Short Communication

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2022.41.006559

COVID-19: The Impact of Emerged Omicron on Vaccine Escape

Mohammed Ibrahim Saeed[1]* and Ayat Hassan Mahmoud Bakr[2]

[1]*Department of Medical Microbiology, Faculty of Laboratory Science, The National Ribat University, Sudan*

[2]*Pathology & genetic laboratory, Department of Microbiology, UAE*

***Corresponding author:** Mohammed Ibrahim Saeed, Department of Medical Microbiology, Faculty of Laboratory Science, The National Ribat University, 055, Burri, Khartoum, 1111, Sudan

ARTICLE INFO

Received: December 23, 2021

Published: January 19, 2022

ABSTRACT

Citation: Mohammed Ibrahim Saeed, Ayat Hassan Mahmoud Bakr2. COVID-19: The Impact of Emerged Omicron on Vaccine Escape. Biomed J Sci & Tech Res 41(1)-2022. BJSTR. MS.ID.006559.

Introduction

Going to the thitd year since the emerging of Covid-19 virus and its global containment effort that ends up with the ongoing scenario of failure to halt virus spread waves or eradication until now. There are many queries raised in what went wrong with repeayed emerging waves. On the other hand, the newly emerged covid Omicron and the expected future coming variant based on the significance of dry lab sequence analysis outcomes on vaccines protuctivity or virus escape indicated fir the crucial need for web lab that will indicate the how far the current vaccines still offering enough prevention or a new vaccine version is required, this review covers the key preventive action that should be taken towards the ideal Covid eradication strategy.

The Current Covid-19 Vaccines

Principally covid-19 vaccines were approved with great expectations to protect healthy individuals from exposure to infection, as well as to enhance recovery and minimize the disease severities, reduces hospitalization, fatality, terminate infected healthy carriers and new cases among the vaccinees. Since initiated covid-19 vaccination in December 2020; and out of more than one hundred vaccine trials; currently only 14 fast track coronavirus covid-19 vaccine has been designed, tested & approved. But an unexpected different scenario took place among the vaccinee as what currently noticed that some of those fully vaccinated captured the infection in addition to the raised issues on the vaccines boosting dosage, number, timing and the best efficient way to deliver the vaccine in order to induce the best types of protective immune response/s toward such respiratory pathogens. The direction and significant of Omicron Covid variant dry-lab analysis vs wet lab results: Sequences based lab analysis known as dry lab, while the real phenotypic are wet-lab; the sequences of viral isolates analyzed in dry lab based showed presence of mutation in term of many variant including Omicron as a common expected feature in RNA viruses [1].

The virus have many structural proteins and genes of which Covid spike is the unique key player that have role on its capacity of invasions to target cell and tissue tropism, bind to receptor/co-receptor epitope, immunogenicity, passive plasma therapy for sever disease and vaccine success or failure. Covid based sequences outcome should focus on how far its significance the new viral emerged variant such as Omicron in term of the location, number and types of mutation on spike genes S1 & S2, the 3D epitope modified conformation compared to native viral spike and how far the mutations have impact on spike epitopes affinity binding to Ace2 receptor on the fusion of viral particle to target cell and the outcome of the reported mutation on the protective capacity of new

variant spike based on wet lab, using the well-known *in-vitro* virus neutralization test in susceptible VERO-E6 cell lines, towards sera from vaccinee received full Covid vaccines dosage [2]. This wet-lab virus neutralization result outcome remain as the most important and crucial parameter to prove and will tell the reality of legend-legend binding affinity and to give answer for the assumptions raised based on dry-lab sequence analysis about whether those mutations in Omicron spike gene will affect protectivity, partial vaccine escape or fully emerged new viral variant escape totally missmatch the current ongoing Covid vaccines. At any time the wet-lab reported failure of vaccinee sera in virus neutralization, it mean new design of covid vaccine version will urgently require to include the mutant gene or epitopes of both the new Covid variant like Omicron and to maintain the effective and protectiveness of the ongoing covid vaccines.

What Should be Ideal Vaccine Delivery Route toward Covid-19 Eradication

Although covid vaccines offers protection to vaccinees and the current need for a third boosting dose towards Omicron and the challenging pressures on manufacturers to meet the increased covid vaccine market. But still there is a major gap in covid-19 vaccine that clearly appeared on neglecting vaccine delivery route to consider the crucial issue of vaccine capabilities in blocking the virus invasion and replication in its target cell & tissue tropism at entry sites. And the role of spike specific IgA in the neutralization of covid primary replication, attach of viral spike to ACe2 cell receptor that terminates presence of healthy carrier vaccinees [2].

Therefore it is top demand for vaccine capable to induce anti-covid-19 specific mucosal immunity as the key component and most crucial effective mechanisms to halt exposure to infection through blocking early virus entry at the mucosal front line, attached to target cell Aec-2 receptors and inhibits early virus replication among the fully vaccinated population [3-5].

An ideal novel smart covid-19 vaccine need to be designed and delivered to offer the vaccinees with triple immune responses as follows; enough cellular memory and specific higher humoral immunity in term of Covid-19 IgM & IgG responses induced through parenteral immunization routes. In addition to strengthened potent, covid-19 spike-specific mucosal immunity in term of higher covid-19 IgA antibody titer to neutralizes virus inoculum on mucosal lining on upper respiratory, pharyngeal, nasal sites and lung, through mucosal (nasal spray or oral) vaccine delivery as 3rd and 4th doses following initially two parenteral doses [3,6]. Therefore, a new revised covid-19 vaccine design, downstream processing, through encapsulating carrier, mucosal delivery systems post-parenteral dosage to modulate and boost covid-19 spike specific M-cells and APC that promote adherence and transport of vaccine epitopes for triggering covid-19 spike-IgA class-switching as mucosal vaccines that is expected to terminates virus spread and game changer and initialization of pandemic eradication era [7-10]. In addition introduction of such mucosal requires re-adjusting of vaccine testing and efficiency parameters including measurement of covid-19 IgA titer in vaccine and to develop *in-vitro* neutralization testing protocols & assay for covid-19 mucosal samples (saliva, nasal) and viral specific mucosal dendritic & M-cell flow-cytometry [11,12].

Competing Interests

The authors declare that there are no competing interests.

References

1. Wang, Rui (2021) Vaccine-escape and fast-growing mutations in the United Kingdom, the United States, Singapore, Spain, India, and other COVID-19-devastated countries. Genomics 113(4): 2158-2170.
2. Geers, Daryl (2021) SARS-CoV-2 variants of concern partially escape humoral but not T cell responses in COVID-19 convalescent donors and vaccine recipients. Science Immunology 6(59): eabj1750.
3. Mudgal R, Nehul S, Tomar S (2020) Prospects for mucosal vaccine: shutting the door on SARS-CoV-2. Human vaccines & immunotherapeutics 16(12): 2921-2931.
4. Ejemel M, Li Q, Hou S, Schiller ZA, Tree JA, et al. (2020) A cross-reactive human IgA monoclonal antibody blocks SARS-CoV-2 spike-ACE2 interaction. Nature communications 11(1): 4198.
5. Isho B, Abe KT, Zuo M, Jamal AJ, Rathod B, et al. (2020) Persistence of serum and saliva antibody responses to SARS-CoV-2 spike antigens in COVID-19 patients. Science immunology 5(52): eabe5511.
6. Woodrow Kim A, Kaila M Bennett, David D Lo (2012) Mucosal vaccine design and delivery. Annual review of biomedical engineering 14: 17-46.
7. Ashraf MU, Kim Y, Kumar S, Seo D, Ashraf M, et al. (2021) COVID-19 vaccines (revisited) and oral-mucosal vector system as a potential vaccine platform. Vaccines 9(2): 171.
8. Neutra, Marian RV (1998) Role of M cells in transepithelial transport of antigens and pathogens to the mucosal immune system. American Journal of Physiology-Gastrointestinal and Liver Physiology 274(5): G785-G791.
9. Lee JS, Poo H, Han DP, Hong SP, Kim K, et al. (2006) Mucosal immunization with surface-displayed severe acute respiratory syndrome coronavirus spike protein on Lactobacillus casei induces neutralizing antibodies in mice. Journal of virology 80(8): 4079-4087.
10. Travis CR (2020) As plain as the nose on your face: the case for a nasal (mucosal) route of vaccine administration for Covid-19 disease prevention. Frontiers in Immunology 11: 2611.
11. Wilson, Nick (2021) We should not dismiss the possibility of eradicating COVID-19: comparisons with smallpox and polio. BMJ Global Health 6(8): e006810.
12. Fukuyama, Yoshiko, Daisuke Tokuhara, Kosuke Kataoka, Rebekah S, et al. (2012) Novel vaccine development strategies for inducing mucosal immunity. Expert review of vaccines 11(3): 367-379.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2022.41.006559

Mohammed Ibrahim Saeed. Biomed J Sci & Tech Res

Submission Link: https://biomedres.us/submit-manuscript.php