

Dealing the Variant of Concern ‘Omicron - A Panoramic Public Health Outlook

¹Danish Qureshi, Fellow , School of Epidemiology & Public Health; Department of Community Medicine, Department of Community Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Wardha, (MS) India

²Sonali G. Choudhari, Professor, School of Epidemiology & Public Health; Community Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, IND

³Shariqa Qureshi, Assistant Professor, Department of Clinical Microbiology & Infectious Diseases, Chacha Nehru Balchikitsalaya, Delhi, IND

Corresponding Author: Shariqa Qureshi, Assistant Professor, Department of Clinical Microbiology & Infectious Diseases, Chacha Nehru Balchikitsalaya, Delhi, IND

Citation this Article: Danish Qureshi, Sonali G. Choudhari, Shariqa Qureshi, “Dealing the Variant of Concern ‘Omicron - A Panoramic Public Health Outlook”, IJMSIR- October - 2022, Vol – 7, Issue - 5, P. No. 26 – 33.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

The world has confronted huge repercussions of the COVID-19 Pandemic. Besides, SARS CO-V-2 has been picking up mutations since its inception that is lately chased by another variant of concern, Omicron. Not much has been explored about the VOC hitherto. This critical narrative review is embarked upon to confer diverse details on Omicron, accessible from the contemporary research and literature. It would assuredly benefit the public health specialists as well as health professionals to figure out the anticipated challenges and be acquainted with contemporary evidence-based practices. The key review findings revealed that Omicron has more than 50 mutations in the spike protein making it dissimilar from the prototype SARS-CoV-2 virus or the Delta variant. It is approximated to affect three to six times more individuals as Delta over the same time. The most frequently reported symptoms are cough, fatigue, congestion, or runny nose, few necessitating hospitalizations, and minimally documented

fatalities. There is a reduction in disease severity possibly due to markedly intensified vaccination coverage amongst appropriate masses. Several vaccines have been approved and are being used in vaccination campaigns globally. Increased emergency visits and hospitalizations have been hard-headed among toddlers during the Omicron period. This may well be attributed to decreased vaccination in children in contrast with adults. There are more vaccine candidates in the pipeline explicitly targeting Omicron. Acceptance of preventive measures to disrupt the chain of transmission remains the pillar of strength for public health. Avoiding crowded areas, ensuring adequate ventilation in closed spaces, social distancing, masking, self-hygiene, is the fundamental word to the masses. Standard precautions encompassing WHO’s five moments of hand hygiene, respiratory etiquettes, appropriate personal protective equipment, and transmission-based precautions are the mainstay for healthcare professionals to combat the ongoing fury of highly transmissible Variant of concern.

Keywords: SARS-CoV-2, WHO, Covid -19.

Introduction

The globe has gone through the ferocious pandemic with the kick-off of 2020 due to novel Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) which has potentially affected over 286,515,043 people and claimed nearly 5,429,596 lives worldwide [1]. A colossal battle fought by the medical fraternity all-encompassing public health and scientific inquest armored with expeditiously evolving science focussing the state of art patient care has to lead the way forward on one hand. On the contrary, lately recognized variant of concern (VOC) of SARS-CoV-2, Omicron G.R./484A (B.1.1.529) in Botswana, South Africa on November 24, 2021, upturned voluminous concern for its rapid transmission across the continents [2]. Within no time, all that could be foreseen by the Centers for Disease Control and Prevention (CDC) was steep epidemic trajectories that would necessitate pragmatic public health action to avert the collapse of the contemporary healthcare structure. In comparison to the Delta variant, which was the last VOC, fifty ancillary mutations out of which thirty-two at the receptor-binding domain (RBD) of spike glycoprotein have peaked all debates for Omicron [3-5]. This substantial conformational alteration owing to the mutational hotspots has raised concern for its high transmissibility, immune escape, and vaccine efficacy. This moment necessitates enticing the evidence, info, data, facts, the progress of scientific research, and public health measures at one point. Therefore, the article collectively focuses on the transmission undercurrents, clinical course, vaccine effectiveness, potential public health dreads around the VOC despite pointing the silver lining of the cloud.

While Omicron has arrived in the world with its populace battling socially, mentally, and economically with the

aftermaths of the COVID-19 pandemic, mixed concerns flash to the fore to understand whether vaccine-induced protection would be our armor to fight the resilient foe. Global transmission of Omicron has been inevitable and international travel as the key contributor. India is no exception to being spared, has set off witnessing the abruptly soaring Omicron cases. Consequently, the present study provides a panoramic insight and extrapolation from the retrospective, accumulating data to respond to this public health urgency with the finest feasible approach.

Objective: The critical narrative review is undertaken to furnish assorted details on Omicron, the variant of concern, as available from the existing database and its public health repercussions. This review would route an insight to health care proficient to curtail the disease at the healthcare level in conjunction with the community settings.

Methodology: A meticulous literature review was performed on key databases: PubMed, WHO COVID-19 Database, Google Scholar, manual searches of prominent journals encompassing the chronology of November 2021 to January 2022. The keywords to search: Omicron, a variant of concern, and COVID 19. Primary explorations were also steered in the Johns Hopkins Health Resource and US CDC Library and Ministry of Health and family welfare, India. Since Omicron is the newly evolving variant, studies included in the study were mostly dealing with Omicron but because extrapolation was needed with previously dominant delta variant, so studies on delta variant have been contained as well.

Review

The existing list of VOC of SARS CO-V-2 comprises Alpha, Beta, Gamma, Delta, and the Omicron as per WHO, variant names being followed by the Greek

alphabet. While Omicron VOC unambiguously is not an immediate relative of the Delta or previous variants of concern, rather it seems to have emerged as collateral and is distinct from overtly divulged SARS-CoV-2 genomes [6].

Through more than 50 mutations, Omicron's spike protein has 26-35 amino acids which are diverse from the prototype SARS-CoV-2 virus or the Delta. S gene dropout or S gene target failure (SGTF) in the three-target RT-PCR assay is the reason attributed to looking for non-detection of one of the three target genes encoding for the spike protein and evaluating by whole genome sequencing subsequently [7].

In June 2022 new Omicron subvariants, BA.4 and BA.5 have been detected in 58 and 62 countries, respectively. They are being reported as the dominant variants driving a surge in COVID-19 cases in several countries including Australia, United Kingdom and United States amongst others.

The increase in BA.4 and BA.5 is likely due to their ability to evade immune protection from prior infection and /or vaccination, especially if this has waned over time. The extent of the rise in cases depends on many factors, such as immune protection (dependent on vaccination programmes, timing, and coverage), and the presence of previous variants. According to WHO, BA.4 and BA.5 has been shown to have growth advantage increased transmissibility compared to BA.2, no change in disease severity as compared to BA.1 and BA.2 variants (limited data), Lowered antibody response compared to BA.1, reduced effectiveness of casirivimab and imdevimab

Transmission undercurrents

The RNA virus genomes are extremely vulnerable to mutations which ultimately impact its diffusion between individual hosts, mutation rate, the response for

transmission and disease, and the evolution of pandemics [8]. A pandemic's progression is calculated by R, illustrating the average number of novel cases caused by each infection. Omicron is approximated to affect three to six times more individuals as Delta over the same time [9].

Infectivity and clinical course

Initially described cases of Omicron were subjective reports from South Africa about young adults with mild clinical symptoms, not necessitating hospitalization or critical care [10]. The most frequently reported symptoms were cough, fatigue, and congestion or runny nose amongst 43 Omicron cases in the United States, one patient necessitating hospitalization, and no fatalities were recorded either. The VOC might not be as much severe as its prototypes, but surely it is also early to predict the benevolence of Omicron [11]. Well, it may be early to predict post-Omicron effects and concerns on health.

Potential public health concerns

Data from across the globe has coherently outlined a swift upsurge in cases with COVID-19-associated Emergency visits throughout the pandemic with apprehensions of straining the health care system further. However, Morbidity and Mortality Weekly Report, MMWR, CDC, in the last week of January 2022, has contrasted with preceding high disease-transmission periods showcasing lower emergency visits, hospitalizations, ICU admission, mechanical ventilation, length of stay, and deaths to cases observed during the Omicron period [12]. This perceptible reduction in disease harshness is possibly related to numerous reasons, most markedly intensified vaccination coverage amongst appropriate masses [13,14]. Likewise, customizing vaccine boosters in the proposed subcategories [15]. Supplementary crucial aspects for

lesser disease severity embrace infection-attained immunity and possible lesser virulence of the Omicron variant [16-18].

Reports onOMICRON from South Africa, England, Scotland, health systems in California and Texas as well, are not linked with an escalation in hospital or disease severity indicators when compared with Delta infections [16,19,20].

Children less than 18 years also had decreased length of stay and ICU admission during the Omicron period in comparison to previous high-transmission periods. Though, increased Emergency visits and hospitalizations were observed among children less than 4 years during the Omicron period. This may well be attributed to decreased vaccination in children in contrast with adults, particularly this age group.

Treatment: Scientists are still connecting the strings how well the established medications work on Omicron plus a candid treatment plan

Vaccination

An artificial intelligence (AI) based model, with millennial investigational data points and comprehensively authenticated by speculative data on SARS-CoV-2, uncovers Omicron to be twice more contagious in comparison to the Delta variant. Centered on 132 three-dimensional (3D) structures of antibody-RBD complexes, the study by Chen et al divulged Omicron to doubly escape current vaccines more than the Delta variant [21].

However, a study on Vaccination with Routine Childhood Vaccines and Severity of COVID-19 among Children in Delhi, concluded that children who did not receive both doses of MR vaccine had a severe infection when compared to those who were vaccinated [22]

Vaccine effectiveness of more than 89% was documented against Omicron which lasted for over four months

following the third dose of BNT162b2. Three doses of BNT162b2 were also effective at precluding omicron-related emergency admission, however, protection waned for this milder form of the disease and might require boosters as propounded by Pfizer BioNTech [23].

Vaccine and the impending prospect

As of 25th January 2022 Pfizer, Inc. and BioNTech had announced their Omicron-based vaccine candidate as a two-dose primary series and as a booster dose with the opening participants being enrolled in a clinical trial that aims to evaluate its safety, tolerability, and immunogenicity in healthy adults 18 through 55 years of age.

Kathrin U. Jansen, Ph.D., Senior Vice President and Head of Vaccine Research & Development at Pfizer had remarked for boosters offer high ranking safety against severe disease and hospitalization with Omicron Vigilance to identify innovative tactics for the populace to maintain a high level of protection by exploring variant-based vaccines.

Prof. Ugur Sahin, CEO, and Co-founder of BioNTech have committed a longer duration of protection is the key highlight of the Omicron vaccine. The research would assess nearly1,420 participants across the three cohorts. Cohort #1 who had received two doses of the current COVID-19 vaccine, Cohort #2 who have received three doses of the current Pfizer-BioNTech COVID-19 vaccine, and Cohort #3 with Vaccine-naïve participants, depending will receive three doses of the Omicron-based vaccine [23].

Misinformation Spread

As we entered the pandemic phase a feast of misinformation was in the air via social media, newsrooms, print media, and public figures to gain some publicity and did a lot of harm to society by reducing the relevance of evidence-based medicine. [24]

Infection Prevention and Control

Embracing preventive measures to break the chain of transmission by avoiding potential exposures remains the cornerstone for public health. This comprises avoiding crowded areas, ensuring adequate ventilation in closed spaces, and social distancing wherever possible. Following general hygiene measures community settings like wearing a mask having two or more layers of washable, breathable fabric that completely covers the nose and mouth and fits snugly against the sides of the face leaving no gaps. A nose wire to prevent air from leaking out of the upper part of the mask is ideal. Practice hand hygiene dutifully using a sanitizer if soap and water are not available. Avoid touching faces or surfaces which are frequently touched by many other people.

Infection Prevention and Control Practices IPC for the health care fraternity is the practice to prevent the spread of Omicron during the delivery of healthcare services in facilities like hospitals, outpatient clinics, general practitioners, or dialysis centers. IPC is an eminent component of health structure consolidation and drives to protect patients, attendants, and healthcare workers. Against the backdrop of COVID-19, Delta, or Omicron variants, the IPC goal is to back the maintenance of essential healthcare services by containing and preventing its transmission within healthcare facilities to keep patients and healthcare workers healthy and safe. Sequential IPC Starting from triage include expeditious recognition of suspect in the facility and rapid execution of source control. Restraining the entry of healthcare workers and/or visitors with alleged or confirmed VOC. Prompt isolation and testing. Cohorting patients with suspected or confirmed Omicron/VOC separately. Adherence to IPC practices as elaborated by Centres for Disease Control and Prevention CDC:

Standard Precautions

Standard precautions are a set of practices that apply to the care of patients in all healthcare settings at all times. Standard precautions remain the keystone of infection prevention and control. The application of these precautions depends on the nature of the healthcare worker-patient interaction and the anticipated exposure to a known infectious agent. Standard precautions for the VOC embrace [25]

1. Hand hygiene according to WHO's My five moments of hand hygiene [26]

2. Wearing appropriate Personal protective equipment as per risk assessment. Existing WHO directives for healthcare workers caring for suspected or confirmed COVID-19 patients recommend the use of contact and droplet precautions in addition to standard precautions lest an aerosol-generated procedure is being performed, in which case airborne precautions are needed.

Wearing a medical mask (at least a surgical/medical mask)

Wearing eye protection (goggles) or facial protection (face shield)

Wearing a clean, non-sterile, long-sleeve gown

Use of appropriately fitting gloves.

Healthcare workers while performing aerosol-generating procedures like endotracheal intubation, Bronchoscopy, noninvasive ventilation, tracheostomy, dentistry, manual ventilation before intubation, cardiopulmonary resuscitation on patients with Omicron, it is recommended that a fitted respirator mask (surgical N95 respirators, FFP2 or equivalent) should be used.

Appropriate donning and Doffing of PPE is a mandate for adequate protection and the reason that removing PPE carries a higher risk of self-contamination [25]

3. Practicing and ensuring Respiratory hygiene and cough etiquette in the COVID positive patient care areas

4. Cleaning and disinfection of devices and environmental surfaces: Disposable or dedicated patient care equipment, such as stethoscopes, blood pressure cuffs, should be used. If equipment needs to be shared among patients, it should be cleaned and disinfected between uses for each patient using products containing ethyl alcohol of at least 70%.

5. Safe injection practices and Medication storage and handling are another subpart of the Standard precautions to be followed

Public Health Threats

Covid has undesirably affected many aspects of Public Health [27]. The re-structuring of healthcare infrastructure channelizing of the healthcare workforce to fight SARS-CoV-2, knowingly or unknowingly led to the neglect of both communicable and non-communicable diseases. Threatening with diseases like tuberculosis (TB); human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS); and malaria. Culmination these threats by 2030 is one of the health goals of the 2030 Sustainable Development Goals. These milestones are at a risk. Researchers working on these, estimate a possible delay of five to eight years in the fight against the incidence and deaths from TB, 20 years in the fight against mortality due to malaria and about 12 years in AIDS-related deaths [28 - 30]. These top killer infectious diseases concentrate in current high burden countries mainly in Asia and sub-Saharan Africa, whereas the SARS-CoV-2 has taken its toll on high- and low-income countries alike. However, a large number of high-income developed economies still continue to be severely gripped.

Conclusions

The unfolding facts of the Omicron pandemic have featured its soaring transmissibility in contrast to Delta but with milder disease severity. Undoubtedly, Public

health dynamism against Omicron has steered better ways to dislodge coherence. And one of the pivotal directives is battling reinfection. Social distancing, hand hygiene, and masking remain the latchkey in combating the pandemic in community settings. Standard precautions sideways with transmission-based precautions are the mainstay of infection prevention in the healthcare system. With an exorbitant vaccine drive across the globe overcoming vaccine hesitancy or its shortage is another ray of optimism peeping over the horizons. For the moment, with greater reason, there is an accountability to make a balance of being groomed for the worst COVID waves but anticipating the best.

References

1. Johns Hopkins, C. S. S. E. (2020). Coronavirus COVID-19 (2019-nCoV). (2020). Accessed: Retrieved July, 18, 2020.: <https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>.
2. World Health Organization. Classification of Omicron (B.1.1.529): SARS-CoV-2 variant of concern.. (November 26, 2021). [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).
3. World Health Organization. (2021). Enhancing readiness for omicron (B. 1.1. 529): technical brief and priority actions for member states.. (December 2021). Accessed: 30 December 2021: <https://www.who.int/docs/default-source/coronaviruse/2021-12-23-global-technical-brief-and-priority-action-on-omicron...>
4. England, P. H. (2021). SARS-CoV-2 variants of concern and variants under investigation in England. Tech Brief, 12..

- (2021). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1042367/technical_bri...
5. CoVariants. Variant: 21K (Omicron). 2021. (2021). Accessed: December 1, 2021.: <https://covariants.org/variants/21K.Omicron>.
 6. K Kupferschmidt : Kupferschmidt, K. (2021). Where did ‘weird’Omicron come from?.. *Science* . 2021, 374 (6572):1179. 10.1126/science.acx9738
 7. E Brits, P Adepoju: Omicron potential under close scrutiny.. *Nature*. 2021, 10:197-199.
 8. Bal A., Destras G., Gaymard A., et al.: S., ... & COVID-Diagnosis HCL Study Group. (2021). Two-step strategy for the identification of SARS-CoV-2 variant of concern 20212/01 and other variants with spike deletion H69-V70, France, August to December. 2020, 26:2100008. 10.2807/1560-7917.ES.2021.26.3.2100008.
 9. Callaway E, Ledford H: How bad is Omicron?. *Nature*. 2021, 600:197-199.
 10. Mukherjee PS: African doctor says patients with Omicron variant have “very mild” symptoms. 2021, 12:2021.
 11. Pulliam J, Van Schalkwyk C, Govender N, et al.: Increased risk of SARS-CoV-2 reinfection associated with the emergence of the Omicron variant in South Africa. *medrxiv*. 2021, 10.1101/2021.11.11.21266068
 12. Iuliano AD, Brunkard JM, Boehmer TK, et al.: Trends in Disease Severity and Health Care Utilization During the Early Omicron Variant Period Compared with Previous SARS-CoV-2 High Transmission Periods — United States, December 2020-January 2022. *MMWR Morb Mortal Wkly Rep*. 2022, 71:146-152.
 13. Johnson AG, Amin AB, Ali AR, et al.: COVID-19 incidence and death rates among unvaccinated and fully vaccinated adults with and without booster doses during periods of Delta and Omicron variant emergence—25 U.S. Jurisdictions, April 4-December 25. 2021202271717104271042,
 14. CDC. COVID data tracker. Trends in number of COVID-19 vaccinations in the US. Atlanta, GA: US Department of Health and Human Services, CDC. (2021). Accessed: January 15, 2022: <https://covid.cdc.gov/covid-data-tracker/>.
 15. Thompson MG, Natarajan K, Irving SA, et al.: Effectiveness of a third dose of mRNA vaccines against COVID-19-associated emergency department and urgent care encounters and hospitalizations among adults during periods of Delta and Omicron variant predominance—VISION Network, 10 states, August 2021-January 2022. *MMWR Morb Mortal Wkly Rep*. Epub 21 January. 2022,
 16. Lewnard JA, Hong VX, Patel MM, et al.: Clinical outcomes among patients affected with Omicron (B.1.1.529) SARS-CoV-2 variant in southern California. *medRxiv* [Preprint posted online. Accessed: January 11, 2021: <https://www.medrxiv.org/content/10.1101/2022.01.11.22269045v1external>.
 17. Abdullah F, Myers J, Basu D, et al.: Decreased severity of disease during the first global Omicron variant covid-19 outbreak in a large hospital in Tshwane, South Africa. *Int J Infect Dis*. 2021, 116:38-42.
 18. Ferguson N, Ghani A, Hinsley W, Volz E: Report 50—hospitalization risk for Omicron cases in England. London, UK: Imperial College London.
 19. Diamond M, Halfmann P, Maemura T, et al.: The SARS-CoV-2 B.1.1.529 Omicron virus causes

- attenuated infection and disease in mice and hamsters. [Preprint posted online December 29, 2021].
20. Wolter N, Jassat W, Walaza S, et al.: Early assessment of the clinical severity of the SARS-CoV-2 Omicron variant in South Africa. medRxiv [Preprint posted online December 21, 2021].
21. Chen J, Wang R, Gilby NB, Wei GW. Omicron (B: 1.1.529): Infectivity, vaccine breakthrough, and antibody resistance. ArXiv [Preprint. 2021, 1:2112-01318.
22. Majhi MM, Borle AL, Lal P, et al.: Vaccination with routine childhood vaccines and severity of COVID-19 among children in Delhi.. Indian pediatrics. 2022, 59:132-35.
23. Tartof, Sara Y, Slezak Jeff M., Puzniak Laura: BNT162b2 (Pfizer-Biontech) mRNA COVID-19 Vaccine Against Omicron-Related Hospital and Emergency Department Admission in a Large US Health System: A Test-Negative Design.. Accessed: SSRN: <https://ssrn.com/abstract=4011905> or: <http://dx.doi.org/10.2139/ssrn.4011905>.
24. Tagliabue F, Galassi L, Mariani P: The "Pandemic" of Disinformation in COVID-19 [published online ahead of print, 2020 Aug 1]. SN Compr Clin Med. 2020;13, 10.1007/s42399-020-00439-1
25. COVID-19 Overview and Infection Prevention and Control Priorities in non-U.S. Healthcare Settings. (2021). <https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/overview/index.html>.
26. WHO. Infection prevention and control during health care when novel coronavirus disease (COVID-19) is suspected or confirmed external icon.29. June. 2020,
27. Susana David,corresponding author1,2 Guillermo Dorado,: COVID-19: impact on Public Health and hypothesis-driven investigations on genetic susceptibility and severity. Immunogenetics. 2022, vol. 74,4 (2022): 381-407:10.1007/s00251-022-01261-w
28. Lucia Cilloni , Han Fu , Juan F Vesga ,: The potential impact of the COVID-19 pandemic on the tuberculosis epidemic a modelling analysis. EClinicalMedicine. 2020, 28 :10.1016/j.eclinm.2020.100603
29. Britta L Jewell*, Edinah Mudimu*, : Potential effects of disruption to HIV programmes in sub-Saharan Africa caused by COVID-19: results from multiple mathematical models. Lancet. 2020, 10.1016/ S2352-3018(20)30211-3
30. <https://www.stoptb.org/advocate-to-endtb/step-tb-2020>. (2020). Accessed: 7/8/2022: <http://2020>.