A Commentary on the Summaries, Analysis and Simulations of Recent COVID-19 in Mainland China

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Commentary

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ABOUT THE STUDY

Globally COVID-19 epidemics have caused tremendous disasters. China prevented effectively the spread of COVID-19 pandemic before 2022. Recently Omicron variants cause a surge pandemic spread in Mainland China.

Before 25 July, 2021, there had been forty days which had a few new daily symptomatic and asymptomatic infection cases. The current symptomatic and asymptomatic individuals were 629 and 31, and the foreign input ones were 578 and 406, respectively. On July 25, forty new symptomatic and four new asymptomatic cases were reported, and the foreign input new cases were thirty-six and twenty, respectively. On December 30, the numbers of the current symptomatic and asymptomatic individuals increased to 2714 and 28, and the foreign input ones were 779 and 484, respectively [1] .

The article investigated the recent COVID-19 in Mainland China (RCMC) during December 31 2021 to May 15, 2022 by using differential equations with variables: current Symptomatic Individuals (SI), current Asymptomatic Individuals (AI), Cumulative Recovered Symptomatic Individuals (CRSI), Cumulative Recovered Asymptomatic Individuals (CRSI), and Died Individuals (DI). Assume that the dynamics of the epidemic can be described by 19-time intervals and 18-times intervals (for the foreign input case), which correspond different transmission rates, prevention and control measures and medical effects. Nine equation parameters represent the transmission rates of the SI and AI infecting susceptible population to become AI and SI, the recovery rates of the current SI and AI, the death rate of AI, and the blocking rates to symptomatic and asymptomatic infections over the investigated time intervals, which were determined by the real world data [1,2].

The simulation results on the end points of time intervals were in good agreement with the real word data. The recovery rates of the foreign input symptomatic and asymptomatic infected individuals are much higher than those of the mainland COVID-19 infected individuals. The blocking rates to symptomatic and asymptomatic mainland infections are lower than those of the previous epidemics in mainland China. For the foreign input COVID-19 epidemics, the numbers of the current SI and the AI have decreased significantly after March 17, 2022.

Visual simulations predicted that that on day 160 (July 9 2022), the numbers of the current SI were between 605 and 1090 (the real one was 795), for the foreign input case the ones were between 52 and 362 (the real world one was 194), the numbers of the current AI were between 4088 and 7908 (the real one was 2571), for the foreign input case the ones were between 403 and 454 (the real world one was 487). The results suggest that during the last 25 days, the prevention and control measures and therapies to the domestic become better.

Our simulations show that about 92% and 46% blocking rates, and about 0.08 and 0.06 recovery rates of the symptomatic and asymptomatic infections could not prevent effectively the spreads of the pandemic. Over 93% and 61% blocking rates, and about 0.12 and 0.10 recovery rates of the symptomatic and asymptomatic infections could reduce rapidly the numbers of the current SI and AI [2]. On December 6, 2022, the numbers of the current SI and AI increased to 42955 and 354890, and the foreign input ones were 589 and 1737, respectively [1]. The data suggest that during the last 5 months, the previous blocking rates and recovery rates to the symptomatic and asymptomatic infections cannot be kept.

In an experiment on acute Hepatitis B Virus (HBV) infection in Chimpanzees, Asabe et al., observed that low dose (1 genome equivalents per animal) inocula primed the CD4 T cell response, allowing infection 100% of hepatocytes and requiring prolonged immunopathology before clearance occurred, and causing prolonged infection [3]. Theoretically, the virus infection models show that if one infected individual's basic virus productive number R is >1, the individual will be obtained symptomatic or asymptomatic continued infection even contacting only one virus [4,5]. Otherwise if R<1, the infected individual will recover finally even contacting high dose virus. It can assume similar [6].

- When the numbers of SI and AI have decreased significantly, most people's R<1 and most people can prevent COVID-19 virus infection.
- To coming new COVID-19 variant, most people's R>1 and most people will be infected until their specific immune functions are activated such that their R<1. Therefore the author recommends:
- Using more accuracy SARS-CoV-2 nucleic acid testing (CT value>40) detects individuals who may be infected by new COVID-19 variant.
- Administrative authorities need to persuade their society to implement a prevention and control strategy to be withstood until social infection cases disappear or keep a low level.
- Every individual should know that one new COVID-19 variant entering his/her throat, nose or eye may cause infection.

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