How Long that a SARS-CoV-2 Variant Delay Impacts Required Period to Achieve Herd Immunity?

Dear Editor,

The coronavirus disease (COVID-19) vaccine is the present preventive tool for COVID-19 containment. Mass immunization is required for achieving herd immunity. If herd immunity is reached, a successful COVID-19 containment is expected.[1,2] In general, the targeted population size that herd immunity will achieve is mainly based on the basic reproduction number and is generally estimated as 75%.[1,2] Regarding the required period to achieve the impact of herd immunity depends on many facts including the targeted population size (unit: %), base local infection prevalence (unit: %), vaccination rate (unit: %), efficacy of vaccine (unit: %), and monthly infection rate (unit: %). The standard formula for calculating the required period to achieve the impact herd immunity (unit: month) is the following: [1,2]

"Required period to achieve impact herd immunity = targeted population size – ([base local infection prevalence] + [vaccination rate * efficacy of vaccine])/ monthly infection rate."

An important factor affecting the required period to achieve the impact herd immunity is mutation. The effect of the severe acute respiratory syndrome coronavirus (SARS-CoV-2) variant is reported.[3] Lippi *et al.* found that the targeted population size was about 10% higher in the variant than the wild type.[3] Here, the authors estimate how long a SARS-CoV-2 variant delay impacts the required period to achieve herd immunity. Using the earlier mentioned formula, it can show that there will be an additional period required for achieving herd immunity equal to "10/monthly infection rate." For example, if a local monthly infection rate is about 1%, an additional 10-month period is required to achieve herd immunity.

Hence, it can show that mutant SARS-CoV-2 significantly affects the success of mass COVID-19 vaccination for the containment of COVID-19.

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Beuy Joob, Viroj Wiwanitkit[1]

Private Academic Consultant, Bangkok, Thailand, [1]Honorary Professor, Dr DY Patil Vidhyapeeth, Pune, Maharashtra, India

Address for correspondence:
Dr. Beuy Joob,
Private Academic Consultant, Bangkok 103300, Thailand.
E-mail: beuyjoob@hotmail.com

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