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Breakthrough Infections Due To the Omicron Variant of COVID-19 Infection in Myanmar in June 2022: The Value of Surveillance and Early Quarantine to Prevent Fifth Wave

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The "severe acute respiratory syndrome coronavirus type 2" (SARS-CoV-2) is also known as "coronavirus disease 19" (COVID-19). It originated in Wuhan, Hubei province, People's Republic of China, in December 2019; and, it spread worldwide causing a global pandemic. Genetic variants of SARS-CoV-2 have been emerging and circulating around the world throughout the COVID-19 pandemic. The original (wild-type) SARS-CoV-2 coronavirus that causes COVID-19 has been changing; and, it has reproduced several new variants- the original (wild-type), the Alpha variant, the Beta variant, the Delta variant, the Gamma variant and the Omicron. the Omicron variant was first detected in South Africa in late November; and, it was found in Myanmar in January 2022 (Pyar, 2022).

As of June 2022, 60.8% of the world population had completed vaccination according to vaccination record, (World Health Organization, 2022). In Myanmar, 48% of total population had completed vaccination- two doses in end of May 2022. The morbidity and mortality of SARS-CoV-2 infected cases may be better with increasing COVID-19 vaccine coverage; nonetheless, the transmissibility and virulence of several variants leads to BTIs.

Breakthrough infections **(**BTIs) is the infection which develops after getting complete vaccination, two doses of recommended vaccine. The protective effect of antibody level in blood reaches at 2 weeks; thus, BTIs can be labelled if you have COVID-19 infection 14 days after vaccination. The duration of protection after vaccination is interesting; it is usually 6 months after vaccination according to studies. There are 2 types of BTIs: BTIs after completed vaccination (two recommended doses of vaccine) and BTIs after booster vaccination (two recommended doses plus extra one dose of vaccine).

The study from UK pointed out that "the third/booster dose of vaccination offers substantial additional protection against the risk of symptomatic COVID-19 for being infected with the Omicron variant when compared to ≥ 25 weeks post second vaccine dose". In the outbreak report from Norway, the SARS-CoV-2 Omicron variant was highly transmissible among fully vaccinated young and middle-aged adults. The transmissibility of the Omicron variant compared to other variants is not clearly known (World Health Organization, 2021). The study from Norway, Brandal et al., (2021) revealed that the SARS-CoV-2 Omicron variant was highly transmissible even among fully vaccinated young and middle-aged adults. The omicron variant was at least twice as contagious as delta and at least four times as contagious as the original version of the coronavirus (UK Health Security Agency, 2021).The study "Ontario COVID-19 cases" found that the Omicron variant was less likely to cause hospitalization or death than the Delta variant, but it had

significantly impact health-care systems due to its high transmissibility (Public Health Ontario, 2021).

Figure (1) reveals frequency distribution of the number of confirmed COVID-19 cases per day worldwide. Fourth wave of epidemics in Myanmar started in late December 2021 and early January 2022 as shown in figure (2) and (3). As of December 2021, the number confirmed COVID-19 cases per day began to rise; and it reached peak in early months of 2022. Then, it dropped gradually; in May, the number was less than 5 cases per day. Nevertheless, surveillance has been carrying on particularly transfer cases from border area irrespective of symptoms.

As demonstrated in figure (7), Sittwe hospital which is situated in western part of Myanmar, border area with India and Bangladesh. The patients were transferred from Sittwe for further management to tertiary hospital in Mingaladon, Yangon via transfer flight. The transfer cases were screened routinely at entry to tertiary hospital. Figure (4), (5) and (6) demonstrate the number of screened cases and positive cases per day in Mingaladon hospital. Almost all screened cases in Mingaladon hospital were nasopharyngeal swab PCR negative for SARS-CoV-2 infection for nearly 12 weeks; however, the surveillance was still going on.

All of sudden, screening to cases from Sittwe in 28 May, 13 out of 45 tested cases were nasopharyngeal swab PCR positive for SARs COV2 infection; and 9 out of 22 cases were positive in 29 May. They were asymptomatic COVID-19 infection; they were sent for further investigation and management like major surgery, endoscopy, CT imaging and coronary angiogram etc. Once the PCR results came out, the positive cases were kept in quarantine hospital and given necessary treatment. At the same time, public health emergency measures were done in their origin, Sittwe hospital.

All the patients, health care workers and exposed persons in Sittwe hospital were undergone nasopharyngeal swab test for PCR; the number was 26 remaining patients and 120 health care workers and exposed persons. They were asymptomatic too; and the patients were mobile workers coming back from border area with India and Bangladesh. A total of 41 cases (15 of 120 health care workers and 26 patients) were found to be PCR positive. Therefore, positive cases were isolated; and, negative cases were quarantined in Sittwe hospital. Transfer to tertiary hospital was postponed for two weeks.

The vaccination history of positive cases was reviewed; fifteen health care workers have received booster vaccination (Covishield and Covaxin or Sinopharm) and the remaining positive cases have got completed vaccination. Most of them obtained last vaccination in March 2022, 60 days ago.

The nasopharyngeal swabs were tested for different variant; they were Omicron positive. Their mean Ct value was 35; thus, their viral load was low. None of them developed severe symptoms or drop in oxygen saturation during 14 days quarantine period in hospital. There were no fatal cases.

No new cases were detected in both Sittwe and Mingaladon, Yangoon; showing effectiveness of early quarantine which was done timely. As the Omicron infected cases were reported as highly transmissible (Public Health Ontario, 2021), no evidence of new case confirmed the success of public health action.

And, it showed the importance of surveillance. Moreover, it highlighted the need for booster dose in non-health care workers; health care workers must keep on using personnel protective measures (Brandal et al.,2021). It also confirmed the previous findings "the Omicron variant was found to be refractory to vaccine'.

All PCR positive cases were asymptomatic; and, they did not progress to severe or critical form. It again pointed out the report mentioning that the Omicron infected cases were less severe and critical compared to the Delta variant (Public Health Ontario, 2021). All cases were survivors; it may be due to prior vaccination. The fact that 'primary immunization with two doses of COVID-19 vaccine had partial protection against the development of severe infection and mortality caused by the omicron variant' was arguable and more evidence are needed (Andrews et al., 2022).

Having booster dose of COVID-19 vaccine 60 days ago in 120 health care workers in Sittwe hospital proved the good efficacy protection. Only 12% (15 of 120 health care workers) positive cases revealed the effectiveness of booster vaccination. It again gave supporting evidence for former findings (Andrews et al., 2022).The study from Sweden proved that the efficacy of 3 dose vaccine to the Omicron sub-variant was 80% (Björk et al., 2022). Having the Omicron infection in 15 health care workers who had booster dose (Covishield and Covaxin or Sinopharm) pointed out the requirement for a fourth dose of vaccine as the Israel study highlighted that "older patients in Israel who received a fourth dose of the BNT162b2 (Pfizer-BioNTech) SARS-CoV-2 vaccine were more than 3 times less likely to develop severe COVID-19 than those who received only 3 doses"(Larkin, 2022).

In conclusion, surveillance must be continuous to get early recognition of cases even in period of low case detection. Contact tracing, timely quarantine and giving appropriate treatment are essential to prevent further spread

which may lead to epidemics. A fourth dose of COVID-19 vaccine should be recommended for health care workers

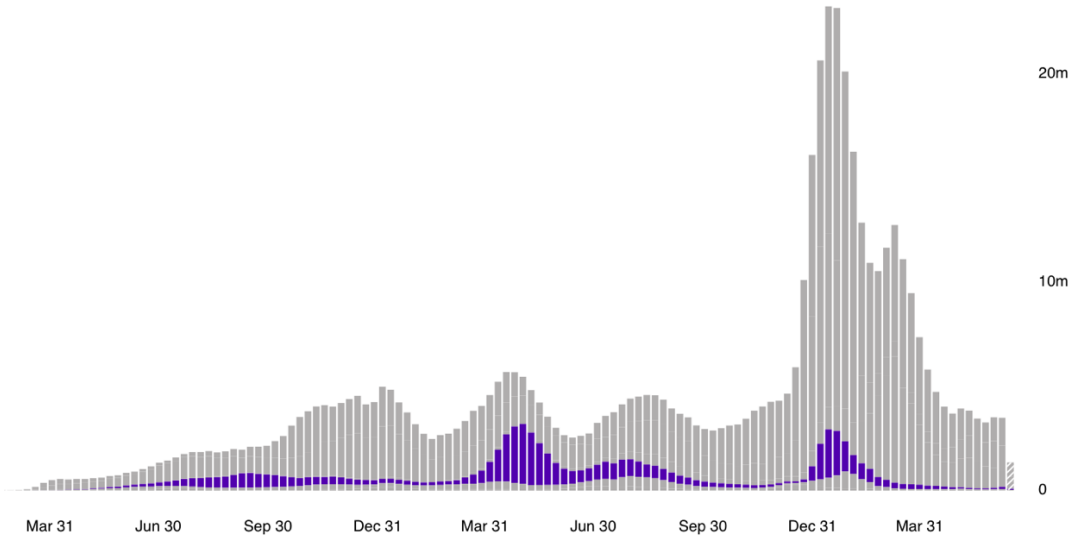

Figure (1) Frequency distribution of the number of confirmed COVID-19 cases per day worldwide (Brown = World data; Purple = South East Asian) (WHO, 2022)

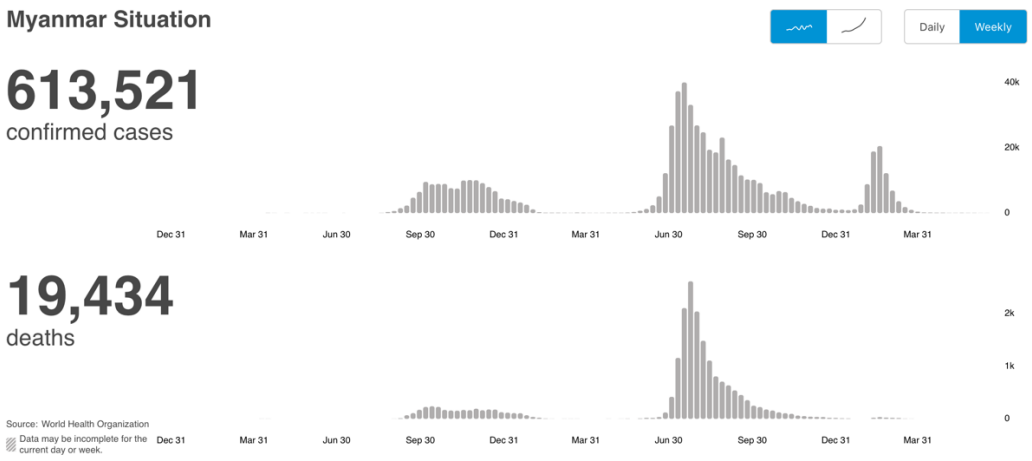

Figure (2) Frequency distribution of the number of confirmed COVID-19 cases per day and deaths in Myanmar (WHO, 2022)

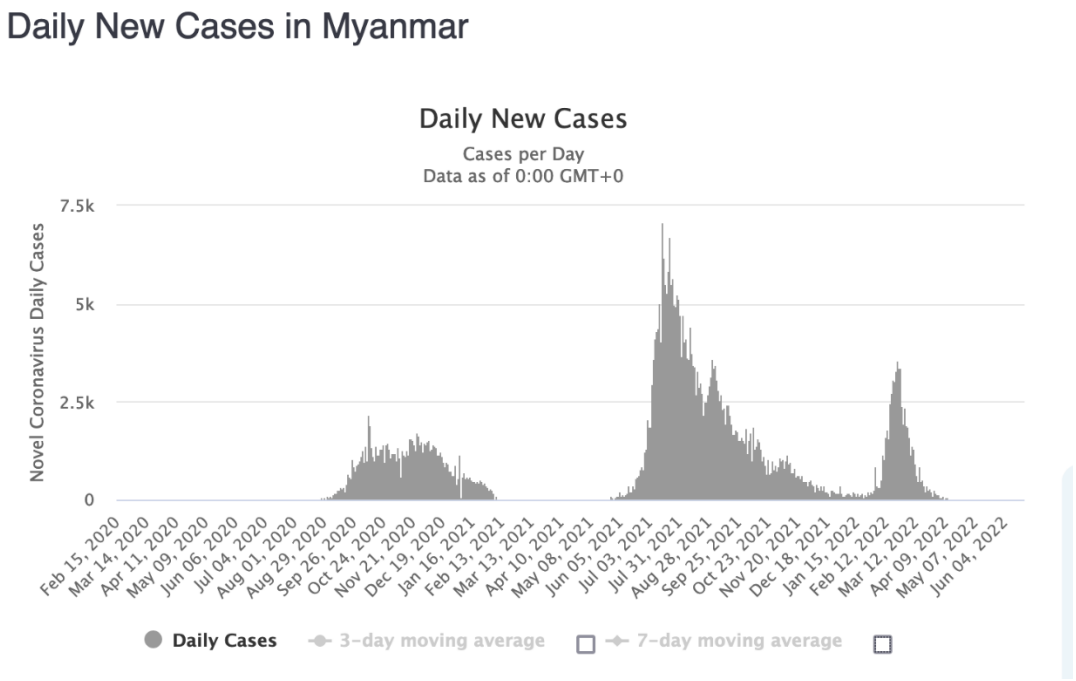

Figure (3) Frequency distribution of the number of daily new cases in Myanmar (Worldometer, 2022)

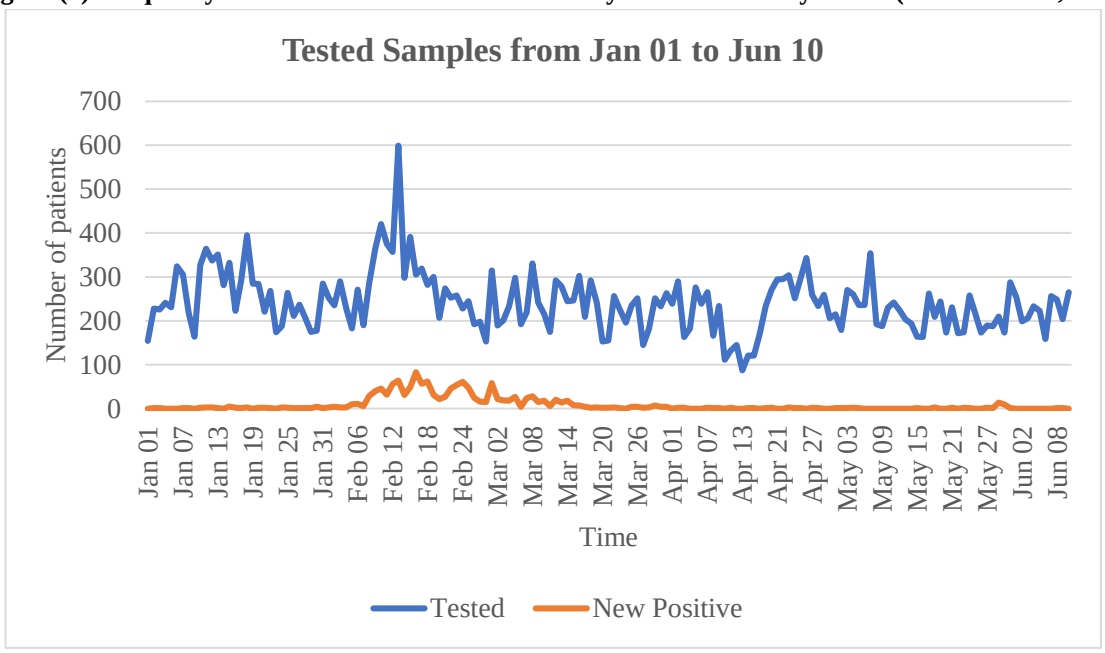

Figure (4) Frequency distribution of the number of tested samples and new positive cases per day in Mingaladon hospital in 2022

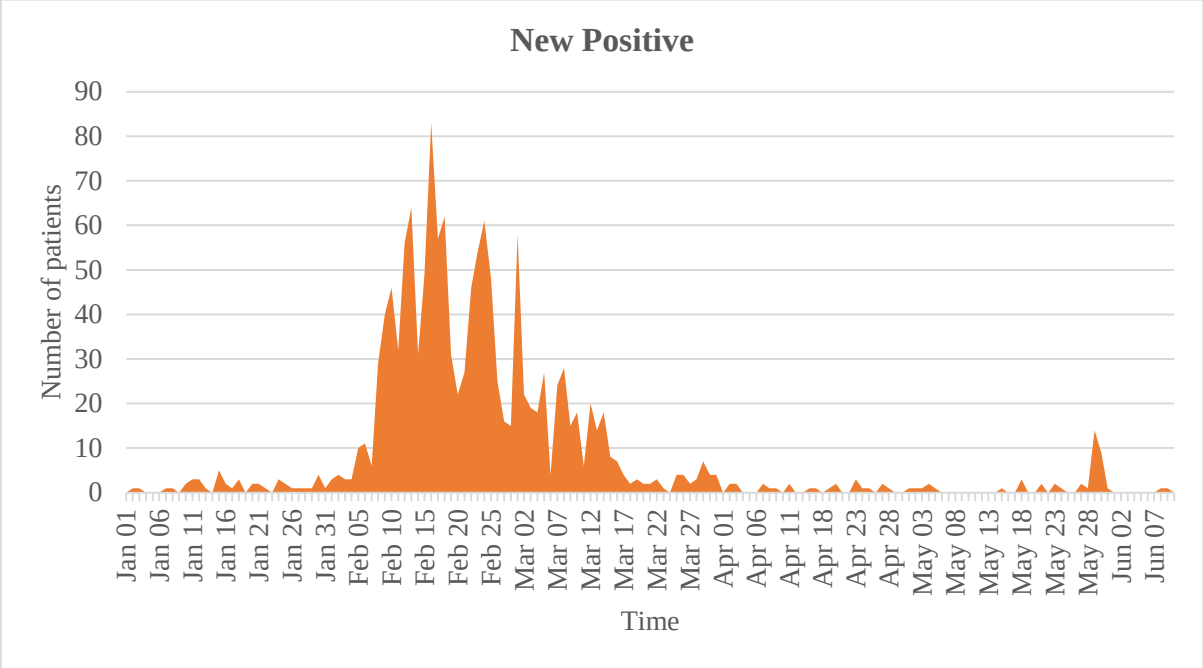

Figure (5) Frequency distribution of the number of new positive cases per day in Mingaladon hospital in 2022

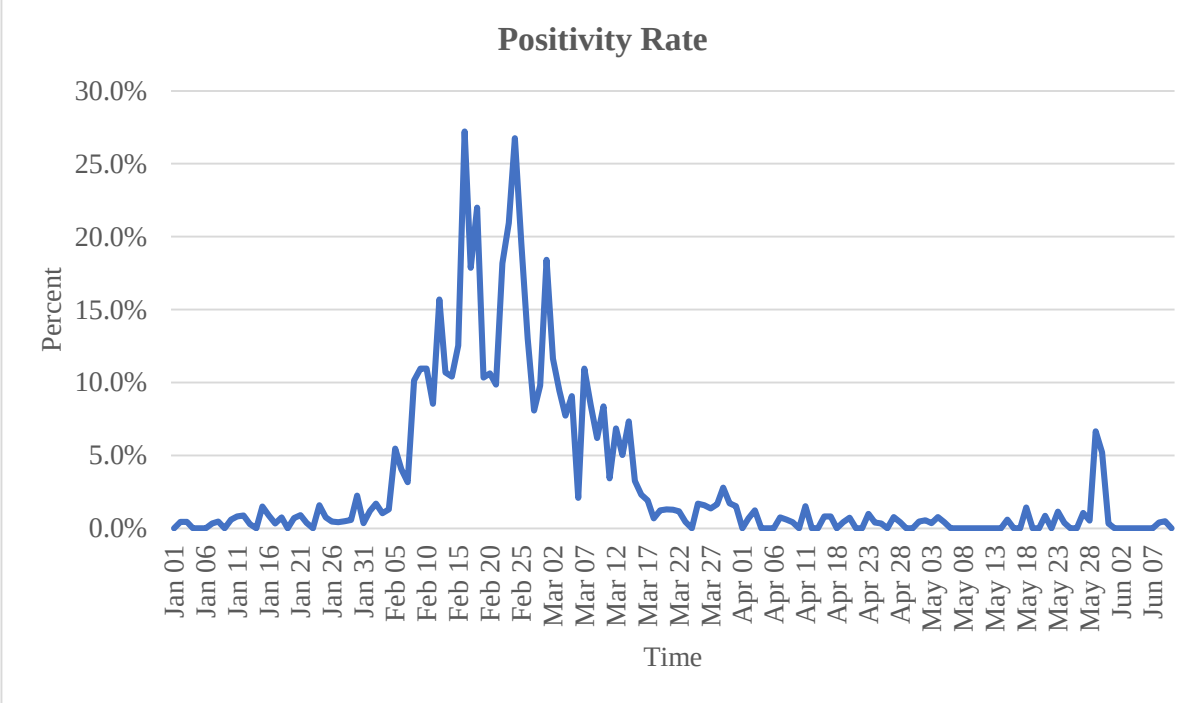

Figure (6) Frequency distribution of the positivity rate in Mingaladon hospital in 2022

Figure (7) Myanmar map showing location of Sittwe and Mingaladon hospital (Nations Online, 2022)

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