

Title: EPIDEMIOLOGICAL ASPECTS OF CANINE RABIES BASED ON USER FRIENDLY MONOCLONAL ANTIBODY BASED IMMUNOCHROMATOGRAPHY IN AND AROUND SHIVAMOGGA OF KARNATAKA STATE

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Keywords

Abstract

The present study was carried out to investigate the epidemiological aspects of canine rabies in and around Shivamogga of Karnataka state during two years period from January 2018 to December 2019. A total of 41 dogs presented to Veterinary Clinical Complex, Veterinary College, Shivamogga with a history of having one or more symptoms among salivation, attacking behavior, dropped jaw, choke and recumbency were clinically examined and tentatively diagnosed as rabies. Saliva and or brain samples were collected from these dogs and were subjected to lateral flow assay (immunochromatography) for rabies viral antigen detection (Bionote®, South Korea). Breed wise prevalence revealed highest prevalence in non-descriptive dogs (70.73%). Age-wise prevalence showed highest prevalence in less than one year old dogs (68.3%) when compared to more than one year (31.70%). The seasonal prevalence revealed highest numbers of rabid dogs during North-east monsoon (43.9%) followed by South-West monsoon (26.83%). In all, twenty seven (65.9%) male and 14 (34.10%) female dogs were affected with rabies. Dog bite history was available only in 65.90% of dogs. Thirty nine (95.13%) dogs were not subjected to anti rabies vaccination. Among the affected animals, 53.65 percent of dumb form and 46.35 percent of furious form of rabies were

noticed.

Introduction

Rabies is a disease of ancient times which continues to cause significant mortality. It is progressive and highly fatal viral disease of central nervous system caused by Lyssavirus Type I. Rabies virus (RABV) primarily causes disease in terrestrial mammals, including dogs, wolves, foxes, coyotes, jackals, cats, bobcats, lions, mongooses, skunks, badgers, bats, monkeys and humans, although the majority of lyssavirus species are associated with bats. The dog has been, and still is, the main reservoir of rabies in India (Badraneet al., 2001 and Banyard et al., 2011). The fear of rabies leads the victim to seek post-exposure prophylaxis for getting bitten incidentally on provocation from other animals, such as monkeys, jackals, horses, cattle and rodents. (Ghosh *et al.*, 2006). Worldwide canine rabies accounts for 55,000 deaths annually and India has reported 20,565 deaths from rabies per year projected from the National Multicentric Rabies Survey, conducted in 2004 by the Association for Prevention and Control of Rabies in India in collaboration with the World Health Organization (Sudarshan, 2004). There is no organized surveillance system of human or animal rabies cases as it is not a notifiable disease in India. The actual number of deaths may be much higher than reported. In India, the need post exposure prophylaxis is more since every year 15 million people are bitten by animals, especially dogs. The people of poor or low-income socioeconomic status form the majority of individuals who die of rabies. It is estimated that the dog population is around 25 million in India. Clinical manifestation in affected animal could be either dumb form or furious form. In specific, the symptoms in animal with dumb form of rabies include dropped jaw and hyper salivation with hyperesthesia in some cases whereas, the symptoms in animal with furious form of rabies has biting/attacking tendency with unusual barking, hyper salivation and hyperesthesia. Rabies is usually transmitted through the bite of a rabid animal, where virus is introduced into bite wound through saliva (Bowen Davies and Lowings, 2000). Non-bite exposure includes organ transplantation. This article sets out to define the Epidemiological aspects of Canine Rabies based on user friendly Monoclonal antibody based Immunochromatography in and around Shivamogga of Karnataka State during two years period from January 2018 to December 2019. A major part of Shimoga district lies in the Malnad region or the Sahyadri. Shimoga city is its administrative centre. Shimoga district is a part of the Malnad region of Karnataka and is also known as the 'Gateway to Malnad' or 'Malenaada Hebbagilu' in Kannada. This Malnad region is a biodiversity hotspot with a rich diversity of flora and fauna. The region has protected areas classified as wildlife sanctuaries to ensure the protection of these species.

Material and Methods

Study population

The study population consisted of 41 rabies suspected dogs presented to Veterinary Clinical Complex, Veterinary College, Shivamogga with a history of dog bite in some dogs with one or the other symptoms like hypersalivation, hyperaesthesia, dropped jaw or attacking tendency.

Brain sample collection through foramen magnum

Saliva samples were collected from clinically ailing dogs tentatively diagnosed as rabies. Brain samples were collected from the above dogs from cadavers. A 5 mm drinking straw or a 2 ml disposable plastic pipette is introduced into the occipital foramen in the direction of an eye. Samples can be collected from the rachidian bulb, the base of the cerebellum, hippocampus, cortex, and medulla oblongata. The resulting samples are relatively easily recognized as to the area of brain sampled.

Lateral Flow assay

The Lateral flow assay was performed using the Anigen Rapid Rabies Ag Test Kit of BIONOTE, Korea as per the manufacturer's instructions detailed below.

Protocol

- The brain tissue/saliva was mixed with equal quantity of the assay diluent in a micro centrifuge tube
- The test device was placed on a horizontal surface and four drops of the virus diluent mixture was added to the sample well
- The results were read within 5-10 min
- Presence of two bands in the result window at position "T" (Test sample) and "C" (Control) indicated the presence of virus.

Results and Discussions

In the present study, a total of 41 confirmed rabid dogs were considered. The data which included the details of breed wise, age-wise, seasonal and gender wise prevalence with dog bite and preventive vaccination histories and the clinical form of rabies pertaining to study animals analyzed to know the epidemiological aspects of canine rabies in and around Shivamogga of Karnataka state during two years period from January 2018 to December 2019. Month wise distribution of cases of Rabies presented is shown in the Table 1.

Table 1: Month wise distribuTlon of cases of Rabies presented in 2018 and 2019

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
2018	02	02	02	01	00	00	01	01	02	02	04	03	20
2019	01	01	01	01	01	03	04	01	00	02	03	03	21
Total	03	03	03	02	01	03	05	02	02	04	07	06	41

Breed wise prevalence revealed highest prevalence in non-descriptIve dogs (70.73%, n=29) while in, Labrador, Spitz, Mudhol and German shepherd was found to be 14.63% (n=6), 9.78% (n=4), 2.43% (n=1) and 2.43% (n=1) respectIvely (Figure 1). Similar observaTlon has been explained in studies by (DuTTa *et al.*, 1992; Gunaseelan *et al.*, 2004; Yale *et al.*,2013;and Sukumar and Gunaseelan, 2016). The reason for greater incidence of Rabies in non-descriptIve could be aTTributed to free mobility of owned non-descript dogs thereby more risk of exposure and by the reluctance or ignorance of prophylacTlc rabies vaccinaTlon by the owners for these non-descript dogs.

Age-wise prevalence was more in less than one year old dogs (68.3%) when compared to dogs with more than one year (31.70%) age which is detailed in Fig. 2. This also coincides with the results of Gunaseelan *et al.* (2004); Sukumar and Gunaseelan, 2016 and Karshima *et al.* (2013). According to Narayan, 1985, this could be due to greatest acTIvity during breeding cycles providing greater opportuniTles for rabies transmission in this age group. There could be higher risk of these younger dogs and pups for exposures to dog aTTack and bite. Rabies in this age group may be aTTributed to lack of maternal immunity due to the inability of dog owners to vaccinate their bitches which would have protected the puppies (Karshima *et al.*, 2013).

Fig. 1: Breed wise prevalence of Canine Rabies

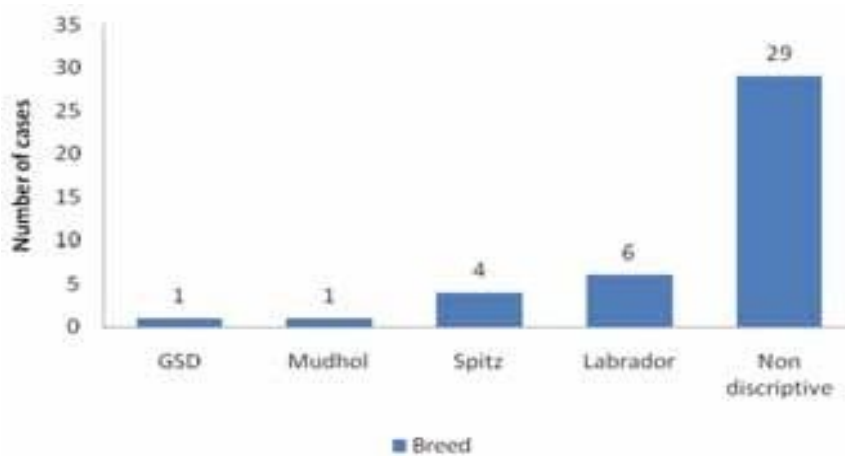
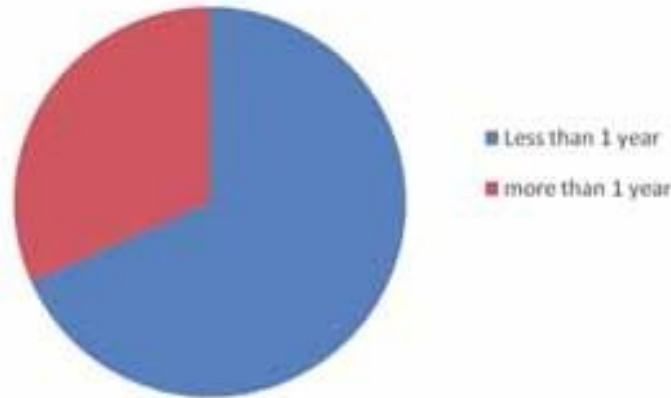


Fig. 2: Age wise prevalence of Canine Rabies



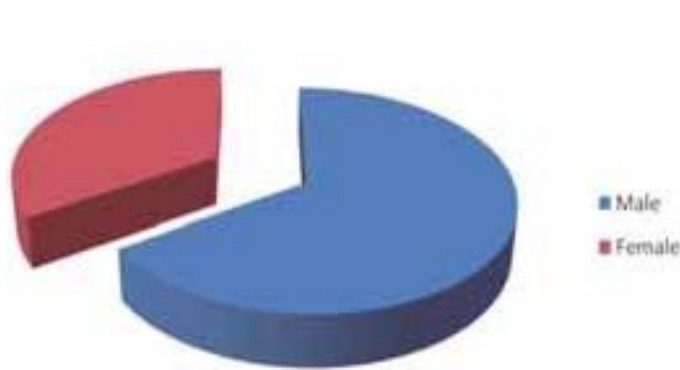
The seasonal prevalence revealed highest numbers of rabid dogs during North-east monsoon (43.9%) followed by South-West monsoon (26.83%), Summer (14.6%) and Winter (14.6%) (Fig. 3). Similar findings were reported by Narayan, 1985. This could also be attributed to more movements and activities of dogs in breeding season as the higher incidence may be determined by dog densities and interaction of the dogs during this period.

Fig. 3: Seasonal occurrence of Canine Rabies



Twenty seven (65.9%) male and 14 (34.10%) female dogs were affected with Rabies as shown in the Fig.4. Similar observations made by Gunaseelan *et al.* (2004) and Yale *et al.* (2013) in Chennai. Males may be having higher risk of exposure of being more attacking and fighting nature

Fig. 4: Gender wise distribution of Canine Rabies



Information on history of dog bite revealed that only 65.90 per cent of affected dogs were bitten by dogs and rest 34.10 per cent of dogs had no history of dog bite (Fig.5). It may be due to the fact that dogs that are kept out doors may be allowed to roam freely and may not be available for keen observations daily, and this chance is more possible in non-descript dogs. The present study also revealed higher incidence of rabies in non-descript dogs. In addition, other means of exposure other than dog bite may be the possibility and it possesses a difficulty in presumptive diagnosis of rabies.

In the present study, it was found that thirty nine (95.13%) dogs were not undergone preventive vaccination against Rabies (Fig.6) which may be mainly due to the ignorance shown by owners. At the same time, study indicated owned Non-descript dogs attributed to the higher incidence. Hence, educating owners about rabies vaccination is needed because they are closer source of rabies to human than stray dogs as suggested by Sukumar and Gunaseelan (2016).

Among the affected animals, 53.65 percent of dumb form and 46.35 percent of furious form of Rabies were noticed (Fig.7). The higher percentage of dumb forms of rabies poses difficulty in diagnosis of rabies as many owners of these dogs presented their animals with only history of inability to close the mouth, choke in the throat, recumbency, dullness etc. The dumb form also increases the risk of exposure to animal owners and the clinicians which prompts for detailed history, clinical examination and rapid laboratory tests for the early diagnosis of canine rabies.

Fig. 5: History of dog bite among dogs affected with rabies

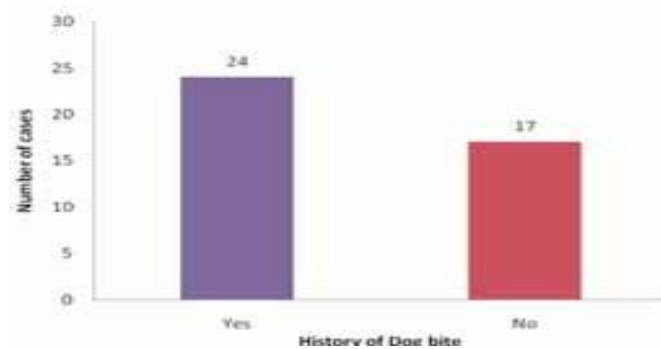


Fig. 6: History of Preventive vaccination in dogs affected with rabies

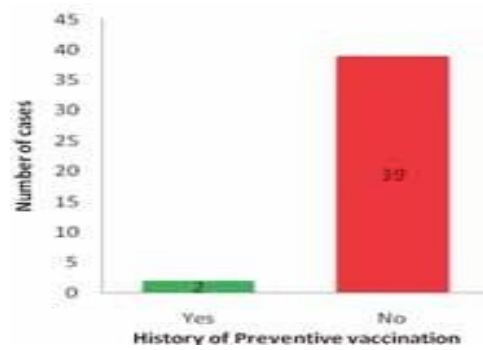
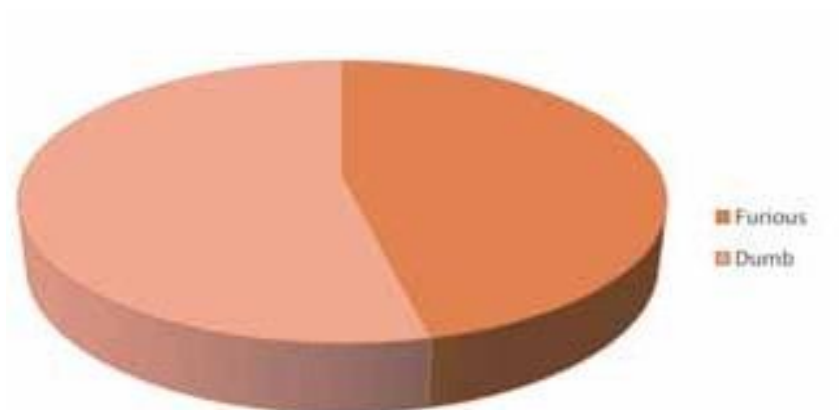


Fig. 7: Dumb form and furious form of rabies in affected dogs



Conclusion

The preliminary screening of brain samples of dogs suspected for rabies using the Monoclonal antibody based Lateral Flow assay / Immunochromatography tool was handy, most user friendly and faster. This enabled the documentation of cases of rabies at the field level and helped to understand the epidemiological aspects related to Breed, age, seasonal occurrence, vaccination and the form of rabies. The majority of the cases were reported in non-descriptive dogs and young dogs indicating the immediate need to undertake mass immunization against rabies in the free ranging , roaming non descriptive dogs and educate the owners on necessity of pre exposure anti rabies vaccination in pets. As dogs are the main reservoir for rabies in India, mass rabies vaccination can avoid the transmission cycle among dogs and other susceptible animals. Awareness is a key component of successful control programme. The need for adherence to local public health recommendations regarding control and vaccination of domestic animals against rabies is important. In this context, implementation of National Action Plan for Rabies Elimination (NAPRE) in the near future in India with special reference to Animal Health component, emphasizing the mass immunization of dogs is timely.

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