Vaccines have up to 90% efficacy against severe COVID-19 for up to six months

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Protection against symptomatic COVID-19 begins to decrease after one month from initial vaccination, while immunity against severe COVID-19 remains high for about six months, according to a recent

study in *BMC Infectious Diseases* by Penn State College of Medicine scientists.

In the largest study to date, the researchers analyzed data from 7 million unvaccinated and vaccinated individuals. The latter received Pfizer-BioNTech, Moderna or Johnson & Johnson doses of the COVID-19 vaccine. Conducting a systematic review and meta-analysis, the investigators examined 18 peer-reviewed studies published from December 2019 to November 2021, prior to emergence of the omicron variant that dominated the most recent pandemic surge in the U.S.

According to the Centers for Disease Control and Prevention, more than 577 million doses of the COVID-19 vaccine have been administered across the nation. Vaccinated individuals may wonder how long the vaccine provides protection against the coronavirus.

In their analysis, the researchers determined the vaccines provided significant protection against COVID-19, but effectiveness waned over time. The findings revealed that after full vaccination, immunity against COVID-19 infection decreased from 83% after the first month to 22% after five or more months.

The research included data on adults and children, aged 12 and older. The findings showed that recipients of the Moderna vaccine experienced the highest levels of protection. Fully vaccinated individuals are defined as those who received two doses of either the Moderna or Pfizer vaccines, as well as individuals who received one dose of the Johnson & Johnson vaccine. The researchers did not have data beyond six months, and the study did not include data on booster vaccines.

"It is reassuring to see that individuals vaccinated against COVID-19 maintained strong protection against hospitalization and death over time even when effectiveness against infection waned," said senior author Dr.

Catharine Paules, assistant professor in the Department of Medicine. "More data are needed specific to protection against the omicron variant."

The researchers said that vaccines remained 90% effective against severe COVID for up to six months. However, protection against severe COVID-19 was lower (74%) for individuals who received the Johnson & Johnson vaccine. According to the study, immunity against COVID-19 decreased more rapidly for individuals 65 or older regardless of which vaccine they received.

"It's important to note that the rate of waning of vaccine effectiveness against COVID-19 is not uniform. Elderly populations had a higher rate of waning effectiveness," said Dr. Paddy Ssentongo, assistant professor for the Department of Public Health Sciences and lead author of the study. "Future studies should focus on showing how vaccine protection lasts for various comorbidities and immune suppression status."

The researchers noted that overall efficacy could depend on several factors, including vaccine type, patient age, emerging variants and geographic areas. According to the CDC, subsequent doses of the vaccine are recommended as time passes to help boost immunity and mitigate the threat of COVID-19. Evidence shows that booster doses can provide a short-term increase in protection against COVID-19 infection and symptomatic disease.

"COVID-19 vaccines are critical for ending the pandemic, and even if their effectiveness against infection wanes, they provide key and important protection against severe COVID-19 disease that can lead to hospitalization," Ssentongo said. "Future studies will need to explore the evolution of effectiveness against omicron and newer variant-related hospitalizations."

The authors note that the results might have been influenced by a high degree of variation in factors such as study designs, follow-up lengths, geographical location, vaccine types and variants of the virus.

More information: Paddy Ssentongo et al, SARS-CoV-2 vaccine effectiveness against infection, symptomatic and severe COVID-19: a systematic review and meta-analysis, *BMC Infectious Diseases* (2022). DOI: 10.1186/s12879-022-07418-y

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