



WILL OMICRON CLOUDS PREDICT THE COVID ENDGAME?

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ABSTRACT Omicron 90% minimized a fight for ventilators to a cry for oxygen, the breath of life. It is more contagious and less severe. It causes mild infections like common cold with rapid spread and is an indication for the end of Pandemic. The ultra-contagious omicron mutant is now pushing cases to all-time highs and causing chaos. Omicron does not yet appear very deadly, but some experts do warn of possible issues like long covid. Many have lost their loving ones. The covid-19 pandemic has thrown our world off balance. Mental health pandemic is ragging. Our daily life has been restricted as never before in recent history. Uncertainty, illness, fear, social isolation, loss of grief, financial insecurity, and unemployment have resulted in loneliness, anxiety, depression, and disturbances. History demonstrates that vaccination is the most effective approach to prevent or sustainably controlling diverse infectious diseases. This scenario demanded the global urgency to develop a successful vaccine to set human lives & normalcy back. The global health care community established a new paradigm of rapid vaccine development at unprecedented speed.

KEYWORDS : Omicron variant (B.1.1.529), Delta lineage-B.617.2, Omicron sub variant BA.2, SARS-CoV-2, Variants of concern (VOC), GenXpert/ CBNAAT, Rapid Antigen test (RAT)

INTRODUCTION

The **Omicron variant** (B.1.1.529) is a variant of SARS-CoV-2 that was first reported to the World Health Organization (WHO) from South Africa on 24 November 2021

Omicron multiplies around 70 times faster than the Delta variant

Omicron might be less able to penetrate deep lung tissue

with the Greek letter omicron

Greek letters are used to identify variants of SARS-CoV-2.

The previous designation was for the "variant of interest" Mu

The 'standard' sublineage is now referred to as BA.1/B.1.1.529.1, and the two other sub lineages are known as BA.2/B.1.1.529.2 and BA.3/B.1.1.529.3

Corticosteroids such as dexamethasone and IL6 receptor blockers such as tocilizumab (Actemra) are known to be effective for managing patients with the earlier strains of severe COVID-19.

History

Omicron was first detected on 22 November 2021 in laboratories in Botswana and South Africa based on samples collected on 11–16 November.

The first known sample was collected in South Africa on 8 November.

As of 7 January 2022, the variant has been confirmed in 135 countries.

Omicron has an unusually large number of mutations compared to previous variants.

Several of the mutations are novel and involve changes to the spike protein reducing the ability for COVID-19 vaccines to prevent symptomatic disease

Evolution Of Omicron

Researchers around the world are busy trying to identify the specific characteristics of the omicron variant of coronavirus and its origin. It is not originate from delta variant. It is diverged from B.1.1.

Omicron originated from non-human host mouse. This variant is dominant in the world.

The variant has more than 50 mutations, with a majority of them in the virus' spike protein, which it uses to infect human cells. Omicron accumulated mutations in goat, mice. Wuhan virus enters into mice and later into man. It has high binding affinity with human ACE-2 receptors and hence viruses open out very fast. Tree theories explain the origin.

1. It evolved undetected in an isolated population with low level of testing.
2. It evolved in a person with a weakened immune system. Chronically infected from covid-19 patients
3. It evolved in an animal host and jumped back. Accumulated mutations from non-human hosts like mice, camel and goat. Wuhan virus got into the mice. 45 mutations accumulated. Infected host and spread into the community.

Viral Characteristics

The spike protein of the Omicron variant is characterized by at least 30 amino acid mutations. Notably, 15 of the 30 amino acid substitutions are in the receptor binding domain (RBD). - primary target of vaccine-induced immunity and monoclonal antibody treatment. These mutations are known to lead to increased transmissibility, higher viral binding affinity, and higher antibody escape.

Symptoms:

People who are exposed to omicron appear to get sick faster and may have symptoms that are different than those of other variants.

In fully vaccinated people and especially after getting the booster, Omicron appears to result in mild illness that can resemble the common cold, (URI - upper respiratory tract infection-Flu-like illness, acute bronchitis-laryngitis), comprises mainly of fever, chills, cough, fatigue or tiredness, congestion, sore throat, hoarse voice and runny

nose, typically lasts for ~5 days. (Shortness of breath (Pneumonia, hypoxia), loss of taste and smell seems to be quite uncommon).

Variants Of Concern (VOC) Are--alpha,beta,gamma And Delta And Omicron Variants

Delta lineage-B.617.2. Detected first in India,May-21. Transmission increased disease and was also very severe.

Omicron lineage-B.1529.Detected first in South Africa,November-21.It is highly transmissible but shows less symptoms.It does not originate from the Delta variant.

Mutations

So many mutations in Omicron. Replication rate of omicron is higher in the bronchus than in lungs as compared to Delta.Omicron leads to less severe disease than other variants.Low viral load inlungs causelesser inflammation in lungs. Mutational land scape of evolved virus renders its high transmissibility.Mutations in the antibody binding site reduces the vaccine effectiveness.

Innate Immunity And COVID 19

Innate immunity is the first line of defense against virus invasion. The dendrite cells, macrophages, and neutrophils are the first line of defense and initiate the initial immune reaction upon entry of SARS-CoV-2.Macrophages are the large eaters.

These cells show delayed type 1 IFN response.. Natural killer cells are decreased .Exhaustion of NK cells show high expression of NKG2A and low expression of TNF- α , IL-2, CD107 , IFN- γ and decreased cytotoxicity, reduced performance and granzyme secretion The spike glycoproteins (S protein) on the viral envelope binds to its receptor, ACE2, on the surface of human cells to gain entry. This virus entry activates the intracellular pattern recognition receptors (PRRs) that sense the virus associated molecular patterns, such as double-stranded RNA or uncapped mRNA. This triggers the cascade of the cytolytic immune responses, mainly through the type I interferon (IFN) and natural killer cells. Interleukin 6, IL-18 are also released.

Adaptive Immunity:

The Adaptive Response: T Cells

Adaptive immunity plays a major role in the clearance of SARS-CoV-2 from the body and consists of cell mediated immunity and humeral immunity. "T cells can play different roles. They can act as 'killer cells,' attacking cells which have been infected with a virus or another kind of pathogen, or they can act as 'helper cells' by supporting B cells to produce antibodies." T cells also need the peptides to be bound to specialized cell surface proteins known as MHC molecules."In vaccinated individuals or those with a prior history of COVID-19, memory T cells will respond quickly if they encounter the same viral peptides bound to the same MHC molecules again." "However, if the peptides they originally recognized are no longer present in the virus as a consequence of mutations, these memory T cells could have lost their purpose. This depends on whether the mutated peptides can still be recognized by them," said Prof. Kern.The Omicron variant of SARS-CoV-2 has many mutations, which scientists believe help it escape neutralizing antibodies.

However, if Omicron cannot escape T cells, then they may still have a level of protection against the variant.

Critical Aspects Of Antibodies (Abs)

Do the Abs neutralize the virus (block it entering cells and multiplying)? Abs develop against different proteins that are part of a virus. Abs against one type of viral protein might neutralize the virus, while others might not. How many antibodies are produced (titre)? Duration: how long do the antibodies persist in the body after infection?

Critical Aspects Of Viral Protein.(antigens)

Antigen stability: Viruses may mutate over time. Viral proteins may change so much that antibodies produced against the virus won't recognize the antigens if they meet again later.The positive antibody indicates that the person was infected in the past with the virus that causes COVID-19 ü If IgM and IgG are positive, infection was recent (i.e. within the past few weeks) ü If only IgG is present, the infection occurred more than a few weeks ago.

Analysis Of 20 Deaths In Delhi Finds Omicron In All

An analysis of samples obtained from 20 people who died due to

COVID-related ailments from January 1 through 24 has shown that all of them were infected with the Omicron variant, revealed an official source.The study was conducted by the Delhi government and noted that 14 of the 20 people had the BA.2 virus, an Omicron sub-variant. The Delhi government is looking at the severity and recovery among those who are infected with the BA.2 sub-variant.

Pathogenicity

Viral load is high in nasal and lower in lung parenchyma as compared to SARS-CoV,2020 infection. The Omicron virus, after entry,will not create syncytia .Reduced syncytia formation means reduced lung disease. Syncytia formed mainly in lung tissue. It shows mild symptoms. Corona Is supposed to enter into the cell by binding to ACE2.The cell membrane contains transmembrane protease protein(TMPPRSS2) protein that can cut the protein.later enters into the cell.It still needs S1,S2 spikeproteins.ACE2 down regulates and endocytosis as a phagolysosome. These receptors are expressed particularly in type 2 pneumocytes.

Omicron—Lung pathology

Animal studies and experiments involving cells cultured in the laboratory suggest that the Omicron variant may have a reduced ability to infect the lungs, compared with the Delta variant.This could explain why the Omicron variant appears to cause less severe disease than the Delta variant.These studies indicate that the Omicron variant could be more efficient at infecting the upper airways than the Delta variant, potentially explaining its increased contagiousness.The ability of the Omicron variant to escape neutralizing antibodies may also be responsible for its increased transmissibility.

Samples To Be Collected

Throat and nasal swabs

Other samples--Brobchoalvolar lavage,tracheal aspirates and sputum

Laboratory Diagnosis

"A number of laboratory-based studies have now shown that the Omicron variant is less able to infect the lungs as well as other variants and, as a result, is leading to less patients being admitted with pneumonia who require oxygen and ventilators.

If a variant is circulating at 0.1% frequency, there is a >99% chance that it will be detected in CDC's national genomic surveillance system.

Two types of tests are used to test for current infection: The gold-standard PCR -nucleic acid amplification tests (NAATs) and Less reliable Rapid antigen tests.

The CDC 2019-Novel Coronavirus (2019-nCoV) Real-Time RT-PCR Diagnostic Panel and the Multiplex Assay for Flu and SARS-CoV-2 are expected to detect the Omicron variant.

Changes in the viral genome can result in changes to viral proteins and, therefore, can also impact the performance of an antigen or serology test.

Rapid antigen tests (like Abbott BinaxNOW and Quidel QuickVue antigen tests) can detect the omicron variant.

Timing is critical for rapid tests. Rapid antigen tests are generally less sensitive and less likely to pick up very early infections (False negative) than PCR-molecular tests for any variant. Since Omicron multiplies so quickly and is so transmissible—and these tests provide only a snapshot in time—you could test negative in the morning and positive by the afternoon.

PCR-molecular test – more sensitive/specific, but results take days and are currently short supplied.

If infection due to COVID-19 is still suspected after receiving a negative Rapid antigen test result consider repeat/follow up testing with another rapid tests, waiting at least 24 hours between each one, or get a PCR test.

Itinerary of COVID19

Day 0: infected, Up to Day 5: symptom onset.Day 7: IgM positive (D7-D 21),Day 14: IgG positive,Days 1-28: SARS CoV2 RNA & Antigens will be positive,Day 21: IgM disappears

Day 28: SARS CoV2 RNA & Antigens disappear

Omicron infection found in 100% COVID fatalities in Delhi since December-end

Genome sequencing results from a Delhi-based laboratory suggest that in all COVID-19 deaths.

From the last week of December 2021 to the first week of January 2022, the patients were infected with the Omicron variant. Almost all the deceased had comorbidities, with many of them having serious underlying medical conditions. Delhi has been reporting 30-40 deaths related to COVID-19 every day despite a drop in new cases.

Omicron Will Not Be Last COVID-19 Variant: WHO

Amid the global Omicron surge, the World Health Organization (WHO) has been urging people to get vaccinated and continue using face masks. The WHO's technical lead on COVID-19, Maria van Kerkhove, said that Omicron will not be the last variant of the coronavirus, adding that there could be more variants in the future. She said that the virus is still evolving and we need to adjust accordingly. There is a need to increase vaccination coverage globally and to transition out.

What Approach Should We Adopt To Treat Omicron?

If symptoms settle down within four days there is no need for aggressive treatment. With omicron becoming the dominant covid-19 variant in the country and with its repetition of being a milder form of the disease, there is a debate raging of what treatment methodologies are appropriate. Jumping the guns and running for medicines for every patient is probably ill advised.

Vaccines are the powerful weapon to fight against Covid.

Covid Vaccines

Vaccines offer some protection from serious illness, may be won't always prevent mild infection. Many experts believe we are never going to reach a point where we can eliminate the virus.

- **GERMAN-US' vaccine: Pfizer-BioNTech; BNT162b2; New messenger RNA (mRNA) platform'**
- **US' vaccine:**
- **Moderna; mRNA-1273 for spike protein; New messenger RNA (mRNA) platform**
- **'British' vaccine: Oxford-AstraZeneca; ChAdOx1 nCoV19/**
- **Covishield; Traditional inactivated virus platform – Adenovirus from Chimpanzee;'**
- **Russian' vaccine: Gamaleya Institute; Sputnik V; Two human adenoviruses vector platforms.'**
- **Indian' vaccine: Bharat Biotech, Hyderabad / ICMR's National Institute of Virology, Pune; Covaxin; Traditional whole cell inactivated virus platform, fully locally developed from a strain isolated by ICMR-NIV, Pune.**

Covishield – Developed by Serum Institute of India.

CONCLUSION

The COVID-19 pandemic has severely impacted human lives. This massive disruptive outbreak of the SARS-Cov-2 virus rapidly became the cause of universal fatality on a large scale. COVID pandemic has given us irreparable loss. The world has been devastated. Economy has received a severe loss. Many have lost their family members. Vaccines have been prepared at an unprecedented pace. Hope was raised that possibly vaccination of population.

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