



REVIEW ARTICLE

A Rumination on Highly Resistant the SARS-CoV-2 (Omicron) of Mutation, Spread, and Vaccinations to New Challenges

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Abstract

When the world is largely focused on battling the Delta spread, On 26 November 2021 WHO announced the new Covid-19 variant, which is highly mutated. That is called Omicron, which is a serious variant of the subject. The current study examines and compares the changes in SARS-CoV-2, Alpha to Omicron. In these mentioned variants, we observed mutations that could have an impact and alter. Its activity with Spike protein, with to negotiated Omicron affected countries situation in review, has focused on the evolution of SARS-CoV2 variants, the vaccine efficacy and rt PCR testing. This review is to focus on special strategies to boom vaccine recognition against Omicron, an important theme of covid-19 situations. These views on overcoming the pandemic's modern-day demanding situations provide strategies to include SARS-CoV-2 globally.

Introduction

Almost two years after the start of the rampant "novel coronavirus" which has more than affected 50 lakhs people lived, COVID-19 is on alert for the world. On Friday, 26,12, 2021, declared publicly WHO (WHO, 2021) a new variant of the SARS-CoV-2 virus, given the name Omicron or B.1.1.529. Which has appeared to be developing in all of southern Africa, especially Gauteng. The WHO, association scientists, and many health institutions have been closely tracking the Coronavirus since 2020 (Petersen *et al.*, 2022). The CDC emergence of specific variants of Covid-19 has been characterized is to 3 parts which are- a variant of concern (VOC); Variant of Interest (VOI); Variant of High Consequences (VOHC) (SARS-CoV-2). World-class Health communities are constantly monitoring novel coronavirus-related and to the degree feasible to prevent it by informing the world of any changes of Covid virus to the outbreak. Since January 2021, multiple Covid -19 viral variations have evolved and grown dominant in numerous countries, with (α) ALPHA, (β) BETA, (γ) GAMMA & (Δ) DELTA being the most noticeable to date (Table-1) (WHO). This article discusses the newly acquired Covid-19 variant Micron and the reviews of the same are focused.

Changing viral evolution

In 2020 the summer a new variant, B.1.177 (Nextstrain 20E), emerged and quickly made its way to European

Countries (Hodcroft *et al.*, 2020). after this got the a variant (Lineage B.1.1.7, Nextstrain 20I). From December 2020 to January 2021, this variant spread more. The variant is estimated to be 40-80% more transmissible than the other SARS-CoV-2. Detected The Alpha variant has been declared a worrying outbreak Variant of Concern (VOC). This line shows a series of important adaptations in the viral S protein after some commercial PCR assays, such as the Thermo's TaqPath test. On the basis of the investigation, the del69/70 mutation was of particular interest as it triggers the degradation of the S gene, leading to the failure of the clinical target.

This gene drop can be used during this period, to screen it for potential alpha variants before the development of specific PCR tests and large-scale whole-genome sequencing (Washington *et al.*, 2020). The Federal Office of Public Health and the National Reference Center for Emerging Viral Infections of Switzerland were confirmed between December 2020 and March 2021. They coordinated the (beginning of screening) with line-specific PCR tests followed by sequencing integrons. Because it was clear in many types of research so far that the Alpha Variant is spreading very fast in different countries. For this reason, transcription has been used to reduce its spread (Cabecinhas *et al.*, 2021). again in 2021 Month of May, within some weeks, the Alpha was replaced by Delta Variant with a higher transmission rate. Which is a higher role-play in Covid-19 infections in over the world

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(Mlcochova *et al.*, 2021). Then, after all, variants, a new variant was found in November 2021 which was named Omicron. Early findings suggest that the Omicron variant has now been detected in many countries worldwide. Any type of Cov-19 Variants might be more severe than Delta. But it is important to remember that all variants of Covid-19 so far caused disease, or are becoming the cause of death. On 4 January 2022, found one more variant, which has 46 mutation variants which are identified as the type of B.1.640.2 in France by which has South France this new variant infected 12 people. The complete information is not yet received. regarding this variant (<https://www.euronews.com/next/2022/01/05/covid-variant-b-1-640-2-what-we-know-so-far-about-the-new-strain-found-in-france>).

Declaration and status of Omicron

In the Republic of South Africa, a new Omicron variation of the SARS-CoV-2 was discovered, on 24,12,2021 raising numerous worries around the world (WHO 2021; GISAID 2021). Currently, WHO-recommended techniques and procedures are still working against this pandemic strain. On November 24, 2021, the WHO received the first report of the SARS-CoV-2 VOC from South Africa. This new variant most rapid spread in the young age group peoples. WHO and the global health system have been on high alert in the Gauteng City of South Africa, where the first time found this new Omicron variant now till date, The SARS-CoV-2 VOC also has been identified in many countries. The SARS-CoV-2 VOC has been found in 108 countries over just one month, and 1.5 lakh patients affected by this variant have been identified. The first case of Omicron was discovered in South Africa on November 24, and until December 13, roughly 95% were infected by Omicron in SA. Within a month, the number of cases of Britain delta rose to 74%. However, this new COVID-19 strain, Omicron, has shattered all records for COVID-19 cases in the United Kingdom in less than a month. On December 22, more than 1 lakh new cases were reported in the United Kingdom, the greatest number ever in a single day. In the United States, Delta variant cases made up about half of all Covid-19 cases. Delta had 90% of the instances by the end of July, just one month later. However, by December 22, Omicron is responsible for one out of every four cases in the United States.

In India, the first case of Omicron was discovered on December 2, and there are currently around 358 cases of this variety in the country, with no deaths reported. India has reported a sharp increase has been witnessed in case of positivity from 0.79% on 29 December 2021 to 5.03% On 5 January 2022. When the variation was initially discovered in Germany, Delta had 0.69% of the cases. Omicron, on the other hand, accounts for 9% of all Covid-19 instances in this European country. World Health Community acclaimed all scientists who reported and timely updated

to WHO regarding Covid (WHO 2021) along with the speed at which they detected, indexed, and characteristics of SARS-CoV-2 strains. According to their outstanding work on SARS-CoV-2 sequencing (Wilkinson *et al.*, 2021). 127 total VOC in this new variant GR/484A have been deposited into the GISAID databases as of November 28, 2021, 17:00 CET (<https://gisaid.org/about-us/mission>). Several mutations in the receptor-binding domains and N-terminal domains have been linked to antibody enlarged transmissibility. Omicron has more than 52 mutations in the variation, with 32 of them in the S gene. On the other hand, the Alpha version contains nine mutations in its S gene.

In contrast, the Delta variant has nine to thirteen mutations, making it the micron variant with the most mutation sites of all SARS-CoV-2 variants identified. But according to another research on 5 December 2022 by the Indian Council of Medical Research, SARS-CoV-2's C.36.3.1 variant has been showing the S-gene mutation 69-70, which is like that of Omicron (ICMR. ORF1a Omicron variants harbour six substitutions (L2084I, A2710T, K856R, T325I, I3758V, and P3395H) and 2 deletions of in the total number of four amino acids (2083 & 3674-3676). These include substitutions, E484A, A67V, Y145D, L212I, T95I, Q498R, S371L, G339D, S373P, S375F, N440K, G446S, K417N, T478K, Q493R, S477N, G496S, N505K, T145Y, Y505K, D5 H656, N764K, Q954H, N91, Y, 9, 5 N6969I, 9, P and L981F Spike protein" structure is altered as a result of H69/V70. The disease-causing potential, transmissibility, and impact on vaccine efficacy of this variation in spike protein raise concerns. (Lancet, 2020). Compared to the mutations found in the number of four extra VOS variants, the total of spinal mutations found in the new variant omicron is approximately 3-4-fold higher, as shown in Fig.-1 (Burki, 2021).

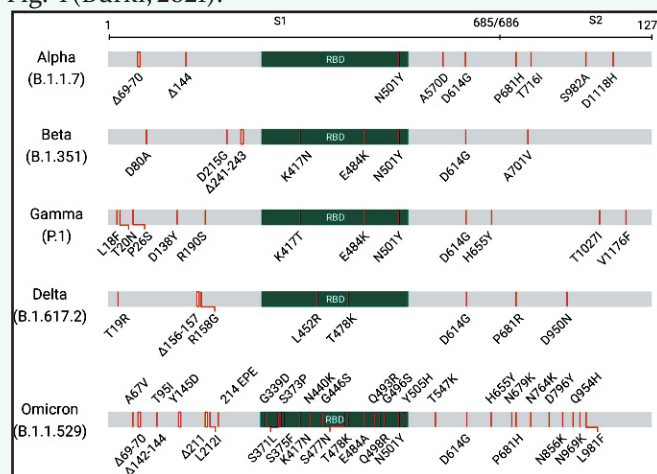


Figure-1: The representative of the spike mutations of 5 editions of concern (VOCs). The mutations, which include substitutions, deletions, and insertions, are described primarily based totally on the information from covariants (<https://covariants.org>) (20I(α) ALPHA, 20H(β) BETA, 20J(γ) GAMMA, 21A(Δ) DELTA and 21 K Omicron, serially)

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Table 1-Variants of Concern (VOCs) for Novel corona virus, identified by the WHO: Tracking SARS-CoV-2 variants (who.int)

WHO designation	Pangolineage	GISAIDclade	Nextstrain Clade	Additional amino acid changes monitored	Country of origin of first documented samples and date
(a) ALPHA	B.1.1.7	GRY	20I (V1)	+S:484K; +S:452R	Sept 2020 UK, (18 Dec 2020)
(b) BETA	B.1.351	GH.501Y.V2	20H (V2)	+S L18F	May 2020 South Africa, 18 Dec 2020
(c) GAMMA	P.1	GR.501Y.V3	20J (V3)	+S 681H	Nov 2020 Brazil, 11 Jan 2021
(d) DELTA	B.1.617.2	G.478K.V1	21A, 21I, 21J	+S 417N; +S 484K	Oct 2020 India, 11 May 2020
OMICRON	B.1.1.529	GRA	21K, 21L, 21M	+S R34K	Nov 2021 South Africa, Hong Kong, Belgium, Israel, 26 Nov 2021

Omicron Vs antibodies

Any virus-related pandemic can be characterized by the formation of various variants and the eventual emergence of new ones (Burki, 2021; Sanjuán & Domingo-Calap, 2016). For example, SARS-CoV-2 Omicron is a dynamically enriched mutational mosaic, showing the S amino acid sequence's involvement in developing novel variants (Boehm et al., 2021) and that has been proved new Covid-19 Omicron variant of spike protein carries 6 Unique amino acid substitutions. It has significantly more mutations compared to any other virus variant. This Omicron variant affected antibodies. Because of that all worldwide Scientists, focus mainly on vaccines to help increase new antibodies.

Currently, many studies and experiments have already clear that Omicron has significant mutations that can reduce antibodies to one-fortieth of their effectiveness against its ability to block an infected cell's infection-causing virus.

Surprisingly, research evidence from South Africa found that Omicron had a higher rate of secondary infection than previous waves caused by Beta and Delta variants. Omicron also caused some mild to moderate infections in vaccinated individuals who received booster shots. An early report from the UK estimated that a vaccine for symptomatic disease would be less effective for Omicron than a vaccine for Delta. These early findings suggest that vaccines may not be as effective at preventing infections as they once were. Omicron special boosters may be required in the future.

Effectiveness & diagnosis of SARS-CoV-2 Omicron

RT-PCR assays are still detecting Covid-19 virus infection (Wu et al., 2021). but in this new variant Omicron, infected case identification has S-genome. In instances of omicron the validity of rapid antigen detection techniques must be evaluated immediately. According to the current study, Omicron will spread fast in most probably the world, which for this, the defence can be done only by vaccination. From Previous VOCs data records, those who had been vaccinated had minimal chances of Omicron infection. vaccination is an important role play for any virus infections. To review research analyzing the capacity of vaccine and strength kill Omicron is critically required (Greaney et al., 2020).

Conclusion

The Covid-19 Pandemic has not finished yet. This new variant, Omicron is a message for the whole world and WHO. As per the information in the Omicron variant H69/V70 is present, it has 52 mutations, including 32 in the S gene, resulting in a conformationally altered spike protein. It spread fast as compared to other Covid-19 variant like Alfa, Delta, etc. New Covid-19 variants have been sharing some common mutations. So far, in the refinement, an isolated mutation in Omicron has been found in some countries, as a serious theme. The main focus has been on all mutants of SARS-CoV-2, especially the new spreading of the new Omicron variant and the vaccine's potency in the case of to against them. The most critical feature in any pandemic situation is prevention. Vaccines will play an important role in the Present Pandemic prevention. It is critical to how coronavirus receives mutated to lay out higher new vaccines, supplying long-time period safety and neutralizing large mutant variants.

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Relevant Links

- <https://timesofindia.indiatimes.com/city/pune/icmr-scientists-spot-variant-with-s-gene-dropout-feature/articleshow/88699645.cms>
- <https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-classifications.html>
- <https://covariants.org/>
- <https://www.who.int/publications/m/item/2nd-global-consultation-on-assessing-the-impact-of-sars-cov-2-variants-of-concern-on-public-health-interventions>
- [https://www.who.int/news/item/26-11-2021-classification-of-omicron-\(b.1.1.529\)-sars-cov-2-variant-of-concern](https://www.who.int/news/item/26-11-2021-classification-of-omicron-(b.1.1.529)-sars-cov-2-variant-of-concern)

