

OCCURRENCE OF RABIES IN ANIMALS- A RETROSPECTIVE STUDY IN WAYANAD, KERALA, INDIA

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ABSTRACT

Rabies is zoonotic viral encephalitis targeting the nervous system of several vertebrates and transmitted mostly through the saliva of the infected host causing extensive neurological dysfunction. In this study, 873 post-mortem examinations of different species of animals were done in the Department of Veterinary Pathology, Pookode and 17.64% were diagnosed as rabies positive by using direct fluorescent test (d-FAT). Out of all the rabies positive cases, 76.6% were dogs, 9.1% large ruminants, 8.4% cats and 4.5% goats. In dogs, non-descript dogs were highest followed by Labrador, Pomeranian, German Shepherd, crossbred dogs, Rottweiler, Doberman and Spitz. The male dogs contributed about 69.5% of positive cases. Highest number of cases of rabies in animals were found during the winter season (January to March) comprising 33.76% of all the rabies cases.

Key words: Animals, Breed, India, Rabies occurrence, Season, Species

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INTRODUCTION

Rabies is an important widespread zoonotic viral disease affecting the nervous system of multiple vertebrates and caused by the genotype I of genus *Lyssavirus* belonging to the family *Rhabdoviridae* (Hambolu *et al.*, 2013). The transmission of the disease occurs through the saliva of infected hosts

usually via bites (Hampson *et al.*, 2009). The rabid dogs alone lead to huge economic loss of about 8.6 billion USD annually worldwide. This is also involved in 99% of human rabies cases (WHO) causing annual death of 55,000 people worldwide out of which 25,000-30,000 death reported from India alone (Wunner and Briggs, 2010). Though the transmission of the virus primarily happens through infected saliva (Monroe *et al.*, 2016), other routes such as organ transplants and aerosol transmission are also reported (Bronnert *et al.*, 2007; Davis *et al.*, 2007). Fluorescent antibody test (d-FAT)

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is widely used for accurate and rapid detection of rabies viral antigen in the cerebral tissue of infected animals and is considered as a gold standard test (Servat *et al.*, 2012).

MATERIALS AND METHODS

In the present study, we examined 873 carcasses of different species brought to the Department of Veterinary Pathology, College of Veterinary and Animal Sciences, Pookode in a span of three years (January 2018 to December 2020). The detailed post mortem examinations were done after collecting detailed history and brain samples from suspected animals were subjected to direct fluorescent antibody technique (d-FAT). For d-FAT, the impressions from different parts of the brain were taken on a clean glass slide and kept in chilled acetone for about 30 min followed by incubating the smear with a fluoresce in-labelled monoclonal antibody (Merck, Germany) targeting nucleocapsid protein epitope of the virus diluted in 1% BSA (1:50) at 37°C for about 30 min in a moist chamber. After incubation, the glass slides were subjected to two successive washings in PBS (pH7.2) for 10 min each and mounted by using buffered glycerine and observed under a fluorescent microscope (Zeiss, Progres C5).

RESULTS AND DISCUSSION

A total of 873 post-mortem examinations done in Department of Veterinary Pathology, Pookode over a period of 36 months comprised 232 dogs (26.58%), 182 goats (20.85%), 166 swine (19.01%), 99 cats (11.34%), 84 large ruminants (9.62%),

74 rabbits (8.48%), 27 wild animals (3.09%), five sheep (0.57) and four horses (0.46%) (Fig. 1).

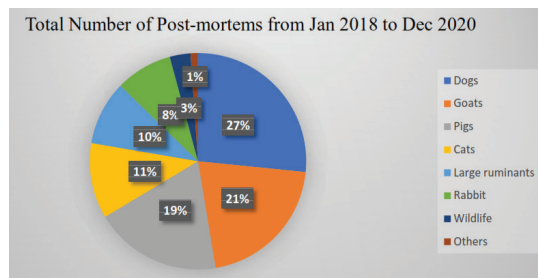


Fig. 1. Distribution of post-mortem examinations during three years

Out of all 873 post-mortems, 154 cases (17.64%) were found positive for rabies by using d-FAT for rabies viral antigen. The highest number of rabies positive cases were found in dogs, comprising 76.62% followed by large ruminants (9.10%) mostly cattle, cats (8.44%) and goats (4.54%). One pig (0.65%) and one rabbit (0.65%) were also found rabies positive during this period. The highest number of rabies positive cases was in the year 2020, (22.91%) followed by the year 2019 (14.61%) and the least in 2018, (14.07%) (Fig. 2). The average number of rabies positive cases for the last three years was 51 (17.64%). These days the public people have increased concern regarding the emerging zoonotic diseases after the recent outbreaks of Nipah virus, avian influenza and corona viruses. Tefera *et al.* (2002) had reported an annual prevalence of rabies cases as 11.35% in Ethiopia for five years and 94% of which comprised of dog cases. In other research work by Singh and Sandhu (2008) in Punjab found that the majority of rabies cases were

of dogs (59.53%) followed by large ruminants (33.94%).

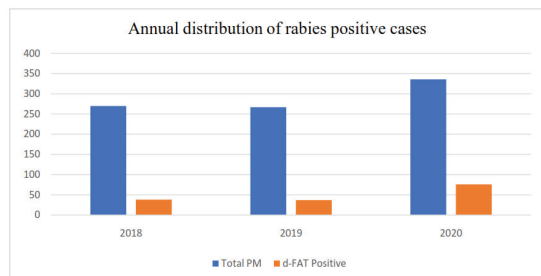


Fig. 2. Annual distribution of rabies positive cases

Dog rabies cases were the highest in 2020 (57n) and the least in the year 2018 (29n) and comprised 76.62% of all rabies cases, out of which male dogs and female dogs comprised 69.5% and 30.5% respectively (Fig.3). Generally dogs, especially male animals are preferred as the best companion animals by all categories of people. Similar results were noticed by Widdowson *et al.* (2002) and Ratsitorahina *et al.* (2009). However, Kasempimolporn *et al.* (2007) and Reta *et al.* (2014) noticed a higher prevalence of rabies in female dogs than that of male dogs in a study conducted in Ethiopia.

With regard to breeds of the animals affected, the non-descript dogs comprised 55% of the rabid dogs followed by Labrador (12.7%), Pomeranian (11.3%), German Shepherd (7.6%), crossbred dogs (5.9%), Rottweiler (3.4%), Doberman (2.5%) and Spitz (1.6%) (Fig. 4). Yale *et al.* (2013) and Sukumar and Lakshmanasami (2016) documented that the non-descript dogs comprised majority of all rabies cases in dogs. Free roaming dogs

play an important role in the dissemination of the disease. Out of 65 non-descript rabid dogs, 34 (52.3%) were free roaming dogs and the rest were either owned or semi-owned dogs. This might be due to a very less chance of prophylactic vaccination in free roaming dogs.

Sex ratio in rabies positive dogs

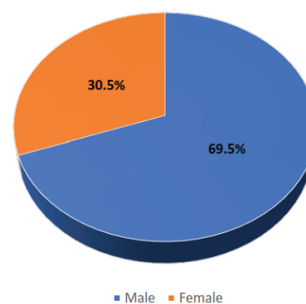


Fig. 3. Gender-wise distribution of rabies cases in dogs

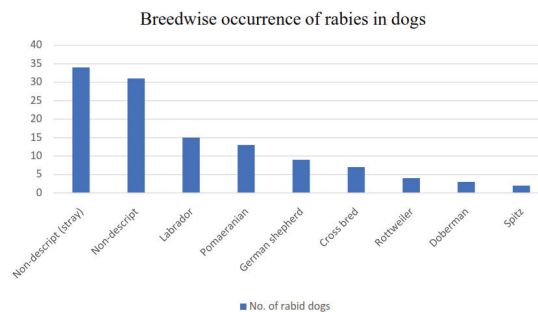


Fig. 4. Breed-wise distribution of rabid dogs

Out of 14 rabies cases in cattle, nine carcasses were brought for complete post mortem examination and the others only the heads were presented. The number of rabies cases in cattle were the highest in the year 2020 (6n) and least in the year 2019 (3n).

Among 14 cases in cattle, 12 were female and the remaining two, the gender was unknown as only the heads were submitted. Singh and Sandhu (2008) found 57% of female buffaloes positive for rabies among 79 tested.

The rabies cases in cats were rather less when compared to dogs and it was the highest in the year 2020 (10n) and least in year 2019. Among 13 rabid cats, nine were male and four were female. The cats were reported second after dogs to transmit rabies in human beings Ichhpujani *et al.* (2008). There were seven cases of rabies in goats and the occurrence was highest in the year 2020 (3n) and in the years 2018 and 2019, there were two cases each. Out of seven rabid goats, six were female goats and one was male. One rabbit and one piglet were also found positive for rabies in this period. Dhand and Ward (2011) reported one per cent occurrence of rabies in goats and pigs each in Bhutan during the study period of 14 years. These farm animals are safely housed in groups and therefore exposure to animal bites is comparatively rare.

The month-wise occurrence of rabies is depicted in Fig. 5. During the study period, the seasonal prevalence of rabies cases was seen highest from January to March (33.76%) and least during July to September (19.48%) in all the three years (Fig. 6). Yale *et al.* (2013) also found greater incidence of rabies cases during February and March which was thought to have an association with the terminal part of the breeding season of dogs. Tefera *et al.* (2002) and Reta *et al.* (2014) also stated the incidence was higher during the breeding season of dogs. This might be due to

the aggressive behavior during the breeding season with a high chance of getting bite and thus transmitting the disease.

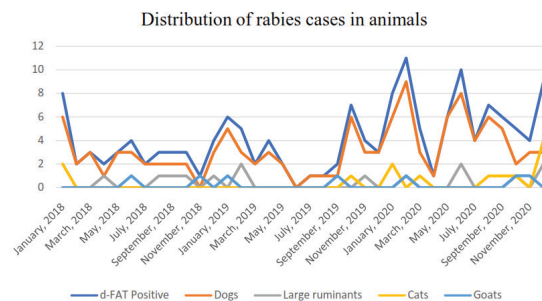


Fig. 5. Month-wise distribution of rabies cases

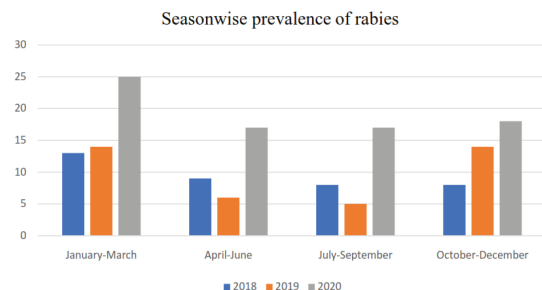


Fig. 6. Season-wise distribution of rabies cases

REFERENCES

- Bronnert, J., Wilde, H., Tepsumethanon, V., Lumlertdacha, B. and Hemachudha, T. (2007). Organ transplantations and rabies transmission. *Journal of travel medicine*, **14**(3): 177-180.
- Davis, A.D., Rudd, R.J. and Bowen, R.A. (2007). Effects of aerosolized

- rabies virus exposure on bats and mice. *The Journal of infectious diseases*, **195**(8): 1144-1150.
- Dhand, N.K. and Ward, M.P. (2011). Patterns of rabies occurrence in Bhutan between 1996 and 2009. *Zoonoses and public health*, **58**(7):463-471.
- Hambolu, S.E., Dzikwi, A.A., Kwaga, J.K., Kazeem, H.M., Umoh, J.U. and Hambolu, D.A. (2013). Rabies and dog bites cases in Lagos state Nigeria: a prevalence and retrospective studies (2006-2011). *Global Journal of Health Science*, **6**(1):107-114.
- Hampson, K., Dushoff, J., Cleaveland, S., Haydon, D.T., Kaare, M., Packer, C. and Dobson, A. (2009). Transmission dynamics and prospects for the elimination of canine rabies. *PLOS Biology*, **10**;7(3):e53. doi: 10.1371/journal.pbio.1000053.
- Ichhpujani, R.L., Mala, C., Veena, M., Singh, J., Bhardwaj, M., Bhattacharya, D., Pattanaik, S.K., Balakrishnan, N., Reddy, A.K., Sampath, G., Gandhi, N., Nagar, S.S. and Shiv, L.(2008). Epidemiology of animal bites and rabies cases in India. A multicentric study. *The Journal of Communicable Diseases*, **40** (1):27-36.
- Kasempimolporn, S., Sichanasai, B., Saengseesom, W., Puempunpanich, S., Chatraporn, S. and Sitprija, V. (2007). Prevalence of rabies virus infection and rabies antibody in stray dogs: a survey in Bangkok, Thailand. *Preventive Veterinary Medicine*, **78** (3-4): 325-332.
- Monroe, B.P., Yager, P., Blanton, J., Birhane, M.G., Wadhwa, A., Orciari, L., Petersen, B. and Wallace, R. (2016). Rabies surveillance in the United States during 2014. *Journal of the American Veterinary Medical Association*, **248** (7): 777-788.
- Ratsitorahina, M., Rasambainarivo, J.H., Raharimanana, S., Rakotonandrasana, H., Andriamiarisoa, M.P., Rakalomanana, F.A. and Richard, V. (2009). Dog ecology and demography in Antananarivo, 2007. *BMC Veterinary Research*, **5**(1): 1-7.
- Reta, T., Teshale, S., Deresa, A., Ali, A., Mengistu, F., Sifer, D. and Freuling, C.M. (2014). Rabies in animals and humans in and around Addis Ababa, the capital city of Ethiopia: A retrospective and questionnaire-based study. *Journal of Veterinary Medicine and Animal Health*, **6**(6): 178-186.
- Servat, A., Picard-Meyer, E., Robardet, E., Muzniece, Z., Must, K., and Cliquet, F. (2012). Evaluation of a rapid immunochromatographic diagnostic test for the detection of rabies from brain material of European mammals. *Biologicals*, **40** (1): 61-66.

- Singh, C.K. and Sandhu, B.S. (2008). Rabies in South Asia: epidemiological investigations and clinical perspective. *Developments in Biologicals*, **131**: 133-136.
- Sukumar, B. and Lakshamananasami, G. (2016). Study on epidemiological trends of canine rabies between 2011 and 2014 in Chennai city, South India. *Indian Journal of Animal Research*. **50** (6): 964-968.
- Tefera, G., Yimer, E. and Geyid, A. (2002). Endemic existence of rabies in Ethiopia. *Ethiopian Medical Journal*. **40** (2):163-170.
- Widdowson, M.A., Morales, G.J., Chaves, S. and McGrane, J. (2002). Epidemiology of urban canine rabies, Santa Cruz, Bolivia, 1972–1997. *Emerging infectious diseases*, **8** (5): 458.
- Wunner, W.H. and Briggs, D.J. (2010). Rabies in the 21st Century. *PLOS Neglected Tropical Diseases*, **4** (3): e591, doi: 10.1371/journal.pntd.0000591
- Yale, G., Ganesan, P.I., Bharathi, M.V., Tirumurugaan, K.G., Thangavelu, A. and Srinivasan, S.R. (2013). A retrospective study of canine rabies incidence in Chennai. *International Journal of Advanced Research*, **1**:821-824.