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Correspondence



Monkeypox plays a similar role like SARS-CoV-2; intensive animal screening is crucial after the first human-to-dog transmission report – Correspondence

Dear Editor,

The Monkeypox virus (MPXV) has periodically affected human race since 1967 with recurrent outbreaks. The current 2022 Monkeypox (MPX) outbreak has been reported from 92 non-endemic countries with over 47209 confirmed cases as of August 26, 2022 [1] and the World Health Organisation (WHO) has declared MPX as a public health emergency of international concern [2]. The cases of 2022 MPX were supposedly to originate in the West African clade. There are yet a lot to learn about this zoonotic virus and extensive monitoring of MPX cases, particularly in non-endemic countries, to help better understanding of its transmission from animals to humans [3,4]. Along with monkey, MPXV is thought to reside in rodents like squirrels and rats. Reportedly, wild animals like rodents (rat, squirrel and dormice) and non-human primates (like African gorilla, chimpanzee, marmoset, squirrel monkey) are carriers of MPX virus [5–8]. There are wide ranges of susceptible animals. Transmission of MPX virus in prairie dogs, Gambian rats and hamsters (USA) and in captive primates (Europe) has also been reported [6,9,10]. MPX virus has been isolated from a chipmunk in the DRC in 1985, and from a dead baby mangabey in Côte d'Ivoire in 2012. Due to the high risks of transmitting the disease to humans, the Cane rats (*Thryonomis*), giant pouched rats (*Cricetomys*) and African rope squirrels (*Funisciurus*) need special surveillance [11–13].

Recently, the Lancet reported a confirmed MPX infection in a four-year old Italian male dog for the first time [14]. Reportedly, the dog co-slept with two MPX infected MSM (men who have sex with men) with one patient being HIV positive. Comparison of DNA sequences of both men and dog revealed that they contained the hMPXV-1 virus clade with B.1 lineage, which is currently spreading in non-endemic countries. The virus showed 100% sequence homology in both MSM patients and the dog, suggesting human-to-dog MPXV transmission. Being the only report of human-to-animal transmission of MPXV, it calls for a probe into secondary transmissions via pets. MPX infected humans have been suggested to spread the virus to animals (pets, domestic animals and the wildlife) through close contacts (hugging and kissing). Thus, the MPXV-infected should avoid close contact with pets to prevent the spread [14].

The CDC recommends not to bathe a MPX suspected pet with chemical disinfectants, hydrogen peroxide, or other surface cleaning products, and to take veterinarian advice [15]. An infected person should avoid close contact with animals, and pets should be taken care of by a healthy household member until the infected person fully recovers. After recovery, the house should thoroughly be disinfected before bringing pets back. It is strictly suggested that the immunocompromised, pregnant, young children or one with a history of atopic dermatitis or eczema, should stay away from infected animals as these people are at a greater risk for severity if infected. Use of long sleeves,

long pants, gloves and a well-fitting mask while caring infected animals is also suggested [15].

Vulnerable wild animals' number may diminish or wipe off as a worst consequence of reverse zoonosis, resulting in an area losing its biodiversity and ecological balance. Owing to the animal-type, dependent transmission means and disparity in risk factors, attempts to recognise and eliminate reverse zoonoses through conventional approaches may be unsuccessful. Instead, it may be controlled and/or minimised through state-of-art techniques like Artificial Intelligence [16]. Contemporary technological advances have been suggested to be used to evaluate movement patterns of pet owners during the SARS-CoV-2 pandemic to ascertain their infection contact history and inform them on the risk of SARS-CoV-2 [17].

Owing to the frequent emergence of zoonotic diseases like Monkeypox and Marburg, amid the COVID-19 pandemic, global human health is under extreme pressure [18,19]. SARS-CoV-2, a zoonotic virus that is responsible for the COVID-19 pandemic, allegedly reached humans from bats/pangolins leading to human-human transmission since the last couple of years. Pets, domestic animals and wildlife were shown to become infected by SARS-CoV-2 from humans after a few months, suggesting human-to-animal transmission [20,21]. In a similar manner, another zoonotic virus MPXV is believed to have been passed from animals to humans, leading then to human-human transmission. The actual animal host is yet unknown and its human transmission is debatable and still remains a mystery. A recent Lancet report on human-to-dog transmission that suggested human-animal transmission of MPXV has created tremendous pressure on the healthcare research community. Wild animals, particularly rodents and primates, reportedly are MPXV carriers in endemic countries. Due to contact with other infected animals, MPXV transmission in prairie dogs and captive primates has also been reported. Reports on infection among pets like cats, dogs and cows have been scanty, except the recent one published in the Lancet. This report emphasised the need to isolate pets from MPX-positive individuals and suggested to probe on secondary transmissions via pets [14]. This could also lead to emergence of MPXV variants. The majority of MPX cases diagnosed earlier were observed in rural and tropical forest belts where human-animal interactions were frequent [22]. However, the current 2022 MPX outbreak emerges in almost all regions, it is demonstrably more mutational than anticipated, and spreads more rapidly to humans. The coexistence of COVID-19 and MPX has not been reported, although this possibility may not be ruled out. The combined pathogenesis may be dangerous and more fatal [23]. As keeping in mind the learned lessons from earlier outbreaks, zoonotic diseases are continuously evolving. To limit transmission possibilities, an effective global zoonotic disease surveillance system is highly recommended [24]. Early discovery of disease, epidemiology, transmission

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channels, pathophysiology and prompt response in line with the One Health Approach are highly essential to contain the virus.

Reverse zoonosis that sparked concerns during earlier epidemics like H1N1 and SARS-CoV-2 should give warnings to a MPXV epidemic threat. Healthcare systems need to be vigilant and upgrade their conventional surveillance systems through AI and IoT, thereby enabling creation of an effectively vigilant global surveillance system to safeguard against future pandemics [16]. Deeper evaluation of novel approaches which have been initiated during the SARS-CoV-2 pandemic for their efficacy would probably benefit the monkeypox epidemic fight against a possible outbreak.

Ethical approval

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