The Epidemiology and Diagnosis of Human Leptospirosis in Malaysia

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Introduction

Malaysia, being in the tropics, has a warm and wet climate, which is conducive to the spread of leptospirosis. As such, there is a high prevalence of the infection in humans and lately, there has been numerous reports of clinical disease. Information and data on various aspects of leptospirosis in wildlife, animals and the environment in Malaysia are well documented but there is paucity of information on the source and the occurrence of the disease in humans, particularly in relation to occupations. The missing picture of the disease is the role of humans in the epidemiology of the infection. Two areas that need research are the survivality of leptospires in the environment and the mode of transmission of the disease to humans. The main objective of this present study is to determine the epidemiology of leptospirosis in humans in Malaysia. Study on the development of a simple screening test for human leptospirosis and a simple technique in the identification of the causal leptopiral serovars will also be investigated. These will help in monitoring any new development in the epidemiology of the disease in humans in the country.

Materials and Methods

Leptospires will be isolated from livestock and wildlife as they are the maintenance hosts and the primary source of infection. Urine samples and kidneys will be obtained and cultured. The isolation technique and facilities for isolation have been established in UPM. Invariably, the environment (soils, waters and others) will be contaminated and samples will be procured and cultured for leptospires. Information on the survivality of leptospires in the environment has not been asessed. Therefore, initially simulated environment based on natural conditions will be organised and the survivality of the leptospires determined. Its survivality, even in animal products such as frozen kidneys will be investigated. Animal models particularly hamsters will be used to determine the ease of transmission from the environment to animals or humans. An ELISA that can detect leptospirosis using a single common antigen will be investigated. BRENDA will be investigated and modified so as to identify leptospiral isolates in a simple and rapid procedure.

Results and Discussion

A retrospective study was done on data obtained from IMR for the last 16 years and initial results indicated a high prevalence of leptospiral infection in the human population in Malaysia. A serological survey was organised on serum samples submitted to hospitals and IMR. From this study, it was found out that ELISA using a genus specific antigen prepared in the laboratory was easy and simple to be use in the diagnosis of leptospiral infection as compared to the MAT. The polymerase chain reaction (PCR) was evaluated and it was found to be a quick method for the diagnosis of leptospiral infection. Both random and specific PCR were applied to reference strains and field isolates. Simulated urine samples were prepared and tested using the specific PCR.

In our serological survey, it was shown that cattle had high prevalence of serovar *hardjo* infection and suspected to excrete large number of leptospires to the environment. It was similarly suspected that rats, which are abundant in our environment, are also excreting leptospires. With this scenario, 6 calves were procured and 4 were infected with serovar *hardjo*. Two of the calves were controls but were allowed to mingle with the infected animals in a bid to detect transmission of the infection. At the same time, hamsters were used as models in place of humans to determine whether infection can be transmitted from the environment (around the calves) to the hamsters. Majority of the hamsters had antibody titres to serovar *hardjo* indicating that the hamsters were infected. This project is still on-going.

The survivality of leptospires in waters and soils was conducted using natural waters and different types of soils set in different climatic conditions. Available results indicated that leptospires can survive for a long time (more than 96 hours) in the environment and be a source of infection. A bacteriological survey on the presence of leptospires in soils from farms and other places showed the presence of leptospires, mainly saprophytes. *Leptospira interrogans* serovar *pyrogenes*, a pathogenic type was isolated from the soils.

Conclusions

With the abundant of rats, domestic animals and stray dogs, humans can easily pick up leptospiral infection from the environment. The Malaysian environment is very conducive for the survival of leptospires and in this project it was shown by animal models that humans could easily pick up the infection when exposed to contaminated environment like farms, streams and forests. A simple genus specific ELISA was developed to diagnose patients suspected to be infected with leptospirosis and a modified BRENDA is being worked to identify leptospires to the serovar level within a short time.

Benefits from the study

Valuable information and data on the epidemiology of leptospirosis obtained will be useful in formulating control and prevention programmes. This will help to reduce the prevalence of the infection in the human population. Diagnosis of the infection will be improved with the development of the

rapid diagnostic technique (ELISA) and the definitive identification technique of the leptospiral serovars through the bacterial restriction endonuclease DNA analysis (BRENDA).]

Literature cited in the text

None.

Project Publications in Refered Journals

None.

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Graduate Research

None.

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