



E-ISSN: 2320-7078

P-ISSN: 2349-6800

www.entomoljournal.com

JEZS 2021; 9(2): 739-742

© 2021 JEZS

Received: 11-12-2020

Accepted: 02-02-2021

MM Bale

Department of Veterinary
Epidemiology and Preventive
Medicine, KNP College of
Veterinary Science, Shirwal-
Satara, Maharashtra, India

MD Meshram

Department of Veterinary
Epidemiology and Preventive
Medicine, KNP College of
Veterinary Science, Shirwal-
Satara, Maharashtra, India

KP Khillare

Department of Veterinary
Epidemiology and Preventive
Medicine, KNP College of
Veterinary Science, Shirwal-
Satara, Maharashtra, India

VS Dhaygude

Department of Veterinary
Epidemiology and Preventive
Medicine, KNP College of
Veterinary Science, Shirwal-
Satara, Maharashtra, India

PS Vidhate

Department of Veterinary
Epidemiology and Preventive
Medicine, KNP College of
Veterinary Science, Shirwal-
Satara, Maharashtra, India

Corresponding Author:**MM Bale**

Department of Veterinary
Epidemiology and Preventive
Medicine, KNP College of
Veterinary Science, Shirwal-
Satara, Maharashtra, India

Prevalence of leptospirosis in canines of Goa and Pune

MM Bale, MD Meshram, KP Khillare, VS Dhaygude and PS Vidhate

Abstract

Leptospirosis although highly zoonotic, remains one of the majorly neglected disease in dogs as well as humans in India. The present study entitled, "Prevalence of leptospirosis in canines of Goa and Pune" was undertaken to find out the overall seroprevalance of leptospirosis in canines. A total of 100 dogs were included showing clinical signs like anorexia, vomiting, fever, icterus, melena, polyuria, and polydipsia, from Goa and Pune. Leptocheck © WB lateral flow test was used for this study. The overall seroprevalance of leptospirosis in dogs was 28%. Age wise seroprevalance was higher in adults when compared to young dogs. Seroprevalance was higher in males as compared to females. Breed wise prevalence was highest in non-descript breed. This study provided a brief epidemiological understanding of leptospirosis in canines in Goa and Pune.

Keywords: Leptospirosis, canines, seroprevalance, rapid lateral flow kit

1. Introduction

Leptospirosis is a zoonotic disease caused by pathogenic spirochetes of the genus leptospira. Infections are prevalent in wild and domestic animals. Historically, the genus leptospira has been divided into more than 250 serovars belonging to two species *Leptospira interrogans* and *Leptospira biflexa*, containing pathogenic and saprophytic strains respectively. It has recently gained some recognition as a re-emerging infectious disease, in part because of recent large scale outbreaks associated with recreational activities (swimming, farming etc.)⁰⁸ This disease is commonly seen as sequelae of natural disasters causing prolonged flooding, especially in tropical regions. Environmental factors like high pluviometric precipitation rates, flooding, natural disasters, uncontrolled urban expansion and poor sanitation affect transmission. The major source of infection is soil and water contaminated with infected urine¹¹. Synanthropic behaviour of rodents is associated with widespread transmission to humans⁰³. The primary route of infections is direct contact (oral or conjunctival), venereal and placental transfer, bite wounds, and ingestion of infected or contaminated meats. Widespread use of inactivated vaccines containing serovars *L. canicola* and *L. icterohaemorrhagiae* has markedly reduced the incidence of disease attributable to them, use of a bivalent vaccine against serovar *L. canicola* and *L. icterohaemorrhagiae* decreased the incidence of homologous infections with both serovars but infections with other serovars have been reported to cause acute clinical infections in dogs in Europe and the USA. Survival rates of dogs with leptospirosis range from 78-83 percent. The present study aims at getting to know a better epidemiological understanding of leptospirosis in canines in Goa and Pune.

2. Materials and methods**2.1 Study area**

For the present study a total of 100 dogs showing one or more of the following symptoms; viz. fever, lethargy, vomiting, anorexia, melena, icterus, abdominal pain, polyuria and polydipsia were considered, from in and around Goa and Pune. Present research work was carried out at the Central Coastal Agricultural Research Institute, ICAR complex Old Goa and in the Department of Veterinary Epidemiology and Preventive Medicine, Krantisinh Nana Patil College of Veterinary Science, Shirwal, District-Satara.

2.3 Sample collection

Blood samples collected were subjected to ELISA based SNAP test immediately. Blood samples from dogs found seropositive by SNAP test were collected in K3-EDTA vials and

transported to the laboratory on ice. These blood samples were subjected to haematological analysis. The serum samples were also stored at -20 °C and biochemical estimations were carried out.

2.4 Serological test (Rapid Test)

Sandwich immunoassay (Rapid test) was performed by using Leptocheck®-WB kit manufactured by Zephyr Biomedicals, Tulip Diagnostics (P) Ltd. The test was performed as per the protocol outlined in the user manual supplied with the kit.



Fig 1: Shows in sandwich immunoassay (Rapid test) Kit

3. Results

3.1 ELISA based rapid test (Leptocheck® WB)

Serum/ blood samples from total of 100 dogs were tested for seropositivity by ELISA based rapid test (Leptocheck® WB).

Table 3.3: Age wise sero-positivity in canines by rapid test.

Sr. No.	Age group	Total No. of Samples (n=100)	No. of Positive samples (n=28)	Percent Positivity (%)
1	1-3 years	31	7	22.58
2	3-6 years	32	8	25.00
3	6-9 years	26	9	34.61
4	9-12 years	7	4	57.00
5	Above 12 years	4	0	0

Similar results were reported by Ward *et al.* (2002) who reported higher sero-prevalence of leptospirosis in dogs of 4-9 years of age as compared to dogs below one year of age group.

However Iwamoto *et al.* (2009) reported no significant association of age with leptospiral status in dogs. Similarly Rentko *et al.* (1992) also reported no age or breed predilection in their retrospective study.

The present study revealed that age is a significant risk factor for leptospirosis, which is contradictory with the findings of Ghneim *et al.* (2007) study in which it was reported that age is a statistically significant demographic risk factor for

Out of total of 100 samples, 28 serum samples were positive for leptospirosis with an overall sero-prevalence of 28%, by ELISA based rapid test.

Table 3.1: Sero-prevalence of leptospirosis in canines by rapid test

Total no. of Samples	Positive Sample	Negative Sample
100	28	72

The findings of this study were in accordance with Batista *et al.* (2005) in which they reported a seroprevalence of 21.4% in a study conducted in Paraiba, Brazil. Also in a study conducted in Temuco, Chile in stray dogs a seroprevalence of 21.3% was reported by Tuemmers *et al.* (2013) [14].

The results in a study conducted by Patil *et al.* (2014) [9] in dogs of Mumbai were similar to this study, in which they reported a prevalence of 17.5%.

3.2 Area wise sero-prevalence of leptospirosis in canines

A total of 100 blood samples were collected out of which 82 and 18 were from the Goa region and Pune region respectively. Higher seropositivity was observed from Goa (31.7%) as against Pune (11.11%), when subjected to ELISA based rapid test.

Table 3.2: Area wise sero-prevalence of leptospirosis by rapid test

Sr. No.	Area	Total no. of Samples (n=100)	No. of Positive Samples (n=28)	Percent Positivity (%)
1	Goa	82	26	31.70
2	Pune	18	2	11.11

The current study showed results similar to Senthil *et al.* (2013) which reported that 24 out of 42 blood samples were found to be positive for one or more serovars.

3.3 Seroprevalance with respect to age

To know age wise seroprevalance, 5 groups were made. In the age group of 9-12 years seroprevalance was highest (57%) followed by 6-9 years age group as 34.61%, subsequently by 3-6 years age group as 25% and 1-3 years age group as 22.58%, when subjected to ELISA based rapid test Leptocheck® WB. The present study showed that dogs in the adult age group were more affected than younger dogs.

leptospirosis, where cases were approximately 16.5 times more likely to be juvenile (< 1 year) and 11 times more likely to be older than one and three years of age.

Even though this study indicates higher seropositivity in dogs of 9-12 years age group, an exact estimate about the age-wise seropositivity cannot be made as the sample size for all age groups was not similar.

3.4 Seroprevalance with respect to sex of canines

Based on the ELISA based Rapid flow test the seroprevalance in males (27.8%) the seroprevalance was higher as compared to females (24%).

Table 3.4: Sex wise incidence in canines by rapid test

Sr. No.	Sex	Total No. of Samples (n=100)	No. of Positive Samples (n=28)	Percent Positivity (%)
1	Male	54	15	27.8
2	Female	46	11	24

The results of this study were found to be similar to Boutilier *et al.* (2003) which reported a 20-26% prevalence in females while a 20-33% prevalence in males.

Also Stritof Majetic *et al.* (2012) opined that the incidence of leptospirosis in male dogs could be higher as males show the tendency of roaming around more than females and get exposed to the infection.

Similar findings to this study were reported in a study

conducted by Azocar and Monti (2016) ^[1] wherein they reported that males were highly seroprevalent to leptospirosis as compared to females. Also Lopez *et al.* (2019) ^[7] reported similar findings with respect to males showing high seroprevalance when compared to females.

3.5 Breed wise incidence of leptospirosis in dogs

The breed wise seroprevalence was found highest in Non-Descript cross breed as 38.46%, followed by Labrador retriever as 30.76%, Golden retrievers as 20%, subsequently followed by German Shepherd as 18.2%, Rottweiler as 14.3% and Spitz as 10%. Other breeds which were symptomatic but not positive for leptospirosis included Siberian husky, Neopolitan Mastiff, Mudhol Hound, Beagle, Shih-Tzu, Cocker Spaniel, Saint Bernard and Dalmatian.

Table 3.5: Breed wise seroprevalance in canines by rapid test.

Sr. No.	Breed	Total No. of Samples (n=100)	No. of Positive samples (n=28)	Percent Positivity (%)
1	Non- Descript	39	15	38.46
2	Labrador Retriever	26	8	30.76
3	Golden Retriever	5	1	20.1
4	German Shepherd	11	2	18.2
5	Rottweiler	7	1	14.3
6	Spitz	10	1	10

The breed wise sero-prevalence of leptospirosis in dogs observed in this study is in accordance with findings of Senthil *et al.* (2013) ^[12], in which it was recorded higher seroprevalence in Non-descript (26%) followed by small breeds (17%) and large breeds (14.7%). Senthil *et al.* (2013) ^[12] also hypothesized that Non-descript dogs showed the highest incidence of leptospirosis due to more frequent contact with rats Present findings are also in accordance with the findings of Goldstein *et al.* (2006) ^[5] who documented that out of 24 seropositive dogs, twelve were mixed breed, five were German Shepherds, four Doberman Pinschers and three Labrador Retrievers.

The breed at risk for leptospirosis identified in the present study represents the most prevalent breed in South Western Maharashtra, also the other possible reason for its higher risk is that most of the Non-descript dogs are not vaccinated against leptospirosis and they tend to spend more time outside than pure breed dogs.



Results obtained in Leptocheck® WB

Fig 2: Rapid test strip showing positive reactions for IgM class antibody detection in canines by sandwich ELISA. In addition to the control band 'C' another red coloured band can be seen in the test window 'T' indicating positive result.

Breed wise seropositivity for leptospirosis recorded in this study may not be the true estimate as the number of observations per breed was not the same. However, for a more exact estimate about breed wise seropositivity for

leptospirosis the number of observations for all breeds should be similar with a large sample size from different geographical locations.

4. Conclusion

The overall seroprevalence of leptospirosis in dogs was 28%. Higher seropositivity was observed from Goa (31.7%) as against Pune (11.11%), when subjected to ELISA based rapid test. The present study showed that dogs in the adult age group were more affected than younger dogs, higher seroprevalance was seen in adult i.e. 9-12 years of age group (57%) followed by 6-9 years of age group (34.61%). Higher seroprevalance was observed in males (27.8%) as compared to females (24%) in the present study. Breed wise prevalence was highest (38.46%) in the non-descript breed.

5. References

1. Azócar-Aedo L, Monti G. Meta-Analyses of Factors Associated with Leptospirosis in Domestic Dogs. *Zoonoses Public Health*. 2016;63(4):328-36. Doi: 10.1111/zph.12236. Epub 2015 Oct 30. PMID: 26515048.
2. Batista, Carolina, Azevedo, Sérgio, Alves, Clebert *et al.* Seroprevalence of leptospirosis in stray dogs from Patos city, state of Paraíba, Brazil. *Brazilian Journal of Veterinary Research and Animal Science* 2004;41:131-136.
3. Costa F, Hagan JE, Calcagno J, Kane M, Torgerson P, Martinez-Silveira MS *et al.*, Global Morbidity and Mortality of Leptospirosis: A Systematic Review. *PLoS Negl Trop Dis* 2015;9(9):e0003898. Doi: 10.1371/journal.pntd.0003898. PMID: 26379143; PMCID: PMC4574773
4. Ghneim GS, Viers JH, Chomel BB, Kass PH, Descollonges DA, Johnson ML. Use of a case-control study and geographic information systems to determine environmental and demographic risk factors for canine leptospirosis. *Vet Res* 2007;38(1):37-50. Doi: 10.1051/vetres:2006043. Epub 2006 Nov 1. PMID:

- 17074294.
5. Goldstein RE, Lin RC, Langston CE, Scrivani PV, Erb HN, Barr SC. Influence of infecting serogroup on clinical features of leptospirosis in dogs. *J Vet Intern Med.* 2006;20(3):489-94. Doi: 10.1892/0891-6640(2006)20[489:ioisoc]2.0.co;2. PMID: 16734079.
 6. Iwamoto E, Wada Y, Fujisaki Y, Umeki S, Jones MY, Mizuno T *et al.* Nationwide survey of leptospira antibodies in dogs in Japan: results from microscopic agglutination test and enzyme-linked immunosorbent assay. *J Vet Med Sci* 2009;71(9):1191-9. Doi: 10.1292/jvms.71.1191. PMID: 19801899.
 7. López MC, Vila A, Rodón J, Roura X. *Leptospira* seroprevalence in owned dogs from Spain. *Heliyon.* 2019;5(8):e02373. Doi: 10.1016/j.heliyon.2019.e02373. PMID: 31485543; PMCID: PMC6717157.
 8. Monahan AM, Miller IS, Nally JE. Leptospirosis: risks during recreational activities. *J Appl Microbiol* 2009;107(3):707-16. Doi: 10.1111/j.1365-2672.2009.04220.x. Epub 2009 Mar 3. PMID: 19302325.
 9. Patil D, Dahake R, Roy S, Mukherjee S, Chowdhary A, Deshmukh R. Prevalence of leptospirosis among dogs and rodents and their possible role in human leptospirosis from Mumbai, India. *Indian J Med Microbiol.* 2014;32(1):64-7. Doi: 10.4103/0255-0857.124319. PMID: 24399392.
 10. Rentko VT, Clark N, Ross LA, Schelling SH. Canine leptospirosis. A retrospective study of 17 cases. *J Vet Intern Med* 1992;6(4):235-44. Doi: 10.1111/j.1939-1676.1992.tb00345.x. PMID: 1522555.
 11. Schneider MC, Najera P, Pereira MM, Machado G, dos Anjos CB, Rodrigues RO *et al.* Leptospirosis in Rio Grande do Sul, Brazil: An Ecosystem Approach in the Animal-Human Interface. *PLoS Negl Trop Dis.* 2015;9(11):e0004095. Doi: 10.1371/journal.pntd.0004095. PMID: 26562157; PMCID: PMC4643048
 12. Senthil NR, Palanivel KM, Rishikesavan R. Seroprevalence of Leptospiral Antibodies in Canine Population in and Around Namakkal. *J. Vet. Med* 2013, 1-4.
 13. Stritof, Zrinka, Habus, Josipa, Milas, Zoran *et al.* Serological survey of canine leptospirosis in Croatia - The changing epizootiology of the disease. *Veterinarski Arhiv* 2012;82:183-191.
 14. Tuemmers C, Lüders C, Rojas C, Serri M, Espinoza R, Castillo C. Prevalencia de leptospirosis en perros vagos capturados en la ciudad de Temuco [Prevalence of leptospirosis in vague dogs captured in Temuco City]. *Rev Chilena Infectol* 2013;30(3):252-7. Spanish. Doi: 10.4067/S0716-10182013000300003. PMID: 23877776.
 15. Ward MP. Seasonality of canine leptospirosis in the United States and Canada and its association with rainfall. *Prev Vet Med* 2002;56(3):203-13. Doi: 10.1016/s0167-5877(02)00183-6. PMID: 12441236