

WHY CATS AND DOGS ARE LESS SUSCEPTIBLE TO OMICRON

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

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Besides the large-scale unrest in Shanghai following the prolonged lockdown of millions of people, several video clips of pets of people infected with SARS-CoV-2 virus being killed by people wearing hazmat suits have gone viral in recent days. This is not the first time that China has killed companion pets of people with confirmed virus infection and even pets of people who were only contacts of people who tested positive. In September and November last year, there were reports of people in hazmat suits entering people's homes and killing their pets without the consent or knowledge of the owners who were in quarantine. With China still clinging on to the Zero COVID strategy, the local governments are taking no chances as there is a perceived fear that pet dogs and cats that are infected could lead to spread of the virus.

But the [results of a small study](#) carried out in Spain and posted in a preprint server *medRxiv*, which is yet to be peer-reviewed, has found that dogs and cats do not easily get infected by the Omicron variant. This despite the owners having had high contact with their pets and the sampling done at the "best time for the detection of the disease". And even when they do get infected, the viral load is less and the shedding of viral RNA lasts for only a brief period. Even the pet dogs and cats that tested positive for Omicron did not show any symptoms. The authors note that there were slim chances of spread from dogs and cats to humans.

The study was carried out on 50 dogs, 28 cats, and one rabbit when the pet owners were in quarantine between December 15, 2021 and March 23, 2022. This period coincided with the highest prevalence of the Omicron variant in Spain. Of the 78 dogs and cats tested for the virus, only seven cats and one dog tested positive for the Omicron variant, which is 10.13% of the total number of pets tested.

Also, the researchers were not able to isolate the Omicron variant virus for any of the pets that tested positive, which the researchers believe is a strong indication of the low viral load. Surprisingly, neutralising antibodies were not detected in any of the pets that tested positive for the virus.

The low susceptibility of dogs and cats to the Omicron variant is in striking contrast to susceptibility to the Alpha and Delta variants and the absence of symptoms in pets that tested positive for the Omicron variant unlike the other two variants.

One reason why dogs and cats show less susceptibility to the Omicron variant could be the low binding ability of the virus with cells. As per a [study published](#) in the *Journal of Genetics and Genomics*, the Omicron variant might have emerged in mice and then spread to humans. The authors from the Chinese Academy of Sciences in Beijing do cite three possible scenarios under which the Omicron variant could have emerged.

The first hypothesis is the evolution and spread in a small population that was neither vaccinated nor tested and genomes sequenced. The second hypothesis is an immunocompromised individual providing a perfect environment for the virus to persist in the host and undergo numerous mutations. The third is the possible origin in mice before jumping to humans.

The researchers from the Chinese Academy of Sciences cite a few reasons to substantiate the possibility of origin in mice. The first is that the spike protein sequence has been under stronger positive selection than in other variants that have emerged in humans. Second, the molecular spectrum of mutations acquired by the progenitor of Omicron is very different from the spectrum for variants that emerged in humans. At the same time, the molecular spectrum of mutations seen in Omicron have a close resemblance to the spectra associated with virus evolution in a mouse cellular environment. Third, mutations seen in the Omicron spike protein “significantly overlapped with SARS-CoV-2 mutations known to promote adaptation to mouse hosts”. Particularly, the mutations that increase the binding affinity of the virus with the cell receptor show a strong overlap.

According to the researchers, based on genetic analysis, the progenitor of Omicron first jumped from humans to mice “most likely in mid-2020” and collected a large number of mutations while spreading within the mouse population for over a year before jumping back to humans in late-2021.

“Collectively, our results suggest that the progenitor of Omicron jumped from humans to mice, rapidly accumulated mutations conducive to infecting that host, then jumped back into humans, indicating an inter-species evolutionary trajectory for the Omicron outbreak,” they write. At the same time, they do state that the possibility of the Omicron variant having emerged in an immunocompromised individual is the “most popular hypothesis regarding the proximal origins of Omicron”.

There is evidence that the SARS-CoV-2 virus had indeed jumped from another species to humans during the course of the pandemic. In late-2020, the virus had jumped from humans to minks in Denmark and spread among minks being reared in farms for fur. The SARS-CoV-2 outbreaks or cases in farmed minks were reported from many countries, particularly in Europe. Later, in the Netherlands, a mutated virus was transmitted back from minks to humans.

More recently, pet hamsters that Hong Kong imported from the Netherlands had likely carried the Delta variant into the country leading to an outbreak in a pet store that led to the spread of the virus to dozens of people. A study posted in *The Lancet* found eight of 16 Syrian hamsters in the pet shop and seven of 12 hamsters in the warehouse tested positive for the Delta variant. All of the 15 hamsters that tested positive for the virus contained a variant of Delta that had not previously been detected in Hong Kong before and might have originated from the same source.

As per the study, the hamsters were infected with the Delta variant around November 21, 2021 and there were two separate transmission events of the Delta variant from hamsters to humans, one leading to onward household spread. This led to culling of over 2,000 hamsters in Hong Kong last year. As of Feb 3, 2022, there were 82 patients in the hamster-related cluster.

Hamsters have been found to be easily infected by the virus. But infections in hamsters were so far limited to labs where the hamsters were intentionally infected. But the Hong Kong experience suggests that hamsters can get infected from humans in a natural environment and then spread from one hamster to another before jumping back to humans.

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