

Predicting the Status of the New Strain of Coronavirus, Omicron, in Iran for the Next 4 Months

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ABSTRACT

On 26 November 2021, the World Health Organization (WHO) announced variant B.1.1.529, a variant of concern named Omicron. In this study, we used a susceptible, exposure, infection, and compartmental recovery model (SEIR) to estimate the future status of the omicron virus in Iran. We showed that the epidemic could last for about 3 to 4 months in Iran. It seems that by increasing the effectiveness of interventions, the Omicron wave could be under control with more minor casualties. The response strategy in Iran should be implemented to gain time for the roll-out of the third vaccine dose and complete those who just received the first shot. Besides, the effectiveness of interventions in the real world almost occurs more slowly than the simulated data.

Keywords: COVID-19, Omicron, Epidemiology

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On 26 November 2021, the World Health Organization (WHO) announced variant B.1.1.529, a variant of concern named Omicron (1). The cluster of severe respiratory infections with the Omicron variant was reported in many countries with the highest incidence in South Africa, the United Kingdom, Denmark and Norway, and the United States (2, 3). Although the first data from South Africa indicated that the Omicron variant causes mild disease without any official mortality reported, the preliminary statistics from the United Kingdom revealed the mortality and morbidity due to this variant even among fully vaccinated people (4). Iran reported its first confirmed cases on 19 December 2021 in Tehran (Tehran province, Iran). The coverage of full vaccination in Iran reached just 60% for the total population, and the percentage of people who received the booster shot was still low (5). So, it could be expected that there is a potential for a new outbreak with the new variant in the country. In this study, we used a susceptible, exposure, infection, and compartmental recovery model (SEIR) to estimate the future status of the omicron virus. The model was updated based on the following information; as of 4 January 2022, 244 definite cases of Omicron have been reported in Iran. Since about 70% of omicron cases are asymptomatic, it was assumed that the number of potential cases had reached 2,000 patients at the beginning of the outbreak. We considered the recovery rate of the disease to be 92% and the effectiveness of the interventions (vaccination, masking mandatory and social distancing) to be about 75%. However, if we assume that most people will receive the third dose of the vaccine up to

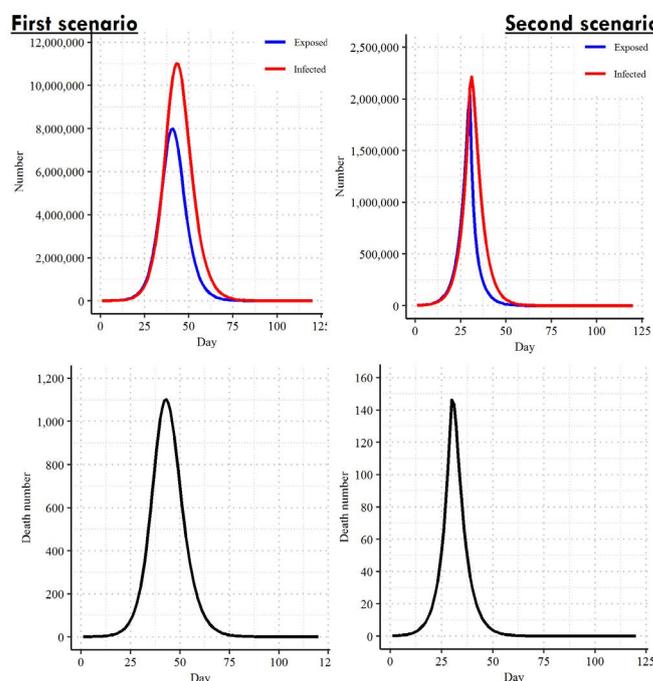


Fig 1. The daily number of exposed cases, infected cases and death in Iran in 4 next months based on two scenarios.

the following months, it seems that the effectiveness of the interventions would be reached to 90%. For this purpose, we considered two scenarios: for the first scenario, the effectiveness is supposed to be equal to 75%. For the second scenario, the effectiveness is equal to 90%. The case fatality rate (CFR)

was assumed at 0.0003 for the first scenario and then at 0.0002 for the second scenario (4). We considered the exposure period 2 days and the disease period to be 3 days. Finally, the primary reproductive number (R_0) is fixed at 10 for both scenarios (6). The estimates obtained from the SEIR model for both scenarios are presented in Figure 1. According to the first scenario, given the current situation, the epidemic will increase by about 35 days and affect about 10 to 12 million people, leading to about 1,100 mortalities at the wave's peak. In the second scenario, which assumed increasing effectiveness from 75% to 90%, the rate of epidemic reduction is slightly faster (approximately 2 million people are infected). However, consequently, the mortality is significantly lower, about 150 cases per day at the peak of the wave. In other words, there would be a 6-fold decrease in the number of infected cases and about a 10-fold decrease in the number of deaths by increasing the effectiveness of vaccination coverage and masking mandatory. In conclusion, by increasing the effectiveness of interventions, the Omicron wave could be under control with fewer casualties. The rapid spread of the Omicron variant is worrying. Danish study indicated that within 1.5 weeks from identifying the first case of Omicron, there was already widespread community transmission (7). So the window for controlling the outbreak would be closed very soon. The response strategy in Iran should be implemented to gain time for the roll-out of the third vaccine dose and complete those who just received the first shot. Besides, the effectiveness of interventions in the real world almost occurs more slowly than the simulated data. Therefore the number of patients and mortality due to the Omicron wave in Iran could be potentially more minor than the modeling results. On the other hand, the epidemic can last for about 3 to 4 months in Iran.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest to this work.

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