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Seroprevalence of Leptospirosis in Animals in Thrissur District of Kerala

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A B S T R A C T

Leptospirosis is a widespread and fatal zoonotic disease caused by Spirochaetes of the genus *Leptospira.* It constitutes a major public health concern in tropical and subtropical regions. Kerala is endemic for leptospirosis. It almost affects all the domestic and wild mammals as well as human beings causing severe renal and hepatic damage, leading to fatality, if untreated. The present study was conducted to analyse the seroprevalence of leptospirosis in animals in Thrissur district over a period of one year (March 2019 – March, 2020), based on the detection of anti-leptospiral antibodies using Microscopic Agglutination Test (MAT). A total of 205 serum samples (Dog-139, Cat-11, Cattle-29, Goat-26) collected from Teaching Veterinary Clinical Complex, College of Veterinary and Animal Sciences, Mannuthy and University Veterinary Hospital, Kokalai were analysed in the study. Among these samples, 43 were found to be positive (20.97 per cent) with MAT titre of 1:400. The seropositivity in dogs, cattle, goats and cats were 23.02, 20.68, 15.38 and 9.09 per cent, respectively. The most predominantserovar infecting dogs was identified as *Leptospira interrogans* serovar Australis and serovar Autumnalis. Cats and Cattle showed highest prevalence to serovar Sejore while goats showed prevalence to serovar Pomona followed by pyrogenes. From this study, we could conclude that there is a high prevalence of leptospirosis in the animal population in this district. For effective prevention of the disease, one must follow routine vaccination of pets, proper sanitation and waste disposal to control the rodent population that plays a major role in transmission of leptospirosis. The need for a modified vaccine for animals as well as humans including prevalent serovars of *Leptospira* is being highlighted.

Introduction

Leptospirosis is a transmissible disease of animals and humans caused by infection with pathogenic members of the genus *Leptospira*. It is a zoonotic disease with worldwide distribution having high endemicity in Kerala. Rats serve as the primary hosts for transmission, while other mammals including dogs, cats, cattle, sheep and pigs act as

secondary hosts. The disease is of considerable economic importance in livestock due to manifestations like abortion, infertility and decreased production. More than 300 serovars of *Leptospira* have been identified (Picardeau, 2017). It affects almost all the domestic and wild mammals causing severe renal and hepatic damage leading to fatal conditions if untreated. Clinical signs are quite variable. Most cases are probably in apparent and associated with host-adapted serovars such as Canicola in dogs, Bratislava in horses and pigs, Hardjo in cattle and Australis and Pomona in pigs. However, other serovars can also be involved in serious infections. The disease is mainly associated with season and occupation and is highly prevalent in populations with poor sanitary conditions. This, in combination with extreme climatic conditions like heavy rainfall and flood will increase the chances of contact with contaminated environments. The present study deals with seroprevalence of leptospirosis in animals in Thrissur district of Kerala.

Materials and Methods

Sample collection

A total of 205 blood samples were collected from animals suspected of leptospirosis presented to Teaching Veterinary Clinical Complex, Mannuthy during the period from March 2019 to March 2020. The blood samples were collected from dogs (n=139), cats (n=11), cattle (n=29) and goats (n=26). In order to perform MAT, the blood samples for separation of sera were collected in 5 mL clot activator vials. The samples were centrifuged immediately after receipt and the separated sera were stored at -20^{o}C until use.

Microscopic Agglutination Test

Microscopic Agglutination Test was carried out using a battery of 15 live *Leptospira* serovars as described by Faine *et al.,* (1999) and the serovars are Australis, Autumnalis, Bataviae, canicola, Grippotyphosa, Hebdomadis, Icterohaemorrhagiae, Javanica, Pomona, Pyrogenes, Sejroe, Tarassovi, Celledoni, Cynopteri, Patoc.

A 1:400 serum dilution was prepared in PBS, 30 µL of which was taken in 96 well microtiter plates (Tarsons) and mixed with 30 µL of each of the three to four day-old live leptospiral serovars separately.

Antigen controls were set with 30 µL PBS and 30 µL of different live leptospiral serovars and the plates were incubated at 37°C for two to three hours. After incubation, the results were read by examining a drop of serum-antigen mixture from each well under low power objective of a dark field microscope (Carl Zeiss AXIO, USA) to observe 50 per cent agglutination or reduction in number of organisms in comparison to the respective antigen control.

Results and Discussion

Out of 205 samples, antileptospiral antibodies were detected in 43 samples revealing an overall seropositivity of 20.97 per cent, among which 23.02 per cent, 20.68 per cent, 15.38 per cent and 9.09 per cent seroprevalence was recorded in dogs, cattle, goats and cats, respectively. Similar observations were recorded by Patil *et al.,* (2014).

Among the 139 samples collected from dogs when tested using MAT, 32 (23.02per cent) were found positive against the various serovars of *Leptospira i.e., L. interrogans* serovar Australis (21.87 per cent), Autumnalis (18.75 per cent), Pomona (15.63 per cent), Canicola (12.5 per cent), Icterohaemorrhagiae (12.5 per cent), Bataviae (9.38 per cent), Pyrogenes (6.25 per cent) and Grippotyphosa (3.12 per cent). The details are presented in

table 1. Similar observations were recorded by Ambily *et al.,* (2013), who reported Australis and Autumnalis as the predominant serovars affecting dogs in Thrissur district. Chandran (2017) also reported Australis (29 per cent) and Autumnalis (18 per cent) to be the predominantly infecting serovars in canines in Thrissur district. Both these reports are in perfect agreement with the results of the present study. In cats, only one (9.09 per cent) among the eleven serum samples was tested positive in MAT and was having antibodies against the serovar Sejroe, similar to the observations made by Jamshidi *et al.,* (2009).

Out of 29 serum sample collected from cattle and tested using MAT, six (20.68 per cent) were found positive with serovarSejroe (33.33 per cent) and 16.66 per cent each for the serovars Bataviae, Hebdomadis, Javanicaand Pyrogenes (Table 2). Gamage *et al.,* (2011) reported that serovars Sejroe and Hebdomadis were the predominant serovars in cattle, which is in agreement with the present study.

Table.1 Seroprevalence of leptospirosis in dogs by MAT

Sl. No.	Serovars	No. of positive samples	Per cent positivity (%)
1	Australis	7	21.87
2	Autumnalis	6	18.75
3	Pomona	5	15.63
4	Canicola	4	12.5
5	Icterohaemorrhagiae	4	12.5
6	Bataviae	3	9.38
7	Pyrogenes	2	6.25
8	Grippotyphosa	1	3.12
Total		**32**	**100**

Table.2 Seroprevalence of leptospirosis in cattle by MAT

Sl. No.	Serovars	No. of positive samples	Per cent positivity (%)
1	Sejroe	2	33.33
2	Bataviae	1	16.66
3	Hebdomadis	1	16.66
4	Javanica	1	16.66
5	Pyrogenes	1	16.66
Total		**6**	**100**

Table.3 Seroprevalence of leptospirosis in goat by MAT

Sl. No.	Serovars	No. of positive samples	Per cent positivity (%)
1	Canicola	1	25
2	Hebdomadis	1	25
3	Pomona	1	25
4	Pyrogenes	1	25
Total		**4**	**100**

Among the 26 serum samples collected from goats, four (15.38 per cent) were found positive in MAT, with infecting serovarsCanicola, Hebdomadis, Pomona and Pyrogenes - 25 per cent each (Table 3). Dhivahar *et al.*, (2019) also reported a similar result *i.e*., serovar Pomona (23.08 per cent) was observed to be the most predominant one affecting goats.

Hence, the present study could successfully detect leptospiral antibodies in the sera of major domestic and pet animals presented to Teaching Veterinary Clinical Complex, Mannuthy during the period from March 2019 to March 2020, with an overall seroprevalence of 20.97 per cent for a total of 205 serum samples tested. Australis and Autumnalis were found to be the most prevalent serovars in dogs. However, the currently employed canine whole cell inactivated vaccines offering serovar specific immunity incorporates none of these emerging serovars. Hence, vaccinated animals may also be considered equally susceptible as unvaccinated animals. The low seroprevalence among cats may be attributed to the small sample size in the present study. However, similar studies showing different seroprevalence rates and different serovars indicate that cats can be exposed to leptospires and under optimal conditions may spread these organisms in the environment. Not all the animals presented in the study showed clinical signs completely indicative of leptospirosis, especially among cattle and goats. Hence, chances of misdiagnosis are high, particularly of sub-clinically infected animals, also posing a threat to animal and human populations due to their major role in dissemination of infection.

Based on the limited data obtained from the present study, it may be suggested that a more extensive epidemiological study of leptospirosis involving the whole of Kerala has to be conducted owing to the changing predominance of different serovars in the region. The study also stresses on the fact that an effective vaccine for animals as well as humans including prevalent serovars of *Leptospira*or a one with genus specificity still remains as a complicated issue.

References

Ambily, R., Mini, M., Joseph, S., Krishna, S.V. and Abhinay, G. 2013. Canine leptospirosis-a seroprevalence study from Kerala, India. *Vet. Wld*. 6: 42-43.

Burriel, A. R., Dalley, C. and Woodward, M. J. 2003. Prevalence of *Leptospira* species among farmed and domestic animals in Greece. *Vet. Rec*. 5: 146-148.

Chandran, R. A. 2017. Molecular characterization of leptospiral isolates from domestic animals, rats and human beings. *M.V.Sc thesis*, Kerala Veterinary and Animal Sciences University, Pookode, 100 p.

Dhivahar, M., Ambily, R., Joseph, S., Shyma, V. H., Reshma, P. S. and Mini, M.

2019. Seroprevalence of leptospirosis among aborted goats in Kerala. *Int. J. Curr. Microbiol. Appl. Sci*. 8:1403-1407.

Faine, S., Adler, B., Bolin, C. and Perolat, P. 1999. Clinical leptospirosis in humans. In:*Leptospira and Leptospirosis*. (2nd Ed.).Medisci, Melbourne, Australia, pp. 272-277.

Faine, S., Adler, B., Bolin, C. and Perolat, P. 1999. Clinical leptospirosis in humans. In: *Leptospira and Leptospirosis*. (2nd Ed.). Medisci, Melbourne, Australia, pp. 272-277.

Gamage, C. D., Koizumi, N., Muto, M., Nwafor-Okoli, C., Kurukurusuriya, S., Rajapakse, J. R., Kularatne, S. A., Kanda, K., Lee, R. B., Obayashi, Y. and Watanabe, H. 2011. Prevalence and carrier status of leptospirosis in smallholder dairy cattle and peridomestic rodents in Kandy, Sri Lanka. *Vector Borne Zoonotic Dis*.11: 1041-1047.

Jamshidi, S., Akhavizadegan, M. A., Bokaei, S., Maazi, N. and Ghorbanali, A. 2009. Serologic study of feline leptospirosis in Tehran, Iran. *Iranian J. Microbiol*.1: 32-34.

Lilenbaum, W., De Souza, G.N., Ristow, P., Moreira, M.C., Fráguas, S., Cardoso Vda, S. and Oelemann, W.M. 2007.A serological study on *Brucella abortus*, caprine arthritis-encephalitis virus and Leptospira in dairy goats in Rio de Janeiro, Brazil. *Vet. J*. 173: 408-412.

Picardeau, M. 2017. Virulence of the zoonotic agent of leptospirosis: still terra incognita? *Nature Reviews Microbiology*, 15: 297.

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