



OMICRON (B.1.1.529): New Variant of SARS-CoV-2

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ABSTRACT

In this article or report, an attempt made to present an overview of corona virus & its variants. A Corona virus is a group of enveloped viruses, belongs to family Coronaviridae in order Nidovirales. Corona viruses are non-segmented, highly diverse, positive stand RNA genomes & single stranded. A Corona virus is a contagious disease its transmitted human to humans as well as humans to animals by air. Corona virus is a virus that originated from Bats. In this report we all know about Corona viruses. In that we are include its different Variants, symptoms, diagnosis, prevention etc. Its have some variants namely Alpha, Beta, Gamma, Delta, Epsilon, Zeta, Eta, Theta, Iota, Kappa, Lambda, Mu & new variant are comes known Omicron. Omicron has about 50 genetic changes in this structure and about 32 mutations in spike protein, due to these mutations currently available vaccines doesn't affect on Omicron. Corona virus is mainly cause's respiratory infection such as cold, sneezing, breathing difficulty, pneumonia, coughing & fever. Upper respiratory diseases & diarrhea like causes see in animals. Omicron variant show mild symptoms like Headache, Nausea, Dizziness, Fever, Cough etc. Although Omicron variant spread faster, it's not very dangerous. Corona detected by PCR (polymer chain reaction) and Antigen test and Omicron variant identified by genome sequencing. Prevention is

same as other corona variants such as use proper mask, wash hand, sanitize properly, avoid crowd place, make distance (6 feet), take vaccine etc.

Key Words: Omicron, Non-segmented, Coronaviridae, RNA genome, Enveloped virus, contagious disease, etc.

INTRODUCTION

The corona virus belongs to family Coronaviridae in order Nidovirales. Corona viruses were given their name based on the crown-like projections on their surfaces. In Latin language "Corona" means "halo" or "crown." They are associated with the common severe acute respiratory syndrome (SARS), cold and pneumonia. (Petrosillo, Viceconte, Ergonual, Ippolito, & Petersen, 2020). All corona variants come from bats to animal or directly into humans or animals to human beings. Scientists have found that corona viruses can infect rats, dogs, pigs, cats, horses cattle & turkeys. (Syed, Coronavirues: A Mini-Review, 2020) In December 2019, From China, From Wuhan market, in the corona virus marked its origin which is currently a global public health challenge. World Health Organization (WHO) declared the corona virus disease as a pandemic condition on 11th March, 2020 (WHO declares pandemic, 2020). In 2021, about 77 countries including India are reported the omicron positive cases and United Kingdom reported the first death with the variant B.1.1.529. Majorly United Kingdom, South Africa and United States (Omicron may already be in most contries,WHO warns., 2021) (Covid: Frist UK death recorded with Omicron variant., 2021).

The Omicron (B.1.1.529) variant is a type of SARS-CoV-2, the virus that causes corona virus. As of December 2021, this is the newest variant. It was 1st reported to the World Health Organization (WHO) on November 24, 2021 from South Africa (Classification of Omicron (B.1.1.529): SARS-CoV-2 Variant of Concern, 2021). The article by Ewen Calloway entitled "heavy mutated omicron (B.1.1.529) variant puts on scientist on alert". On November 26, 2021 The World Health Organization (WHO) designated it is a variant of concern & named it "Omicron", the 15th letter in the Greek Alphabet. (Parekh, Platt, Team, & Barnes, Coronavirus latest news: EU suspends all flights to southern Africa over omicron Covid variant fears, 2021)

It remains to be seen where & how the omicron variant evolved. Analysis of the Sequence of SARS-CoV-2 variants shows that Omicron is very different from other SARS-CoV-2 variants in that it is difficult to identify its closest relative. The result of phylogenetic studies suggests that the Omicron evolved earlier those other SARS-CoV-2 variants slightly than evolving from previous VOCs. (Kupferschmidt, Where did 'weird' Omicron come from?, 2021) Omicron speculates that the omicron variant may have been impregnated in immunocompromised individuals for a specific period of time or in non-human species & recently re-emerged in human's beings. (Kumar, Thambiraja, Karuppanan, & Subramaniam, 2021)

STRUCTURE

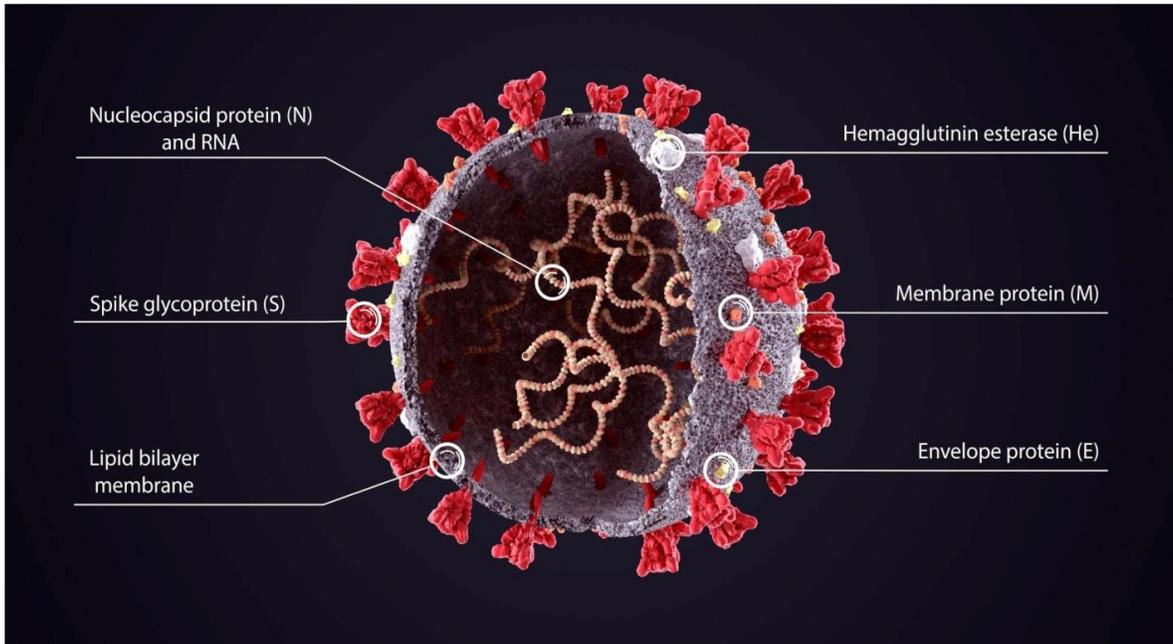


Figure 1: New Variant Omicron (B.1.1.529)

SYMPTOMS

In some cases it appears that the symptoms of the Omicron variant are different from the Delta variant. According to the WHO, the major symptoms remain:

- Headache
- Nausea
- Dizziness
- Fever
- Cough

The above symptoms saw in Omicron variant. (Budhiraja, 2021)

According, the National Institutions for Communicable Diseases (NICD) of South Africa. The researchers or scientists say no any symptoms have been observed in the patients who affected new corona variant i.e., omicron (B.1.1.529). (Kaunain, Explained: What we know so far about the omicron variant of Covid-19, 2021) Further clinical & epidemiological corrections have not been recognized with further research into the mutations of omicron that would further establish the effectiveness of the currently available vaccine against omicron variant. According to WHO, Those people who have previously been infected with the corona virus may be more easily re-infected with the new corona variant Omicron. (Update on Omicron, 2021)

VARIANTS OF CORONA VIRUSES AND THEIR ORIGIN

The Corona viruses are shows following some variants. From September 2020 to November 2021, about 13 variants have been finding.

Table 1: Variants of Corona Viruses with their first origin

Sr. No.	Variants	First Origin	
		Country	Date
1.	Alpha B.1.1.7	United Kingdom	September 2020
2.	Beta B.1.351	South Africa	May 2020
3.	Gamma P.1	Brazil	November 2020
4.	Delta B.1.617.2	India	October 2020
5.	Epsilon B1427/ B1429	India	October 2020
6.	Zeta P2	Brazil	April 2020
7.	Eta B1525	Multiple Countries	December 2020
8.	Theta P3	Philippines	January 2021
9.	Lota B1526	United State	November 2020
10.	Kappa B.1.617.1	India	October 2020
11.	Lambda C.37	Peru	December 2020
12.	Mu B.1.621	Colombia	January 2020
13.	Omicron B.1.1.529	South Africa	November 2021

A Corona virus is virus that is known to have a zoonotic origin, having originated from Bats in the literature. (Domingo, 2021)

OMICRON VARIANT OF THE CORONAVIRUS

According to WHO, the new variant of corona virus known omicron (B.1.1.529) was detected in South Africa, on 24th November, 2021. (Classification of Omicron (B.1.1.529): SARS-CoV-2 Variant of Concern, 2021) On 26th November 2021, Omicron variant was declared as a type of concern by the World Health Organization (WHO). However, some mutations in omicron (B.1.1.529) have not been detected before which makes further studies obligatory to discover. (Kaunain, Explained: What we know so far about the omicron variant of Covid-

19, 2021) The mutations observed in new variant Omicron was previously observed in Alpha & Delta variants of Corona virus. (SARS-CoV-2 Viral Mutations; Impact on COVID-19 Tests, 2021) The rate of transmission the new variant known omicron (B.1.1.529) to be more as compare to previously detected corona variants. Preliminary observed data associated to omicron show that it contains multiple spike protein mutations, proteins that enclosed 30 mutations in the virus region that are responsible for the viral entry into host cells. (Callaway, 2021) According to the NGS-SA (Network for Genomic Surveillance in South Africa), A cluster of mutations known as H655Y + P681H + N679K + H655Y is associated with more effective entering into host cells, indicating high susceptibility of the virus. (Kaunain, Explained: What we know so far about the omicron variant of Covid-19, 2021) The current available vaccines may be ineffectual or less effective against the omicron. Spike protein zone/ region of virus show mutations.

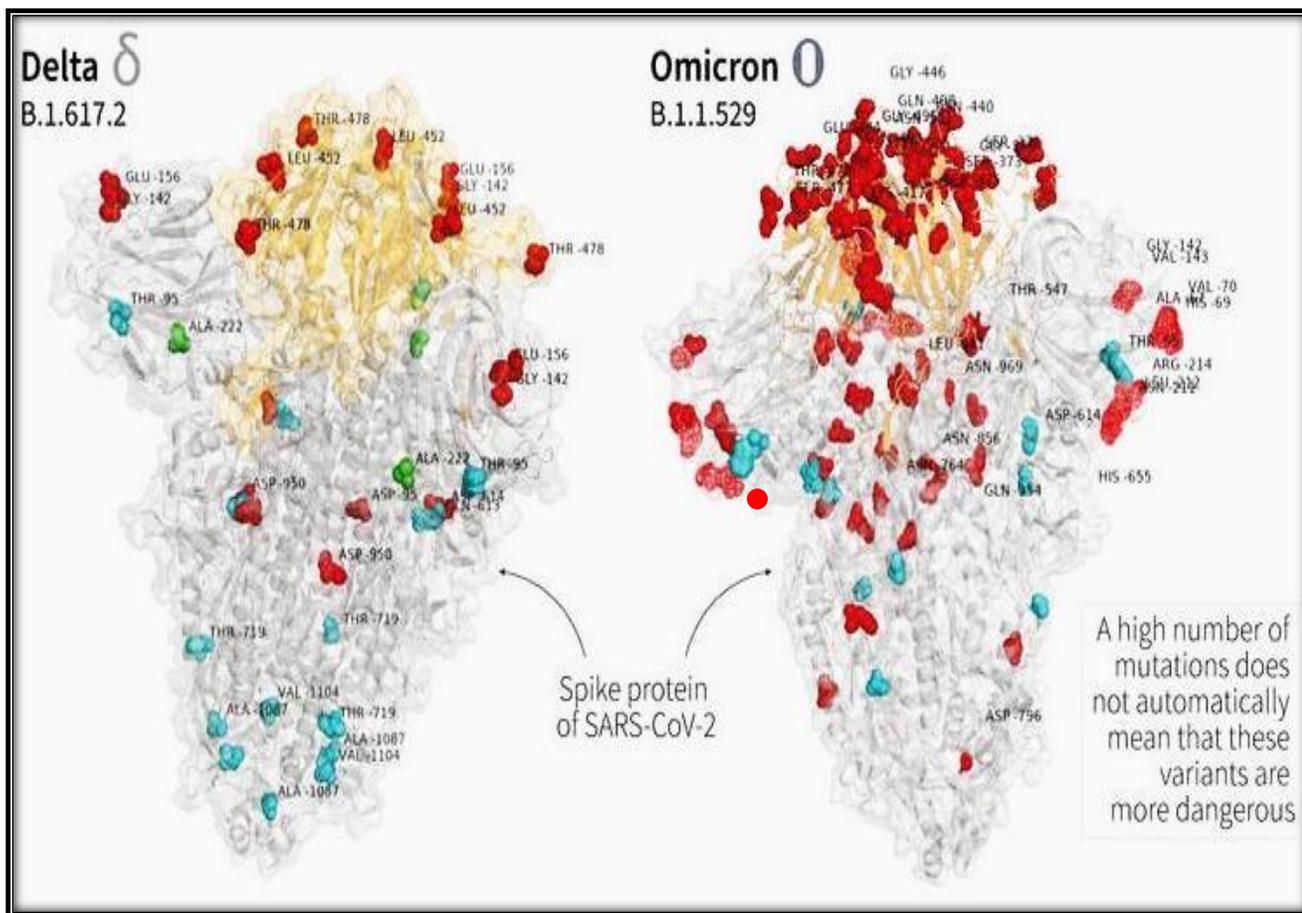


Figure 2: Delta & Omicron variants mutations comparison

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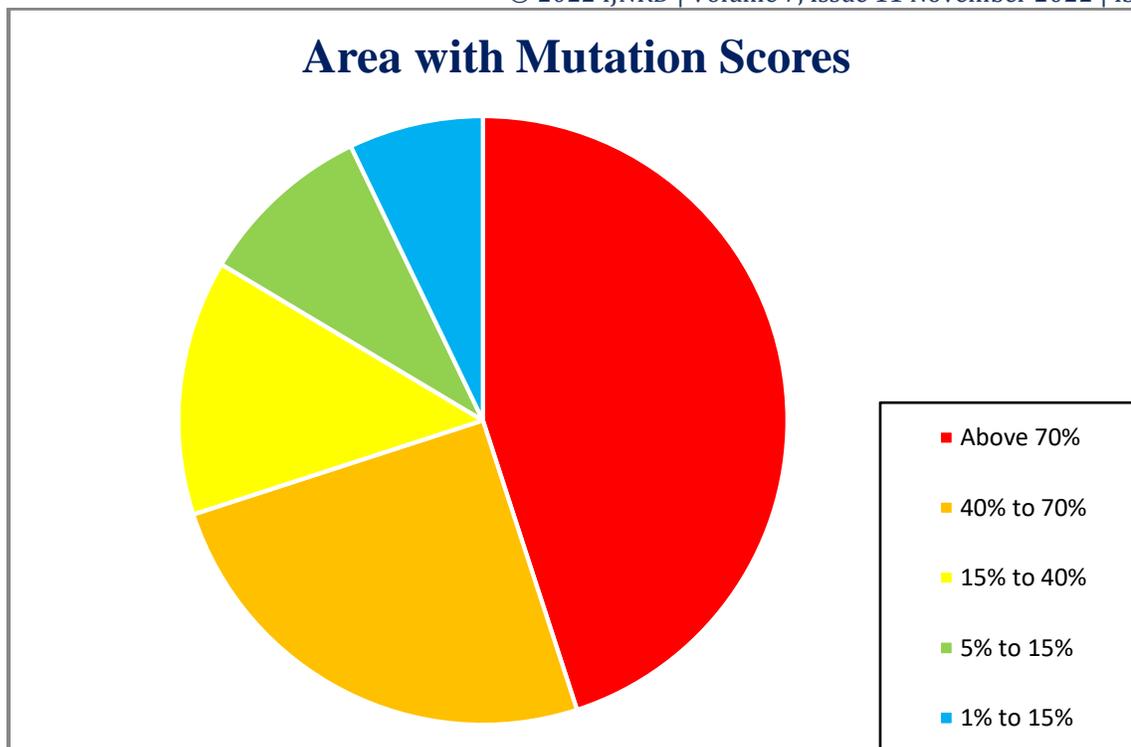


Figure 3: Area with mutation scores

In above figures (fig:2 & fig:3), Show comparison of Delta & Omicron variant mutations. The Omicron shows greater mutations than Delta. Here some area shows high mutations. These all mutation areas are colored and below the graph show color and the percentage of mutations comparison between Delta & Omicron Variant. (Fox, Omicron vs. Delta: More mutations don't necessarily make a meaner Covid-19 virus, 2021)

MUTATIONS INOMICRON

According to the United States Centers for Disease Control & Prevention (USDCP), Spike proteins of Omicron variant have at least 30 amino acid substitutions, 3 short deletions & 1 short addition. The Centers for Disease Control & Prevention has found four major mutations that could assist in spreading i.e. P681H, N501Y, and N679K & H655Y. The last of which is also seen in Alpha variant, whereas a different mutation (P681R) is seen in the Delta variant. (Science Brief: Omicron (B.1.1.529) Variant, 2021)

Omicron has 10 times more mutations on the spike protein than the Delta variant, raising fears about transmissibility, symptoms and whether it can evade vaccines more easily

Side-on view of the spike protein

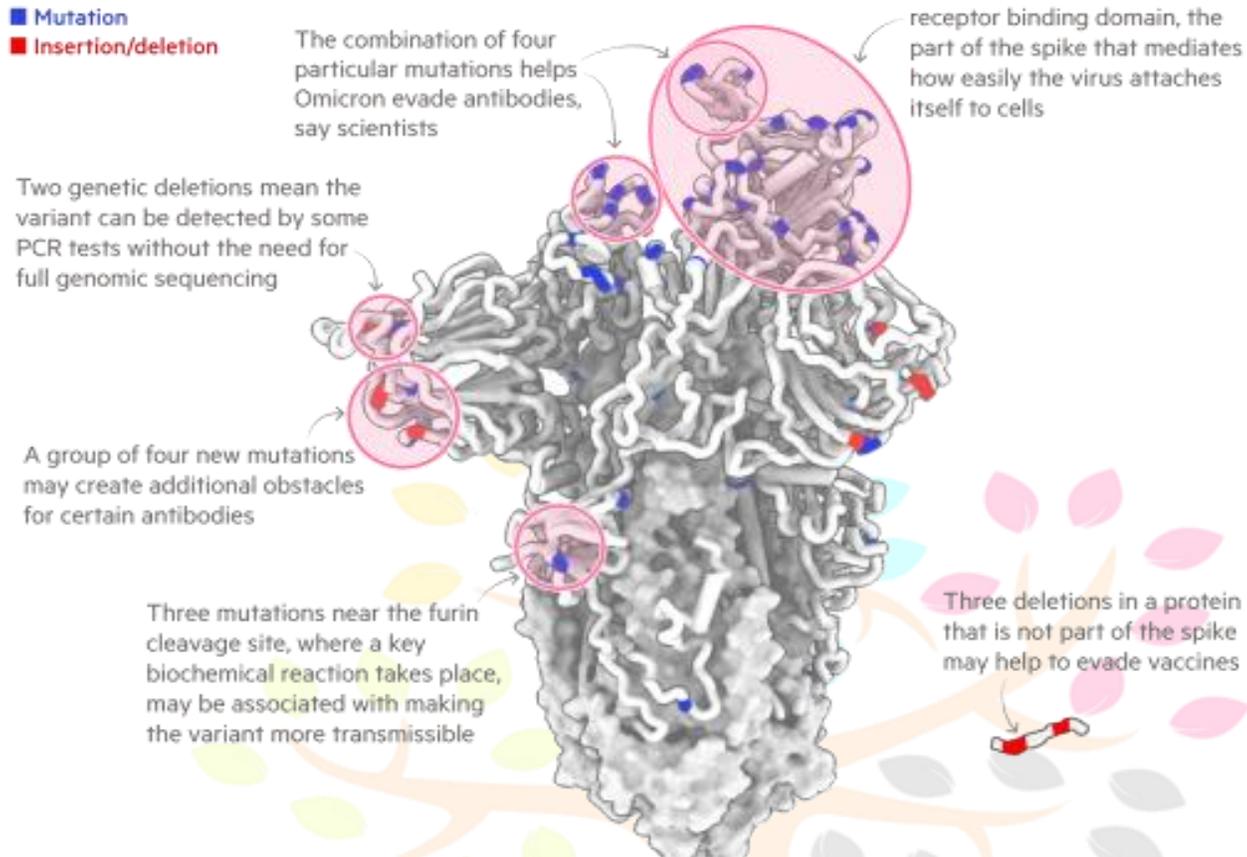


Figure 4: The key mutations that shape Omicron (B.1.1.529)

Omicron's 50 genetic mutations include more than 30 spike proteins, the exposed part of the virus that attaches to host or human cells. Researchers expect that these changes will transmit more than the delta variant & move away from the immune-suppressant provided by the vaccine or a previous infection. Due to this mutation's in omicron variant show higher transmissibility (Cookson & Barnes, Omicron: What we know about Covid strain promoting fresh global restrictions, 2021).

Since, the scientist's detect of omicron species which are originated from South Africa and researchers are trying to find evidence & some possible ways of its origin of an unknown epidermis. Based on the analysis of B.1.1.529 variant & other SARS-CoV-2 sequence, Scientist are hypothesized from stains of COVID-19 that Omicron (B.1.1.529) variant appears likely divergent and parallel (Kupferschmidt, Where did 'weird' Omicron come from?, 2021).

TRANSMISSION

Early indications are that omicron is more contagious than previous types, mainly as it has spread more faster as compared to the delta variant as the main type in South Africa & there is evidence that it increases risk of re-infection (Classification of Omicron (B.1.1.529): SARS-CoV-2 Variant of Concern, 2021). Omicron is considered to be more contagious than previous variant and its spread in the lungs about 70 times faster than previous variants but its unable to penetrate in deep lung tissue there is a reason to reduce the chances to hospitalization (Lung tissue study sheds light on fast Omicron spread, 2021).

DETECTION OFOMICRON

Usually used PCR (Polymer Chain Reaction) & Antigen-based rapid diagnostic tests identify all corona virus variants including new variant called Omicron. Genome sequencing test used to find which variant was infected (What we know about the Omicron variant, 2021). The positive report sent for genome sequencing. This involved find out what type of corona the patient has.

PREVENTION

Table 2: list of things you can do to prevent the spread of infection

Sr. No.	METHOD	DISCRIPTION	REF
1.	Mask	Wearing a mask properly to cover nose and mouth to avoid entry of virus inside the body.	(Budhi raja, 2021)
2.	Sanitizer	Use sanitizer to sanitize hands, floor, cloths & instruments.	
3.	Social Distance	Keep a physical distance of minimum 6 feet from each other peoples to reduce risk of contamination or infection.	
4.	Ventilation	Avoid poorly ventilated or crowed place. Open windows to enhance indoor ventilation.	
5.	Wash Hand	Wash your hand regularly to avoid the covid-19 and their other variants infection.	
6.	Vaccine	To take vaccine. It's an efficient way to protect your-self from corona virus and their other variants.	

VACCINES

Researchers are exploring the possible effect of omicron variant of corona vaccines on potency. Information is still limited, but there may be a slight decrease in the potency of vaccines against harsh sickness & decrease chances of death as well as a decline in the prevention of mild disease and contagious infection. However, the WHO reports that currently available vaccines provide significant protection against serious disease and/or patients deaths (What we know about the Omicron variant, 2021).

To effectively treat the novel B.1.1.529 types of variant, the vaccine. The manufactures, namely Pfizer & BioNTech are willing to make their changes in their mRNA vaccine shorts for the omicron variant if needed by tweak (Covid news: Pfizer-BioNTech, Morderna, J&J, AstraZeneca investigating omicron, 2021). Then the

Pfizer plans to develop a tailor-made vaccine against the B.1.1.529 variant & expects to identify escape variants from their data within 2 to 6 weeks (Pfizer testing its vaccine against new COVID-19 strain, 2021). Finding from the small scale study involving only 12 people in South Africa, published by pre-print, suggest that the effectiveness of the Prizer-BioNTech vaccine against omicron may be significantly lowered, with 41-Fold lower levels of neutralizing anti-bodies. Comparison with the type of virus that is most prevalent in the early stages of epidemic disease (Spike Protein re-placement D614G). (Cele, et al., SARS-CoV-2 Omicron has extensive but incomplete escape of Pfizer BNT16b2 elicited neutralization and requires ACE2 for infection, 2021).

According to research, Pfizer suggests that, the 3rd dose of the Pfizer vaccine may provide the same levels of anti-bodies against omicron variant as seen after taking two doses against the family of corona virus as well as their some primarily discovered variants (Pfizer and BioNTech Provide Update on Omicron Variant, 2021). AstraZeneca is conducting research at sites in Bostswana and Eswatini as well as claims that their current vaccine platform enables them to identify new mutations in variant B.1.1.529. The CEO of Moderna had such doubts combinations of mutations have reduced vaccine potency against omicron. The plan of action is to test 3 booster candidates or subjects in addition to developing B.1.1.529 variant specific booster doses to boost waning immunity (RACGP, 2021). As we knows, Booster dose of Moderna, Pfizer and BioNTech for adult was permitted by US CENTERS FOR DISEASE CONTROL & PREVENTION.

CONCLUSION

All of these studies show that although omicron is not a deadly virus but its ability to spread faster than that of other corona virus variants. Genome sequencing used to find out which variant was detecting specially B.1.1.529. Also, the vaccine available against the corona virus has no show any effect on omicron variant. Therefore, people should protect themselves by following the rules and regulations by the government.

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