

Letter to the Editor

Is Bangalore achieving herd immunity

Sir,

The emergence of a novel coronavirus (SARS-CoV-2) in late 2019 has led to millions of infections and substantial morbidity and mortality across the world. COVID-19 caused by SARS-CoV-2 infection ranges from mild self-limiting disease to acute respiratory distress syndrome and death. India is presently reeling under the second wave of COVID-19 pandemic with more than 2,52,28,996 cases and 2,78,719 deaths as of 18 May, 2021 making it the country with highest reporting cases in the world. Till that date, Bangalore, the capital city of Karnataka alone reported a total of 22,42,065 COVID-19 positive cases overstretching Indian Health care system in this pandemic situation. Considering its high population densities and contact rates it poses a challenge for controlling COVID-19 which is transmitted directly from person to person. The question of herd immunity and how soon it would develop therefore appears to be highly relevant in the context of disease elimination programs.

Herd immunity may be gained through natural infection or through vaccination. It will halt endemic transmission of the pathogen if the proportion of immune individuals in a population is above a threshold limit. In the simplest model, the herd immunity threshold is calculated as $1 - 1/R_0$, where R_0 is the basic reproduction number. The SARS-CoV-2 R_0 is estimated to be 2 to 3 in most of the studies. The herd immunity threshold for SARS-CoV-2 would therefore be between 50% and 67% in the absence of any interventions and also based on the assumption of no population immunity, equally susceptible individuals and equally infectious.¹⁻³

In view of the present pandemic situation both COVID-19 antigen test and seropositivity test were introduced during screening of the volunteers before subject recruitment for our clinical studies. Screening period was 30th April to 07th May, 2021. During this period India was at the peak of the pandemic and the number of active cases in Bangalore was among the highest reported in India. 75 male volunteers in the age group of 20-45 years reported. These volunteers are from in and around Bangalore. None of these volunteers were vaccinated against COVID-19. 3 volunteers were failed in the screening test due to positive antigen test results (rapid card method and SD biosensor kits for COVID-19 antigen testing). Antigen test result was negative for remaining 72 volunteers (Table 1). However, to our surprise the antibody test [Enzyme linked fluorescent assay method (Minividas, Biomerieux)] result was positive (antibody index more than 1.0) for 43% volunteers (31 out of 72 volunteers). 9 volunteers had very

high titre (11-55). 4 volunteers who were considered negative had values more than 0.8 (0.83-0.93).

Table 1: Antibody test results of volunteers.

Sr. no.	No. of volunteers	Results	Remarks
Antigen test result (positive/negative)	72	Negative	-
Antibody test result (positive)	31	Antibody index >1.0	Antibody index: 11-55 for 9 volunteers
Antibody test result (negative)	41	Antibody index <1.0	Antibody index: more than 0.8 for 4 volunteers

Our study result indicated a considerably higher seroprevalence (43%) compared to the earlier reported seroprevalence of 16.4% among adults aged 18 years and above during a survey in all 30 districts of Karnataka state.⁴ However, one major difference between the two studies is that the survey was conducted in September 2020 when there was first wave of COVID-19 pandemic whereas our study was conducted recently when 2nd wave of pandemic is in progress. Our seroprevalence rate was also 6-fold higher than the seroprevalence of 7.1% obtained in the 2nd national survey.⁵

Earlier George et al reported that in DJ Halli slum in Bangalore the overall seroprevalence of IgG antibody for COVID-19 was 57.9%.⁶ This study was concentrated only in one particular area of Bangalore and the volunteers were predominantly females. On the other hand, volunteers in our study were from different parts of Bangalore and its nearby area and consisted of only males. Hence gender bias, if any, cannot be ruled out. Although the life span and efficacy of the antibody against different COVID-19 mutants are not known, this significant increase in seropositive result clearly points that we are moving towards achieving the herd immunity. Previous studies indicated that antibodies against SARS-CoV-1 and MERS-CoV lasted for 2 and 3 years respectively.⁷⁻⁹ Because of its huge population it is a challenge to vaccinate each individual in India within a short period of time. Achieving herd immunity will therefore provide a ray of hope to fight against this COVID-19 pandemic. Additionally, delaying vaccination for those with antibodies would go a long way

to equitably distribute the vaccines to a more high-risk population thus stretching scarce resources.

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