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

Muhammad Hassan Saleem*, Muhammad Sarwar Khan, Muhammad Arif Khan, Muhammad Athar Khan1, Muhammad Ijaz, Ayesha Hassan and Khalid Mehmood

Department of Clinical Medicine and Surgery; 1Department of Epidemiology and Public Health, University of Veterinary and Animal Sciences Lahore 54000, Punjab, Pakistan

*Corresponding Author: dr_mhs@uvas.edu.pk

ARTICLE HISTORY
Received: April 08, 2012
Revised: July 16, 2012
Accepted: January 11, 2013

Key words:
Canine leptospirosis
Prevalence
Serosurveillance
Temperature

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.

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 leptospiro 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...
Statistical analysis: Serosurveillance was analyzed calculated as per formula described by Thrusfield (2002). E17928c). Serosurveillance of canine leptospirosis was χ² (found positive. Chi-square analysis showed significant leptospirosis by ELISA Kit and 155 (36.1%) dogs were (265 males; 164 females) were tested for canine in both developed and developing countries (Shi et al., 2008). 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 can also act as a threat to public health. Therefore, the dogs 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.

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 (χ² = 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 3: Age and sex wise serosurveillance of canine leptospirosis

<table>
<thead>
<tr>
<th>Age</th>
<th>Dogs Examined</th>
<th>Male (n=265)</th>
<th>Female (n=164)</th>
<th>Seroprevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults (&gt; 6 months)</td>
<td>336</td>
<td>81</td>
<td>38.6</td>
<td>48</td>
</tr>
<tr>
<td>Pups (&lt; 6 months)</td>
<td>93</td>
<td>21</td>
<td>07.9</td>
<td>05</td>
</tr>
<tr>
<td>Total</td>
<td>429</td>
<td>102</td>
<td>38.5</td>
<td>53</td>
</tr>
</tbody>
</table>

Chi-square analysis showed no significant difference in age-wise (χ² = 3.438, P-value=0.06373) and sex- wise serosurveillance of leptospirosis (χ² = 1.673, P-value=0.196). The strength of association between the ages and leptospirosis showed a 0.03 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.

Acknowledgement: This work was completed in partial fulfillment of the requirements for the PhD degree in Clinical Medicine and Surgery at University of Veterinary and Animal Sciences Lahore, Pakistan.
Higher Education Commission (HEC), Islamabad for the financial support to conduct this research.

Table 2: Season-wise serosurveillance of leptospirosis in dogs

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

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.

REFERENCES


