Immune Responses After ChAdOx1 or BNT162B2 Boosters in Primary CoronaVac Vaccination

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Watsamon Jantarabenjakul[1,2], Pimpayao Sodsai[2], Napaporn Chantasrisawad[1,2], Anusara Jitsatja[2], Vichaya Ruenjaiman[2], Jiratchaya Sophonphan[3], Supaporn Wacharapluesadee[1], Thanyawee Puthanakit[2], Nattiya Hirankarn[2], Opass Putcharoen[2,3]

1. Thai Red Cross Emerging Infectious Diseases Clinical Center, King Chulalongkorn Memorial Hospital, Bangkok, Thailand; 2. Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand; 3.Thai Red Cross AIDS Research Centre, Bangkok, Thailand

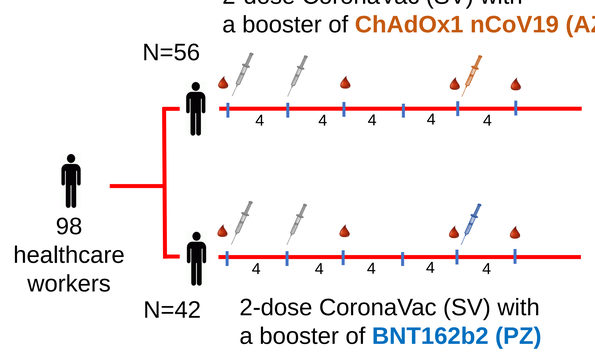
Contact Email: watsamon.j@chula.ac.th

BACKGROUND

- The CoronaVac (an inactivated SARS-CoV-2 vaccine) is one of vaccines that used for immunization against COVID-19 in many countries. After a complete vaccination of this vaccine, the decline in antibody levels were observed and a booster is required due to the waning immunity against circulating variants.
- This study aimed to explore immunogenicity against SARS-CoV-2 following the booster by assessing both B-cell and T-cell activities compared to the convalescent sera.

METHODS

- A prospective cohort study, March-Oct 2021



Immunogenicity

- Surrogated viral neutralization test (sVNT, cPass™) to wild-type SARS-CoV2
- Anti-SARS-CoV-2 RBD total antibodies (Elecsys®),
- ELISPOT with spike (S1) peptide pools

Timing of blood sampling

- At baseline, 4 and 12 weeks after the second CoronaVac
- 4 weeks after a booster dose
- Convalescent sera and peripheral blood mononuclear cells (PBMCs) of the COVID-19 patients were collected at 4 weeks after diagnosis.

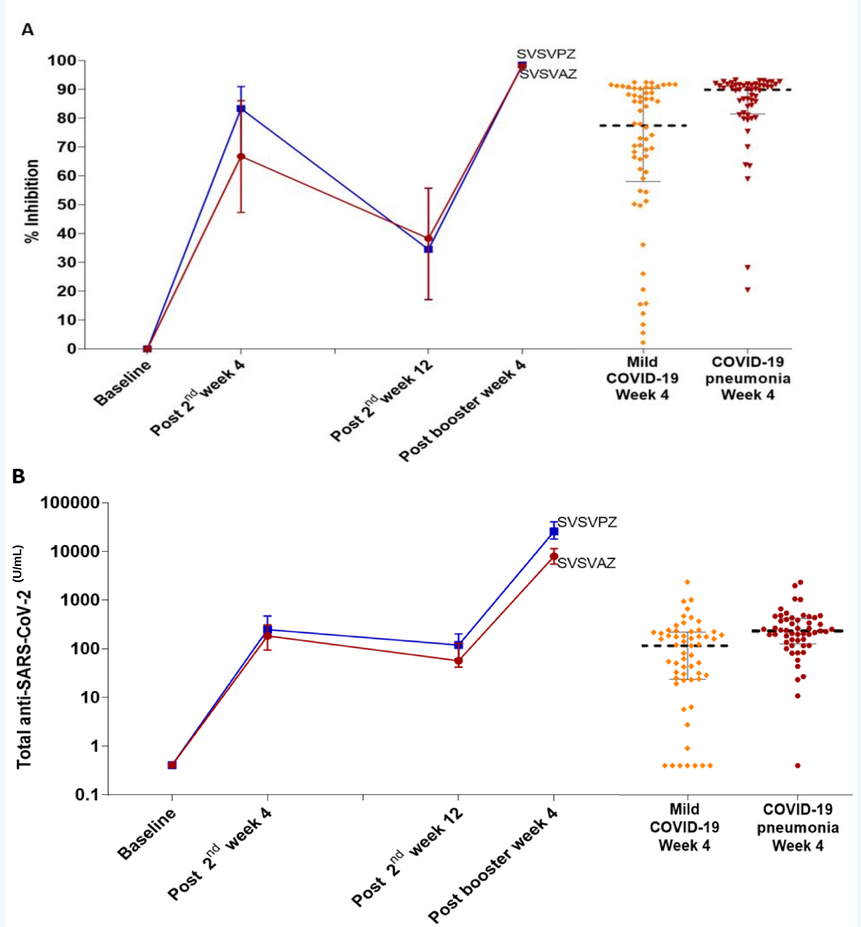
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✓Immunogenicity of primary CoronaVac vaccination significantly decreased at 12th week.

✓Booster with BNT162B2 has high antibody response.

RESULTS

- Median (interquartile range, IQR) age was 40 (31-52) years old with female predominant (80%).
- Median (IQR) interval after the second CoronaVac was 88 (74-92) days for ChAdOx1 nCoV-19 and 113 (112-115) days for BNT162b2.
- There was a significant decrease in neutralizing antibodies at the 12th week after primary CoronaVac vaccination. (Figure 1)



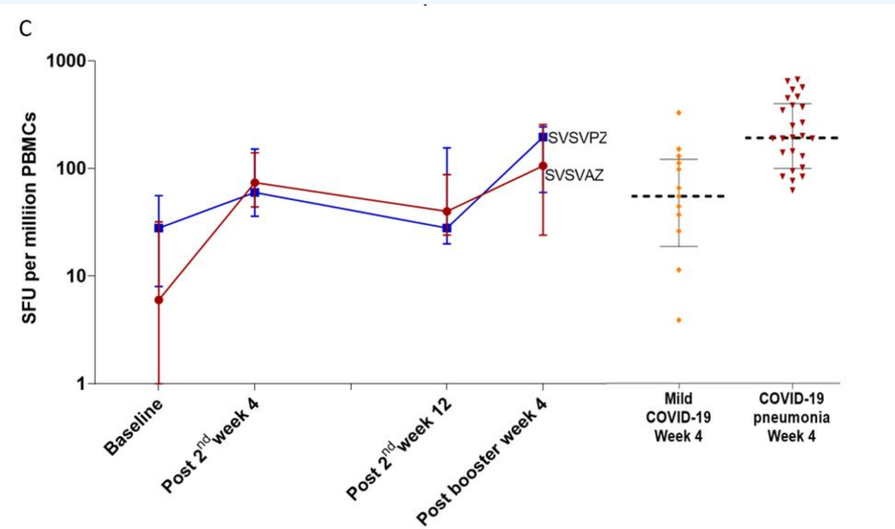


Figure1. Immune responses in participants as evaluated by (A) SARS-CoV-2 surrogate virus neutralization test cPass™ , (B) anti-SARS-CoV-2 RBS total antibodies using Elecsys® , (C) SARS-CoV-2 specific T-cell response using ELISPOT against spike peptide pool at baseline, 4 and 12 weeks after 2-dose CoronaVac (SV) and 4 weeks after a booster dose of either ChAdOx1 nCoV019 (AZ) or BNT162b2 (PZ) compared to convalescent sera and PBMCs of mild COVID-19 and COVID-19 pneumonia cases at 4 weeks after diagnosis

At 4 weeks after booster (Median, IQR)	SVSV-AZ	SVSV-PZ	p value	4 weeks after COVID-19 mild	4 weeks after COVID-19 Pneumonia
sVNT % inhibition	98.1% (97.9-98.2%)	98.5% (98.5-98.6%)	< 0.001	80.8% (61.7-94.2%)	93.8% (85.4-95.6%)
anti-RBD total Ab, U/mL	7791 (5503 – 11462)	25853 (18035-40570)	< 0.001	97 (23-213)	228 (133-389)
ELISPOT SFU/millions of PBMCs	106 (24-256)	196 (60-244)	0.49	60 (20-124)	214 (112-436)

SV CoronaVac, AZ; ChAdOx1 nCoV19, PZ; BNT162b2, sVNT; surrogated viral neutralization test, ELISPOT; enzyme-linked immunospot, SFU; spot forming unit

CONCLUSIONS

- A booster of ChAdOx1 nCoV-19 or BNT162b2 after primary CoronaVac vaccination boosted a significantly higher antibody response than the natural COVID-19 infection.
- BNT162b2 booster induced significantly higher antibody levels than ChAdOx1 nCoV-19.
- Booster dose could consistently induce T cell responses; however, the levels were lower compared to some patients with COVID-19 pneumonia.