

Brazilian model vaccination program reduced severe cases of COVID-19 and deaths

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The dynamics of SARS-CoV-2 variant substitution in the town where a clinical trial of vaccination effectiveness was conducted matched the pattern seen elsewhere in the country, but most cases were mild. Credit: Butantan Institute

A study conducted in Serrana, a small town in São Paulo state used as a model for COVID-19 vaccination in Brazil, shows that mass vaccination reduced the severe case and death rates even while the gamma and delta variants were circulating. Gamma and delta were considered alarming because they spread so much faster than previous variants.

Based on an analysis of the virus's evolutionary history (phylogeny), the researchers showed that the dynamics of SARS-CoV-2 substitution in the town was similar to the pattern seen in the rest of Brazil. The ancestral strains (B.1.1.28 and B.1.1.33) were replaced by gamma, delta (first detected in India in 2020 and originally labeled B.1.617.2) and more recently omicron.

In Serrana, however, the study showed that most cases caused by all three variants (88.9%, 98.1% and 99.1% respectively) were mild, thanks to immunization with CoronaVac (Sinovac Biotech-Butantan Institute). Coverage had then reached 80% of the target population.

The [phylogenetic analysis](#) was applied to 4,375 genomes obtained between June 2020 and April 2022, the period between the introduction of SARS-CoV-2 and completion of the double-dose vaccination process.

According to the authors, their genomic surveillance exercise not only monitored the spread of the key variants in the town but also helped identify some rare variants of interest, such as C.37, which circulated in the Andean countries but was under-represented in Brazil, and alpha, which was detected in Serrana but did not spread elsewhere. All told, the scientists detected 52 sublineages of SARS-CoV-2 in the town.

An article on the study is published in the journal *Viruses*. Codenamed Project S, the study was conducted by Butantan Institute. The authors are researchers affiliated with Butantan Institute, the Ribeirão Preto Blood Center and the Center for Cell-Based Therapy (CTC), a Research,

Innovation and Dissemination Center (RIDC).

Serrana was a model for a clinical study of the first mass vaccination of a town's entire adult population (over 18) using CoronaVac before the Ministry of Health began official vaccine rollout. A large-scale sequencing program was developed to analyze all SARS-CoV-2 positive samples obtained in the town in real time.

"Next-generation sequencing is increasingly affordable and widely used for genetic monitoring of [infectious diseases](#) and the viral variants involved. The technologies now available are applicable even in relatively remote areas with scant resources. This type of surveillance helps us prevent outbreaks, understand how novel viral genotypes spread and identify emerging viruses. Detection of novel agents and viral variants provides key input for public health decisions to avoid future pandemics or epidemics," Svetoslav Nanev Slavov, first author of the article and a researcher at Butantan Institute, told Agência FAPESP.

Results

The 4,375 genomes analyzed in the study broke down as follows by variant: 1,653 delta (37.8%), 1,053 gamma (24.1%), 1,513 omicron (34.6%), 75 zeta (1.7%), and 81 other (1.9%). Most subjects were in the 21-50 age group, although there were participants of all ages.

According to the authors, based on the clinical scores of the subjects who tested positive, vaccination reduced morbidity and mortality in Serrana, especially during the gamma and delta waves. They compared the results with those of São José do Rio Preto, a medium-sized city about 200 km away, where mortality was higher during the gamma wave, especially among unvaccinated young people.

The beneficial effects of vaccination have been observed in other

studies, showing that fully vaccinated people are less likely to contract symptomatic or asymptomatic infections. The conclusion is that vaccination reduces infection rates, numbers of severe cases and [death rates](#) due to SARS-CoV-2.

"In addition to genomic monitoring of patients who tested positive for SARS-CoV-2 in Serrana, the study demonstrated the benefits of early [mass vaccination](#) in significantly reducing morbidity and mortality due to this viral agent," said Simone Kashima, last author of the article and a researcher at the Ribeirão Preto Blood Center.

The study serves as a basis for future research on the genetic monitoring of viral diseases and measures to combat them, she added.

More information: Svetoslav Nanev Slavov et al, Dynamics of SARS-CoV-2 Variants of Concern in Vaccination Model City in the State of Sao Paulo, Brazil, *Viruses* (2022). [DOI: 10.3390/v14102148](https://doi.org/10.3390/v14102148)

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