Review Article

Epidemiological and clinical importance of leptospirosis: Bangladesh perspective

Patwary MI[1], Bari MZJ[2], Islam T[3]

Introduction

Leptospirosis (tightly coiled, thread-like organisms about 5–7 μm in length, which are actively motile) is a zoonotic disease caused by *leptospira* species, which has over 20 serogroups and more than 250 serovars are distributed worldwide. Wild mammals particularly, rodents are the primary reservoir of the infection where as domestic animals such as cattle, dogs and pigs may act as carriers for several months. Leptospirae are excreted in the urine of the animals and they affect men when they comes into contact with urine of infected animals, directly or indirectly or when the person is exposed to an environment contaminated by the urine of the infected animals such as soil and surface water. Leptospires can enter their human hosts through intact skin or mucous membranes but entry is facilitated by cuts and abrasions. It causes severe disease in at least hundreds of thousands of people each year, with fatality rates of up to 30%.[1-4]

Clinical manifestations

Leptospirosis can range from a self-limited febrile syndrome to a fatal illness characterized by hemorrhage, renal failure, and jaundice. The incubation period averages 1–2 weeks.

Four main clinical syndromes can be discerned and clinical features can involve multiple different organ systems i.e.Bacteraemic leptospirosis, aseptic meningitis, Icteric leptospirosis (Weil's disease) and pulmonary syndrome. After a relatively brief bacteraemia, invading organismsare distributed throughout the body (mainly in kidneys, liver, meninges and brain). In tropical settings, leptospirosis can be difficult to differentiate from other febrile illnesses such as scrub typhus, malaria, or dengue.[1-2, 4]

Laboratory diagnosis

During acute phase diagnosis can be performed using methods such as ELISA for the detection of anti-LeptospiraIgM, lateral-flow enzyme immunosorbent assays, or culture of blood, cerebrospinal fluid or urine.

Highly sensitive and specific diagnostic tests based on standard or real-time PCR have also been developed. Immune-phase diagnostics remain reliant on the microscopic agglutination test,which detects the presence of antibodies specific to leptospires using a panel of antigens representing the serogroup orserovars indigenous to the given geographical location.[4-6]

Epidemiological and clinical importance

Leptospirosis remains a major endemic environmental disease in most countries in the Asia Pacific Region and an important public health problem in resource-poor countries.[7]The disease is not well recognized in Bangladesh where diagnostic tests for leptospirosis are not easily available and it remains largely under-reported. However, socioeconomic conditions (urbanization), population density, global climatic and environmental changes such as floods and heavy rainfall, cyclones, humidity, and water contamination, poor sanitation and inadequate waste disposal and behavioral and occupational habits of humans are amenable to spread of the disease in this country.[8-9]

The presence of garbage, waste and sewage encourage the proliferation of rodents and can therefore increase the risk of leptospirosis. Garbage can also block drainage systems and exacerbate flooding risk. Many studies around the world have confirmed that close contact with garbage and sewage are significant risk factors in leptospirosis transmission particularly in urban slums which is particularly applicable for Bangladesh.[7-10]

The increased risk of leptospirosis in South East Asian region particularly Bangladesh during the rainy season becomes higher after flooding that accompanies natural disasters when the human population may be exposed to water contaminated with urine from infected animals. It has been shown that people who are engaged in agriculture and animal husbandry have higher risk of leptospirosis in comparison to other occupations.[10-11]

Though data on leptospirosis in Bangladesh is limited, La Rocque RC reported 18% of dengue-negative febrile patients at two Dhaka hospitals were positive for leptospirosis by PCR in a 2000 dengue outbreak. The case fatality rate among leptospirosis patients (5%) were higher

1. Professsor Dr Md Ismail Patwary, Professor, Department of Medicine, Sylhet Women's Medical College, Sylhet
2. Dr Mohammad Zabed Jillul Bari, Registrar, Department of Medicine, Sylhet MAG Osmani Medical College Hospital, Sylhet
3. Dr Towhidul Islam, MD Resident, Department of Oncology, BSMMU, Dhaka

**For correspondence*

than among dengue fever patients(1.2%).[7,9] In a serosurvey conducted in rural Bangladesh in 1994 revealed high prevalence of anti-leptospiral antibodies among both patients with jaundice and healthy controls.[12,13]

Conclusion

The epidemiology of leptospirosis is complex and varies significantly in different environmental settings and an ecological approach is therefore required to understand disease patterns at local, regional and global levels. Unless interventions to minimize exposure are aggressively implemented, the current global climate change will further aggravate the extent of the disease problem particularly in Bangladesh perspective. More enhanced surveillance and further research is required to understand better the transmission dynamics of leptospirosis and how these can be influenced by climate events, environmental factors, animal reservoirs, and human demographic and social trends.

Ongoing monitoring in the post-disaster phase is essential for assessing the long-term impacts of leptospirosis following flooding and natural disaster. Tools can also be developed to identify trigger factors for outbreaks, develop early warning systems, estimate and predict outbreak frequency and intensity, and identify areas most vulnerable to a high disease burden.

This information could be used by stakeholders in emergency and disaster response to manage risk factors at disaster sites, to improve the timelines of emergency response, to assess the ability of response teams to cope with increasing future demands, to provide an evidence based for planning and allocating disaster management and public health resources and to target interventions aimed at reducing infection risk and the overall burden of disease from leptospirosis.

References

1. Hartskeerl RA, Wagenaar JFP. Leptospirosis. In: Kasper LD, Hauser LS, Jameson LS, Fauci SA, Longo LD, Loscalzo J, editors. Harrison's Principles of Internal Medicine. 19th ed. Philadelphia: McGraw-Hi11 Education; 2015. pp.1140-1145.
2. Dockrell HD, Sundar S, Angus BJ, Hobson RP. Leptospirosis. In: Walker BR, Colledge NR, Ralston SH, Penman ID, editors. Davidson's Principles and Practice of Medicine. 22nd ed. Edinburgh: Churchill Livingstone Elsevier; 2014. pp. 336-338.
3. Tilahun Z, Reta D, Simenew K. Global Epidemiological Overview of Leptospirosis. International Journal of Microbiological Research. 2013; 4 (1): 09-15
4. Leptospirosis-Fact Sheet. World Health Organization.
5. Safiullah SA, Saleh AA, Munwar S. Laboratory Methods for Diagnosing Leptospirosis: A Review. Bangladesh J Med Microbiol. 2009; 03(01): 39-43.
6. Gamage C D, Tamashiro H, Ohnishi M, Koizumi N. Epidemiology, Surveillance and Laboratory Diagnosis of Leptospirosis in the WHO South-East Asia Region. Zoonosis. Vailable from: www.intechopen.com.
7. Victoriano AFB, Smythe LD, Gloriani-Barzaga N, Cavinta LL, Kasai T, Limpakarnjanarat K et al. Leptospirosis in the Asia Pacific region. BMC Infectious Diseases. 2009; 9:147.
8. Kendall E A, Kendall R C, Bui D M, Galloway R, Ari MD, GoswamiDetal. Short Report: Leptospirosis as a Cause of Fever in Urban Bangladesh. Am J Trop Med Hyg. 2010; 82(6): 1127–30.
9. LaRocque RC, Breiman RF, Ari MD, Morey RE, Janan FA, Hayes JM et al. Leptospirosis during dengue outbreak, Bangladesh. Emerg Infect Dis. 2005, 11:766-769.
10 Samad M A. Public health threat caused by zoonotic diseasesin Bangladesh. Bangl J Vet Med. 2011; 9(2): 95-120.
11. Lau CL, Smythe LD, Craig SB, Weinstein P. Climate change, flooding, urbanisation and leptospirosis: fuelling the fire? Transactions of the Royal Society of Tropical Medicine and Hygiene. 2010; 104:631-38.
12. Morshed MG, Konishi H, Terada Y, Arimitsu Y, Nakazawa T: Seroprevalence of leptospirosis in a rural flood prone district of Bangladesh. Epidemiol Infect 1994, 112:527-31.
13. Pappas G, Papadimitriou P, Siozopoulou V, Christou L, Akritidis N. The globalization of leptospirosis: worldwide incidence trends. International Journal of Infectious Diseases. 2008; 12: 351-7.

10 Samad M A. Public health threat caused by zoonotic diseasesin Bangladesh. Bangl J Vet Med. 2011; 9(2): 95-120.
11. Lau CL, Smythe LD, Craig SB, Weinstein P. Climate change, flooding, urbanisation and leptospirosis: fuelling the fire? Transactions of the Royal Society of Tropical Medicine and Hygiene. 2010; 104:631-38.
12. Morshed MG, Konishi H, Terada Y, Arimitsu Y, Nakazawa T: Seroprevalence of leptospirosis in a rural flood prone district of Bangladesh. Epidemiol Infect 1994, 112:527-31.
13. Pappas G, Papadimitriou P, Siozopoulou V, Christou L, Akritidis N. The globalization of leptospirosis: worldwide incidence trends. International Journal of Infectious Diseases. 2008; 12: 351-7.