HUMAN VACCINES & IMMUNOTHERAPEUTICS
2022, VOL. 18, NO. 1, e2034458 (2 pages)
https://doi.org/10.1080/21645515.2022.2034458

Taylor & Francis
Taylor & Francis Group

LETTER



# Omicron, a new SARS-CoV-2 variant: assessing the impact on severity and vaccines efficacy

Gaurav Joshi [a] and Ramarao Poduri [b]

[a]School of Pharmacy, Graphic Era Hill University, Dehradun, India; [b]GITAM Institute of Pharmacy, GITAM University, Visakhapatnam, India

**ABSTRACT**

The reply letter has been put forth in response to the comment made by Karthyayani Priya Satish entitled "India and the COVID-19 Vaccine." The comment was made in context to our published work "Exploring the covid-19 vaccine candidates against SARS-CoV-2 and its variants: where do we stand and where do we go?" The reply letter is concerned with the newer variant of SARS-CoV-2, i.e., Omicron and its impact on severity and vaccine efficacy. Though the variant is mild, as per the reports, the cases are rising at an unprecedented rate that may create havoc on humankind considering shortages of RT-PCR testing and prevailing unequal vaccine distribution and vaccine hesitancy.

**ARTICLE HISTORY**
Received 7 January 2022
Accepted 22 January 2022

**KEYWORDS**
Omicron; SARS-CoV-2; Covid-19; vaccine efficacy

Dear Editor,

World Health Organization (WHO) designated variant B.1.1.529 as Omicron on 26 November 2021. The variant has been considered a variant of concern by the WHO as it may pose a spike in transmissibility.[1] The new variant has been found to carry at least 32 mutations (in contrast to 16 mutations in delta variant), among which 15-point mutations (Del 69–70/142–144/211 A67V, T95I, Y145D, L212I, Ins 214EPE, T547K, D614G, H655Y, N679K, P681H, N764K, D796Y, N856K, Q954H, N969K, and L981F) are reported in the Receptor Binding Domain (RBD) that is vital for viral-cell interaction with ACE-2 optimized via enhanced S1–S2 furin cleavage site. This is followed by extensive changes in the N-terminal domain of the spike protein.[2] As the omicron variant contains specific overlapping deletions, insertions, and deletions that are in accordance with previously reported Alpha, Beta, Gamma, and Delta variants that were considered vital for increasing viral transmissibility and binding affinity, the similar postulations have been forecasted for the new variant omicron that may be associated with the immune evasion and probable antibody escape.[3] A preprint study suggested that ACE-2 receptors are the primary entry site for the Omicron variant in accordance with its other variant of SARS-CoV-2.[4,5]

Further, as detection goes, a recent report suggested that the new variant does not impact nucleic Acid Amplification Tests (NAATs). However, S-gene target failure (SGTF) was observed with the TaqPath (manufacturer: ThermoFischer) probably due to deletion in spike sequence at 69–70, which is originally a probe for detection by the mentioned kit.[3] To overcome the failure, variant screening that involves the use of different mutation-specific tests (E484K/Q, L452R, and N501Y detection) is recommended to overcome the false positives or negatives.

A briefing released by the UK health security agency published an analysis that suggested the risk of presentation to the hospital admission with Omicron is approximately half (Hazard Ratio: 0.53) than that was initially been by delta variant. Further, the risk of hospital admission was only found to be one-third (Hazard Ratio 0.33) with the Omicron variant. Moreover, the analysis also revealed that hospitalization is lower after the second dose of vaccine and almost 81% lower after three doses than the unvaccinated cases against Omicron.[6]

Finally, as the waning of vaccines was seen as a widespread phenomenon during evolving SARS-CoV-2 variants, many studies are currently underway to deduce the vaccine efficacy against this novel variant. Press report by Pfizer-BioNTech (Comirnaty or BNT162b2 vaccine) suggested through their laboratory studies that three doses neutralize the omicron variant, and two doses could reduce the neutralization titration significantly. The study also suggested that neutralization titer value of antibodies rises to about 25-fold after administration of the third dose.[7] Further, in the research analysis on hospital admission with Covid-19 (presumed to cause by omicron variant), the vaccine efficacy was found to be 70% for the Pfizer-BioNTech vaccine.[8] A study published as preprint report indicated that mRNA vaccine was not protective against omicron variant, whereas three doses imparted the vaccine efficacy of 37% only even less against delta variant.[9] A similar trend was put forth by another preprint that suggested primary vaccination by BNT162b2 conferred vaccine efficacy of 55.2% and with mRNA-1273, vaccine efficacy was found to be 36.7%. However, the authors highlighted that this primary vaccine efficacy against Omicron decreases with time, allowing the reconsideration for booster doses.[10] Low effectiveness was also observed in another study on ChAdOx1-S (Covisheild) and BNT162b2 efficacy on Omicron variant after primary vaccination that was elevated to 70–75% after administration

**CONTACT** Gaurav Joshi garvpharma29@gmail.com School of Pharmacy, Graphic Era Hill University, Dehradun 248002, India; Ramarao Poduri ramaraop@yahoo.com GITAM Institute of Pharmacy, GITAM University, Gandhi Nagar, Rushikonda, Visakhapatnam 530045, India

of booster doses against mild infection.[5] Another study analyzed the efficacy of the BNT162b2 vaccine in neutralizing the Omicron variant in comparison with D614G mutated virus strain collected plasma from BNT162b2 vaccinated participants. The study highlighted that the plasma sample had a strong neutralization outcome against D614G mutant strain, whereas a 41-fold decrease in efficacy was noted against the Omicron variant.[4]

The analysis on SARS-CoV-2 new variant, Omicron, thus suggests that virus although highly transmissible operates via its entry through ACE-2 binding. Though the hospitalization cases are found to be milder in comparison to what they were in the case of delta variant, the neutralization effects were found to be optimum when the individual was dosed with a minimum of primary dosing followed by a booster dose. In the light of current analysis, the authors again feel a strong need to analyze the previously discussed queries,[11] which includes but are not limited to streamlining the vaccine equity or distribution as booster doses are making their mark to counteract Omicron variant; second, testing of vaccines cocktail for their efficacy against emerging variants. Nevertheless, the research is going at a tremendous pace to decipher the severity of the Omicron variant and its influence on vaccine efficacy, still a greater degree of ambiguity persists how the variant will behave in different ethnic groups across the globe or it may evolve further giving arise to newer pandemic altogether.

## Author contributions

The manuscript has been prepared and drafted with the understanding and contributions of all the authors.

## Acknowledgments

All the authors thank their respective affiliated working institutes for providing the necessary infrastructure and support to carry out the current work.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## ORCID

Gaurav Joshi http://orcid.org/0000-0002-7812-2871
Ramarao Poduri http://orcid.org/0000-0002-8144-349X

## References

1. Technical Advisory Group on Virus Evolution. Update on Omicron. https://www.who.int/news/item/28-11-2021-update-on-omicron .
2. Zinatizadeh MR, Zarandi PK, Zinatizadeh M, Yousefi MH, Amani J, Rezaei N. Efficacy of MRNA, adenoviral vector, and perfusion protein COVID-19 vaccines. Biomed Pharmacother. 2022;146:112527. doi:10.1016/j.biopha.2021.112527.
3. Dhawan M, Priyanka OPC. Omicron SARS-CoV-2 variant: reasons of emergence and lessons learnt. Int J Surg. 2022;97:106198. doi:10.1016/j.ijsu.2021.106198.
4. Cele S, Jackson L, Khan K, Khoury D, Moyo-Gwete T, Tegally H, Scheepers C, Amoako D, Karim F, Bernstein M, et al. SARS-CoV-2 Omicron has extensive but incomplete escape of Pfizer BNT162b2 elicited neutralization and requires ACE2 for infection. medRxiv Prepr Serv Heal Sci. 2021;10:11.
5. Andrews N, Stowe J, Kirsebom F, Toffa S, Rickeard T, Gallagher E, Gower C, Kall M, Groves N, O'Connell A-M. Effectiveness of COVID-19 vaccines against the Omicron (B. 1.1. 529) variant of concern. MedRxiv. 2021.
6. England PH. SARS-CoV-2 variants of concern and variants under investigation in England. Tech Brief. 2021;12:1–44. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009243/Technical_Briefing_20.pdf .
7. Pfizer. Pfizer and biontech provide update on Omicron variant. [accessed 2022 Jan 4]. https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-provide-update-omicron-variant .
8. Collie S, Champion J, Moultrie H, Bekker L-G, Gray G. Effectiveness of BNT162b2 vaccine against Omicron variant in South Africa. N Engl J Med. 2021. doi:10.1056/NEJMc2119270.
9. Buchan SA, Chung H, Brown KA, Austin PC, Fell DB, Gubbay JB, Nasreen S, Schwartz KL, Sundaram ME, Tadrous M, et al. Effectiveness of COVID-19 vaccines against Omicron or delta infection. medRxiv. 2022:2021. doi:10.1101/2021.12.30.21268565.
10. Hansen CH, Schelde AB, Moustsen-Helm IR, Emborg H-D, Krause TG, Mølbak K, Valentiner-Branth P; Institut, on behalf of the I. D. P. G. Vaccine effectiveness against SARS-CoV-2 infection with the Omicron or delta variants following a two-dose or booster BNT162b2 or MRNA-1273 vaccination series: a Danish cohort study. medRxiv. 2021;2021. doi:10.1101/2021.12.20.21267966.
11. Joshi G, Borah P, Thakur S, Sharma P, Mayank, Poduri R. Exploring the COVID-19 vaccine candidates against SARS-CoV-2 and its variants: where do we stand and where do we go? Hum Vaccin Immunother. 2021:1–27. doi:10.1080/21645515.2021.1995283.