

Infection with COVID carries much higher risk of developing neurological complications than vaccine, says new study

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COVID-19 is more likely to cause very rare neurological events than vaccines, according to a new study involving experts from the University of Nottingham.

The findings of the study, led by the University of Oxford, are published today in *Nature Medicine*.

Researchers from across the UK reported on the risks of developing neurological complications following a positive COVID-19 PCR test, or a first dose of either the Oxford-AstraZeneca or Pfizer-BioNTech COVID-19 vaccinations.

Several COVID-19 vaccines, including the Oxford–AstraZeneca and Pfizer–BioNTech vaccines, are approved for use in many countries and have been shown to reduce SARS-CoV-2 infections, transmissions, hospitalizations and deaths. However, there have been reports of rare neurological complications associated with SARS-CoV-2 infection and vaccines. In the study, the researchers detail the findings from an analysis of anonymized healthcare records of over 32 million people across England. They assessed the risk of developing neurological complications within 28 days of a first dose of either the Oxford-AstraZeneca (ChAdOx1nCoV-19) or Pfizer-BioNTech (BNT162b2) vaccines, or within 28 days of a positive COVID-19 PCR test. They found an increased, but low, risk of the rare neurological conditions Guillain-Barré syndrome and Bell's palsy following a first dose of the Oxford-AstraZeneca vaccine and an increased but low risk of hemorrhagic stroke following a first dose of the Pfizer-BioNTech vaccine. However infection with COVID-19 was associated with a greater risk of developing neurological complications than receiving either vaccine.

"This analysis provides important information about which [neurological conditions](#) could be linked with Covid-19 vaccination or infection. Overall, the findings from this study show that the risks of hospital admission with nervous system complications associated with COVID-19 infection are greater than the risks associated with COVID-19 vaccinations; highlighting the benefits of the on-going

vaccination programs," said Professor Carol Coupland from the School of Medicine at the University of Nottingham, who was one of the researchers involved in the study.

Martina Patone, Medical Statistician at the Nuffield Department of Primary Care Health Sciences, University of Oxford, and co-lead author, said, "We found different risks for different types of neurological condition depending on which vaccine people received. However, these were substantially lower than the risks occurring in association with a positive COVID-19 PCR test. For example, we estimate 145 excess cases of Guillain-Barré syndrome per 10 million people in the 28 days after a positive SARS-CoV-2 test, compared to 38 per 10 million for those who received the ChAdOx1nCoV-19 vaccine."

Initial clinical trials of the vaccines were not large enough to be able to detect very rare adverse neurological events—those that happen in less than 1 person out of 10,000. This study was able to achieve this by looking at the real-world data from over 32 million healthcare records in England.

The study used what is known as a "self-controlled case series (SCCS)" design. An SCSS compares how often "adverse events—in this case neurological complications—happen in different set windows of time within the same person; before, in a short period after, and in a later period after an exposure such as a COVID-19 vaccine a positive test for SARS-CoV-2.

The authors noted that there were several limitations to the study, including:

- Only risks associated with the first [vaccine](#) dose were examined, as data on outcomes following second doses was limited at the time of this study since the vaccination program in the UK is still

underway.

- They could not distinguish between different types of Guillain-Barré syndrome due to the way healthcare records were coded.
- Only hospital admissions and mortality were included, so patients with milder neurological disease may not have been included and the overall burden of neurological adverse events from vaccination and infection could be underestimated.
- The data set came only from England, though a confirmatory analysis was undertaken using a Scottish dataset, but different populations may experience different rates of very rare complications.

More information: Patone, M., Handunnetthi, L., Saatci, D. et al. Neurological complications after first dose of COVID-19 vaccines and SARS-CoV-2 infection. *Nat Med* (2021).

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