

COVID-19 Immune Persistence After Vaccination and the Potential Need for Vaccine Booster Shots

By Dr Ajit Pal Singh Raina

The vaccination effort against COVID-19 has surged in full force with 123.6% or 4.7 billion population of the world now being vaccinated. Currently, Malaysia has 27.3 million or 32.6% of the population vaccinated, but questions, whether booster jabs are needed to protect against the virus have arisen as our antibody level starts to decline after a certain period.

Although Malaysia's vaccination rate is increasing tremendously, we are seeing a massive rise in daily COVID-19 cases. Among those infected are mainly unvaccinated individuals, which does not reflect well on the confidence people have in the vaccines' efficacy as well as its safety.

Be it Sinovac, Pfizer, AstraZeneca, all vaccines are made to stimulate your immune system and to produce antibodies, exactly like they would if you were exposed to the disease and to protect you against any variants.

The results from a recently completed immune-persistence study of Sinovac demonstrated that two doses of CoronaVac COVID-19 vaccine induce good immunogenicity. Although neutralizing antibody levels declined after 6 months, a two-dose vaccination schedule generated a strong immune memory. A third dose, given at an interval of 6 months after the second dose, led to a strong boost in immune response, with an increase of 3-5-fold in neutralizing antibody titers¹.

Immunogenicity or neutralizing antibody titers is defined as the ability to provoke an immune response capable to kill or neutralize virus causing disease. It results from the bio-material being detected by the body's immune system as a foreign object and the body's response to eliminate it with the use of neutralizing antibodies.

Hence, will a booster shot be necessary? The third dose of CoronaVac effectively boosts neutralizing titres and provides a better immuno-protection response. This pattern is consistent with other vaccines like AstraZeneca ChAdOx1, showing higher concentrations of total Immunoglobulin G (IgG) antibodies after a third dose. It is also worth mentioning that timing for a booster dose is critical and not to be given too early.

According to University College London (UCL) researchers, decay in Antibody titres is also seen with other COVID-19 vaccines. Antibody levels start declining from as early as 6 weeks after complete vaccination with Pfizer and AstraZeneca vaccines². Antibody reduces further by more than half in 10 weeks, confirming the need for a booster dose. The findings were published as a research letter in The Lancet, which are based on data from over 600 vaccinees.

For Pfizer, antibody levels reduced from a median of 7,506 U/mL at 21–41 days to 3,320 U/mL at 70 or more days, while for AstraZeneca, the antibody came down from a median of 1,201 U/mL at 0–20 days to 190 U/mL (67–644) at 70 or more days. U/mL is units per millimetre³.

However, different methods and measuring units are used to measure decay at the antibody level. Hence the results are not directly comparable but indicate a similar decline in antibodies overtime for all vaccines.

Nevertheless, despite the reduction in neutralizing antibody titres, the vaccine has shown significant protection from serious disease, as seen in from real-life effectiveness study done in Chile⁴.

The real-life effectiveness of the vaccine is a useful parameter to measure actual protection rendered by the vaccine, compared to data from efficacy studies conducted under a controlled environment. During the first 3 months of Chile's mass vaccination campaign, a two-dose CoronaVac schedule showed good protection against COVID-19 with 65.9% for symptomatic infection, 87.5% for hospitalization, 90.3% for ICU admission, and 86.3% for death among a population aged 16 years or older.

Another real-life study was conducted in Uruguay on the impact of CoronaVac COVID-19 vaccine among its population that showed it was over 90% effective in preventing intensive care admissions and deaths. The shot reduced deaths by 95% and intensive care admissions by 92%, and also showed 61% efficacy in cutting coronavirus infections.

A total of 795,684 health workers and the general population between the ages of 18 and 69 were involved in the study. The result differs between those who have received their second dose of CoronaVac at least after 14 days to determine the real-life vaccine effectiveness.

Earlier, Phase 3 clinical data of CoronaVac from Brazil and Turkey showed significant vaccine protection, resulting in approval for emergency use worldwide. However, protection in real life is more important and increases confidence in Health agencies for the use of the vaccine to control the COVID-19 pandemic.

After initially spurning the idea of booster dose and complete understanding of how the vaccine works against COVID-19 virus, it is clear from the recent studies that protection from severe disease and hospitalisation remain high after vaccination. However, the surge in cases caused by the contagious and deadly variants have caused some countries to look more closely at booster shots, and even some have started administering them.

The fight against the COVID-19 pandemic may seem to prolong through next year due to the emergence of new variants; hence it is crucial to emphasise the need for booster shots, which will bring incremental value in improving immunity, stopping transmission, preventing severe symptoms and most importantly to prevent fatality.

Researchers from the Ministry of Health of Chile published a paper in **The New England Journal of Medicine (NEJM)** on 7th July 2021, reporting the real world protection and data of CoronaVac, Sinovac Covid 19 vaccine, in Chile. The study was conducted from February 2 to May 1, 2021, and cohort included approximately 10.2 million citizens who were affiliated with Chile's national public health care system. Those people are 16 years of age or older.





Caption: Vaccines are made to stimulate your immune system and to produce antibodies, exactly like it would if you were exposed to the disease and to protect you against any variants

References:

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2. *Antibody Persistence through 6 Months after the Second Dose of mRNA-1273 Vaccine for Covid-19*; Nicole Doria-Rose et al *The New England Journal of Medicine* Published on June 10, 2021
3. *Spike-antibody waning after second dose of BNT162b2 or ChAdOx1* www.thelancet.com Published online July 15, 2021
4. *Effectiveness of an Inactivated SARS-CoV-2 Vaccine in Chile*; Alejandro Jara et al; *The New England Journal of Medicine* published on July 7, 2021

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