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## LETTER

### Potential Threat of Rabies Virus from Bat Bite in Nepal

Yogendra Shah<sup>1,2,\*</sup>, Kishor Pandey<sup>1,3</sup>, Dhan K. Pant<sup>2</sup>, Ajay Poudel<sup>4</sup>, Bimal Dahal<sup>5</sup>, Krishna P. Panta<sup>6</sup> and Basu D. Pandey<sup>1,7</sup>

<sup>1</sup>Everest International Clinic and Research Center, Kathmandu, Nepal

<sup>2</sup>National Zoonoses and Food Hygiene Research Centre, Kathmandu, Nepal

<sup>3</sup>Nepal Academy of Science and Technology, Lalitpur, Nepal

<sup>4</sup>Department of Microbiology, Chitwan Medical College and Teaching Hospital, Bharatpur, Nepal

<sup>5</sup>Kathmandu College of Science and Technology, Kathmandu, Nepal

<sup>6</sup>Department of Microbiology, Far-Western University, Bhimduttanagar, Nepal

<sup>7</sup>Sukraraj Tropical and Infectious Disease Hospital, Teku, Kathmandu, Nepal

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#### Letter to the Editor,

Rabies is a zoonotic viral disease caused by the rabies virus of the genus *Lyssavirus* and family *Rhabdoviridae* [1]. It is one of the neglected zoonotic diseases and remains a major public health concern globally. Rabies is of high risk in developing countries like Nepal [2 - 4]. It is an endemic and priority zoonotic disease in Nepal. It is transmitted through the bite of infected dogs, cats and other domestic animals or wild animals (monkey, mongoose, wolf, fox, raccoon, jackal and bat) to human population [5, 6].

Rabies virus is maintained in two epidemiological cycles: the urban cycle involves domesticated dogs and the sylvatic cycle that involves wild animals [7]. The urban cycle is maintained by the street and community dogs and is the main source of human rabies. The dog population in Kathmandu valley was around 22,300 in 2012 [8]. In countries where dogs are the primary source of infection to humans, vaccination of dogs can help reduce or eliminate the human rabies burden. Vaccines help establish pre-exposure immunity and protect individual animals from contracting rabies, there by preventing further spread to humans or other domestic animals [9].

Bat origin rabies cases are reported mainly in the developed countries like the United States where domestic rabies has been controlled successfully. Countries that are suffering from domestic rabies have not given much attention to sylvatic rabies [10]. According to the Ministry of Health in Nepal, not even a single case of rabies has been reported from the bat bite so far. The previous studies published from Nepal also suggest that no human rabies cases transmitted due to bats are documented in Nepal till date [7, 11]. However, one of the research scientists (physician) working in tropical infectious disease from a reputed hospital in Kathmandu mentioned having experience of a Nepalese who died from rabies virus transmitted through bat bite. (**Personal communication with Dr. Sher Bahadur Pun**). Though we do not have existing evidence of rabies in bats and its transmission to other animals and humans in Nepal, endemic colonies of giant fruit bats (*Pteropus giganteus*) which are known to be reservoirs for multiple zoonotic viruses are found in Kathmandu Valley and other parts of Nepal which warrants research in this area [12].

Although human cases in developing countries have been mostly associated with dog bites, bat species may also be infected by rabies virus [13, 14]. Deforestation has drastically reduced the number of natural prey for bats. The migr-

\* Address correspondence to this author at the Everest International Clinic and Research Center, Kathmandu, Nepal; Tel: +977-9849610127; E-mail: [yogendra90@hotmail.com](mailto:yogendra90@hotmail.com)

ation pattern of bats from rural to urban areas for food supply may also increase potential contact with domestic and wild animal populations and human beings [15]. In some European countries, cats have been considered a high-risk species for rabies transmission to humans due to predatory behavior of flying birds and bats which may connect rabies from the sylvatic-aerial cycle to urban settings. Such scenarios may appear in major urban areas of Nepal but no studied so far [16].

Rabies is a 100% vaccine-preventable disease. Successful elimination of human rabies requires a multisectoral collaborative approach. Prevention of animal rabies, better public awareness and improved access to cost-effective and high-quality human rabies vaccines are essential for the elimination of human rabies [17, 18]. However, Nepal has been facing a number of barriers – technical, intersectoral, organizational and financial. In addition, there has been poor implementation of sylvatic rabies surveillance, dog rabies control campaigns and dog population control programs [17, 18].

The Government of Nepal should take quick and urgent action to prevent the zoonotic rabies virus disease by formulating rabies elimination strategies such as [6]; developing the protocol for identification and characterization of rabies virus at regional, national and international laboratories; identification and control the source of virus entry, enhancing laboratory-based surveillance in domestic and wild animals; increasing the rate of vaccination in animals against rabies; coordinating multi-agency response [19] and expanding public/professional outreach and education guidelines in addition to implementing the strong strategy plan to further reduce zoonotic rabies outbreak in the future. Globally appreciated mechanisms such as One health approach or Ecohealth approach that connects medical, veterinary and environmental scientists within the same umbrella should be used to increase studies related to bat and wild animal-associated rabies in Nepal in order to get it eliminated sooner.

## REFERENCES

- [1] Knobel DL, Cleaveland S, Coleman PG, *et al.* Re-evaluating the burden of rabies in Africa and Asia. *Bull World Health Organ* 2005; 83(5): 360-8.  
[PMID: 15976877]
- [2] Karki S, Thakuri KC. Epidemiological situation of animal rabies and its control strategy in Nepal. *Proceedings of the 9th Conference of Kathmandu. Nepal: Veterinary Association* 2010; pp. 105-10.
- [3] Yousaf MZ, Qasim M, Zia S, Khan Mu, Ashfaq UA, Khan S. Rabies molecular virology, diagnosis, prevention and treatment. *Viro J* 2012; 9: 50.  
[<http://dx.doi.org/10.1186/1743-422X-9-50>] [PMID: 22348291]
- [4] OIE. Animal Health in the World, Rabies Portal; 2018 Available from: [<http://www.oie.int/animal-health-in-the-world/rabies-portal/>]
- [5] Condori-Condori RE, Streicker DG, Cabezas-Sanchez C, Velasco-Villa A. Enzootic and epizootic rabies associated with vampire bats, peru. *Emerg Infect Dis* 2013; 19(9): 1463-9.  
[<http://dx.doi.org/10.3201/eid1909.130083>] [PMID: 23969087]
- [6] Singh R, Singh KP, Cherian S, *et al.* Rabies - epidemiology, pathogenesis, public health concerns and advances in diagnosis and control: A comprehensive review. *Vet Q* 2017; 37(1): 212-51.  
[<http://dx.doi.org/10.1080/01652176.2017.1343516>] [PMID: 28643547]
- [7] Devleeschauwer B, Aryal A, Sharma BK, *et al.* Epidemiology, impact and control of rabies in Nepal: A systematic review. *PLoS Negl Trop Dis* 2016; 10(2): e0004461.  
[<http://dx.doi.org/10.1371/journal.pntd.0004461>] [PMID: 26871689]
- [8] Kakati K. Street Dog Population Survey, Kathmandu 2012. Final Report to the World Society for the Protection of Animals. 2012. Available from: [http://awnnepal.org/pdf/DogSurvey,Kathmandu2012,FinalReport%28April15,2012%29.K.Kakati\\_3.pdf](http://awnnepal.org/pdf/DogSurvey,Kathmandu2012,FinalReport%28April15,2012%29.K.Kakati_3.pdf)
- [9] Berndtsson LT, Nyman AKJ, Rivera E, Klingeborn B. Factors associated with the success of rabies vaccination of dogs in Sweden. *Acta Vet Scand* 2011; 53(22)  
[<http://dx.doi.org/10.1186/1751-0147-53-22>]
- [10] Dato VM, Campagnolo ER, Long J, Rupprecht CE. A systematic review of human bat rabies virus variant cases: Evaluating unprotected physical contact with claws and teeth in support of accurate risk assessments. *PLoS One* 2016; 11(7): e0159443.  
[<http://dx.doi.org/10.1371/journal.pone.0159443>] [PMID: 27459720]
- [11] Pant GR, Lavenir R, Wong FYK, *et al.* Recent emergence and spread of an Arctic-related phylogenetic lineage of rabies virus in Nepal. *PLoS Negl Trop Dis* 2013; 7(11): e2560.  
[<http://dx.doi.org/10.1371/journal.pntd.0002560>] [PMID: 24278494]
- [12] Available from: [https://www2.vetmed.ucdavis.edu/ohi/local\\_resources/pdfs/chapters/7\\_predict\\_information\\_management.pdf](https://www2.vetmed.ucdavis.edu/ohi/local_resources/pdfs/chapters/7_predict_information_management.pdf)
- [13] Sparkes J, Fleming PJS, Ballard G, Scott-Orr H, Durr S, Ward MP. Canine rabies in Australia: A review of preparedness and research needs. *Zoonoses Public Health* 2015; 62(4): 237-53.

- [http://dx.doi.org/10.1111/zph.12142] [PMID: 24934203]
- [14] Cordeiro RA, Duarte NFH, Rolim BN, *et al.* The importance of wild canids in the epidemiology of rabies in Northeast Brazil: a retrospective study. *Zoonoses Public Health* 2016; 63: 486-93.  
[http://dx.doi.org/10.1111/zph.12253]
- [15] Johnson N, Aréchiga-Ceballos N, Aguilar-Setien A. Vampire bat rabies: ecology, epidemiology and control. *Viruses* 2014; 6(5): 1911-28.  
[http://dx.doi.org/10.3390/v6051911] [PMID: 24784570]
- [16] Frymus T, Addie D, Belák S, *et al.* Feline rabies. ABCD guidelines on prevention and management. *J Feline Med Surg* 2009; 11(7): 585-93.  
[http://dx.doi.org/10.1016/j.jfms.2009.05.007] [PMID: 19481038]
- [17] The control of neglected zoonotic diseases. A route to poverty alleviation. Geneva: World Health Organisation 2005.
- [18] Available from: <http://www.who.int/news-room/fact-sheets/detail/rabies>
- [19] Seneschall C, Luna-Farro M. Controlling rabies through a multidisciplinary, public health system in Trujillo, La Libertad, Peru. *Pathog Glob Health* 2013; 107(7): 361-6.  
[http://dx.doi.org/10.1179/204773213Y.0000000123] [PMID: 24392679]

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