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SARS COV-2 BREAKTHROUGH INFECTIONS – IS IT AN AREA OF CONCERN?

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ABSTRACT

The devastating morbidity and mortality caused by SARS COV-2 pandemic led to spurred research for development of vaccines against the SARS-CoV2 virus. Usually, the development of a new vaccine takes 10–15 years, but the search for a vaccine against SARS-CoV2 moved at a breakneck speed, with numerous research institutions and vaccine producers nearing a breakthrough in vaccine development within 15-18 months. At present numerous vaccines are available but vaccines do not confer 100% immunity. Emerging new variants are a constant worry about breakthrough infections globally. However, there isn't enough data to state whether insufficient vaccine-induced immunogenicity caused breakthrough infections during the variant's outbreak. There are concerns regarding the occurrence of breakthrough infections after vaccination, and it is still a topic of exploration.

INTRODUCTION

COVID 19 was declared the deadliest pandemic on 10 March 2020, causing more than 1 million deaths. India too witnessed an unprecedented spike in COVID-19 cases again since March 2021 [Patil, 2021] Covid vaccines are indisputably the only effective and the only instrument along-with social distancing, masks to bring the situation under control. Though it has been proven in large evidence based studies that it only provides protection but doesn't prevent infection. None of the vaccines are 100 % effective at preventing illness in vaccinated individual; few individual may even contract infection even after complete vaccination. In large experimental randomized trials, it has been elucidated that majority of vaccinated people suffer from mild course of the disease but few may even get hospitalized or die too. These cases are called vaccine breakthrough cases [One, 2021]

What is a Vaccine breakthrough infection?: "Vaccine breakthrough infection" is defined as the detection of SARS-CoV-2 RNA or antigen in a respiratory specimen i.e. nasal or oropharyngeal collected from a person ≥ 14 days after they have completed all recommended doses of a U.S.

Food and Drug Administration (FDA)-authorized COVID-19 vaccine [COVID-19, 2021] Vaccine-induced immunity along with natural immunity has been critical in halting catastrophic pandemic, by the reduction in transmission, hospitalization and mortality. However, the new variants have succeeded to break through the immunity, causing concern among the public and stakeholders [Lumley, 2021]. As per the study conducted at All India Institute of medical sciences (AIIMS), New Delhi, out of the 24,000 people, immunized with Covaxin, more than 18,000 tested positive after the first dose. Around 5000, suffered from Covid after the second dose. In contrast with Covishield, around 80,000 and 35000 people tested positive after the first and second dose respectively. To summarize, 0.13% of Indian people who had received Covaxin suffered from breakthrough infection even after vaccination in contrast to 0.07% jabbed with Covishield [One Can Get Covid-19] However in studies Pfizer and Moderna's two-dose regimens were 95% and 94% effective while Johnson & Johnson's one-shot vaccine was found to be 66% effective in preventing Covid [Birhane, 2021] The study of vaccine breakthrough cases would help in seeing any unusual patterns, such as trends in age or sex, the vaccines involved, underlying health

conditions, or which of the SARS-CoV-2 viruses/variants are responsible. An elaborate study of the cases that erupt post inoculation would help to decrease the vaccine hesitancy and help in the differentiation of Adverse event following immunization (AEFI) after Covid vaccination [Amit, 2021].

Reasons put forward as a cause of explanation for Covid 19 breakthrough: According to immunological Experts, usually after a time span of two weeks, the immune system builds antibodies following immunization. So, there can be people who got infected just before, or after, getting their first dose. In such cases, the infection may have increased to its maximum even before the antibodies develop optimally. Centers for disease control and prevention (CDC) Atlanta has classified variants as (i) Variant of interest, (ii) Variant of concern, (iii) Variant of high consequence. The B.1.1.7 (Alpha), B.1.351 (Beta), B.1.617.2 (Delta), P.1 (Gamma), and AY1 (Delta plus variant) have been shaking the world by giving unprecedented hike in cases from time to time. At present globally, the new SARS-CoV-2 variant (B16172) and Delta plus (AY1), omicron, deltacon are gaining ground in many countries and posing a threat again. It has been termed as the greatest threat in eliminating COVID 19 in countries including India [Breakthrough, 2021]. But the point to ponder is though these variants have given an unparalleled increase in cases, but the severity is less in vaccinated countries. Hence escalation along with severity of cases can be stopped by rigorous vaccination which would help in achieving herd immunity. And thus saving from Covid crisis and emergence of breakthrough infections [Hurst, 2021].

Global and national glimpse of Breakthrough Infections: Various studies and trials are being conducted to explore breakthrough infections. In a study conducted in Boston, SARS-CoV-2 cases occurred in 1.4% of healthcare workers (HCWs) given at least a first dose and 0.3% of HCWs given both vaccine doses [Bouton, 2021]. While in another study no HCW vaccinated twice had a symptomatic infection and incidence was 98% lower in seropositive HCW [Lumley, 2021]. Likewise research in Israel reported that 0.54% HCWs developed COVID-19 after immunization [Amit, 2021]. In India too, a large epidemiological study so conducted at a tertiary hospital, Mumbai showed the prevalence of SARS-CoV-2 cases among vaccinated HCWs to 10.1% [Patil, 2021].

Tracking breakthrough cases: Breakthrough infections, that bypass vaccine protection, are usually rare, asymptomatic, or mild in comparison to Covid infected cases. But, still they should be kept under track. Due to mutations and different variants, the number can reverse and it can be worrisome in the future. The question is what should be the focus of interest – tracking of all breakthrough cases or severe cases or those with different symptoms [Shmerling, 2021]: As per the recent updates, the Centers for Disease Control and Prevention (CDC) are not tracking all the breakthrough cases. But it's worth noting that the CDC isn't the only option: the National Institute of Health (NIH), academic medical centres, state and regional health departments, private companies, can decide to support efforts to track breakthrough cases. In days, weeks, or even months to come, it's possible the CDC will reverse its decision and resume tracking all breakthrough cases. Regardless of how we shine a light on all breakthrough cases, it would seem wise to pay more, not less, attention to them [Shmerling, 2021].

Strategy to save from breakthrough infections: The SARS COV2 variants that are creating ripples for impending breakthrough infections can be tackled by adhering to CAB (Covid Appropriate behaviour) by even those who are fully vaccinated. In USA and India, where the delta variant is giving scary rise in cases, virus experts, epidemiologists, stakeholders, public health experts have strongly recommended the “mask mandate” to masses irrespective of vaccination status. One major fact to introspect is mask mandate is basically for protection of unvaccinated strata. As it is difficult to differentiate between vaccinated and unvaccinated, so it is better to save unvaccinated community. The breakthrough infection doesn't imply that vaccines don't confer enough protection or are ineffective. And till date, a very minimal percentage of cases have been reported that have been hospitalized. The only worrisome thing in regards to breakthrough infection is the unvaccinated children population. So one has to be vigilant about wearing a mask and modelling good behaviour, showing social solidarity for the unvaccinated population especially children or pre-teens who can fall for future variants [Severn, 2021].

CONCLUSION

Vaccination is one of the most cost-effective instrument for preventing and decreasing the severity of breakthrough infections. If the pandemic continues, vaccines may not be the lone cure for preventing and stopping it. Rather we may need to constantly observe covid appropriate behaviour. Although current vaccines remain effective at preventing severe disease and deaths from COVID-19, while vaccination alone is not sufficient to prevent all transmission of the variants.

Conflict of Interest: No conflict of interest in the study.

REFERENCES

- Patil Y, Kesari M, Agrawal S, Dholpure M, Rehemani H. Post Vaccination Covid Infection in Health Care Workers at a Tertiary Care Centre: A Retrospective Cohort Study. *Int J Contem Med Res*. 2021; 8 (5):E1-5
- One Can Get Covid-19 After Taking Two Vaccine Shots. Here's Why There Is No Need To Worry. *News18*. 2021 Jul 01. Accessed from: <https://www.news18.com/news/explainers/one-can-get-covid-19-after-taking-two-vaccine-shots-heres-why-there-is-no-need-to-worry-3810749.html> on 5th July 2021
- COVID-19 Vaccine Breakthrough Case Investigation and Reporting. Centers for Disease prevention and control. 2021 Jul 02. Accessed from: <https://www.cdc.gov/vaccines/covid19/healthdepartments/breakthrough-cases.html>. on 4th July 2021
- Lumley SF, Rodger G, Constantinides B, et al. An observational cohort study on the incidence of SARS-CoV-2 infection and B. 1.1. 7 variant infection in healthcare workers by antibody and vaccination status. *medRxiv*, 2021.
- Birhane M, Bressler S, Chang G, Clark T, Dorough L. COVID-19 Vaccine Breakthrough Infections Reported to CDC—United States, Jan 1–Apr 30, 2021. *Morbidity and Mortality Weekly Report*. 2021;70(21):792. Accessed from <https://www.cnn.com/2021/06/25/covid-breakthrough-cases-cdc-says-more-than-4100-people-have->

- been-hospitalized-or-died-after-vaccination.html. on 6th July 2021
- Amit S, Beni SA, Biber A, Grinberg A, Leshem E, Regev-Yochay G. Postvaccination COVID-19 among healthcare workers, Israel. *Emerg Infect Dis*. 2021;27(4):1220.
- Breakthrough infection. Wikipedia. 2021 Jun 15. Accessed from: https://en.wikipedia.org/wiki/Breakthrough_infection#Breakthrough_COVID-19. on 6th July 2021
- Hurst T. COVID-19 vaccines: Some fully vaccinated people will still get infected — here's why. *Down To Earth*. 2021 May 18. Accessed from: <https://www.downtoearth.org.in/blog/health/covid-19-vaccines-some-fully-vaccinated-people-will-still-get-infected-here-s-why-76962>). on 5th July 2021
- Bouton TC, Lodi S, Turcinovic J, Weber SE, Quinn E. COVID-19 vaccine impact on rates of SARS-CoV-2 cases and post-vaccination strain sequences among healthcare workers at an urban academic medical center: a prospective cohort study. *MedRxiv* [Preprint]. 2021:2021.03.30.21254655.
- Shmerling H.R. Should we track all breakthrough cases of COVID-19?. *Harvard health publishing*. 2021 Jun 03. Accessed from: <https://www.health.harvard.edu/blog/should-we-track-all-breakthrough-cases-of-covid-19-202106032471>) on 4th July 2021
- Shmerling H.R. Should we track all breakthrough cases of COVID-19?. *Harvard health publishing*. 2021 Jun 03. Accessed from: <https://www.health.harvard.edu/blog/should-we-track-all-breakthrough-cases-of-covid-19-202106032471> on 5th July 2021
- Sevem C, Siler T. Delta Variant in California: What Vaccinated People Should Know About Breakthrough Cases, Symptoms and Travel. *KQED. Inform. Inspire. Involve*. Delta Variant in California: What Vaccinated People Should Know About Breakthrough Cases, Symptoms and Travel. 2021 Jul 02. Accessed from: <https://www.kqed.org/news/11880128/delta-variant-in-california-what-vaccinated-people-should-know-about-breakthrough-cases-symptoms-and-travel>. on 7th July 2021
