



OMICRON VARIANT: TROUBLE TO HUMAN LIFE -A REVIEW

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Coronavirus disorder-2019 (COVID-19), associated with the outbreak of deleterious virus originating in Wuhan, China, is now a global health emergency and need to pay attention. Coronavirus discovered in human embryonic tracheal organ cultures received from the respiration tract of an adult with a commonplace cold. It causes symptoms like fever, cold, ache, cough, loss of taste sensation as well as smell. Ideally, the condition is spread by inhalation or close interaction with infected droplets that have incubation period between two or 14 days. Different variants of excessive acute respiration syndrome coronavirus 2 recognized because the first coronavirus disorder 2019 (COVID-19) infection seemed in December 2019. Mutation within the SARS-CoV-2 is a continuous method leading to a couple of version introductions. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused a pandemic resulting in millions of deaths worldwide. On November 26, the World Health Organization (WHO) recognized the unconventional B.1.1.529 version of SARS-CoV-2 named “Omicron”. The D614G, Beta/Gamma, and Delta VOCs, the SARS-CoV-2 Omicron version can be the catalyst for the fourth wave of the Covid 19 outbreak to brush the globe. Unfortunately, this variation has already been spotted in 80 international locations worldwide until December 15, 2021. The fatality rate is high in the year 2020 but it is reduced after the development of vaccine. Looking in the current scenario, safe and efficient vaccines are required to fight against virus. Here, we defined the identification and transmission of the Omicron variant, in comparison the mutations of the spike in the five VOCs, and similarly raised feasible strategies to prevent and triumph over the incidence of the B.1.1.529 variant.

Keywords: Omicron identification and transmission, Computational roles, Biosensors and detectors

1 INTRODUCTION

The coronavirus family of viruses usually infect humans and mammals causing respiratory and gastrointestinal infections. Among these SARS-CoV, MERS-CoV, AND SARS-CoV 2 (COVID 19) are the most infectious strains. Coronavirus disorder 2019 (COVID-19) has added about a high-quality danger to worldwide public health. Coronavirus named for “sun like” shape observed in electron microscope. coronavirus is a large, enveloped positive stranded RNA virus typically ranging from 27 to 32 kilobases. Corona meaning crown or helo. The main proteins of SARS-COV-2 are spike (S) proteins, envelop (E) proteins, membrane (M) proteins, and nucleocapsid (N) proteins. The genome is packed inside a helical capsid formed by the nucleocapsid (N) protein and further surrounded by envelope (E). The membrane (M) protein and the envelope protein are involved in virus assembly whereas the spike (S) protein mediates virus entry into host cell. Membrane protein are responsible for shaping the structure. The replication of SARS-CoV-2 occurs in cytoplasmic organelles of host cell. The spike forms large protrusions from the virus surface giving coronavirus the appearance of having crown hence their name: Corona in Latin means Crown. Different variants of severe acute respiration syndrome coronavirus2 (SARS-CoV-2) had been recognized for the reason that first coronavirus. The pandemic has been surging for almost two years. Omicron version is a new heavily mutated SARS-CoV-2 version known as B.1.1.529, and it's far now detailed as a VOC via the World Health Organization on November 26, 2021. The World Health Organization (WHO) called this version as Variant of Concern (VOC) and named as

“Omicron.” It is the fifth VOC after Alpha, Beta, Gamma, and Delta (1). A few days after the identity of Omicron in Africa, the variation has emerged in the different continents. More than three hundred million people have been inflamed and over 5 million people have died due to the COVID-19 pandemic due to SARS-CoV-2. Omicron has been located in 149 nations across all 6 World Health Organization (WHO) regions considering that it is identified in Botswana (2).

2 IDENTIFICATION AND TRANSMISSION OF OMICRON VARIANT

South Africa stated the heavily mutated coronavirus variant B.1.1.529 on November 24, 2021. This classification turned into based totally on a speedy growth in cases in South Africa Moreover, South Africa is watching a report-breaking contamination among its resident who have been immunized by means of any type of vaccine from Johnson & Johnson, Pfizer-BioNTech, and Oxford-AstraZeneca (3). The identification of Omicron has created new fears around the world, and those are actually panicked again because of this heavily muted variant. Following South Africa, more than 60 nations have been detected with Omicron variant as of December 10, 2021, and the United Kingdom suggested first acknowledged dying of patient with omicron variation(4). This classification turned into based totally on a speedy growth in cases in South Africa. Omicron instances diagnosed through entire genome sequencing first commenced to be detected inside the UK in specimens from mid-November 2021. Initially instances passed off frequently in travelers and their near contacts but there has been proof of network transmission from late November (6). B.1.1.529 version became first mentioned to WHO on November 24, 2021(11). The early facts of South Africa manifested that the Omicron variant can spread easily from person to person. The difficulty of Omicron variant transmissibility will increase as it spreads global within some days, and instances have been increasing dramatically. The Omicron variant has been mutated 50 instances and acquired greater than 30 variations to the spike protein. Most viruses use this spike protein to go into the body cells, and maximum vaccines are made to target the spike protein (7). According to researchers, " Human antibodies produced by way of the immune device targets in particular the spike protein to fight a coronavirus infection. Therefore, WHO described Omicron as a “stressful kind” of coronavirus due to its heavy mutation and changes in spike protein (9). A big number of non-synonymous mutations had been observed in the spike protein at positions H69-, V70-, G142-, V143, Y144-,N211- of which 69/70 deletions resulted within the failure of the S-gene goal. Other substitutions inside the spike protein are A67V, T95I, Y145D, G339D, S371L, S373P, S375F, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H, T547K, D614G, H655Y, N679K, P681H, N764K, D796Y, N856K, Q954H, N969K, and L981F. Of those, mutations at H655Y, N679K, and P681H within the S1-S2 (11-12) furin cleavage web page of theOMICRON variant might be related to accelerated transmissibility. Mutations at Q498R and N501Y in aggregate elevated the binding affinity to ACE2 as mentioned within the delta variation (11-12).

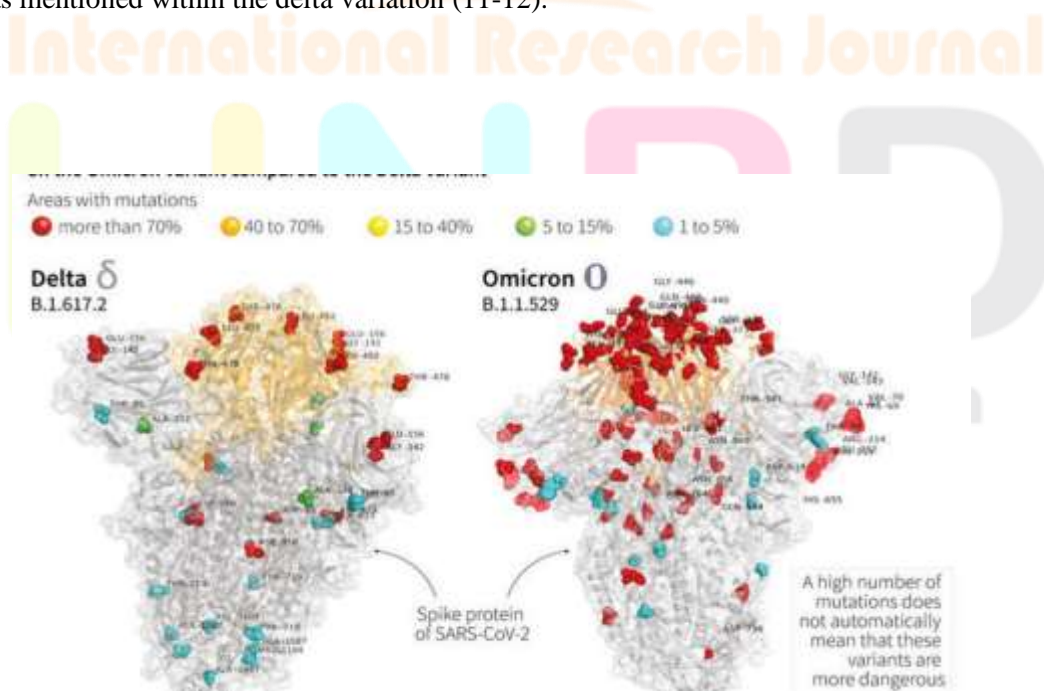


FIGURE 1: A comparison of (A) Delta and (B) Omicron variant spike mutation (Image source: Modified from COVID-19 Genomics UK Consortium). COVID-19, Coronavirus disease 2019(8)

Based on the current epidemiological update by means of the WHO, as of December 11, 2021, five SARS-CoV-2 VOCs had been identified given that the beginning of the pandemic:

Alpha (B.1.1.7): first version of difficulty defined in the United Kingdom (UK) in past due December 2020

Beta (B.1.351): first stated in South Africa in December 2020

Gamma (P.1): first reported in Brazil in early January 2021

Delta (B.1.617.2): first pronounced in India in December 2020

Omicron (B.1.1.529): first said in South Africa in November 2021

The Omicron version is notion to be as a minimum three times more infectious than the authentic SARS-CoV-2 and likely greater so than the delta variation (10). According to a study by way of a Japanese scientist and a professor of health and environmental sciences at Kyoto University, Hiroshi Nishiura, the transmissibility rate is 4.2 instances better in the Omicron version as compared to the Delta. The available statistics handiest proves that the new version is particularly transmissible and can infect human life in a short span of time. Humans and animal coronaviruses had been segregated into 3 broad groups primarily based on their antigenic and genetic makeup. Group I contained virus 229E and other viruses, organization II contained virus OC43 and institution III turned into made up of avian infectious bronchitis virus and a number of related avian viruses. During the 2002–2003 outbreak, SARS infection turned into reported in 29 nations in North America, South America, Europe and Asia. Overall 8098 infected people have been recognized, with 774 SARS-related fatalities.

3 HISTORY OF CORONAVIRUS

Coronaviruses (family Coronaviridae subfamily Coronavirinae are essential pathogens of birds and mammals. Coronaviruses are superb-feel RNA viruses and are currently classified into 4 genera: Alpha coronavirus, Beta coronavirus, Gamma coronavirus, and Delta coronavirus (1). It has been cautioned that East Asia may have additionally been herbal range for coronavirus reservoir species during the last 25,000 years (13). The records of coronavirus are mirrored image of the discovery of the illnesses because of coronavirus and identification of the viruses. The history of human coronaviruses commenced in 1965 when Tyrrell and Bynoe located that they may passage a virus named B814 (14). In the past due 1960s, Tyrrell turned into main a set of virologists running with the human strains and some of animal viruses. These protected infectious bronchitis virus, mouse hepatitis virus and transmissible gastroenteritis virus of swine, all of which have been established to be morphologically similar to visible through electron microscopy. This new institution of viruses became named coronavirus (corona) denoting the crown-like look (15-16). It became found that during temperate climates, breathing coronavirus infections arise more regularly within the wintry weather and spring than in the summer time and fall. It starts with the primary document of a brand new type of upper-respiration tract sickness among chickens in North Dakota, U.S., in 1931. The causative agent became identified as a deadly disease in 1933. By 1936, the ailment and the virus were recognized as particular from different viral ailment. They have become referred to as infectious bronchitis virus (IBV), but later formally renamed as Avian coronavirus. In 1961, an epidemic changed into obtained from a school boy in Epsom, England, who changed into suffering from common bloodless. New not unusual bloodless viruses (assigned 229E) accumulated from scientific college students on the University of Chicago have been additionally stated in 1966(17). At the quit of 2002 and the beginning of 2003, in southern China, a new form of coronavirus became determined. Named Severe Acute Respiration Syndrome Coronavirus (SARS-CoV), it promoted a deadly disease with close to 1000 deaths and more than 8 thousand inflamed (19). In 2012, a second outbreak turned into attributed to the Middle East Respiratory Syndrome Coronavirus (MERS-CoV), with origin in the south of Asia and the middle east of Africa. The spreading of virus human to human occurs due to the close contact with an infected person who is sneezing, coughing, or aerosols and fecal to oral transmission. These can penetrate the human body through inhalation (mouth, nose). Most common symptoms seen in patients are: Fever, Dry cough, Tiredness and the less common symptoms are: Aches and pains, Sore throat, Headache, Loss of taste sensation, Gastrointestinal, Kidney failure, Chest pain, Breathlessness, High fever.

Table 1: Deaths during coronavirus worldwide till 14 May 2022

Country	Cases Confirmed	Deaths
United states	8.3cr	10L
India	4.31Cr	5.4L
Brazil	3.07Cr	6.65L
UK	2.23Cr	1.73L
Italy	1.72Cr	1.6L
Australia	68.6L	8,028
Russia	1.8Cr	3.7L
Canada	38L	40,296
Germany	2.6Cr	1.38L
France	2.85Cr	1.44L
Japan	85.1L	30,212

4 ROLE OF COMPUTATIONAL INTELLIGENCE IN PANDEMIC

COVID-19 has emerged as a pressing emergency for the duration of the world for the final two years. As part of this reaction, considering that early 2020, several computational chemists and biophysicists have pivoted their efforts to try and benefit insight into the internal workings and mechanisms of the molecules of the SARS-CoV-2 virus. The most important problem in the identification of COVID-19 is the diagnosis. Although Reverse Transcription Polymerase Chain response (RT-PCR) method is used for the diagnosis, nonetheless these are time-consuming, less touchy, and short in deliver due to the pandemic Computational intelligence techniques can be rapidly used in various healthcare programs such as identification of illnesses and applying corrective diagnosis measures, drug discovery and manufacturing, medical photograph diagnosis, dealing with of clever fitness facts, clinical trials and studies, crowd-sourced records collection, higher radiotherapy. Currently, computational intelligence strategies already acquired a key vicinity within the healthcare machine.

The recurring detection approach for SARS-CoV-2 is a actual-time Quantitative Reverse Transcriptase Polymerase Chain Response (qRT-PCR). The check is based totally on the detection of two nucleotide sequences: the virus envelope (E) gene and the gene for the RNA based RNA polymerase (RbRp) (20). To ensure particular identification of SARSCoV-2 and keep away from fake-negative and fake-advantageous detection, the computation of SARS-CoV-2-precise primers is required. SARS-CoV-2 tests normally use mucus from the nostril or throat that go through a meta-barcoding analysis. For DNA amplification RT-PCR is applied.

5 PERFORMANCE OF PCR IN SARS-COV2

The new Omicron VOC presently poses a detection challenge for diagnostic laboratories. At the instant there's uncertainty inside the diagnostic overall performance of the to be had PCR assays, as all statistics obtainable at this early degree is based totally on businesses in silico evaluations. Due to the excessive call for SARS-CoV-2 PCR testing at some stage in Switzerland and Liechtenstein as a result of the ongoing epidemic surge with the presently dominating Delta version, additional trying out of all SARS-CoV-2 PCR tremendous cases seems unrealistic. With only a few laboratories, the use of PCR assays that can indicate the Omicron version through S-gene dropout, this would now not generate a decent enough screening net. Notably, a new sub lineage of Omicron, BA.2 does not show S-gene dropout (18). For an RT-PCR take a look at, quick strands of DNA are combined with the swab pattern. These DNA fragments can connect to a goal DNA — the novel coronavirus is an RNA virus, so the RT-PCR take a look at first converts the RNA into DNA using precise enzymes, therefore the 'opposite transcription'. The aggregate is then located in a PCR machine, where fluorescent dyes eventually increase the goal DNA. Now, to ensure that the take a look at is correct, multiple spike gene is focused so that even if a mutation might also have changed one of the genes, the other could nonetheless get captured in the take a look at. That has proved to be a bonus of kinds in terms of detecting a contamination with Omicron seeing that one in all its specific mutations are not always captured by using sure RT-PCR exams.

The World Health Organization (WHO) stated that this phenomenon, referred to as the S gene dropout or S gene target failure, method that precise RT-PCR exams can "consequently be used as marker for this variation, pending sequencing confirmation". Speeding up detection and getting well timed outcomes can help manage this virus pace. We have also

developed RT-Direct RT-PCR package with extraction loose protocol having 3 gene precise to SARS-COV2 and give bring about simply 40 minutes (21).

6 ROLE OF BIOSENSORS AND DETECTORS

Biosensors are analytical gadgets that convert biological reactions into measurable indicators. The organic fabric such as enzymes, tissues, microorganisms, antibodies, cellular receptors, or a biomimetic component, is immobilized over a transducer, and interacts with the analyte within the solution, generating a biochemical response (22). The rapid detection of organic pathogens plays an important function within the prevention of sickness, infections, and pathologies [23]. Huang evolved a fiber-optic biosensor to stumble on the Nucleocapsid (N) protein, a selected SARS-CoV antigen as a quicker and extra opportunity to the RT-qPCR and serological checks (24). After 2 years, Roh, use the quantum dots-conjugated RNA aptamer immobilized over a designed chip to apprehend the identical N protein from SARS-CoV (25), then Park evolved a Surface Plasmon-Resonance (SPR) biosensor for SARS-CoV based on using Gold Binding Polypeptide (GBP) (26). GBP turned into fused to more advantageous inexperienced fluorescent protein (GBP-E) and to SARS-CoV Membrane Envelope (SCV me), the latter that may bind to anti SCV-me antibodies. Layqah has recently developed the primary electrochemical immunosensor for MERS detection. The biosensor includes an array of eight gold nanoparticles changed-carbon electrodes containing MERS antigen immobilized via glutaraldehyde pass-linking immobilization approach (27). Later, Qiu and coworkers provided the primary SARS-CoV-2 biosensor. Using the expertise obtained from RT-PCR from SARS-CoV and SARS-CoV-2, they selected oligonucleotides containing specific sequences for each the illnesses and their thiol-complementary DNA receptor (28).

7 CONCLUSION

Human coronaviruses usually cause moderate top breathing diseases. However, few countries are nonetheless struggling with third wave because of the Delta variation. The detection of the Omicron variation fueled vast fear and alarm across the world. Amid this, the emergence of a new OMICRON variant would possibly impart a bad effect on the existence and livelihood of humankind. Many authorities around the globe declared border closures for vacationers from South Africa and other neighboring countries. Biosensors satisfy the necessities, and they have been developed for lots of functions, including within the health region. Meanwhile, the previous recommendations to tackle the COVID-19 pandemic want to be maintained globally at the side of the newly improvised instructions, inclusive of genome sequencing of all the samples, retaining social distance, continuing vaccination for all. In assessment, the relatively infectious nature of this version shows that, once a man or woman is inflamed, there is possibly wider and quicker spread among cells, tissues, and organs, causing extra excessive tissue damages, for this reason more excessive pathologies and disorder manifestation. The government and nongovernment authorities can arrange public recognition campaigns on the network level to comply with health safety suggestions for safety and lowering virus spread. Also, these projects might reduce panic approximately new coronavirus traces among the overall populace.

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