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BRIEF REPORT

Can Human Transmit COVID-19 to Animal?

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ABSTRACT

Coronavirus (COVID-19) has infected more than three million people worldwide and it's widely believed to have originated in horseshoe bats and passed to humans through other species on sale in a wildlife market in Wuhan. First human transmission to dogs has been detected in Hong Kong; which they have caught the novel coronavirus from owners. Other reported cases of cats in Belgium tested positive with COVID-19. Researchers reveal that cats are not only susceptible to contracting coronavirus but can transmit it on other cats as well. Also, a tiger tested positive for COVID-19 after coming into contact with an asymptomatic caretaker. In this report, we provide all cases registered over the world prompting to take a closer look at the human to pet transmission of the virus and to keep measures to prevent exposure. Also, increased transmission of COVID-19 from human to animal can affect the global health security owing to its ability to rapidly spread due to movement of animals. So, we should reevaluate the probability that this outbreak might also be caused by infected pets' hosts. Particular attention must be also paid to the distribution and the evolution of the virus in animals to control the COVID-19 pandemic.

Keywords: coronavirus, COVID-19, pets, dog, cat, human-animal transmission

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INTRODUCTION

Coronaviruses belong to the Coronaviridae family in the Nidovirales order. Corona represents crown-like spikes on the outer surface of the virus; thus, it was named as a coronavirus [1]. These coronavirus were thought to infect only animals until the world witnessed severe acute respiratory syndrome (SARS) in China, in February 2003 [2]. Another Middle East respiratory syndrome coronavirus (MERS-CoV) caused an endemic in 2012 [3], which can infect both humans and animals, and can be transmitted through camels [4,5]. Recently, In late December of 2019, a novel coronavirus disease (COVID-19) was identified in Wuhan City, Hubei Province, China from patients with severe pneumonia [6]. Since then, human cases have been reported by almost all countries around the world and COVID-19 was declared pandemic by the WHO on 11 March 2020 [7]. The first infections were thought to be linked to a live animal market "bats" [8], However, the intermediate source of origin and transfer to humans is not known [1]. Genomic sequences of COVID-19 and SARS-CoV have extremely high homology at the nucleotide level; almost all encoded proteins of COVID-19 are homologous to SARS-CoV proteins [9]. COVID-19 has been found to have high human-to-human transmission through close contact with infected patients, leading to rapid global spread by infected travelers from China [10]. Currently there are no vaccines, hence clinical drugs and therapies for treating SARS (such as chloroquine, lopinavir-ritonavir, remdesivir and convalescent plasma (CP) therapy) may be used as a reference for COVID-19 treatment [9,11,12].

The first case of human-to-animal transmission of COVID-19 was detected in Hong Kong. Two pets thought to have "caught" the novel coronavirus from owners were two dogs. The first dog tested a weak positive for the virus at 28 February 2020 [13]. The dog died in mid-March, though the exact cause of death is not known, as the owner didn't allow an autopsy. A second dog tested positive on 18 March but showed no

symptoms of the disease [14]. On31 March, Agriculture, Fisheries and Conservation Department (AFCD) declared a third animal tested positive in Hong Kong, the current case it's a pet cat from household with person confirmed as infected with COVID-19 [15]. Previously, domestic cats living in the Amoy Gardens apartment block in Hong Kong, where more than 100 residents contracted SARS in the spring of 2003, were also found to be infected with Coronavirus [16]. AFCD emphasized that there is currently no evidence that pet animals can be a source of COVID-19, even if they can test positive for low levels if they catch it from their owners. Furthermore, another domestic cat in Belgium has been infected with COVID-19, the government's Federal Public Service (FPS) Health, Food Chain Safety and Environment announced on 27 March in press conference [17]. About a week after its owner got sick with COVID-19, after returning from a trip to Italy, the cat developed coronavirus symptoms (diarrhea, vomiting and respiratory issues). Genetic tests showed high levels of COVID-19 in samples of vomit and feces, but the cat recovered after 9 days. This is the first human-to-cat transmission of COVID-19.

Moreover, the Centers of diseases Control and Prevention (CDC) confirmed on 27 March that a 4-year-old female tiger at the Bronx Zoo in New York City developed a dry cough and loss of appetite after contact with an asymptomatic caretaker who tested positive for the coronavirus. Few days later, three other tigers and three African lions had developed dry coughs and had decreased appetites but are expected to recover [18]. On 04 April, Two cats from separate households were tested positive. Clinical signs included sneezing and ocular discharge. One cat is from a two-cat household with a known COVID-19 affected person, the other from a household in an affected neighborhood and allowed to go outdoors [19]. CDC is aware of a small number of pets, including cats and dogs, to be infected with COVID-19, mostly after close contact with people infected by COVID-19. Also, the Center has recommended that people with the virus avoid contact with pets and other animals.

Ministry of Agriculture, Nature and Food announced that two mink farms (on 23 and 25 April) in the Netherlands have been put into quarantine after animals were found to be infected with the new coronavirus. The infection in the minks is considered being a case of human to animal transmission [20].

The World Organization for Animal Health (OIE) has announced that there is a possibility for some animals to become infected through close contact with infected humans [19]. However, the OIE has cautioned that there is no evidence of pets transmitting the virus to humans.

According to some studies, domestic and wild carnivores (such as masked palm civets and raccoon dogs) are susceptible to infection with SARSCoV, which were suspected to be intermediate hosts [16, 21-24]. Researchers reveal that SARS-CoV-2 is able to infect cats and were able to transmit infection to other cats. Ferrets appear to be susceptible to infection but appear to be less affected by clinical disease. By contrast, dogs are relatively safe from COVID-19 than ferrets and cats [16, 19, 25]. But the role of animals in the SARS-CoV-2 epidemiology is still largely unknown [24].

Unfortunately, we raise many questions about the infection of animals via Human by coronavirus that need more studies: Could these animals become reservoirs of infection? There is any evidence that human transmitting the virus to animal more in the future?

Finally, there will be an increase transmission of COVID-19 from human to animal next months, which can affect the global health security owing to its ability to rapidly spread due to movement of animals. So, this current situation necessitates more studies, which reevaluate the probability that this outbreak might also be caused by infected pets' hosts. We recommended, that pet owners must adopt a good hygiene practices including hand washing before and after being around or handling animals, and avoid kissing them. If you walk with your pet, remember you should keep distance away from other people at all times (at least 1m). People who infected with COVID-19 should limit contact with companion and other animals until more information is known about the virus.

Currently, several measures are adopted by the authorities of the countries invaded by COVID-19, namely screening for suspicious cases and screening for people in contact with patients suffering from COVID-19. The diagnosis and screening of COVID-19 should be extrapolated to pets and animals that may serve as hosts for the virus.

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