

LEPTOSPIROSIS IN DOGS: RETROSPECTIVE STUDY OF NINETEEN CASES FROM THRISSUR DISTRICT

Justin Davis^{1*}, K., Gagana, H.S. and Vinodkumar, K.

¹Assistant Professor, Department of Veterinary Epidemiology and Preventive Medicine, College of Veterinary and Animal Sciences, KVASU, Mannuthy, Thrissur, Kerala.

Received: 21.10.2022; Accepted: 27.11.2022]

{DOI 10.29005/IJCP.2022.14.2.153-157}

Leptospirosis is one of the major zoonotic diseases, endemic in Kerala, caused by different serovars of *Leptospira* spp. A retrospective study describing nineteen clinical cases of dogs presented to University Veterinary Hospitals Mannuthy and Kokkalai, Thrissur District, diagnosed with leptospirosis by Microscopic Agglutination Test (MAT) from July to December, 2018 is presented. Major hematological findings were leucocytosis, anaemia and thrombocytopenia. Serum creatinine levels were elevated in 36.8% of the cases. All the cases were treated with Benzyl penicillin (40,000IU/Kg body weight) along with supportive therapy. Uneventful recovery was noticed in all cases except one, where in still birth and macerated fetus was noticed in a bitch.

Keywords: *Leptospira interrogans*, Serovars, Microscopic Agglutination Test.

Leptospirosis is one of the significant zoonotic diseases caused by bacteria of the genus *Leptospira* that affect many species of animals (Bharti *et al.*, 2003). The organism is shed through the urine of infected animals, which can be transmitted by direct contact or contaminated water or soil where it thrives for weeks or months. The organism when contacted can enter by penetrating the intact skin or through abraded skin surface and mucus membranes. Leptospirosis was found to be an emerging zoonotic disease in India since the 20th century (Himani *et al.*, 2013). Reports of leptospirosis was evident from all over the country especially from the southern states of India, including Kerala (James *et al.*, 2018). Kerala, has been witnessing yearly epidemics of leptospirosis in animals and man for the past few decades which have resulted in substantial loss of human and animal lives (Soman *et al.*, 2014). The disease is caused by different serovars of *Leptospira interrogans* sensu lato to isolated from dogs with clinical signs of leptospirosis (Orr *et al.*, 2022). Without treatment, leptospirosis can lead to kidney damage, meningitis, liver failure, respiratory distress, and even death. Clinical signs range from mild, subclinical

infection to multi-organ failure and death. Leptospirosis can be diagnosed by clinical signs, clinic-pathologic findings, and the microscopic agglutination test (MAT). The purpose of this study was to describe the clinical, pathological and serological findings of infections caused by *Leptospira* serovars among the dogs of Kerala.

Materials and Methods

The study was carried out in Thrissur district of Kerala. Retrospective screening of the medical records of 19 canine cases presented to University Veterinary Hospitals, Mannuthy and Kokkalai, diagnosed with leptospirosis from July to December, 2018 were analyzed. Dogs reported as positive by MAT or by PCR was included in the study. The information extracted from each case sheet included breed, gender, age at diagnosis, clinical signs, physical examination findings, results of leptospiral serology, complete blood cell count (CBC), serum biochemical analyses, abdominal ultrasound, treatment, time to resolution of clinical signs and outcome. In each dog, the serologic titer was measured at 1:400 dilution when clinical signs were present. Occurrence and manifestations of

each serovars, variation in hematological and serological parameters were tabulated. All the dogs were examined for multiple organ involvement by ultrasound scanning (USG) of the abdomen. Spleen and liver were examined by USG and the involvement of kidney was mainly based on serum creatinine levels.

Results

Twenty five dogs were shown to have symptoms specific to Leptospirosis. Upon laboratory testing, 19 dogs were reported to be positive for the infection by MAT or by PCR. Among the positive samples, antibodies against *Leptospira* serovar Canicola was detected in five cases which constituted 26.3% of the sample size, four cases each of serovars Ictero haemorrhagiae and Habdomadis (21.05%), three cases of serovar Pomona (15.78%), and one case each from serovars Autumnalis, Grippytyphosa and Javanica (5.26%). The animals were presented with different clinical symptoms with no specific manifestation in accordance with the serovars.

There out of the five dogs, infected with serovar Canicola showed concurrent manifestations. Case no. 1 was recumbent when presented, the dog was anorectic, febrile (103.3°F), showed nystagmous and tremors. Case no. 2 was presented with myalgia, decreased urination, tarry faeces, scrotal edema and limb edema. Ultrasound scanning of the abdomen revealed hepatomegaly and splenomegaly. The dog was found to be positive for ehrlichiosis by buffy coat smear technique. Case no. 3 was also recumbent when presented, with mild fever and anorexia. Ultrasound scanning of the abdomen revealed hepatomegaly. Serological evaluation revealed increase in creatinine and ALP. Blood smear showed positive for *Babesiagibsoni*, thick blood film revealed substantial infection by microfilarial parasites, the fecal sample also came back positive for *Ancylostoma* spp.

All four cases of leptospirosis with serovar Ictero hemorrhagica showed signs of anorexia, myalgia, vomiting and diarrhea with increased creatinine levels (>1.5mg/dl). One of the dogs with microfilarial infection exhibited tremors was febrile (105°F) with splenomegaly and borderline serum creatinine levels. Out of four cases with habdomadis infection, one recumbent dog with heavy infestation of micrifilaria showed nervous signs and limb edema. The dog also had vomiting, yellow urination and bloody feces. It was noted that two of the dogs had diarrhea while two were constipated. One of the dogs showed blood in urine. All three cases of leptospirosis infected with seovar Pomona did not report gastrointestinal manifestations except one dog with constipation. One of the bitch had miscarriage with macerated fetus. Another dog was recumbent, constipated, had increased serum creatinine and ALP. The case with serovar Grippytyphosa (*L. kirschneri* serovar Grippytyphosa) was having fever (103.4°F), myalgia, anorexia, vomiting and constipation. The dog was found to have splenomegaly, increased serum ALT levels with normal serum creatinine level. The dog infected with serovar Autumnalis was reported to have anorexia, fever, yellowish urination, there was increase in creatinine and ALT levels in serum. The bitch infected with serovar Javanica had history of two consecutive incidents of still birth, showed yellowish vomitus, diarrhoea and anuria. Serum creatinine level was found to be 24.98 mg/dl. For the purpose of comparison, clinical manifestations of dogs diagnosed with the same serovar of *Leptospira interrogans* given with respect to other serovars in the Table-1. Hematological and serum biochemical alterations are depicted in Table-2.

Table-1: CLINICAL SIGNS AND SYMPTOMS OF 19 DOGS WITH LEPTOSPIROSIS TABULATED AGAINST THEIR RESPECTIVE SEROVARS

Clinical manifestation	canicola (n=5)	icterohaemorrhagiae (n=4)	habdomadis (n=4)	pomona (n=3)	grippotyphosa (n=1)	autumnalis (n=1)	javanica (n=1)
Recumbancy (%)	40	25	25	0	100	NR	NR
Anorexia (%)	60	100	25	NR	100	100	NR
Vomiting (%)	20	75	25	NR	100	NR	100
Diarrhoea (%)	20	100	50	NR	0	NR	100
Icterus (%)	40	75	50	0	NR	100	100
Myalgia (%)	20	50	NR	NR	100	NR	NR
Fever (%)	60	50	25	0	100	100	100
Splenomegaly (%)	20	50	25	0	100	NR	NR
Hepatomegaly (%)	40	NR	0	0	NR	NR	NR

n=number of cases NR= not reported

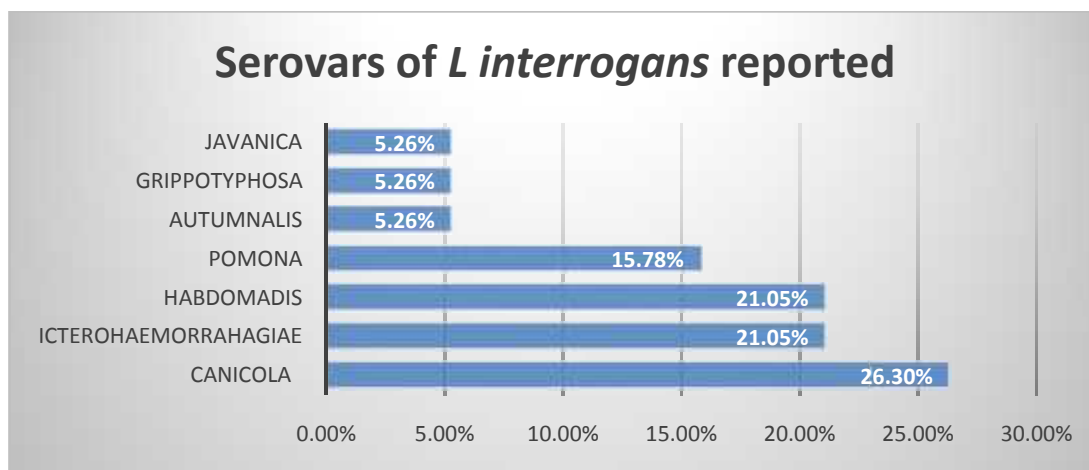
Table-2: HEMATOLOGIC AND SERUM BIOCHEMICAL ABNORMALITIES IN DOGS WITH SEROLOGICALLY CONFIRMED LEPTOSPIROSIS

Hematological and biochemical abnormality	canicola (n=5)	icterohaemorrhagiae (n=4)	habdomadis (n=4)	pomona (n=3)	grippotyphosa (n=1)	autumnalis (n=1)	javanica (n=1)
Anaemia (%)	60	100	100	100	100	NR	100
Leukocytosis (%)	60	100	100	100	100	100	100
Thrombocytopenia (%)	60	25	75	NR	NR	NR	100
Increased creatinine (%)	20	75	25	33.33	NR	100	100
High ALT (%)	20	25	NR	33.33	100	100	100

Major hematological findings among all serovars were leukocytosis, anaemia and thrombocytopenia. Serum creatinine levels were elevated in 36.8% of the cases. All seropositive dog were treated with Benzyl penicillin (40,000IU/Kg body weight)

followed by doxycycline orally for 10 days. All animals were given supportive therapy which consisted of IV fluids, antacids, antiemetics and vitamin B supplements. Clinical improvement was noticed in majority of the cases treated.

Chart1: SEROVARS OF *L INTERROGANS* REPORTED



Discussion

Kerala being an endemic area for leptospirosis, High incidence of canine infections were witnessed when compared to other animals. The most common clinical symptoms reported were fever, myalgia and vomiting. This study aimed at providing a detailed report on clinico-pathological alterations in dogs infected with leptospirosis. Major clinical signs observed were, anorexia, fever, vomiting, diarrhea and icteric mucous membranes. It is found that 52.63% (n=10) cases were presented with anorexia, 36.84% (n=7) with vomiting, 36.84% (n=7) with diarrhea and 26.31% (n=5) of dogs with fever. The leukocytosis (94.73%), anemia (89.47%) and thrombocytopenia (47.36% 9) in dogs with leptospirosis were also in accordance with Geisen *et al.*, 2007.

Microscopic agglutination test of the suspected canine serum samples showed agglutination with Leptospiraserovar Canicola, Icterohaemorrhagiae, Habdomadis, Pomona, Autumnalis, Grippotyphosa and Javanica antigens. Since MAT had been used as the 'gold standard' assay for detection of leptospiral antigens world wide., the serum samples in the study were assessed by MAT alone or in combination with PCR. Dog is being considered as maintenance host for *L interrogans* serovar canicola and incidental host for serovars icterohaemorrhagiae, grippotyphosa, autumnalis and pomona as also recorded by Rentko *et al.*, 1992; all of

which were identified in the canine serum samples in the study. Dog is being considered as maintenance host for *L interrogans* serovar canicola and incidental host for serovars icterohaemorrhagiae, grippotyphosa, autumnalis and pomona. Serovar Canicola was found associated with interstitial nephritis, acute renal failure as also mentioned by Boutilier *et al.*, 2003, with minimum involvement of liver whereas this studies revealed only 20 per cent of the dogs with kidney involvement while 40 per cent of the dogs showed hepatomegaly. Serovar Icterohaemorrhagiae in dog was found to be associated with acute hemorrhagic disease causing high fever, prostration, and death. In less severe cases, it was found associated with liver causing icterus; uremia and hemorrhagic enteritis. But in this study, the serovar was found associated with increased serum creatinine levels which were an indicator of renal damage; there were no detectable manifestations of the liver in all four cases. Serovar Grippotyphosa was found to majorly cause renal failure, but in our study, there was no increase in serum creatinine level in any of the cases. High levels of serum ALT may substantiate. Serovars Boutilier *et al.*, 2003, also reported association of serovar Pomona with renal and hepatic disease which was found in 33.33 per cent of the cases as increase in serum creatinine and ALT levels. Serum Autumnalis was known to cause hepatic involvement as also mentioned by Boutilier *et al.*, 2003, in this study association

was seen in both liver and kidney. Seroprevalence study of canine leptospirosis in the state of Kerala showed incidence of serovars, Autumnalis, Australis, Pomona, Grippotyphosa, Canicola, Pyrogenes, Icterohaemorrhagiae, Javanica, and Patoc in the order of their prevalence in 205 dogs by MAT as have been also reported by Ambily *et al.*, 2013.

Conclusions

Dogs are not the maintenance host for the leptospiraserovars Ictero haemorrhagiae, Habdoadis, Pomona, Autumnalis, Grippotyphosa and Javanica detected in our study. Even though, this is not the first report of sero-prevalence of these serovars, the likelihood of potential zoonoses and antropozoonosis cannot be neglected as the clinical manifestations are similar in all species. It is crucial to look out for incidental infections in other species of animals including human beings who were associated with these dogs.

References

- Ambily, R., Mini, M., Joseph, S., Krishna, S.V. and Abhinay, G. (2013). Canine leptospirosis -a seroprevalence study from Kerala, India. *Vet. World*, **6**(1): 42-44
- Bharti, A.R., Nally, J.E., Ricaldi, J.N., Matthias, M.A., Diaz, M.M., Lovett, M.A., Levett, P.N., Gilman, R.H., Willig, M.R., Gotuzzo, E. and Vinetz, J.M. (2003). Leptospirosis: a zoonotic disease of global importance. *Lancet. Infect. Dis.*, **3**: 757-771.
- Boutillier, P., Carr, A. and Schulman, R.L. (2003). Leptospirosis in dogs: a serologic survey and case series 1996 to 2001. *Vet. Therapeutics*, **4**(4): 387-396.
- Geisen, V., Stengel, C., Brem, S., Müller, W., Greene, C. and Hartmann, K. (2007). Canine leptospirosis infections—clinical signs and outcome with different suspected Leptospirasero groups (42 cases). *J. Small. Anim. Pract.*, **48**(6): 324-328.
- Himani, D., Suman, M.K. and Mane, B.G. (2013). Epidemiology of leptospirosis: an Indian perspective. *J. Foodborne Zoonotic Dis.*, **1**(1): 6-13.
- James, S., Sathian, B., van Teijlingen, E. and Asim, M. (2018). Outbreak of leptospirosis in Kerala. *Nepal J. Epidemiol.*, **8**(4): 745.
- Orr, B., Westman, M.E., Malik, R., Purdie, A., Craig, S.B. and Norris, J.M. (2022). Leptospirosis is an emerging infectious disease of pig-hunting dogs and humans in north Queensland. *PLoS neglected tropical diseases*, **16**(1): e0010100.
- Rentko, V.T., Clark, N., Ross, L.A. and Schelling, S.H. (1992). Canine leptospirosis: a retrospective study of 17 cases. *J. Vet. Intern. Med.*, **6**(4): 235-244.
- Soman, M., Jayaprakasan, V. and Mini, M. (2014). Epidemiological study on human and canine leptospirosis in Central and North Kerala. *Vet. World*. **7**(10): 759-764.