Research Article

Diversity of Leptospira spp. in Rats and Environment from Urban Areas of Sarawak, Malaysia

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Various prevalence studies on Leptospira in animals and humans, as well as environmental samples, had been conducted worldwide, including Malaysia. However, limited studies have been documented on the presence of pathogenic, intermediate, and saprophytic Leptospira in selected animals and environments. This study was therefore conducted to detect Leptospira spp. in rats, soil, and water from urban areas of Sarawak using the polymerase chain reaction (PCR) method. A total of 107 rats, 292 soil samples, and 324 water samples were collected from April 2014 to February 2015. Pathogenic Leptospira was present in 5.6% (6/107) of rats, 11.6% (34/292) of soil samples, and 1.9% (6/324) of water samples. Intermediate Leptospira was present in 2.7% (8/292) of soil samples and 1.9% (6/324) of water samples. Saprophytic Leptospira was present in 10.3% (11/107) of rats, 1.4% (4/292) of soil samples, and 0.3% (1/324) of water samples. From this study, 76 Leptospira spp. were isolated. Based on DNA sequencing, the dominant Leptospira spp. circulating in urban areas of Sarawak are pathogenic Leptospira noguchii, intermediate Leptospira wolffii serovar Khorat, and saprophytic Leptospira meyeri, respectively. Overall, this study provided important surveillance data on the prevalence of Leptospira spp. from rats and the environment, with dominant local serovars in urban areas of Sarawak.

1. Introduction

Leptospirosis is a zoonotic disease with worldwide distribution and caused by pathogenic Leptospira, which results in significant public health problem worldwide [1, 2]. The genus Leptospira consists of 20 species, with more than 300 serovars, grouped into 20 serogroups [3]. Based on the pathogenicity, they can be divided into three major clades, namely, pathogenic, saprophytic (nonpathogenic), and intermediate (unclear pathogenicity) [2]. The pathogenicity status of intermediate Leptospira remains a debate matter. For instance, hamsters inoculated with intermediate L. inadai and L. licerasiae do not cause any clinical manifestation of leptospirosis although both recovered from patients [4].

Humans usually get infected through direct contact with the infected animal urine via mucous membrane and exposed skin or indirect contact by exposure to the contaminated soil, water, and food [5–7]. Normally, maintenance hosts are asymptomatic while accidental hosts like humans may suffer a wide range of clinical manifestation such as renal failure, hepatic failure, severe pulmonary haemorrhage, and even death [8]. The overall case mortality rate in humans ranges from 1 to 5% and the elderly are claimed to have higher infection risk of leptospirosis [9]. Incidence rates are often underestimated because of the relative inaccessibility, lack of rapid diagnostics, and insufficient awareness of leptospirosis [10].

Similar prevalence studies on Leptospira spp. had been conducted in Malaysia in recent years. Leptospira had been isolated from urban rats of Kuala Lumpur [11] as well as soil and water from urban sites in Peninsular Malaysia [12]. The presence of Leptospira spp. was also reported in National Service Training Centres of Peninsular Malaysia [13]. Moreover, Thayaparan et al. [14] reported the presence of Leptospira spp. in wildlife around tourism areas in Sarawak. Our previous study highlighted the presence of Leptospira spp. in national parks [15]. The presence of Leptospira spp. in this area posed the risk of transmission and infection to humans. Since this study on the detection of Leptospira spp. in rats, soil and...