

Do SARS-CoV-2 mutations affect its transmissibility?

ISLAMABAD: New research has found that no currently identified mutation of SARS-CoV-2 appears to make the virus better at transmitting. After studying a significant number of SARS-CoV-2 mutations, the scientists behind a new study have not identified any that are likely to improve the virus's transmissibility.

The research may be valuable in helping scientists keep track of the virus's possible mutations as it encounters people who have been vaccinated against it.

SARS-CoV-2, the virus responsible for COVID-19, has been present in humans for approximately 1 year. During that time, though, it has not stayed the same. Viruses spread by replicating themselves within a host organism. If all goes to plan, this replication results in genetically identical copies of the virus taking over cells within the host. In the case of SARS-CoV-2, these are typically the cells of a person's respiratory tract.

mutation improves the virus's ability to replicate, the mutation is likely to be passed on and may spread exponentially. If the mutation is detrimental to the virus's ability to replicate, it is less likely to be passed on. Mutations that are neutral may be passed on, depending on other factors.

In the case of SARS-CoV-2, a key question is whether and how often the virus's mutations are likely to improve its ability to replicate, for example, by making it more effective at resisting a person's immune system. The virus is already highly infectious, and the disease it can cause has resulted in more than 1.4 million deaths globally. If SARS-CoV-2 mutated to become more infectious, the death rate would likely increase even further.

To determine whether mutations of SARS-CoV-2 are increasing its transmission, the scientists behind the present study analyzed samples of its genome

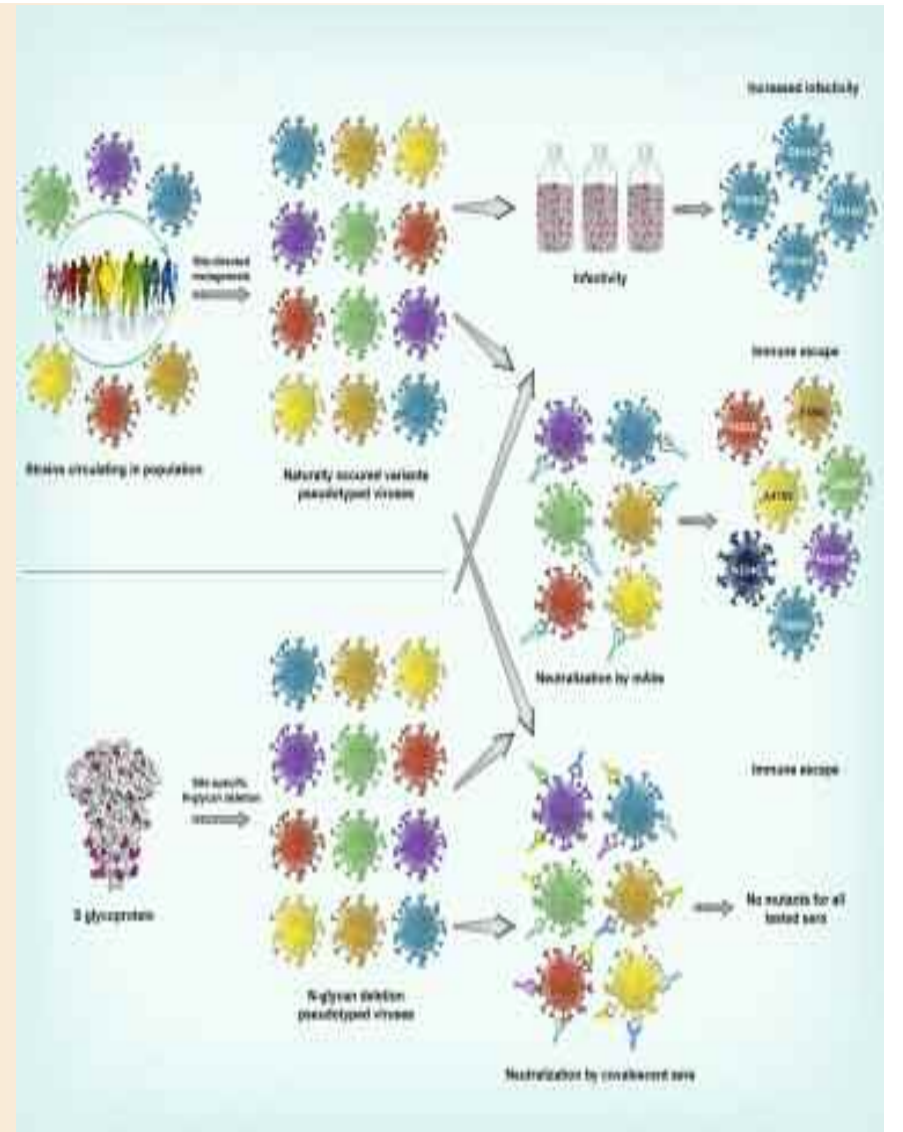
virus that could affect its transmission or symptom severity," she adds. The dataset that the scientists analyzed included samples taken until the end of July 2022.

Of the initial 46,723 samples, the scientists identified 12,706 cases of viral mutation. However, the researchers were particularly interested in 398 mutations that likely occurred independently a number of times. This would indicate that these mutations are more likely to increase the virus's transmission, rather than having a neutral effect and being passed on incidentally.

The scientists finally identified 185 mutations that occurred independently at least three times. To determine whether the mutations were improving the chances of transmission, the scientists created models of the virus's evolutionary tree, tracing how common each mutation was along a particular evolutionary branch.

If the mutation occurred frequently in descendants, it likely increased the chances of the virus's transmission. After tracing the evolutionary progression of the 185 mutations that had each occurred independently three times, the scientists found no evidence that any were increasing the virus's chances of transmission.

Instead, they found that the majority of the mutations were neutral, when it came to viral transmission. The mutations seem to have mainly occurred as an effect of the human immune system. This was in contrast to how the virus behaved when it made the jump from humans to minks, which the scientists had analyzed separately. As Dr. van Dorp says, "When we analyzed virus genomes sourced from mink, we were amazed to see the same mutation appearing over and over in different mink farms, despite those same mutations having rarely been observed in humans before." According to senior study author Prof. Francois Balloux, of University College London's Division of Biosciences, this could mean that the key mutation event for SARS-CoV-2 in humans happened very soon after the virus made the jump from a still unidentified nonhuman animal host: "We may well have missed this period of early adaptation of the virus in humans. We previously estimated SARS-CoV-2 jumped



However, a virus can also mutate during its replication process. Viral mutation happens for one of three reasons. Either there is an error during the replication process, or the mutation occurs because another virus is also present in the host. Or, the mutation may be a consequence of the effects of the person's immune system on the virus.

Mutations are key for a virus's evolution, as they are for other organisms. If a

from 46,723 people across 99 countries. According to the study paper's co-lead author, Dr. Lucy van Dorp, of the UCL Genetics Institute, in the United Kingdom, "The number of SARS-CoV-2 genomes being generated for scientific research is staggering."

"We realized early on in the pandemic that we needed new approaches to analyze enormous amounts of data — in close to real time — to flag new mutations in the

into humans in October or November 2021, but the first genomes we have date to the very end of December. By that time, viral mutations crucial for the transmissibility in humans may have emerged and become fixed, precluding us from studying them."

With the first effective SARS-CoV-2 vaccines soon to be rolled out globally, the virus will likely go through a series of

mutations in response, the scientists note. The approach that they have developed should be helpful in quickly identifying these mutations. For Prof. Balloux, "The news on the vaccine front looks great."

The virus may well acquire vaccine-escape mutations in the future, but we're confident we'll be able to flag them up promptly, which would allow [for] updating the vaccines in time if required."

Losing grandmother can cause lasting depression especially in teen boys

- Data comes from 4,897 primarily low-income children and their parents
- Authors say this loss is a "serious risk factor for depression"
- Adolescent boys show 50% increase in symptoms of depression after up to seven years of grandma's death



In a recent study at Penn State, scientists found that there was a significant correlation between a grandmother's death and depression. The findings of the study showed that depression was more common among adolescent boys.

The study published in *SSM – Mental Health* scrutinized data from 4,897 primarily low-income children and their parents. Authors found that adolescent boys showed a 50% increase in symptoms of depression after up to seven years of their grandma's passing away compared to teenagers who were not grieving a loss. The authors of the study believe that it was crucial for society to understand that this loss was a "serious risk factor for depression".

"Just because these experiences are common does not mean the losses are not a source of great sadness for many, and possibly a risk factor for worse health outcomes among a subset of them," said authors Ashton Verdery, Harry, and Elissa Sichi Early Career Professor of Sociology, Demography, and Social Data Analytics at Penn State. Some of the authors had been studying bereavement in COVID-19. The team's estimates show that nearly four million children and adolescents in America lost a grandparent to the pandemic. "Not only have the youth faced school closures, social distancing, and subsequent isolation, but millions are also grieving a grandparent." —Agencies

Drought may increase females' HIV risk in developing nations



ISLAMABAD: A modeling study suggests that females in developing nations are especially vulnerable to the effects of drought and food shortages.

The social, economic, and medical consequences may disproportionately increase their risk of contracting HIV.

When HIV emerged in the 1980s and 90s, males were more likely than females to contract the virus. However, globally, the majority of adults living with HIV are now females, according to United Nations data.

The Joint United Nations Program on HIV/AIDS (UNAIDS) report that HIV is the leading cause of death in females aged 30–49 years and the third leading cause of females in females aged 15–29 years globally.

The relative rates of males and females contracting HIV vary widely between countries, but data from the World Bank suggest that in Sub-Saharan Africa, for example, more than 60% of all those living with HIV are females.

Females aged 15–24 in this region of Africa are more than twice as likely as males in the same age bracket to become HIV positive, according to UNAIDS.

What makes females in developing countries so much more vulnerable to contracting HIV than males?

Research by Kelly Austin, associate professor of sociology at Lehigh University in Bethlehem, PA, and her colleagues suggests that droughts are one contributory factor.

Their study found that food insecurity resulting from droughts has a disproportionate effect on females' risk of contracting HIV.

They used a statistical technique called structural equation modeling to explore the relationship between HIV infection rates and socioeconomic and environmental factors — including drought and food insecurity — in 91 developing nations.

According to the researchers, females in these societies have little autonomy and are often responsible for raising children, growing and harvesting food, collecting firewood, and fetching water. This makes them uniquely vulnerable to

droughts and the ensuing food shortages.

The researchers identified four ways in which food insecurity exposes females to a greater risk of contracting HIV:

- Malnutrition, which weakens immune defenses to HIV, and increased vulnerability to other illnesses, such as malaria, may also indirectly increase susceptibility to HIV.

- Exacerbation of gender inequalities in terms of access to education and healthcare, including birth control services, which could protect females against HIV.

- Early marriage of daughters for financial reasons, resulting in exposure to sexually transmitted illnesses at a younger age.

- Financial motivation to become sex workers. "Women in less developed countries disproportionately bear the burden in terms of ill health when facing food insecurity or a shock or disaster like drought that impacts the ability to get food or harvest food," says Austin.

"This information would be useful for policymakers and people working in international development and disaster response." The findings are particularly concerning in light of the climate emergency, say the authors. The Food and Agriculture Organization of the United Nations (FAO) predict that climate change will increase the frequency, severity, and duration of droughts in the coming years.

"During times of drought and hardship special attention should be made to ensuring the safety and participation of young women in schooling, medical care, and other activities that ensure their well-being [...] a holistic approach must be taken that not only emphasizes conventional approaches, [such as] expanding access to medical care, but also prioritizing women's empowerment and environmental resilience and sustainability." A possible limitation of the research was that it relied on structural equation modeling. Some researchers have criticized this technique, which is popular in the social sciences, for creating models that oversimplify highly complex real-world situations. —Online

COVID patients more likely to develop serious brain diseases later in life

- Data from 919,731 people who tested for virus are studied by researchers
- COVID-19 can cause enduring mental health problems
- It can increase risk of developing life-altering brain challenges



Scientists studying the long-term effects of COVID-19 warned that the virus could be linked with an increased risk of Alzheimer's disease and Parkinson's disease.

Multiple pieces of research have shown that COVID-19 has the ability to cause enduring mental health problems and cognitive impacts.

A Danish study disclosed that the virus which has killed many across the globe can increase the risk of developing life-altering brain challenges.

The researchers of the study analysed the data collected from 919,731 people who tested for the virus. Out of those, 43,375 positive patients were 3.5 times likelier to develop Alzheimer's and 2.6 times more likely to get Parkinson's later in life. Even worse, the group was 4.8 times more like to go through a brain bleed. "We found support for an increased risk of being diagnosed with neurodegenerative and cerebrovascular disorders in COVID-19 positive compared to COVID-negative patients, which must be confirmed or refuted by large registry studies in the near future," said Dr Parris Zarifkar, lead author from the Department of Neurology at Rigshospitalet, Copenhagen, Denmark.

According to Eureka Alert, the study was presented at the 8th European Academy of Neurology (EAN) Congress. —AFP