Risk factors and reservoir species for leptospirosis in Sri Lanka

Principal Investigators: Jagath Amarasekera[1], Suneth Agampodi[2] and Mudithamala Kodituwakku[3]
Co-authors: Paba Palihawadana[1], Samitha Ginige[1], Wasu Jayasinghe[1], A. Sivasothy[3], R. Wijesinghe[1], T. Wijayathilaka[3]

[1]Epidemiology Unit of Sri Lanka, Ministry of Health; [2]Department of Community Medicine, Rajarata University of Sri Lanka; [3]Department of Animal Production & Health, Ministry of Livestock and Rural Community Development

Introduction

Sri Lanka is rated as a high incidence country (>10 cases per 100,000 population per year) for human leptospirosis from recent past. In 2008, the largest ever outbreak of leptospirosis occurred in the country with more than 7000 cases reported. Since this time the incidence has remained high, for reasons which are not adequately explained.

The recommended key prevention and control interventions include rodent control and domestic animal vaccination. However, there is a dearth of information about leptospirosis in animals in Sri Lanka upon which to base control policy recommendations.

This study aimed to improve understanding of the epidemiology of common *Leptospira* serovars or serogroups in people and animals in Sri Lanka.

Objectives

- Determine the proportion of people with suspected leptospirosis who are laboratory-confirmed cases.
- Evaluate risk factors associated with suspected and laboratory-confirmed cases of leptospirosis.
- Determine the prevalence of anti-leptospiral MAT antibodies to selected serovars/ serogroups in cattle, buffalo, pigs, dogs, rats and bandicoots.
- Develop hypotheses concerning the epidemiological patterns of human leptospirosis and the mechanisms of exposure of affected people to infection.
- Evaluate associations between serovars and serogroups in human cases and the mammalian species associated with them.
- Formulate recommendations for enhancements to the leptospirosis control policy in Sri Lanka.

Methods

To accomplish these objectives, a sentinel-site-based descriptive study was conducted by enrolling hospital patients with clinically suspected leptospirosis. This was accompanied by cross-sectional serological testing of cattle, swamp buffalo, pigs, dogs and rats associated with the households of case patients.

Patients are recruited from seven selected sentinel sites (selection based on previous incidence of cases) from June 1st onwards with the recruitment process currently continuing. All human patients over 13-years of age, who were clinically suspected to be leptospirosis patients by the treating clinician, were eligible for inclusion.

Figure 1: Training workshop for Infection Control Nursing Officers (ICNO).

Patients were actively enrolled by the Infection Control Nursing Officers (ICNO) in liaison with Medical Officers (MO). Blood samples were collected and a face-to-face, questionnaire interview was conducted to collect information on risk-factors. Patients were recalled two weeks after initial presentation for a case review and the collection of convalescent sera.

Veterinary Investigation Officers (VIO) visited the households of enrolled patients. Blood samples were obtained from up to five animals of each species listed below that were kept by the family: cattle, buffalo, pigs, dogs. Serum samples were also obtained from trapped rodents in ecological environments in each district.

A regionally-optimised Microscopic Agglutination Testing (MAT) panel was used to screen the serum samples for *Leptospirosis* serovars at the Port Blair WHO Collaborating Centre, Andaman Islands.

Patients meeting the requirements for laboratory-confirmation of leptospirosis are designated as "Laboratory confirmed cases" on the basis of the MAT results.

To evaluate risk factors associated with laboratory-confirmed cases of leptospirosis, a logistic regression model is being developed using the conceptual hierarchy of determinants of leptospirosis infection.

Results

The human and animal serum samples were collected up to 30th October, 2013 and were sent to the laboratory for analysis. Descriptive data collected through the questionnaire was analysed. A total of 213 patients were recruited for the study up to the given date and the Interim results described below are for these participants. Laboratory results are pending. Of these patients, household of 95 patients were visited and serum from 295 cattle, 27 buffaloes, 37 dogs and 9 pigs were collected. 253 rodent samples were collected from 6 ecological sites.

Majority of patients (182, 85.4%) were males with females being less affected (31, 14.6%). Most patients were within the middle-aged groups (Fig. 2).

Working in paddy fields appears to have the highest association with over 55% participants having paddy field exposure (Table 1). Other exposures such as rats being abundant in the vicinity (21.1%) and using buffaloes (6.1%) appear to be associated as well. These three exposures are generally associated with paddy cultivation. Animal waste had been handled by 11.7% of participants. The exposures such as assisting with milking, animal birth and home slaughter are around 3–4%.

Discussion

Identifying risk factors and reservoir species for leptospirosis in Sri Lanka is very important for control and prevention of the disease. Association with paddy fields appears to be a strong exposure in suspected patients. This finding is similar to national level sentinel surveillance data. Handling animal waste and other activities related to handling animals also appear to be risk factors in some participants. Patients are predominantly males with middle aged groups being more affected. Preliminary risk factor identification is suggestive of occupational exposure being very important for transmission of Leptospirosis in Sri Lanka.

The laboratory results will help to identify the common serovars responsible for the disease in humans in Sri Lanka and the links to animal reservoirs.

Lessons learned

The research study was conducted with involvement of the Ministry of Health and Ministry of Livestock and Rural Community Development. It was conducted using a One Health approach and it helped to further strengthen the bond and understanding between Human and Animal health sectors. It was also beneficial in understanding the role of animals, occupations and other risk factors in Leptospirosis disease transmission.

The results are of immense benefit for policy makers and personnel who plan Leptospirosis control and preventive activities in Sri Lanka.

Table 1. Exposure to risk factors in the 4 weeks prior to illness for 213 suspected leptospirosis patients in Sri Lanka.

Exposure / Risk factor	No. of participants	Percentage
Worked in paddy field	118	55.4
Rats abundant in vicinity	45	21.1
Handled animal waste	25	11.7
Used buffaloes	13	6.1
Assisted with animal birth	8	3.8
Assisted with milking	7	3.3
Assisted with home slaughter	7	3.3
Handled aborted animal products	3	1.4

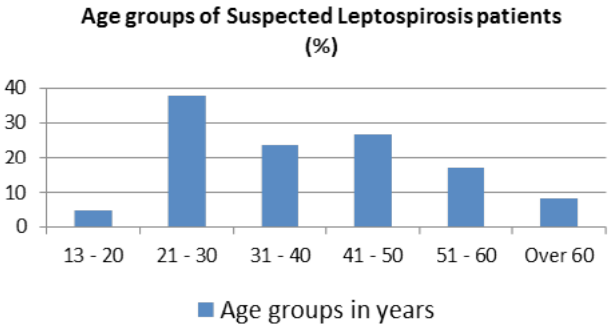

Figure 2. Age distribution of 213 patients with clinically suspected leptospirosis from 7 districts of Sri Lanka.

Recommendations

Developing evidence-based control and preventive strategies for leptospirosis are advised. The One Health approach in conducting research and implementing control and preventive strategies is greatly encouraged. From the development of the project, planning and implementation of research activities, all activities were conducted through One Health approach. It was the key to its success.

Ethics Approval

Ethics approval was granted by Ethical Review Committee of the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka on 2nd January, 2013.

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