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The pattern of IGG antibodies against SARS-CoV-2 nucleocapsid antigen among the recipients of three different vaccine primary series in Malaysia

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INTRODUCTION

Pfizer/BioNTech, AstraZeneca, and CanSino produce COVID-19 vaccines using only materials that induce antibodies against the SARS-CoV-2 spike antigen. However, production of antibodies against nucleocapsid (anti-N) antibodies implies infection. This study aims to describe the patterns of anti-N antibodies after the primary series of three aforementioned COVID-19 vaccines among adults in Malaysia over time.

METHODOLOGY

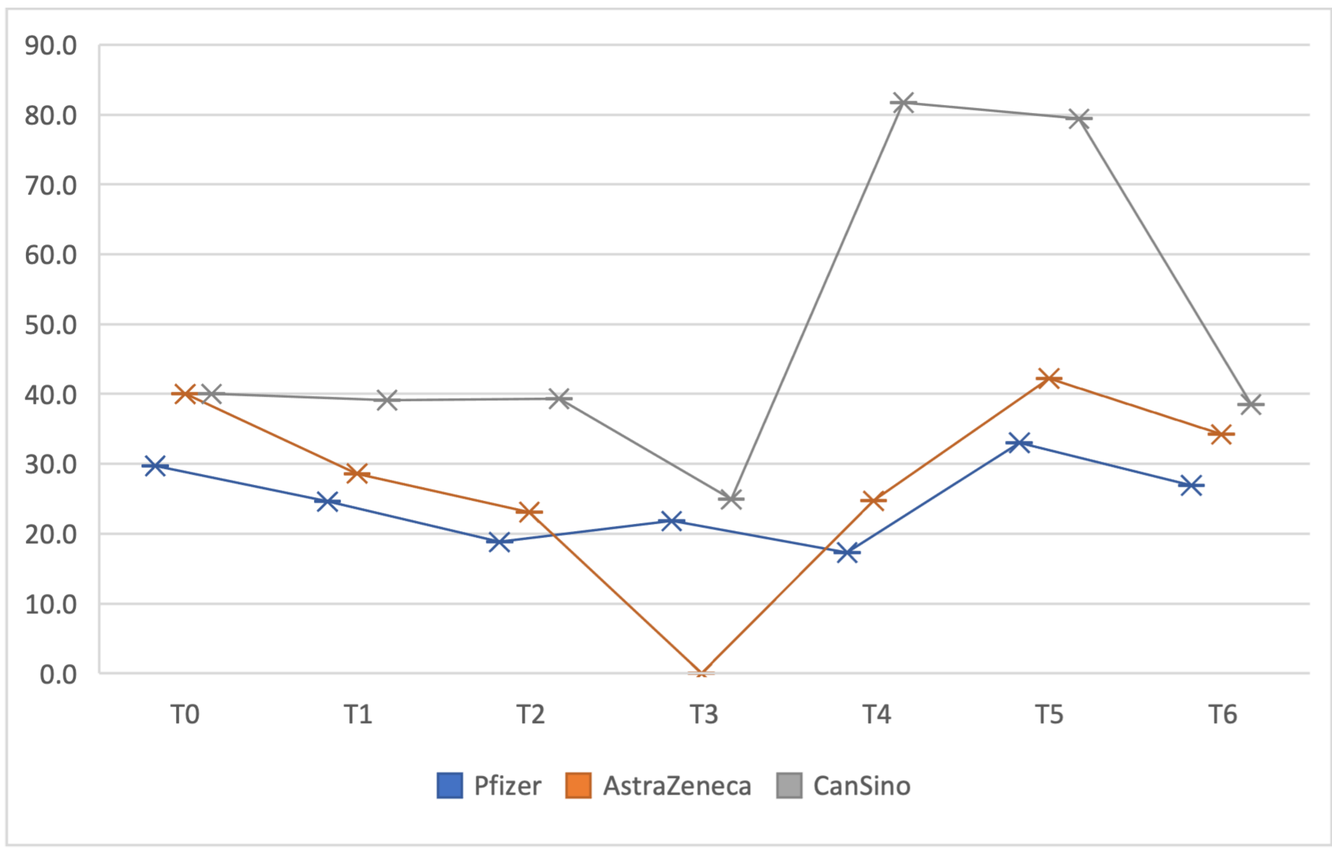
We utilized data from the IMSURE study, a cohort study that recruited 2,513 respondents aged ≥18 years from June 2021 to December 2022 who received vaccines for SARS-CoV-2 including BNT162b2, Sinovac and AstraZeneca. Blood samples were collected at seven different follow-up times. All samples were tested for SARS-CoV-2 anti-N antibodies. Data were analyzed, describing the median with 25th and 75th percentiles of anti-N antibody level (in index, an arbitrary unit with range 0-100 and >=1 as positive cut-off threshold) at each follow-up.

RESULT

Participants' Characteristics

Characteristics	Pfizer (n; %)	AstraZeneca (n; %)	CanSino (n; %)
Total respondents , n	**612**	**617**	**676**
Age			
Mean age (SD)	43.61 (19.71)	33.42 (10.66)	36.93 (11.50)
18-39 years old	329 (53.8)	442 (71.6)	418 (61.8)
40-59 years old	92 (15.0)	168 (27.2)	232 (34.3)
60 years old and above	191 (31.2)	7 (1.1)	26 (3.8)
Sex			
Male	321 (52.5)	276 (44.7)	359 (53.1)
Female	291 (47.5)	341 (55.3)	317 (46.9)
Nationality			
Malaysian	608 (99.3)	612 (99.2)	329 (48.7)
Non-Malaysian	4 (0.7)	5 (0.8)	347 (51.3)
Comorbidity status			
No comorbid	372 (60.8)	506 (82.0)	550 (81.4)
Any 1 comorbidities	119 (19.4)	82 (13.3)	91 (13.5)
2 or more comorbidities	121 (19.8)	29 (4.7)	35 (5.2)
Past Covid-19 infection			
Yes	16 (2.6)	20 (3.2)	30 (4.4)
No	596 (97.4)	597 (96.8)	646 (95.6)
Past Covid-19 symptoms			
Asymptomatic	207 (33.8)	96 (15.6)	230 (34.0)
Symptomatic	405 (66.2)	521 (84.4)	446 (66.0)
COVID-19 booster Status			
No booster	169 (45.7)	131 (30.8)	259 (83.8)
1 dose	199 (53.8)	292 (68.7)	50 (16.2)
2 doses	2 (0.5)	2 (0.5)	0

Anti-N antibody levels among IMSURE participants for 12 months



Note:
Participants were followed-up for a year:
T0: Baseline
T1: Second dose
T2: Completed Vaccination
T3: 3-month
T4: 6-month
T5: 9-month
T6: 12-month

After a year, the study retention rate was 45%.

- The anti-N antibody level was generally lower among Pfizer/BioNTech recipients for all follow-ups as compared to other vaccines.
- After completion of vaccination, the anti-N level was 18.8 (4.3, 78.6), increased slightly at 9-month from the 1st dose- 33.0 (15.0, 71.5), and declined at 12-month- 26.9 (15.2, 62.8).
- AstraZeneca recipients were comparable to Pfizer/BioNTech recipients, with anti-N level of 23.1 (9.8, 54.6) after completed vaccination, later increased slightly at 6-month to 24.7 (6.1, 72.6), to 42.2 (17.4-88.2) at 9-month, and decreased at 12-month- 34.2 (14.8, 72.9).
- CanSino recipients had anti-N level of 39.3 (12.0, 101.0) at 28 days post-vaccination, which increased at 6-month to 81.7 (19.0, 146.9), and decreased at 12-month- 38.5 (11.5, 124.6). CanSino recipients were more likely to be infected with COVID-19 in this study.

DISCUSSION

- Anti-N antibody have been reported as indicators of natural infections [1]. Hence, study reported higher anti-N antibody titers in previously infected individuals compared to vaccinees without history of infection [2].
- Evidently, this study corroborates with other study; anti-N antibody levels are considered to peak at 6-7 weeks after the first or second vaccination or after infection [3].
- Other study reported higher anti-N antibody levels were observed among infected patients than in non-infected participants at 4 months after the third vaccination [3].
- Data analysis on past COVID-19 infections and booster status would further explain the patterns of anti-N antibody levels throughout the year.
- More evidence is required to better understand on the long-term assessment of anti-N, as data is scarce compared to anti-S antibodies.

CONCLUSION

These data provide COVID-19 infection trends in the community following vaccination for future planning and decision-making regarding public health vaccination policy.

References
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