A woman in São Paulo eyes the syringe about to be used to give her a shot of Sinovac's COVID-19 vaccine. ANDRE PENNER/AP

Chinese COVID-19 vaccine maintains protection in variant-plagued Brazil

By **Sofia Moutinho** | Apr. 9, 2021 , 6:10 PM

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As potentially more dangerous coronavirus variants spread worldwide, scientists and clinicians have raced to discover how well the available COVID-19 vaccines protect against the mutant strains. Preliminary results from a large study of health care workers now suggest one dose of CoronaVac, a vaccine developed by a Chinese company, is still about 50% effective against symptomatic COVID-19 in a Brazilian city where more than three-fourths of new cases are caused by the highly transmissible variant known as P.1.

That real-world protection is about the same level clinical trials saw with two doses of CoronaVac against the standard, or "wild type," pandemic coronavirus in the country, suggesting the variant's mutations have not increased SARS-CoV-2's ability to evade vaccine-evoked immune responses.

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"This is very good news and supports the continued use of this vaccine in Brazil and other countries with the circulation of the same variant," says Julio Croda, a physician and researcher at the Oswaldo Cruz Foundation, who led the study. The vaccine's protection may be even better after the second dose, he adds, noting the study is ongoing.

Although 50% effectiveness is far below the greater than 90% real-world protection of COVID-19 vaccines made with messenger RNA (mRNA), it may still be good enough to curb the disease's spread within Brazil; vaccines with that level of efficacy in a clinical trial qualify for emergency use in many places and meet the World Health Organization's threshold, as well.

It's also not clear how well the mRNA vaccines protect against the P.1 variant; their clinical tests happened before it was circulating or in places with little of the variant. Moreover, CoronaVac likely offers far greater protection against severe disease, hospitalization, and death than against milder cases of COVID-19. That was seen in two dose efficacy trials conducted in Brazil and other countries and is typical of COVID-19 vaccines. But the new study has not yet collected enough severe cases to calculate effectiveness, Croda says.

The study's preliminary results, not yet peer reviewed, were posted to a preprint server yesterday and are the

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first to assess the effectiveness of the vaccine made by Sinovac Biotech in an area flooded with the P.1 variant. CoronaVac contains inactivated whole copies of SARS-CoV-2, in contrast to many other COVID-19 vaccines, including the mRNA vaccines, which just present the spike protein of the virus to the immune system.

The origin of the P.1 variant was traced to Brazil in January, and the strain has quickly spread to the rest of the world. Laboratory studies that assess whether vaccine-induced antibodies can neutralize SARS-CoV-2's infectivity have raised concerns that the variant **could escape the immune protection** conferred by vaccines. The mutated virus is likely to be driving a recent COVID-19 resurgence in Brazil—the country currently has up to 60,00 new cases per day. COVID-19 has killed more than 340,000 Brazilians.

The CoronaVac study involved medical data from 67,718 health care workers from Manaus, a city in the Amazon region that is the epicenter of the P.1 variant. The mutant virus now accounts for 75% of all positive test results in the city, where the health system is collapsing because of COVID-19.

To estimate CoronaVac's effectiveness, the researchers focused on 2656 health workers who had taken polymerase chain reaction (PCR) tests for SARS-CoV-2 infections beginning in January, with the initial rollout of the vaccine, through last week. The scientists identified 786 people with apparent COVID-19 symptoms, whom they divided into two groups of 393 each: those who tested positive and negative for the virus. Then, the researchers checked the proportion of vaccinated and unvaccinated people in both groups. In the positive group, 18.6% were vaccinated; in the negative group, the proportion was 24.4%. Using the unvaccinated people as a reference, the researchers calculated the risk of infection by SARS-CoV-2 14 days after the first dose.

The 49.6% real-world effectiveness is similar to the **vaccine's efficacy of 50.34% against symptomatic COVID-19 after both doses**, found in a phase 3 clinical

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trial conducted in Brazil by the Butantan Institute, a state-owned research institute and vaccinemaker. “This is not a coincidence,” says epidemiologist Ricardo Palácios, who ran the vaccine tests at the institution, which is now producing CoronaVac under an agreement with Sinovac. “This is an independent confirmation that the vaccine is efficient in a scenario of a new variant.”

Epidemiologist Eric Feigl-Ding at the Federation of American Scientists, however, cautions that the new study did not sequence SARS-CoV-2 in the people with positive PCR tests to make sure their infections were caused by the P.1 variant. The authors’ conclusion that the vaccine protects against the variant rests on assuming it makes up most of the positive cases, he notes.

On the other hand, Feigl-Ding says, measuring vaccine effectiveness in Brazil may produce artificially low results because there is a high risk that people have some immunity because of previous contact with the virus. “This is a natural property of doing a trial in a highly previously infected population,” he says. This could also explain why the CoronaVac clinical trial in Brazil showed lower efficacy numbers (50%) than in other countries such as Turkey (83.5%) and Indonesia (65%).

CoronaVac may prove better in a general population, as the new trial’s data come from health care workers who are highly exposed to the virus, points out immunopathologist Bruno Filardi at the Brazil Cancer Institute. “Probably the effectiveness will be higher than the preliminary study is showing,” he says. In addition to Brazil, CoronaVac has been authorized and used in China, Chile, Bolivia, Mexico, Turkey, and Indonesia.

Croda and his colleagues will continue to analyze the effectiveness of various COVID-19 vaccines against P.1 and other variants with larger groups of people. In the next 2 weeks, they plan to look at data from Sao Pãulo, where more than 7 million people have been vaccinated with CoronaVac or AstraZeneca’s vaccine.

That work is a top priority, according to infectious disease expert Jason Andrews at Stanford University, who works with the Brazilian research team and is a co-author on the preprint. “It will be critical to detect when vaccines are no longer effective against emerging variants,” he says. “Which is a question of *when* rather than *if*.”

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Sofia Moutinho

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