



# Anti-Spike Antibodies Response To SARS-CoV-2 Vaccines by BMI Status in Adults in Malaysia



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## Introduction

During the pandemic, people with obesity were more likely to be hospitalised, require ventilators and to die from SARS-CoV-2. COVID-19 vaccines are very effective, but for some groups they don't generate as strong immune response. These groups include older adults and people with weakened immune systems, for example due to cancer or other medical conditions. They tend to already be at heightened risk from COVID-19. It is known that people with obesity have an impaired immune response to other vaccines including those for influenza, rabies and hepatitis. This study aims to describe the patterns of anti-Spike IgG (anti-S) antibodies induced by four types of SARS-CoV-2 vaccines (Pfizer, Sinovac, AstraZeneca and CanSino) among adults in Malaysia by BMI status (underweight, normal, overweight and obese).

## Results

After a year, the study retention rate was 45%. No different patterns were observed among all BMI groups. Generally, after completed vaccination, only Pfizer recipients recorded index of 100 for all BMI groups. Antibodies level were declining until 3 months follow-up and rise again at 6- and 9-months follow-ups. At 3-month follow-up, underweight recorded lowest anti-S antibodies among Sinovac [median=2.3 (1.9-7.1)] and CanSino recipients [median=12.8 (5.4-61.2)]. At 6-month follow-up, obese Pfizer recipients showed the lowest anti-S antibodies [(median=17.3 (5.7-100.0))]. All BMI groups of Pfizer, Sinovac and AstraZeneca recipients show highest antibodies level at 9-month follow-up whereas anti-S antibodies level in all CanSino recipients show a decline. Lowest anti-S antibodies were seen among underweight AstraZeneca recipients [(median=38.4 (12.5, 100.0))], and among overweight CanSino recipients [(median=38.4 (12.5, 100.0))].

## Discussion

The anti-Spike antibody among all BMI groups seemed to decline starting at third months after vaccination. Similar result was seen with other study who reported a decline in antibody level among 60% of Pfizer vaccinees sample<sup>2</sup>.

Antibody levels for all BMI group were peaked again at 9 months after vaccination may due to the booster program.

## Conclusion

These findings have important implications for vaccine prioritisation policies for the nation. Underweight and obese adults may have other health related problems that can impair vaccine uptake.

## Methodology

We used data from the IMSURE study, a cohort study recruited 2,513 respondents who received COVID-19 vaccine aged ≥18 years from June 2021 to December 2021 at selected vaccination centres. The respondents were followed up for a period of 12 months and divided into four main groups depending on their vaccinations given; Pfizer, Sinovac, AstraZeneca and CanSino. BMI (body mass index) status was classified according to WHO<sup>1</sup> into underweight, normal weight, overweight and obese. Data was analyzed, describing the median with 25th, and 75th percentiles of anti-S antibodies from each follow-up.

Follow ups	Vaccine type	Underweight	Normal	Overweight	Obese
Baseline	Pfizer (n=612)	4.0 (1.6, 5.8)	2.6 (1.4, 4.4)	1.8 (1.1, 84.0)	3.9 (2.6, 7.5)
	Sinovac (n=608)	2.2 (1.3, 7.4)	1.7 (1.3, 3.2)	2.9 (1.6, 6.9)	3.3 (1.9, 22.0)
	AstraZeneca (n=617)	12.7 (2.0, -)	2.7 (1.4, 4.4)	3.9 (1.4, 5.8)	4.4 (2.6, 7.9)
	CanSino (n=676)	3.0 (2.0, 6.2)	6.0 (2.7, 20.7)	10.4 (3.4, 66.0)	20.6 (6.5, 82.4)
Second dose	Pfizer (n=577)	8.9 (3.5, 18.5)	9.6 (5.6, 23.7)	10.0 (5.0, 19.8)	14.0 (5.4, 29.7)
	Sinovac (n=555)	1.6 (1.3, 8.8)	2.7 (1.6, 6.7)	2.7 (1.5, 10.2)	2.5 (1.5, 8.3)
	AstraZeneca (n=563)	8.8 (4.0, 15.8)	4.4 (2.9, 9.9)	5.5 (2.8, 11.0)	5.1 (2.5, 14.1)
	CanSino (n=562)	100.0 (26.1, 100.0)	100.0 (23.4, 100.0)	100.0 (27.0, 100.0)	84.2 (30.0, 100.0)
Complete vaccination	Pfizer (n=507)	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)
	Sinovac (n=487)	13.6 (7.5, 32.5)	13.9 (7.7, 27.3)	12.8 (6.2, 25.4)	12.7 (5.6, 28.4)
	AstraZeneca (n=486)	22.1 (14.9, 54.1)	19.9 (11.0, 45.0)	27.3 (15.4, 82.5)	31.5 (12.7, 98.6)
	CanSino (n=442)	21.0 (7.5, 100.0)	48.9 (12.7, 100.0)	69.0 (12.6, 100.0)	54.6 (7.2, 100.0)
3 months	Pfizer (n=441)	55.5 (24.3, 100.0)	54.4 (21.5, 100.0)	50.4 (22.6, 100.0)	47.9 (24.3, 100.0)
	Sinovac (n=419)	2.3 (1.9, 7.1)	4.3 (2.2, 9.6)	3.3 (2.1, 8.1)	3.4 (1.7, 9.4)
	AstraZeneca (n=N/A)	-	-	-	-
	CanSino (n=368)	12.8 (5.4, 61.2)	14.9 (5.9, 46.9)	18.5 (5.9, 45.3)	23.1 (9.4, 67.1)
6 months	Pfizer (n=352)	100.0 (42.1, 100.0)	21.5 (8.4, 100.0)	42.4 (7.2, 100.0)	17.3 (5.7, 100.0)
	Sinovac (n=380)	5.4 (1.5, 100.0)	100.0 (4.0, 100.0)	100.0 (5.0, 100.0)	100.0 (55.8, 100.0)
	AstraZeneca (n=394)	7.1 (3.8, 18.0)	5.7 (3.0, 21.9)	8.9 (4.3, 42.4)	9.0 (3.5, 58.1)
	CanSino (n=270)	100.0 (37.0, 100.0)	100.0 (22.7, 100.0)	100.0 (47.7, 100.0)	100.0 (45.5, 100.0)
9 months	Pfizer (n=302)	100.0 (71.0, 100.0)	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)
	Sinovac (n=320)	100.0 (27.6, 100.0)	100.0 (53.5, 100.0)	100.0 (100.0, 100.0)	100.0 (76.1, 100.0)
	AstraZeneca (n=335)	100.0 (13.9, 100.0)	100.0 (18.3, 100.0)	100.0 (20.0, 100.0)	100.0 (39.0, 100.0)
	CanSino (n=236)	46.1 (18.9, 100.0)	29.3 (8.4, 90.3)	31.9 (10.0, 100.0)	39.4 (13.2, 100.0)
12 months	Pfizer (n=277)	81.3 (55.3, 100.0)	100.0 (100.0, 100.0)	100.0 (89.7, 100.0)	100.0 (81.5, 100.0)
	Sinovac (n=308)	100.0 (37.2, 100.0)	98.8 (22.0, 100.0)	100.0 (39.9, 100.0)	79.1 (27.7, 100.0)
	AstraZeneca (n=316)	38.4 (12.5, 100.0)	54.2 (17.7, 100.0)	55.8 (14.5, 100.0)	42.3 (20.9, 100.0)
	CanSino (n=217)	32.4 (10.3, 100.0)	37.1 (8.5, 100.0)	23.8 (11.9, 100.0)	41.7 (9.5, 100.0)

Table 1 : SARS-CoV-2 Anti-Spike-IgG antibodies level in index (median & percentiles) among BMI status based on follow up

## Reference:

1. WHO/IASO/IOTF . *The Asia-Pacific perspective: redefining obesity and its treatment*. Health Communications Australia; Melbourne: 2000.
2. Erice A, Varillas-Delgado D, Cabarello C. Decline of antibody titres 3 months after 2 doses of BNT162b2 in non-immunocompromised adults. *Clin Microbiol Infect*. 2022;28:139-140.doi:10.1016/j.cmi.2021.08.023

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