



SHORT COMMUNICATION

Serosurveillance of Canine Leptospirosis under Different Climatic Conditions in and Around Lahore, Pakistan

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ABSTRACT

Leptospirosis is an important zoonotic problem occurring globally. To study the serosurveillance of canine leptospirosis, 429 dogs (265 males; 164 females) blood samples were collected around Lahore city and its peri-urban areas and processed by using canine *Leptospira* IgG ELISA kit. Of 429 samples, 36.1% were positive serologically for canine leptospirosis. Among 265 male and 164 female dogs, 38.5 and 32.3% male and female dogs were found positive, respectively. Canine leptospirosis was more (38.4%) in adults as compared to pups (27.9%). While season wise serosurveillance was 21.2, 35.8, 40.3 and 49.3% in winter, spring, summer and fall, respectively. It is concluded that highest prevalence of canine leptospirosis is recorded in summer and fall months.

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INTRODUCTION

Leptospirosis is a worldwide zoonotic infection, occurs in subclinical and clinical forms in both animals and humans. In dogs it is caused by pathogenic variants of leptospira which are capable of causing rapidly fatal disease through characterization of fever, vomiting, diarrhea, myalgia and other signs consistent with hepatic and renal insufficiency. Important reservoir of leptospira infection for dogs is rodents which makes the disease difficult to eradicate (Dutta and Christopher, 2005). In humans, Leptospirosis is considered as a job-related disease of persons like veterinarians, pet shop owners, farm workers, abattoir workers, meat handlers, field agricultural workers, slaughterhouse workers, workers in the fishing industry, milkers, sewer workers, coal miners, military troops and plumbers are the major occupational groups that are at high risk (Green-McKenzie and Kulkarni, 2010). Characteristic seasonal pattern of canine leptospirosis have been observed and more number of cases are seen during the summer and fall season (Alton *et al.*, 2009; Sykes *et al.*, 2011).

It continues to be a major clinical presence in canine medicine. In addition to an increase in number of cases more diverse clinical appearance are being accepted, selection of appropriate vaccines and interpretation of

serological results in the presence of vaccine titers are emerging issues in clinical practice. Vaccination of canine leptospirosis was considered successful remedial measure for the control of this disease. Penicillin and doxycycline are very effective and an excellent choice for initial treatment of leptospirosis (Ananda *et al.*, 2008). Keeping in view the importance of this zoonotic disease and dearth of literature regarding its epidemiology, the present project was designed to monitor the serosurveillance of leptospirosis in dogs in Pakistan. The findings of this study would provide the basis for establishing the diagnosis, prevention, and control strategies for leptospirosis in Pakistan.

MATERIALS AND METHODS

The study was carried out through systematic random blood sampling technique from Lahore city and its peri-urban areas. Lahore falls between 31°15'-31°45' north and 74°01'-74°39' east and bounded on the north and west by district Sheikupura, on the east by Wahga border (India) and on the south by District Kasur. The river Ravi flows on the northern side of Lahore. The weather of Lahore is extreme during the months of May, June and July, when the temperatures reaches up to 40-48°C (104-118°F). From June till August, the monsoon seasons starts, with

heavy rainfall throughout the province. Samples from every fifth unvaccinated dog were collected from various private and public pet clinics. The study was conducted during the period of one year from December 2010 to November 2011. Blood was directly approached from cephalic vein in the vacutainer, the samples were collected from the unvaccinated population of dogs hence, a total number of 429 dogs were examined during said period. The collected blood samples were processed at Medicine Laboratory and University Diagnostic Laboratory (UDL), University of Veterinary and Animal Sciences, Lahore by using canine leptospira IgG ELISA Kit (Catalog No. CSB-E17928c). Serosurveillance of canine leptospirosis was calculated as per formula described by Thrusfield (2002).

Statistical analysis: Serosurveillance was analyzed through Chi-square test (χ^2) and to check the strength of association between the age and sex with positive cases of leptospirosis the value of relationship or Coefficient of Association was performed by using statistical package for social sciences (SPSS) version 17.0 (SPSS Inc., Chicago, IL, USA).

RESULTS AND DISCUSSION

Overall serosurveillance: In this study overall 429 dogs (265 males; 164 females) were tested for canine leptospirosis by ELISA Kit and 155 (36.1%) dogs were found positive. Chi-square analysis showed significant difference in month wise serosurveillance of leptospirosis ($\chi^2 = 19.74$). In tropical countries serosurveillance of canine leptospirosis is probably higher owing to the higher temperature and humidity which allows a long time of survival for the leptospira in the environment. Moreover, Lahore is a congested city of Pakistan and high number of free roaming dogs (streets dogs) are there, these dogs can act as maintenance hosts of the agent and support an endemic condition in the study area (Ortega-Pacheco *et al.*, 2007). Therefore, the dogs were considered as a potential risk for public health in major cities. In temperate and tropical climates leptospirosis exists widely. It has become a serious public health threat in both developed and developing countries (Shi *et al.*, 2012). The results of the study indicated nearly similar findings as declared by Jiménez-Coello *et al.* (2008), who studied a total of 400 dogs out of which 140 (35.0%) dogs were serologically found positive for leptospirosis. Similarly, Rad *et al.* (2004) reported 36.9% of positive reaction in farmer's dogs and 31% in urban dogs.

Age and sex wise prevalence: Among 265 males and 164 females dogs in the present study, 102 males (38.5%) and 53 females (32.3%) were serologically positive for canine leptospirosis (Table 1). These results are congruent to the findings of Jiménez-Coello *et al.* (2008) who reported 37% prevalence in males and 31% in females. Rad *et al.* (2004) reported 42.3% of positive reaction in male dogs and 34.4% in female dogs. Incidence of canine leptospirosis was more in male dogs as compared to female dogs. Similar results were also declared by other researchers like Ward *et al.* (2004) who reported that male dogs were significantly at greater risk of leptospirosis than female dogs.

Age wise sero-surveillance of canine leptospirosis were 27.3% in pups (<6 months) and 38.4% in adults (≥ 6 months) as shown in Table 2. Data showed that adults (≥ 6 months) were more frequently infected with canine leptospirosis as compared to pups (<6 months). Rad *et al.* (2004) reported more rate of positive reaction in dogs of more than one year age than dogs of less than one year. Similarly, Ward *et al.* (2004) also declared similar findings that 4 to 6.9 years old dogs were at significantly greater risk than <1 year old. Statistically no significant difference was seen in age-wise ($P=0.06373$) and sex-wise serosurveillance of leptospirosis ($P=0.196$).

Season wise serosurveillance: There was 21.2, 35.8, 40.3 and 49.3% prevalence in winter, spring, summer and fall, respectively as shown in Table 2. In present study canine leptospirosis infection was significantly higher ($P<0.05$) in summer and fall. During the rainy season clinical cases of leptospirosis in dogs may significantly increased while in Pakistan mostly rainfall occurs in summer and fall therefore, leptospirosis was more prevalent in these two seasons. Ward *et al.* (2004) reported that in summer diagnostic laboratory cases were more common whereas in fall the clinical hospital cases of leptospirosis were frequently common. Alton *et al.* (2009) declared that distinct seasonal patterns were correlated with an increased percentage of cases diagnosed from July to December. The control of leptospirosis includes control of rodents, improving hygiene and vaccination. The fact that protection was not achieved sufficiently in the vaccinated dogs due to the prevalence of serovars associated with disease instead of the particular geographical location, which are not included in the battery of serovars in the vaccine (Ward *et al.*, 2004).

Table 1: Age and sex wise serosurveillance of canine leptospirosis

Age	Dogs Examined	Male (n=265)		Female (n=164)		Sero-prevalence	
		No.	%	No.	%	No.	%
Adults (≥ 6 months)	336	81	38.6	48	29.3	129	38.4
Pups (< 6 months)	93	21	07.9	05	3.0	26	27.3
Total	429	102	38.5	53	32.3	155	36.1

Chi-square analysis showed no significant difference in age-wise ($\chi^2 = 3.438$, P -value=0.06373) and sex-wise serosurveillance of leptospirosis ($\chi^2 = 1.673$, P -value=0.196). The strength of association between the ages and leptospirosis showed a 0.23 coefficient of association, showing 23% Association with age. The strength of association between the sexes and leptospirosis showed a 0.13 coefficient of association, showing 13% association with sex of animals.

Conclusion: It was concluded from the results of the present study that the higher prevalence of canine leptospirosis existed during the summer and fall months of the year irrespective to the age and sex of the dogs. It may be recommended that the dogs must be vaccinated before the start of these seasons in the country particularly during the months of May and October and to minimize the public health risk the stray dogs in the city rural and urban areas may be abolished.

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Table 2: Season-wise serosurveillance of leptospirosis in dogs

Season	Dogs tested	Positive samples	Seroprevalence (%)
Winter (November-February)	113	24	21.2
Spring (March- April)	67	24	35.8
Summer (May-August)	176	71	40.3
Fall (September-October)	73	36	49.3
Total	429	155	36.1

Significant difference was observed in season wise serosurveillance of leptospirosis ($\chi^2 = 17.72$, P-Value= 0.0005017). Also checked the relationship by Linear-by- Linear Association between seasons and positivity of cases with leptospira there is more than 60% relationship between them.

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