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Leptospirosis in non-endemic areas in and around Dharwad District

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Abstract

Introduction: Leptospirosis, a zoonotic disease of pathogenic spirochete has gained public health importance in India due to several outbreaks in recent years. The disease is prevalent in Kerala, Tamilnadu, Gujarat, Andamans, Karnataka and Maharashtra. Leptospirosis outbreaks have been reported from 15 districts of Karnataka. Serological testing is the most widely used diagnostic means. IgM ELISA is promising for detection of early leptospirosis.

Objectives: The present study determines the prevalence and clinical profiles of leptospirosis in and around Dharwad district.

Materials and Method: This was a prospective study conducted in patients clinically suspected of leptospirosis from January 2013 to December 2015. Blood samples were tested for positive leptospirosis by IgM ELISA.

Results: A total of 375 samples were tested during the study; of these, 39 samples were tested in 2013 with 16 positives, all hailing from Uttara Kannada. In 2014, 44/125 samples and in 2015, 25/211 samples tested positive for leptospirosis with majority of the patients belonging to adult age group (>12 years age). These cases belonged to non-endemic areas like Haveri, Dharwad and Gadag. Male predominance was noteworthy in 2013 and 2014 unlike in 2015.

Conclusion: Cases of leptospirosis have been detected in non-endemic areas after heavy rainfall and flooding. Increased awareness among physicians regarding early diagnosis of leptospirosis and fever of unknown origin especially after water related natural calamities even in non-endemic regions is of paramount significance which may help in providing better healthcare management of leptospirosis.

Keywords: Fever of unknown origin, Leptospirosis, Natural calamities, Non-endemic areas, Zoonotic disease

Introduction

Leptospirosis is a zoonosis of ubiquitous distribution. The term is used for diseases caused by all leptospira regardless of serotype.(1) Leptospirosis is the result of infection with a spirochete, genus *Leptospira*, which is primarily acquired by exposure to leptospire-contaminated urine from infected animals. Excreted leptospires may survive for days to months in freshwater, soil or mud and result in endemic and epidemic disease in both rural and urban settings.(2) Leptospirosis is an emerging public health problem globally. An international survey conducted by the International Leptospirosis Society reported ≥350,000 cases of severe leptospirosis annually.(3) The World Health Organization (WHO) estimates yearly incidence rates from 1/100,000 endemically, rising to 100/100,000 during outbreaks in tropical climates compared with 0.1–1/100,000 in temperate climates.(4)

Leptospirosis was first reported from the Andaman Islands in 1929 and has since affected all parts of India.(1) Leptospirosis outbreaks have been reported from 15 districts of Karnataka. The highest incidence of cases occurring in Bangalore city, Uttara Kannada, Shimoga, Bidar, Gulbarga, Udupi and Dakshina Kannada districts.(5) Natural disasters and poor sanitary conditions have contributed to the multiple epidemics reported and several outbreaks of the disease have been reported in recent years.(1) In low-income urban neighborhoods, rats are important carrier mammals and excrete the organism in urine. Conditions of poor sanitation, flash flooding and overcrowding may facilitate transmission of the disease. As the cases often present as a nonspecific febrile illness and because no reliable, rapid and readily available diagnostic test exists, many cases go unrecognized.(6) A potentially serious but treatable disease, symptoms of leptospirosis may mimic those of a number of unrelated infections such as influenza, meningitis, hepatitis, dengue or viral haemorrhagic fevers. Due to the protean manifestations of leptospirosis, it is often misdiagnosed and under-reported.(7)

Conventional diagnosis for leptospirosis is by serology; the reference standard diagnostic test is the microscopic agglutination test (MAT).(2) An immunoglobulin M (IgM) enzyme-linked immunosorbent assay (ELISA) is often used as an alternative to MAT in routine diagnostic laboratories. As well as being easier to perform, ELISA can easily accommodate a large number of samples and gives a less subjective result than MAT.(8) The IgM ELISA has been recommended by the World Health Organization (WHO) as a diagnostic test for the serodiagnosis of leptospirosis where healthcare resources are limited.(9)

Using ELISA for IgM detection, the present study was taken up to find out the seroprevalence of this zoonotic disease in and around the geographical area of Dharwad district and to classify the cases based on symptomatology.

Materials and Method

A prospective study was conducted from January 2013 to December 2015 in the Department of

Microbiology at tertiary care centre Karnataka Institute of Medical Sciences, Hubballi, Karnataka which is a laboratory functioning under Integrated Disease Surveillance Programme. Serum samples collected from clinically suspected cases of leptospirosis were subjected to ELISA by Panbio Leptospira IgM ELISA kit (Standard Diagnostics, Republic of Korea). Procedure was followed as per manufacturer's instructions. The data was analyzed using SPSS software version 21.

Results

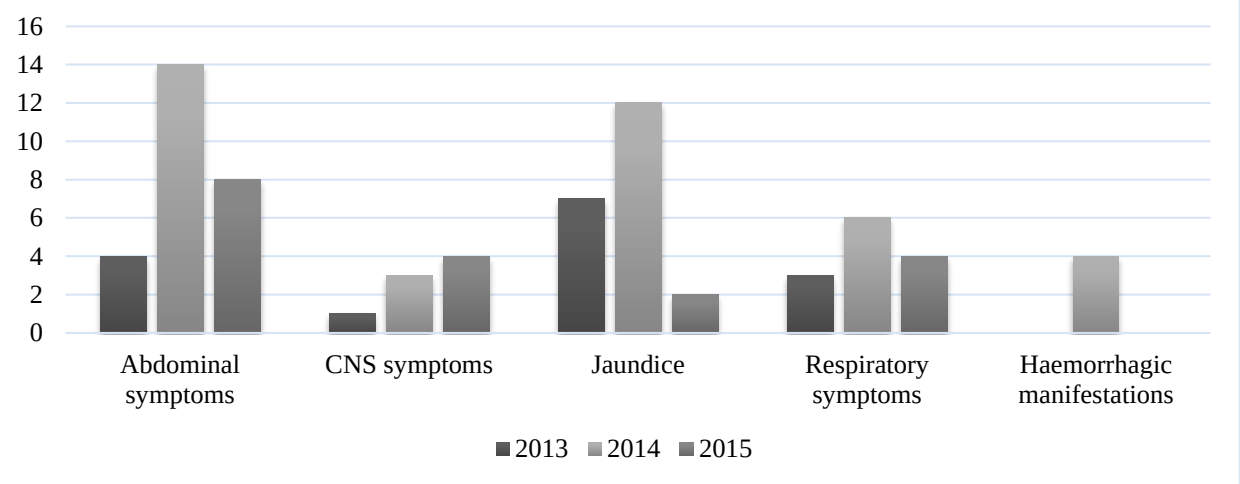
During the study duration of three years from January 2013 to December 2015, a total of 375 samples were tested for anti-leptospira IgM antibodies. Out of the 39 samples tested in 2013, 16 were positive. In 2014, there were 125 cases suspected of having leptospirosis out of which 44 turned out positive. 211 samples were received in 2015 and 25 cases were detected positive.

In 2013, leptospirosis was confined only to Uttara Kannada, an endemic area for leptospirosis. This was not so in 2014 and 2015 where the cases were from non-endemic areas as well. In 2014, although the maximum number of cases was from Uttara Kannada, Haveri and Dharwad also recorded cases. In 2015, the non-endemic area of Haveri had a rise in leptospira cases. Uttara Karnataka district had the least number of cases in spite of being endemic for leptospirosis.

Through the study duration of three years, no paediatric patients were seen; all the cases that tested positive were from the adult age group. Male predominance was seen in 2013 and 2014. But leptospirosis cases were almost equally distributed among both genders in 2015.

The patients were categorized on the basis of their clinical presentation keeping in mind the predominant symptomatology. The most common presentation was jaundice in 2013 followed by abdominal symptoms like vomiting and diarrhea and respiratory symptoms like cough and dyspnoea. Jaundice and gastrointestinal (GI) symptoms again comprised the most common presenting features in 2014. Unseen previously, however, severe haemorrhagic manifestations were registered in this particular year. Most patients in 2015 presented with GI symptoms followed by respiratory symptoms and central nervous system (CNS) symptoms like altered sensorium and convulsions.

Chart 1: Clinical profile of the patients



Discussion

Leptospirosis, a disease caused by pathogenic spirochetes of the genus *Leptospira*, is considered the most common zoonosis in the world and has recently been recognized as a re-emerging infectious disease among animals and humans having the potential to become even more prevalent with anticipated global warming.[10]

The clinical manifestations of leptospirosis range from asymptomatic infection to severe, fatal illness but leptospirosis most commonly presents as an undifferentiated febrile illness.[2] It has a worldwide distribution but is more common in the tropics where conditions for its transmission are particularly favorable – occupational exposure such as rice farming and other agricultural activities. Exposure of the general population during activities of daily living especially is associated with high seasonal rainfall. Incidence rates are underestimated due to lack of awareness of the disease and relatively inaccessible and insufficiently rapid diagnostics.[11]

Leptospirosis has long been considered a rare zoonotic disease in India with only sporadic cases being reported. Since 1980's the disease has been reported from various states during monsoon months in mini epidemic proportions.[5] In the recent past, the incidence has been showing sudden upsurges all over the country.[12]

The clinical diagnosis of leptospirosis is complicated due to the varied and non-specific manifestations resembling other infectious diseases in the tropics such as dengue fever or dengue hemorrhagic fever, malaria and scrub typhus.[13] Laboratory diagnosis is serology-based. Due to the complexity of MAT, ELISA is usually preferred.[14]

In our study, 41.02% cases were found to be positive for leptospirosis in 2013, 35% in 2014 and 11.8% in 2015. Our findings were similar to studies conducted by Deodhar et al[1] (30.9%) and Kuriakose et al[15] (29.6%) for 2013 and 2014 but much less seroprevalence was seen in 2015 which was also seen in a study conducted by Sahira et al[16] (11.4%). Another of our observations was that, in 2013, the cases were only confined to an endemic area but in 2014 and 2015, although there was a reduction in the seroprevalence, cases of leptospirosis were seen in non-endemic areas like Haveri, Gadag and Dharwad. This unexpected spread is attributable to heavy rainfall and flooding in these geographical areas in the late 2014 and early 2015. This finding is in concordance with the studies done in Nepal[3] and Vellore[17] where they have concluded that monsoon and autumn are the seasons when maximum numbers of cases are seen.

Kuriakose et al in their study mention that intermittent flooding of low lying areas lead to breakdown of infrastructure and repeated flushing out of the forests and farmlands and the rodent burrows there into all water sources including ponds, streams, rivers and canals where leptospires can survive for months. This contamination of surface water can cause monsoon outbreaks as well as sporadic cases throughout the year. Patients from rural areas who are usually involved in paddy farming or animal handling can easily get infected by walking in stagnant water contaminated with rodent urine.[15]

All of our cases belonged to the adult age group. These findings are consistent with the observations made by Nepal et al[3] and Sahira et al[16] in their respective studies. Leptospirosis was seen to be equally common in males and females in 2015 as also evidenced by Vimala et al.[17] This is contradictory to the findings in 2013 and 2014 which saw a male predominance similar to studies by Deodhar et al[1] and Nepal et al[3] who found male predominance in cases of leptospirosis attributable to more outdoor activities in men compared to women.

There are variations in the incidence of icteric leptospirosis and severe disease with renal failure reported. It is argued by a few authors that the pattern of severe manifestations of leptospirosis may vary from region to region.[18] Over the course of three years, 85 positive cases were seen in our study. Our findings reflect that patients predominantly presented with abdominal symptoms (30.85%) and jaundice (24.7%). Respiratory symptoms were also observed (15.29%) while CNS symptoms were less common (9.4%). In 2014, severe haemorrhagic manifestations were recorded (4.7%).

It is possible that due to a sudden and unexpected increase in number of cases in 2014, the health services were overwhelmed which led to delayed treatment and a few cases deteriorating to a more severe condition. Although cases were seen in non-endemic areas in both 2014 and 2015, the overall number of positive cases reduced due to preventive measures, public awareness and presumptive treatment of clinically suspected cases in 2015.

Conclusion

Owing to detection of leptospirosis in previously unrecorded areas, the diagnosis of this particular disease must be borne in mind while evaluating a patient with fever and non-constitutional symptoms around the monsoon season even in non-endemic areas especially at the time of unexpected natural calamities which can lead to an increase in the number of cases. The health services in these areas need to be vigilant and prepared.

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