

Survey on leptospirosis in the Pacific

Introduction

During the first series of the subregional EpiNet workshops, participants recommended that, "PPHSN should organise a study to determine the epidemiology of leptospirosis in the Pacific Islands, in both the vector and the human population. This study should include a field trial to evaluate rapid tests for the diagnosis of leptospirosis in Level 1 laboratories" (EpiNet Workshop I, Micronesian subregion, Guam, December 2001).

It is in this context that the collaborative research project, "Multi-centre survey on incidence and public health impact of leptospirosis in the Pacific" was developed. This survey is to be conducted in eight countries selected on known or suspected leptospirosis background, based on former published data or recent alerts: Commonwealth of the Northern Mariana Islands (CNMI), Federated States of Micronesia (FSM), Fiji Islands, Guam, New Caledonia, Palau, Vanuatu, and Wallis and Futuna.

Background

Leptospirosis was described a long time ago as an occupational hazard of rice harvesting in China and Japan, and about 100 years ago the major typical syndrome (icteric disease with renal failure) was described by Weil.

Leptospirosis is caused by the *Leptospira* bacteria belonging to the order Spirochaetales, which includes other major pathogens *Treponema* and *Borellia*. *Leptospira* is divided into several species and subspecies, called serogroups and serovars, usually associated with a natural host.

<i>Leptospira</i> serovars	Usual host
<i>icterohaemorrhagiae</i> and <i>ballum</i>	rats
<i>ballum</i>	mice
<i>grippityphosa</i> and <i>hardjo</i>	dairy cattle
<i>pomona</i> and <i>tarassovi</i>	pigs
<i>pomona</i> and <i>hardjo</i>	sheep
<i>canicola</i>	dogs

Leptospirosis is currently an important emerging disease encountered in various situations including large outbreaks after flooding or when participating in trekking or freshwater sports,

Project objectives

- Describe the mode of circulation— endemic or epidemic — of human leptospirosis in various Pacific insular states and territories
- Assess the incidence of leptospirosis in those sites
- Identify the main circulating sero-groups of *Leptospira*, in order to understand the most probable routes of human exposure
- Review different laboratory testing methods and recommend feasible and reliable methods for different levels of laboratories in the Pacific
- Advocate public health significance of leptospirosis among national and international decision makers

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and is at present recognised as a major endemic environmental disease in many tropical and wet countries, including some of the Pacific Island region.

Leptospirosis has been well described in Australia and New Zealand as an occupational disease affecting livestock farmers and slaughterhouse workers [1, 2]. Among the states and insular territories of the region, Hawaii and New Caledonia have published detailed data on the local epidemiology of this disease [3, 4 & 5]. Few, and often old, studies were conducted in other islands like French Polynesia [6], the Marquesas Islands [7] and Vanuatu [8]. Within the framework of the PPHSN, foci of leptospirosis have been more recently described, in particular in Kosrae (Federated States of Micronesia) [9, 10], the Fiji Islands [11], Palau [12], Commonwealth of the Northern Mariana Islands [13] and Guam.

Epidemiology

Leptospira in the environment

Human contamination is due to direct or indirect contact with urine of infected animals. The incidence rate is high when survival of *Leptospira* in the environment is long, which occurs mainly in warm and humid conditions. Peaks are usually seen during summer in temperate countries and during rainy seasons in tropical areas.

Reservoir animals

Chronically infected animals are maintenance hosts. A wide range of animals is concerned, ranging from wild species, mainly rodents, to domestic animals, such as cows or pigs. Chronic asymptomatic renal infection explains *Leptospira* elimination in urine. Some animals with acute infections, such as dogs, may also be punctually responsible for the dissemination of *Leptospira*.

Human contamination

Contamination usually occurs through cuts in the skin. It may also happen through intact skin after prolonged contact with contaminated water. Other routes are conjunctiva, water-borne transmission, inhalation of contaminated aerosol, animal bites etc.

Risk situations and risk groups

Direct contact with infected animals

Farmers, veterinarians and abattoir workers are professionally exposed to *Leptospira*-infected animals such as cattle or pigs. Rodent control and sewer workers come in contact with rodents, mainly rats.

Indirect contact with urine-contaminated surfaces

This situation is important for various professional groups such as miners, soldiers, rice field workers, banana, taro or sugar cane farmers.

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Outdoor leisure activities

Freshwater-related sports are a potential risk in summer and throughout the year in tropical countries where the disease is endemic.

Everyday life

Contamination may result from barefooted gardening or walking in areas where the disease is endemic.

Unusual situations

Outbreaks can occur where infrastructures are disrupted by war or natural disasters.

Clinical features

Following a 2 to 20-day incubation, the symptoms are variable, ranging from a classical flu syndrome to Weil disease which typically leads to major hepatic and renal failures, often leading to death.

Leptospirosis prognosis is sometimes severe and the associated mortality may be high. In addition, not only can there be an excessive delay in giving a presumptive treatment, but clinical as well as biological diagnosis of leptospirosis is difficult. Classical treatment is based on antibiotics such as ampicillin or doxycyclin.

No strong link can be made between clinical presentation and serovars, although *L. icterohaemorrhagiae* seems to be frequently associated with severe forms of the disease.

Lab diagnosis

Basic exams, such as blood counts, C-reactive protein (CRP) and creatinin, can give a good orientation when leptospirosis is suspected. Specific biological tests, including bacteria isolation, DNA testing and serology using the microagglutination test (MAT), still remain limited to highly specialised laboratories. However, recently released rapid serological tests can now help in first-line screening for leptospirosis, although at this stage they must be followed by confirmation using a reference technique.

The current project uses the following laboratory-based strategy: first-line screening with rapid test, second-line confirmation with ELISA test and third-line confirmation and serovar identification with MAT.

Study protocol

Recruitment of patients

Patient recruitment will be done at the peripheral level, using the following case definition.

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The usual presentation of leptospirosis is an acute febrile illness with headache, myalgia and prostration associated with any of the following symptoms:

- conjunctival suffusion
- meningeal irritation
- anuria or oliguria and/or proteinuria
- jaundice
- haemorrhages
- cardiac arrhythmia or failure
- skin rash

This definition covers the multiple clinical and epidemiological features of leptospirosis, and is provided on a standardised form to be filled by the clinician. This form is also used as a laboratory report sheet. For each recruited patient, a blood sample (approximately 5 ml) will be drawn, ideally 6 to 7 days, or later, after the onset of illness.

Laboratory testing

In this study, every participating laboratory known as an L1 laboratory in LabNet will be supplied with a rapid screening test for *Leptospira* IgM antibodies. The selected kit (PANBIO Dip-S-Ticks) requires no sophisticated technical equipment and training and can be performed for a single patient.

Samples, and their respective transmission form, will then be referred to the closest regional confirmation laboratory (known as an L2 lab) for second level confirmatory testing and then to New Caledonia Pasteur Institute for MAT reference testing.

Principal investigator:
Alain Berlioz-Arthaud
Pasteur Institute of New Caledonia
Noumea, New Caledonia

Coordinator:
Tom Kiedrzyński
SPC, Noumea

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