 weeks earlier than its initial detection on South Africa and

the official WHO statement (1). After first cases in Africa, other parts of the world announced their first Omicron cases through sharing their sample collection. Some cases were directly travelled from southern African countries, while others had no history of crossing their borders, yet tested positive for Omicron variant. It means that despite official data, the new variant had been circulated in nations around the world, and now, 179 countries are reported Omicron from their PCR sampling (2).

Based on the latest WHO statement on enhancing readiness for Omicron, the overall risk associated with Omicron variant remains very high (6). Initial data suggest there are about 50 mutations on the genome of the virus, of which 32 are on the spike and 15 belongs to the receptor-binding domain (RBD) (4, 7), which has been targeted previously by the most vaccines (8). There are also three mutations on the furin cleavage site (FCS), which is associated with increased viral infectivity (9, 10). This huge amount of mutations raised an alarm for the global communities as it can potentially increase transmissibility, vaccine resistance, and virulence of the virus. As a comparison, the number of mutations on the genomic sequence of the Delta variant was 9, 2, and 1 for the spike, RBD, and FCS, respectively (7, 11). Some researchers also proposed that the Omicron might have a higher affinity to the human ACE-2 receptor than the Delta variants (12, 13). Despite preliminary data suggested higher transmissibility and reduced antibody neutralization for Omicron variant (14, 15), further investigations proposed that severe Covid-19 outcomes and hospitalization followed by Omicron is meaningfully lower than other variants, including Delta (16, 17). However, the rate of hospitalizations remain high mainly due to extreme transmissibility of the lineage and novel structure of the spike protein through extensive mutations in the RBD region (18-20).

Whether the Omicron variant has originated in Africa or not, the first cases are always the key to understanding the spreading pattern of the disease. Since the rate of HIV infection is relatively high in African nations (21), it is hypothesized that these large mutations could occur during a chronic Covid-19 infection within an immune-compromised population, which probably has a lower vaccination rate and weak

healthcare infrastructures. This could lead to remaining a group of viruses in such hidden population, and evolved new mutations gathered in one single burst (22, 23). In another theory, the virus could have been hidden in rodents or other animal reservoirs, evolved for a while, and then returned to the human population with a relatively different genomic appearance (24). Taken together, what makes Omicron a new global concern is the rapid spreading of cases across the world, even in populations with higher vaccination coverage, which appears to be out-competing previous variants much faster than before (6, 25, 26).

To the best of our knowledge, widely used PRC tests are detecting Omicron as effective as previous variants. Based on the WHO statement, IL-6 receptor blockers and corticosteroids are still effective therapeutic choices for severe Covid-19 infection, while monoclonal antibodies such as sotrovimab (VIR-7831) are also suggested to preserve immunity against Omicron (3, 27). Recent investigations on vaccines effectiveness provided essential clues on how Omicron can affect vaccine-induced immunity. Several studies reported that mRNA vaccines can offer a similar degree of viral protection against Omicron compared to the previous variants; however, vaccine-induced immunity against symptomatic disease and severe infection will be wane within several weeks (28, 29). The result of other studies also proposed that primary vaccination with two doses of anti-Covid vaccines provide limited protection against Covid-19 caused by the Omicron. However, a booster dose can substantially increase vaccine-induced immunity, even in patients suffered from cancer (30, 31). Although the effectiveness of anti-Covid vaccines against transmission of the Omicron wave is limited, vaccines remained crucial to decrease severe disease, hospitalization, and death, caused by different SARS-CoV-2 variants. (32, 33).

Recommendations

With any new SARS-CoV-2 variant, there is a possibility of a surge in new cases and hospital admissions. Therefore, following the recommendations is the key to control the outbreak and further outcomes.

General Recommendations

The best action people can take to lessen the spread of the virus is simple: To not get sick and not to make others sick. To this purpose, following preventive strategies such as wearing a well-fitting mask, washing the hands regularly, appropriate social distancing, avoiding crowded or poorly ventilated places, opening windows and doors to improve ventilation, covering sneezes and coughs with elbow or tissue, and daily cleaning surfaces are crucial (3, 34). Also, regular Covid-19 testing, daily health monitoring, postpone traveling to high community transmissible areas, and more importantly, getting fully vaccinated, along with booster dose are among the most effective ways to control the disease (35, 36). Based on previous studies, there are other ways to help foster the immune system against severe Covid-19 infection. Physical activity and exercise (37, 38), good nutrition (39), diminishing smoking and alcohol (40, 41), listening to the music and enriching the environment (42), especially when you feel isolated, and also, keep up with regular treatments for underlying diseases, such as diabetes and cardiovascular diseases (43, 44) are among the most effective ways.

National Recommendations

After 4 months of its designation, many countries are facilitating restrictive measures against the widespread diffusion of the Omicron, in the assumption of mild symptom of the disease in the majority of vaccinated or pre-infected people. However, due to higher transmissibility, the rate of hospitalization remained high. This can put further pressure on the hospitals and healthcare providers, while putting them at a higher risk of reinfection and vaccines breakthrough infection, caused by Omicron (45-47). Therefore, by setting accurate healthcare policies and prevention strategies, national authorities can also play a critical role in controlling the disease. A travel ban for highly infected countries, restricting international flights, and quarantining passengers even if they are fully vaccinated, could be a great help. However, timing, quality, and conditionality of testing and quarantine requirements should be concordant between nations and countries to prevent logistical difficulties and charging

travelers with higher costs (48). Based on research, working from home and having fewer occupational workplaces could also make a huge difference in the rate of infection with Covid-19 (49, 50). Therefore, providing employers and companies with remote work facilities can be helpful. Regular testing and speeding up vaccination rate are also promising ways to protect the society against the possible wave of Omicron infection (36).

International Collaboration

With every mutation, there is a chance for increased transmissibility, immune escape, and severity of the variants. Mutations mostly occur in a population with a lower rate of vaccination since the immune system cannot properly detect or eliminate the virus. As a result, the structure of the SARS-CoV-2 can change more and new spreading waves around the world are more likely to be appear (51). African nations are among the poorest contributors in Covid-19 vaccination (52). Given the highest rate of HIV infection as an immune suppressor disease among South African countries (21), Africa could be a vulnerable place to emerge new strains of the SARS-CoV-2 virus. So, it is vital for International communities, vaccine producers, and everyone in power to vaccinate Africa (53), and other less vaccinated nations, which can protect the world against other possible mutations and further variants of concern. If the Omicron is as dangerous as it already appears, setting strict rules on international transportations and local communications should be continued. This can prevent damaging already exhausted healthcare systems and provide better healthcare experience for infected people during the pandemic (45, 54). At this time, we need international collaboration more than ever to end the pandemic; after all, the house is still on fire, and we have to save each other or will be burned together.

Conclusion and Future

Omicron variant showed us there are still new aspects of Covid-19 to be concerned about, and after almost two years, an ever-changing outbreak is

still within us with different faces. Living through the lens of previous pandemics has taught us the main contributors in controlling the outbreak are to follow preventive strategies, stay healthy, and get vaccinated as soon as possible. Besides, national and international collaborations remained crucial to diminish the viral load across the borders, while acting borderless is the potential way to end the global pandemic.

There are also some promising points about Omicron. Through relatively new mutations, Omicron may have evolved to a more transmissible strain; however, it is less fatal than previous VOCs, Delta for example. Further studies should be conducted to show how Omicron could shape the future of the pandemic, but until that time, it is essential to stay positive, follow the health recommendations, and remember, “no one is safe until everyone is safe”.

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