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Epidemiology of Leptospirosis in Humans with Pyrexia of Unknown Origin

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Human leptospirosis, an anthropozoonoses, in India is still being underreported though it has gained extreme public health importance, because of huge livestock and rodent populations and poor sanitary conditions. From 2008 to 2012, about 1730 serum samples from human cases with pyrexia of unknown origin (PUO) from various hospitals in Namakkal district of Tamil Nadu, India were screened by dark ground microscopy (DGM). A positivity of 51.7 % was observed and 85 % of the positive cases manifested a milder anicteric leptospirosis. High positivity was observed in truck drivers (65.8%), age group of <20 years (55.4%), males (54.0%) and north-east monsoon (53.2%), and from the calculated relative risk (RR), a strong positive association could be observed for truck drivers and males with the occurrence of leptospirosis. A prompt epidemiological investigation in susceptible animal population along with an unequivocal diagnosis of positives in humans exposed to the risk factors, in association with the periodical vaccination of susceptible animals and control of rodents, could possibly halt the emergence of the disease.

Key words: Leptospirosis, Humans, DGM, Occurrence, Relative risk.

Leptospirosis, a bacterial zoonotic disease with a worldwide distribution, is caused by spirochetes of the genospecies *Leptospira interrogans* (Guerra, 2009) and the disease has gained extreme public health importance in India, because of huge livestock and rodent populations, poor sanitary conditions and close association between man and animals (Venkatesha and Ramadass, 2001). In Tamil Nadu, an average of about 3000 to 5000 cases of leptospirosis per annum is reported in different districts and the disease has been a common cause of renal illness during monsoons. Transmission occurs by direct contact with urine of infected animal or ingestion of urine contaminated water/food (Mahajan and Chhabra, 2008). *Leptospira* infection results in a wide spectrum of clinical signs ranging from subclinical infection to a severe syndrome of multiorgan dysfunction with a high mortality (Collins, 2006). However, the disease is grossly underreported in India as diagnosis is often challenging due to its protean clinical manifestations in tropical countries and the lack of simple diagnostic measures for early detection and control of the infection (Velineni *et al*., 2007) and the Indian Leptospirosis Society (ILS) also voiced concern on reliable figures on morbidity and mortality due to this occupational disease. Hence, a retrospective study was carried out to assess the prevalence of leptospirosis and the associated risk factors in the epidemiology of the disease.

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MATERIALS AND METHODS

Fresh serum samples from 1730 human cases of different age and occupational groups, and either sex, with PUO or manifesting signs suggestive of leptospirosis were received by the Leptospirosis Laboratory at Department of Veterinary Epidemiology and Preventive Medicine, Veterinary College and Research Institute, Namakkal from various hospitals in and around Namakkal district of Tamil Nadu from June 2008 to May 2012, for early and quick diagnosis of the disease and to differentiate from prevailing diseases like malaria, typhoid and dengue. In addition to this, blood samples were also collected at this laboratory from the patients and examined by Dark ground microscopy (DGM) after differential centrifugation. The DGM has been employed as an useful diagnostic tool to detect the early phase of infection and acute illness (Chandrasekaran and Pankajalakshmi, 1997; Karthikeyan, 2004). This could be used as a direct method to observe leptospires as thin, coiled, rapidly moving microorganisms in serum and could be an useful technique to those with considerable experience in observing leptospires and in situations when antibodies persist for a long period after a past infection (WHO, 2003).

RESULTS AND DISCUSSION

In this retrospective study, a positivity of 51.7 % was observed out of 1730 human cases, however, Karthikeyan (2004) recorded a positivity of 45.8 % in Namakkal. A broad spectrum of signs were observed as fever, chills, headache, myalgia (especially in calf and lumbar areas) and conjunctival suffusion in the first phase (Guerra, 2009), and jaundice, arthralgia, abdominal pain, nausea and vomiting in the second phase as reported by Campagnolo *et al.* (2000). Hence, a milder anicteric form of the disease is diagnosed in approximately 85 % of patients, whereas the severe, icteric form is diagnosed in 15 % of patients which is concurrent to the findings of De Souza (2006).

Leptospires could be demonstrated in 94.97 % of the cases from 1 to 10 days after the onset of clinical signs, 3.91 % of the positives from 10 to 30 days and 1.12 % of the positives from 30 to 90 days. It could presumably be due to the presence of detectable antibody titres appearing in the blood 5–10 days after the onset of disease but sometimes later, especially if antibiotic treatment is instituted (WHO, 2003).

Occupation-specific positivity was observed high in truck drivers with 65.8% in this city which is a hub of transport, though a high number of samples was received from agriculture and allied workers than other groups. This could presumably due to the consumption of unsafe water outdoor as Anderson and Minette (2006) also reported that in more recent years cases had been associated with outdoor. The relative risk (RR) calculated for this occupation (Pfeiffer, 2002) was 1.3 which indicated a strong positive association between this occupational group and the occurrence of leptospirosis. School students, agricultural and animal husbandry workers, and other minor groups (civil and officer workers and households) showed a positivity of 56.2%, 54.8 % and 45.3%, respectively. This concurred with the findings of Demers *et al.* (1983) who reported a prevalence of 30% in city school children, and Sasaki (1993) and Guerra (2009) who stated that the agriculture and contact with domestic animals pose high risk of acquiring leptospirosis.

Age- specific occurrence was high in the age group of <20 years with 55.4 % followed by 21-40, 41-60, and >60 years with 54.37%, 47.8% and 50.0%, respectively and this is in agreement with the findings of Abirami (2008). Here, the RR calculated for <20 years age group was 1.06 indicating a positive association between this age group and the incidence of leptospirosis.

Sex-specific occurrence was higher in the males with 54.0% than in females with 44.1%, as males are being the common working groups. The RR calculated for males was 1.22 indicating a strong positive association between males and the incidence of leptospirosis.

Occurrence was high in the north-east monsoon with 53.2%, followed by south-west monsoon, summer and winter with 52.6%, 48.4% and 41.3%, respectively, since in tropical regions, cases are being reported throughout year but predominantly during the rainy season (Guerra, 2009). The RR calculated for N-E monsoon was 1.07 indicating a positive association between this rainy season and the occurrence of leptospirosis.

CONCLUSION

Leptospirosis could be prevented by directed actions viz. primarily vaccination of livestock and dogs. However, the control of rodents in urban and rural areas in halting the risk of transmission to susceptible hosts from the environment either by direct contact or via drinking water is paramount. Hence, epidemiologists should undergo a prompt investigation and reporting of identified human cases which could identify the risk factors and veterinarians should create awareness among public on zoonotic diseases including risk factors, and prevention and control measures.

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