

ORIGINAL ARTICLE

Low Seroprevalence of COVID-19 among Healthy Malaysian Residents in Kepala Batas, Pulau Pinang, Malaysia, During the Fourth Pandemic Wave

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ABSTRACT

Introduction: Seroprevalence studies on COVID-19 in a general population, including those who are asymptomatic, is important to understand the extent of undetected transmission in a defined community. **Method:** This is a cross-sectional, population-based study and was conducted among healthy Malaysian community in Kepala Batas, Penang, from November 2020 to September 2021. Antibodies to SARS-CoV-2 were detected using Healgen COVID-19 IgG/IgM Rapid Test Cassette. **Result:** A total of 422 respondents from Kepala Batas, Penang, were recruited for this cross-sectional study. From the total, three hundred and eighty (380) healthy individuals from the were selected and analysed. The mean age of the respondents was 33 ± 14.23 years old, with more female respondents and most respondents were Malay (95.8%). A total of 21 (5.5%) respondents were found to have positive COVID-19 antibodies. Among them, two were (0.5%) IgM positive, while nineteen (5.0%) were IgG positive. **Conclusion:** The seroprevalence of antibodies against SARS-CoV-2 among possible cases was lower than expected.

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INTRODUCTION

SARS-CoV-2 continues to widely circulate in populations globally with the emergence of new variants reported periodically since the first recorded case in December 2019. Many people were discovered to be asymptomatic and did not undergo the Rapid Test Kit-Antigen (RTK-Ag) testing, which led to an underestimation of the true incidence of COVID-19 infection from positive RTK detections. According to a systematic review

analysis, up to 40% of confirmed COVID-19 infections are asymptomatic (1). A recent seroprevalence survey in Singapore revealed that 78% of infected migrant workers had subclinical infection (2). As a result, antibody testing in seroprevalence surveys is required to provide information on prior exposure to coronavirus 2 (SARS-CoV-2). In contrast to polymerase chain reaction (PCR)-confirmed cases, seroprevalence studies offer a more accurate picture of coronavirus disease 2019 (COVID-19), as antibodies can be found in moderate or asymptomatic infections that would otherwise go unreported.

Seroconversion occurs in most COVID-19 infected patients between seven and fourteen days after the

onset of symptoms, with the antibody persisting in the ensuing weeks (3, 4). A diagnosis of COVID-19 infection that is only based on antibody response would identify patients in the recovery phase and forestall opportunities for clinical intervention or interruption of disease transmission. Thus, World Health Organisation (WHO) does not recommend serology test for COVID-19 diagnosis (5).

There have been reports published on minimal or absence of antibody in those who are in the recovering phase post-infection of COVID-19 (6). Additionally, demonstration of antibody seropositivity in those who are asymptomatic has also been reported (7, 8). Some studies reported that the real-time reverse-transcription polymerase chain reaction (RT-PCR) is used as standard diagnostic method to detect COVID-19 from the nasopharyngeal and oropharyngeal swabs. The test is useful in determining patient status for tailoring the specific clinical management. However, it would be costly and laborious if used for epidemiological research.

Another potentially useful method is serological methods, which can offer a better understanding on the virus epidemiology in the general population. Antibodies commonly become detectable between one and three weeks after symptom onset, at which time evidence suggests past infection and that some degree of immunity from future infection has developed but not proven (9). Quantification of the antibodies allows identification of those in population with seropositivity towards COVID-19, especially those who are asymptomatic.

There were five studies were performed to assess the seroprevalence in various cohorts of the Malaysian population, such as healthcare workers and frontliners, blood donors, and migrant and local workers (10 – 14). The seroprevalence of COVID-19 results were between 0% and 21.4% among the published Malaysian cohorts. However, there is limited information of COVID-19 seroprevalence in the Malaysian general population. Hence, this work aims to include investigation on the seroprevalence of COVID-19 in healthy Malaysian population as a pilot project to ascertain the extent of transmission of COVID-19 in the community. Transmission to the high risk population prior to the COVID-19 vaccine availability usually end up with fatality complication, and public health intervention is warranted such as vaccine roll-out and a good hygiene practice. To the best of the authors' knowledge, this was the first SARS-CoV-2 seroprevalence survey conducted in Penang, where several stages of the Movement Control Order (MCO) were observed.

METHODS

A cross-sectional, prospective population-based testing was conducted among healthy Malaysian community in Kepala Batas, Pulau Pinang, from November 2020 to September 2021. Kepala Batas is a district in the Pulau

Pinang with total population of 82,925 people.

All healthy persons living in Kepala Batas, Penang, and were aged more than two years old were invited through social media advertisements (Facebook and WhatsApp messaging) to participate in this study. Eligible participants were invited for blood taking on appointment basis at the Advanced Medical and Dental Institute (AMDII), Kepala Batas, Pulau Pinang. On the day participants arrived at the clinic, 3 mL of blood samples were taken from each participant, and data collection was conducted regarding demographics, clinical status, and immunological investigations, as well as on their COVID-19 symptoms in the previous month and known history of SARS-CoV-2 exposure. Each blood sample was centrifuged, and serum was collected and tested by using COVID-19 IgG/IgM Rapid Test Cassette, Healgen Scientific LLC. The tests were performed according to the manufacturer's guideline. Those who have received COVID-19 vaccination or contracted COVID-19 infection recently (within four weeks from the enrolment) were excluded from the study. Based on the single proportion formula and dropout estimation of 30%, the sample size calculated for this project was 468. The study was approved by the JEPeM USM Code: USM/JEPeM/COVID19-41.

The data were analysed using the IBM Statistical Package for Social Sciences (SPSS). Descriptive analysis (mean and standard deviation) was employed to evaluate the continuous data. Meanwhile, the data collected for COVID-19 status and other sociodemographic information variables were displayed in a categorical form. Analysis of the categorical data was performed by utilising the chi-square test.

RESULTS

A total of 422 participants had participated in this study. All of them completed both questionnaires and the COVID-19 RTK Ab blood test. Forty-two (42) out of 422 participants were not analysed due to lysed samples, or they have only received the first COVID vaccine, or that their residential address was not in Kepala Batas. Table I shows the mean age of the respondents was 33 ± 14.23 years old, and the median (minimum, maximum) age of the respondents was 33 (3, 75) years old, with more female respondents. Most respondents were Malay (95.8%) from Kepala Batas (70.5%).

Table I. Respondents' profiles

Variables	Frequency, n (%) (N=380)
Age group, years	
<18 years old	45 (11.8)
>18 years old	335 (88.2)
Gender	
Male	167 (43.9)
Female	213 (56.1)

CONTINUE

Table I. Respondents' profiles (CONT.)

Variables	Frequency, <i>n</i> (%) (N=380)
Ethnicity	
Malay	364 (95.8)
Chinese	5 (1.3)
Indian	7 (1.8)
Others	4 (1.1)
District	
Kepala Batas	268 (70.5)
Penaga	41 (10.8)
Tasek Gelugor	71 (18.7)
SARS-CoV-2 exposure history	
No	356 (93.7)
Yes	24 (6.3)
Contraction of COVID-19 infection	
No	377 (99.2)
Yes	3 (0.8)

Based on Table II, a total of 21 (5.5%) respondents were found to possess positive COVID-19 antibodies. Among them, two (0.5%) were positive on both IgG and IgM, while 19 (5.0%) were only IgG positive. The two positive IgG/IgM participants were further confirmed using RT-PCR for COVID-19, where both showed negative results. Only four (19.0%) participants had a history COVID-19 infection. Towards the end of the sample recruitment, 17 (81.0%) positive cases were found in September 2021. Majority of the positive participants were Malay (85.7%) and from Kepala Batas (57.1%). The prevalence of seroconversion, however, demonstrated a similar seroprevalence across gender (Table II).

Table II. COVID-19 positive seroprevalence cases among residents in Kepala Batas, Penang residents (by age, sex, ethnic, district, exposure history and COVID-19 related symptoms).

Variables	Frequency, <i>n</i> (%)	<i>p</i> -value
Age group, years		
<18 years old	4 (19.0)	0.36
>18 years old	17 (81.0)	
Gender		
Male	11 (52.4)	0.59
Female	10 (47.6)	
Ethnicity		
Malay	17 (81.0)	0.01*
Chinese	2 (9.5)	
Indian	2 (9.5)	
Others	0 (0)	
District		
Kepala Batas	13 (61.9)	0.29
Penaga	1 (4.8)	
Tasek Gelugor	7 (33.3)	
SARS-CoV-2 exposure history		
No	14 (66.7)	<0.001*
Yes	7 (33.3)	
Contraction of COVID-19-related symptoms		
No	20 (95.2)	0.70
Yes	1 (4.8)	
Contraction of COVID-19 infection		
No	18 (85.7)	<0.001*
Yes	3 (14.3)	

DISCUSSION

This study was conducted during the peak of the pandemic in Malaysia, and before and during the COVID-19 vaccination programme. Since the start of the COVID-19 pandemic in February 2020, Malaysia has experienced four waves of COVID-19 breakout and reported one of the highest death tolls in Asia at the end of the fourth wave in October 2021, with a cumulative incidence of confirmed cases of 7.0% (15).

This study demonstrates that the seroprevalences of anti-SARS-CoV-2 IgM and IgG antibodies in the Malaysian population (i.e., study population) were 0.5% and 5.0%, respectively. These findings indicate that the SARS-CoV-2 seroprevalence in the Kepala Batas community is consistent with that in other local and international reported studies, which showed a range between 1.27% and 15.5% (10–14, 16–19). Since the beginning of pandemic, the seroprevalence has increased with increasing positive cases. A recent study from Malaysia reported a very high prevalence of COVID-19 among workers, 99.9% among migrant workers and 12.1% among local workers (11).

From this study, it was found that most of the positive cases were detected in September 2021. During this time, Malaysia had emerged from the most recent wave of COVID-19 infection between June and October 2021, with partial national lockdown (20). Furthermore, only four respondents with positive anti-SARS-CoV-2 IgG antibody had recovered from COVID-19 infection. The research finding of this work is also consistent with findings from others who reported an increase in IgM levels during the first week of infection, where IgG was detectable and maintained at a high level for a long time to indicate history of infection (21). In addition, RT-PCR tests were conducted on IgG/IgM positive participants, and they were referred to the nearest District Health Centre to ensure proper monitoring of their health status. Majority of the positive participants who were asymptomatic had no previous COVID-19 infection, no exposure history, and did not receive any COVID-19 vaccination. This underlines the fact that asymptomatic individuals may not be present to clinic or hospitals and would otherwise remain undetected through existing surveillance systems. Most of them are young adults, and they are deemed as a potentially important source of transmission in the community.

The positive association of COVID-19 seropositivity with ethnicity, history of exposure to SARS-CoV-2, and previous COVID infection were observed in this study. Malay ethnicity is the majority race in Malaysia and the studied area, and this finding may reflect the predominant ethnicity in the population. There is an argument that SARS-CoV-2 might have been in the community earlier than expected. Furthermore, there was no widespread testing, and these individuals were

not properly diagnosed and merely treated as a common upper respiratory infection. Between July and September 2021—20 months into the pandemic—many were likely to have been infected, and the vaccination programme was made compulsory for most adults. This could be the reason for some who likely have seroconverted at the time of study.

Seroprevalence in a community is useful study to estimate the actual burden of COVID-19 infection and to identify at-risk groups, such as elderly people. However, this study has limitations, with relatively low prevalence estimates, because the study was conducted in a single district, small sample size, and convenient sampling. Thus, the findings may not be generalised to the nationwide as the study sample might differ from that done on a general population, resulting in biased estimates. Moreover, bias toward persons in good health who could participate in the study might result in an underestimation of the actual prevalence.

However, with the limitations discussed above, this work demonstrates the feasibility of seroprevalence of COVID-19 in healthy Malaysian population to ascertain the extent of COVID-19 spread in the community. There are many innovative interventions that can be adopted during the COVID-19 pandemic and in future crisis to estimate of community vulnerability and monitor infection fatality rates in different populations over time.

CONCLUSION

The findings of this study implied that the serological prevalence of antibodies against SARS-CoV-2 was among the lowest in healthy residents of Kepala Batas, Penang, Malaysia. This contributes towards improved understanding of the existing seroprevalence, which can indirectly aid in intensification of efforts to reduce the risk of transmission of COVID-19.

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