CHAPTER

106

Leptospirosis - Current Scenario in India

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Introduction

Leptospirosis has long been considered a rare zoonotic disease in India with only sporadic cases being recorded[1,2]. Since 1980's the disease has been reported from various states during monsoon months in mini epidemic proportions. The disease is endemic in Kerala, Tamilnadu, Gujarat, Andamans, Karnataka, Maharashtra. It has also been reported from Andhra Pradesh, Orissa, West Bengal, Uttar Pradesh, Delhi & Puducherry[3,4].

Leptospirosis has been under-reported and under-diagnosed from India due to lack of awareness of the disease and lack of appropriate laboratory diagnostic facilities in most parts of the country. Combining clinical expertise and awareness with confirmatory laboratory back up dramatically increases the recognition of patients with leptospirosis. Clinical features of leptospirosis vary from mild illness to severe life threatening illness. Leptospirosis can be diagnosed only by laboratory tests as the clinical features are nonspecific. But the laboratory tests are complex and hence definite guidelines for diagnosis of human leptospirosis is necessary. In this article, the current scenario of leptospirosis in various endemic states of India will be highlighted and the problems in diagnosis and management will be discussed.

Epidemiology

Leptospirosis is an infectious disease caused by leptospira interrogans complex, which has over 20 serogroups and more than 200 serovars. Rodents, domestic & wild animals form the reservoir of infection where domestic animals such as cattle, dogs, and pigs may act as carriers for several months (temporary carrier) while rodents usually remain carrier throughout their life (permanent carrier). Rodents are therefore considered as the major reservoir of infection. Leptospires are excreted in the urine of the animals and they affect man when he comes into contact with urine of infected animals, directly or indirectly, when he is exposed to an environment contaminated by the urine of the infected animals such as soil and surface water following monsoon rains. Therefore this illness commonly occurs during the monsoon months. The infection is probably transmitted when they wade through stagnant rainwater contaminated by infected urine of animals. These organisms can survive for 6 hours in dry soil and for 6 months in flooded condition. They enter the host through the abrasions of the skin of the feet or intact mucous membranes of eye, throat and gut[5].

Leptospirosis can occur in both urban and rural areas. In urban areas of developing countries, a contaminated environment due to various factors

such as overcrowded slums, inadequate drainage and sanitation facilities for man and animals, presence of stray dogs, cattle, pigs, domestic rats, bandicoots, poor condition of slaughter houses and people walking bare foot contribute to the spread of the illness. In rural areas, high-risk groups are workers in rice fields, cane fields and other agricultural crops and animal husbandry staff. In addition, workers in sewers mines and military personnel are also at risk. History of animal contact is not essential for diagnosis for leptospirosis in developing countries. It is impossible to trace the source of infection and any person can be infected, irrespective of direct contact with animals, due to contaminated environment.Therefore the more important epidemiological factors are rainfall and contact with contaminated environment[5].

Persons of all ages and races are susceptible. Adult men however are more frequently infected because they tend to work in high-risk jobs. The number of cases in a region often fluctuates from year to year due to various factors such as rainfall, flooding and animal infections. Leptospiral infections tend to occur as individual/small cluster of cases or large outbreaks/epidemics. In India, urban leptospirosis has been reported from Chennai & Mumbai while rural leptospirosis has been reported from Gujarat, Kerala and Andamans. Non-reporting of leptospirosis from other states of India does not mean that it is absent in those parts.

Clinical Features

Leptospirosis can manifest in many ways.[6] The various syndromes of presentation are as follows.

1. Acute febrile illness
2. Weil's syndrome characterized by jaundice, renal failure and myocarditis with cardiac arrhythmias
3. Pulmonary Hemorrhage with respiratory failure
4. Meningitis / Meningo encephalitis

The incubation period is 7–14 days, but ranges from 2–21 days.

The incidence rate ranges from 0.1 – 1 / 100,000 per year in temperate climates to 10- 100 / 100,000 in tropical countries. During outbreak the incidence may reach over 100 / 100,000. Hospital based data on clinical manifestations confirmed by laboratory tests (Rapid tests / MAT) are usually needed to obtain the incidence rates. Mild cases may not be admitted to hospitals and hence these data may result in a bias towards severity in assessing the public health importance of leptospirosis.[6]

The prevalence rates are obtained from asymptomatic individuals of selected high risk groups. Sero surveillance provides data on infection rather than as a disease. MAT is required for sero surveys.

Indian Scenario

The current scenario of leptospirosis in various endemic states will be discussed. Data from other states will also be analyzed. In addition, the problems in diagnosis and management will be highlighted.

Andaman and Nicobar Islands

Andaman and Nicobar Islands are endemic for leptospirosis since early part of the 20th century. Outbreaks of Andaman Hemorrhagic fever (AHF) were reported since 1988.[3,7,8] This was proved to be leptospirosis in 1994. 524 cases of AHF (leptospirosis) were reported from 1988-97. The disease presented as febrile illness with pulmonary hemorrhage during post monsoon periods. As the disease presented with predominant pulmonary involvement, a Leptospiral etiology was never considered. In addition, absence of diagnostic facilities were responsible for not diagnosing leptospirosis[7].

During 2000-04, 544 cases were reported in Andamans by disease surveillance system. There were total of 93 deaths with the highest incidence in 2002.[3] At present, Andaman islands has probably

Table 1 : Year wise cases & deaths due to leptospirosis in South Gujarat

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
Cases	657	515	357	156	4	37	373	630	392
Death	76	40	32	16	0	6	40	92	81
CFR %	11.5	7.77	8.96	10.26	0	16.2	10.7	14.6	20.66

Table 2 : Summary of Leptospirosis cases and associated deaths in the year 2005

Districts	Cases	Deaths	CFR	Taluks	PHCs	Villages
Surat	185	43	23.24	10	41	123
Navsari	114	26	22.80	5	31	70
Valsad	88	11	12.50	5	25	58
Bharuch	2	0	0	2	2	2
Gandhinagar	2	1	50	2	2	2
Others	1	0	0	1	1	1
Total	392	81	20.66	25	102	256

the highest incidence rates of leptospirosis in the country with figures ranging between 50- 65 cases / 100,000 per year.[7]

In 2005, 58 cases of confirmed leptospirosis were admitted and 14 patients died [Case Fatality Rate (CFR)- 24.1%]. Majority of deaths were due to pulmonary hemorrhage and occurred within 48 hours. Rural urban ratio was 46 : 12 with exposure to agriculture being 69% and history of contact with animals being 72.4%[3].

In 2004, 322 of 611 sera samples from different high risk populations were positive giving an overall sero prevalence of 52.7%. The sero prevalence was highest among agricultural workers (62.5 %) followed by sewage workers (39.4%) , animal handlers (37.5%), butchers (30%) and forest workers (27.3%). Among the control group the sero prevalence was 14.7%. Grippotyphosa followed by Australis were the common sero groups identified.[9]

These studies were done at the Regional Medical Research Centre (ICMR), WHO Collaborating Centre for Diagnosis Reference, Research and training in leptospirosis which is situated in Andaman and Nicobar Islands.

Gujarat

The disease is endemic in south Gujarat since 1994[3,10,11]. The endemic districts are Valsad, Navsari and Surat. Cases are seen during the monsoon months. The annual data of leptospirosis in Gujarat are shown in Table 1 which shows yearly fluctuations in numbers with tha highest CFR in 2005 (20.6 %).[3,11]

In the year 2005, 392 cases and 81 deaths due to leptospirosis were reported from various districts of south Gujarat (Table 2). There were 310 males and 82 females, mostly in the age group of 26-45 year.[11] Jaundice, renal failure and hemorrhagic pneumonitis were the common complications noted.

Based on extensive studies conducted in Gujarat, it was highlighted that agro-climatic conditions for south Gujarat favor endemicity for leptospirosis. These include heavy rainfall, clay soil and high water table[3].

Public health control measures have been directed towards source reduction to begin with followed by case reduction and then subsequent reduction in case mortality. This is achieved

Table 3 : Year wise cases and deaths due to leptospirosis (1998- 2005)

Year	1998	1999	2000	2001	2002	2003	2004	2005
Cases	197	120	324	860	53	350	225	2355
Deaths	7	3	59	111	5	24	18	167

through a mulitsectoral approach involving collaborative work between Department of health, Irrigation, Agriculture, Animal Husbandry, Tribal Development and Public works[3].

Gujarat has a well organized leptospirosis control program extending from primary health center to district hospital / medical college hospitals in endemic areas. A medical officer at PHC can treat any febrile illness during monsoon months with chloroquine and doxycycline. If leptospirosis is suspected, I.V Penicillin is given. If there is organ dysfunction, he refers them to the nearest hospital for laboratory diagnosis and management.[11]

Chemoprophylaxis is given to all persons working in agricultural farms and those involved in animal husbandry. They are given doxycycline 200 mg once a week for a period of 6 weeks, during the period of maximum rains and water stagnation in a particular district. Public awareness is created by Television and pamphlets at PHCs.[11]

Maharastra

Leptospirosis has been reported regularly since 1998.[3,12,13] The annual data from 1998- 2005 is shown in table 3.

2355 cases and 167 deaths were reported in 2005, mainly due to large outbreak during the post monsoon floods. The number of districts in Maharastra reporting leptospirosis has expanded from two in 1998 to ten districts in 2005. The important districts are Mumbai, Thane, Kolhapur, Sangli and Sindhudurg which are affected by leptospirosis. The serovars isolated were L. icterhemorrhagie (rats), L. canicola (canines) and L. australis (cattle).

In a study of 74 cases , hemorrhagic pneumonitis occurred in 35.1 % cases. Of the 11 deaths (14.8 %), 9 were due to pulmonary hemorrhage[14]. Autopsy findings of 62 cases of leptospirosis revealed pulmonary intra alveolar hemorrhage in 48 cases and renal acute tubular necrosis / acute interstitial nephritis in 45 cases.[15]

In a study of ICU admissions, 7.2% of cases were due to leptospirosis (60/834). Mortality due to leptospirosis was 52% and 95% of these patients needed ventilatory support for respiratory failure.[16]

Kerala

Leptospirosis is endemic in many areas of kerala. Kolenchery is in the midlands of Kerala. In this area leptospirosis was rarely diagnosed before 1987. Since then a yearly increase in incidence was observed. In a study of 976 cases of leptospirosis confirmed by culture and / or serological tests , a mortality rate of 5.32 % was observed. Autumnalis, Australis and Icterohemorrhagiae were the common serogroups identified[17].

In study of 282 cases of leptospirosis from Calicut, hepatic (69.8%), renal (56.3%) involvement and thrombocytopenia (65.8%) were the common complications noted. The mortality was 6.03%.[18] Sero prevalence in Calicut among high risk groups was 38.1% (Fishermen – 52.8%, Sanitary workers – 56.2%, Agricultural workers - 30%, and sewarage workers was 28.2%). The rate in healthy control was 24%. Pomona, Shermani, Canicola were the common serogroups identified.[19]

In a study of leptospirosis from kottayam of 900 cases treated over 10 years, Jaundice- (80 %), renal failure (59 %), hypotension (20 %) were the common complications noted. The disease was commonly seen in agricultural workers, fishermen and oyster shell catchers (82 %). 74 % were seen during the monsoon months with a male / female ratio 7:1.[20]

A model leptospirosis control program has been formulated by Kerala state and is awaiting implementation. A state level diagnostic and epidemiology center at each districts has been established to provide technical leadership with the aim to reduce the incidence / prevalence of leptospirosis. This is not a separate program to control leptospirosis but is integrated with other illness at the district levels[21].

Tamilnadu

Leptospirosis has been reported from Chennai since 1980's.[22,23] The leptospirosis laboratory at Institute of Microbiology, Madras Medical College was established in 1994.[24] This laboratory receives samples from both government and private hospitals. Data on leptospirosis from government hospitals during the period 2004 – 2006 is given in Table 4.

There has been a dramatic increase in the number of leptospirosis cases & during 2006, 2765 cases were reported. The data on leptospirosis from various major public sector hospitals from Chennai city is given in Table 5.

All the Chennai city government hospitals reported cases of leptospirosis. Data on leptospirosis in private sector hospitals are not available and therefore the incidence of leptospirosis is under-reported.

During the period 1987 – 91, there were 159 cases of leptospirosis at the General Hospital, Chennai. There were 108 males and the mean age was 40.1 years. 136 (85 %) had jaundice and 120 (75 %) had renal failure. 70 patients were dialyzed and 25 patients died (15.6 %).[25]

In the recent past, acute renal failure due to leptospirosis at general hospital Chennai has significantly declined from 31% in 1987 – 91 to 7.5 % in 1995-2004.[26] Of the 120 cases of leptospiral ARF during the period 1987-91, the highest number of 45 cases were reported in 1990. Since 1992 there has been a decline in leptospiral renal failure cases and during a 10 year period from 1995 -2004 only 84 cases were reported.[27]

Though severe leptospirosis has declined, mild leptospirosis has increased. In a collaborative study with Leptospirosis Laboratory, Barbados of 57 cases in 1990-91 Jaundice occurred in 84%, and acute renal failure occurred in 72%. Sero group.

Autumnalis was the most common sero group encountered. 26 patients were dialyzed and 2 patients died.[28] In a recent study of 106 cases of leptospirosis from north Chennai, Jaundice occurred in 17.8% and renal failure occurred in 10.3% showing a decline in complications. Only two patients were dialyzed and there were no deaths. Fever, headache, myalgia were the common presentations. Contaminated environment (95%) and rainfall (50%) were the important epidemiological risk factors. Icterohemorrhagiae was the most common serogroup and Autumnalis was not detected.[27]

The reasons for the decline in severe leptospirosis suggested were greater awareness of disease, availability of better diagnostic facilities and widespread use of antibiotics. In addition, serogroup Autumnalis, a virulent serogroup causing severe leptospirosis has also declined since 1995. The increase in mild leptospirosis suggest that contaminated environment plays an

Table 4 : Leptospirosis: Annual data of public sector hospitals-Chennai (2004-2006)

Year	2004	2005	2006
Leptospirosis	963	1724	2765

Table 5 : Year 2006- Government hospital data- Chennai (no-2765 cases)

Hospital	General Hospital	Stanley hospital	Kilpauk MC Hospital	Royapettah Hospital	Children's Hospital
Leptospirosis	965	511	563	169	557

important role in the persistence and spread of the disease.[27]

Leptospirosis is an important cause of acute febrile illness. In a recent study of 500 cases of fever at government Stanley hospital, leptospirosis was the second common cause of fever contributing to 17%, following malaria which was 27%. Co-infection of leptospirosis (48 cases) with malaria (220 cases) occurred in 22 % of cases.[29] Co-infection of Malaria and Leptospirosis has been reported from Chandigarh.[30]

A sero survey in Chennai revealed a seroprevalence rate of 32.9% (Range 17.8%- 40.5%).[31] Uveitis due to leptospirosis has been reported from Madurai.[32] A majority of 73 cases had panuveitis(95.5%), retinal phlebitis (51.4%) and hypopyon (12.6%).

Puducherry

In a study of 33 icteric patients from Puducherry, 22 had altered sensorium and 20 had multiorgan failure and thrombocytopenia. 13 patients died (39.3%).[33]

Karnataka

Leptospirosis outbreaks have been reported from 15 districts of Karnataka. The highest incidence of cases have occurred in Bangalore city, Uttara kannada, Shimoga, Bidar, Gulbarga, Udupi and dakshina kannada districts. During the year 2004, 152 cases and 11 deaths were reported and during 2005, 224 cases and 19 deaths were reported. Patients responded to treatment with amoxicillin and paracetamol[3].

In study of 733 patients suspected of leptospirosis, 84 (11.45%) were found positive by ELISA. The important complications noted were hepatic (65%) and renal failure (63 %).

Diarrhea occurred in 24% of cases. 54.7% were agriculture workers and 55.9% gave history of contact with animals.[34]

Orissa

After the cyclone during the October-November 1999, 142 patients with febrile illness and hemorrhagic manifestations were evaluated. 28 (19.2%) had evidence of leptospirosis which was confirmed by MAT. 6 were positive by culture / PCR[35].

143 people suspected of leptospirosis in a remote village of Mayurbhanj district in north Orissa was evaluated by the Orissa Multi-disease Surveillance System (OMDSS) during the period June-July 2002. The attack rate was 5.95% (143 / 2404) and the CFR was 7.69 % (11/ 143) . There was exposure to infected water in a canal which was probably the source of infection.[36]

Other States

Data from Anthra Pradesh, Uttar Pradesh, West Bengal and Delhi are becoming available. Evaluation of acute febrile patients in Uttar Pradesh revealed that 7% had leptospirosis (25/ 346). 17 of the 25 patients had jaundice.[37] In a study of 55 cases of leptospirosis in Hyderabad, 52 % had renal failure and jaundice occurred in 42%.[38] Out of 42 persons with jaundice who were evaluated in Calcutta, 10 (23.8 %) were found positive for leptospirosis.[39] 75 patients from Delhi with symptoms of leptospirosis were evaluated, 32 were found positive for leptospirosis and 5 died.[40] 180 febrile patients from urban slums of Delhi were evaluated and 27 (15 %) were positive for leptospirosis.[41]

All the available evidence from endemic states suggests that the disease is now emerging in India as an important public health problem. Inspite of adequate knowledge, we do not have an accurate estimate of the disease burden in the country, as data from many other states is not available probably because of lack of diagnostic facilities. The importance of early diagnosis and case management should be emphasized and appropriate modification in approach is essential.[3]

This should include,

a. Guidelines for simple case definition and

empiric therapy in small rural hospitals, where diagnostic facilities are not available.

b. Diagnosis of leptospirosis utilizing Modified Faine's Criteria for in-patients admitted to district / teaching hospitals where diagnostic facilities are available[3].

Diagnosis of Leptospirosis

Laboratory support is needed:

1. To confirm the diagnosis
2. For epidemiological and public health reasons, to determine which serovar caused the infection, the likely source of infection, potential reservoir and its location.

The tests depend on the phase of the infection. During leptospiremic phase (< 7days) leptospires can be isolated by blood culture and PCR, while in the immune phase, rising antibodies can be detected by serological tests.

Culture: The isolation of leptospirosis by culture of blood, CSF and urine is the most definite way of confirming the diagnosis of leptospirosis. Unfortunately, culture of blood does not contribute to an early diagnosis as results come late, weeks or even months after inoculation of culture medium, however it is valuable in critically ill patients who might die in the first week before the development of antibodies.

PCR is promising on both sensitivity and specificity, but is complicated and expensive. Its value for rapid diagnosis is being evaluated and is used in higher centers.[42,43]

Serology: The serological tests for diagnosis of leptospirosis have been classified as serovar specific tests and genus specific tests.

Serovar specific tests: Microscopic agglutination test (MAT): MAT is the gold standard test for diagnosis of leptospirosis because of its unsurpassed diagnostic specificity. The main advantage is that serovars can be identified which is of epidemiological importance. The difficulties in utilizing MAT are due to the following factors.[44]

a. The antibody titers rise and peak only in 2nd or 3rd week, making it a less sensitive test. A study of 108 cases of leptospirosis from Brazil have revealed that 65% of the first sample were positive by SAT compared to 44% by MAT.[45]

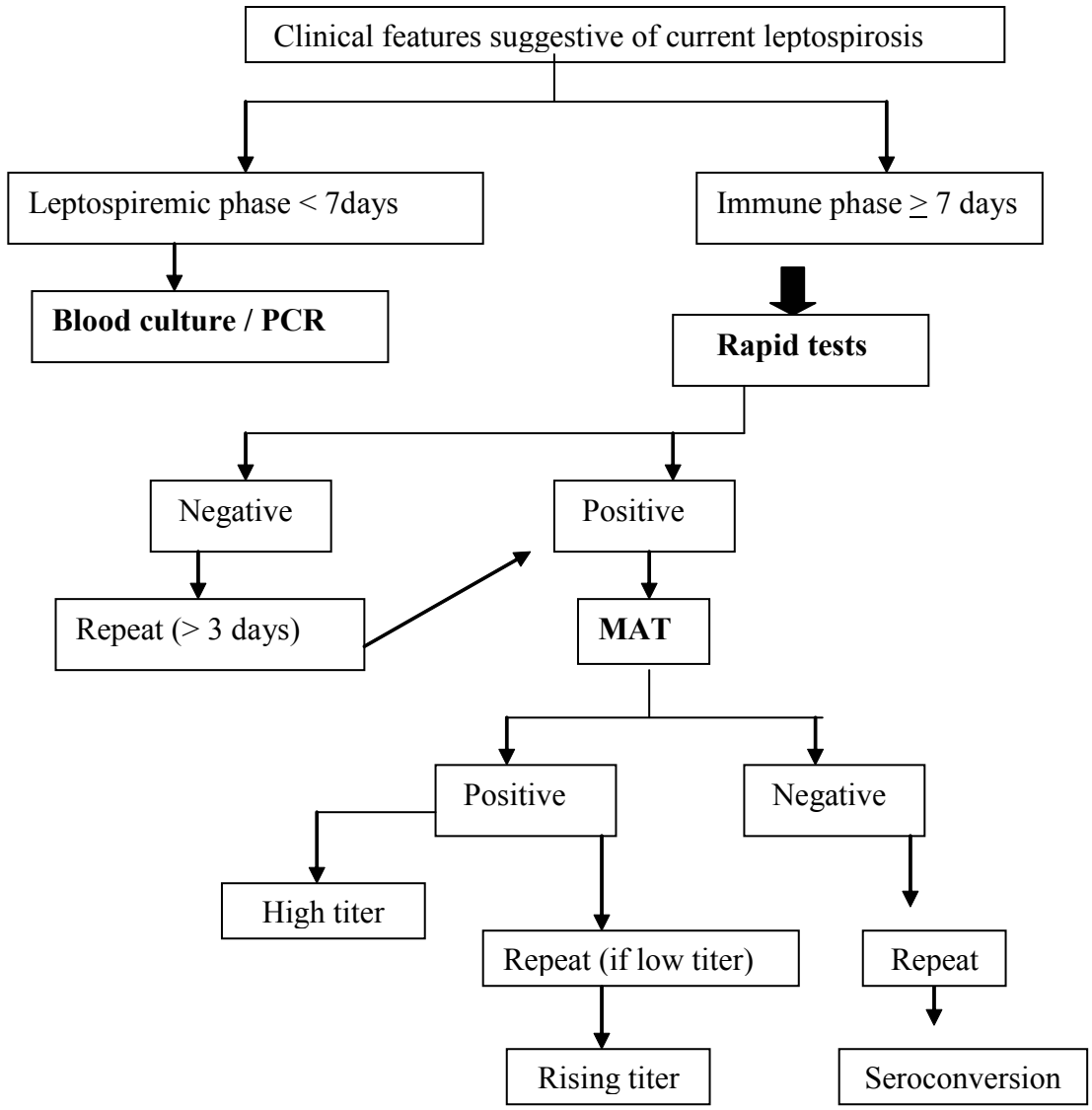
b. A four fold rise in titer or seroconversion is the most definitive criteria for diagnosis of leptospirosis. Therefore a second sample is mandatory, which is difficult to obtain. In such circumstances, a single high titer in MAT can be taken as diagnostic criteria. As MAT titers peak and persist for a long time (5-10 years), they would interfere with current diagnosis. Therefore many workers use different criteria.

   A titer of 1:100 is taken as significant criteria, but there is controversy on the single diagnostic titer as they depend on endemicity. In endemic areas, a titer of 1/100 or 1/200 is considered low; while high titer is usually > 1/400 (some consider 1/800 or 1/1600 as diagnostic criteria). In non- endemic areas, 1/100 titer is taken as the diagnostic criteria. It is preferable to do rapid tests along with single high titers. Positive rapid tests with high titers suggest current infection while negative rapid tests is probably due to past infection. In Andamans, a titer of 1/200 is taken as diagnostic titer. Serosurvey in the asymptomatic high risk group should be done with MAT only and a titer of > 1/50 can be taken as cut off titer.

c. The test is complicated requiring dark field microscopy and cultures of various live serovars. This may not be available in small laboratories.

Genus specific tests (Rapid tests): The common tests are the ELISA,Macroscopic slide agglutination test (MSAT), latex agglutination test, Dipstick tests (Lepto dipstick, Lepto Tek lateral flow) and Lepto Tek Dri-Dot test.[6,11,44,46,47] The genus specific tests are the tests of choice for the diagnosis of current infection. These tests are simple, more sensitive and become positive earlier than MAT. These tests detect genus specific antibodies, which are shared

Table 6 : Approach to Diagnosis of Leptospirosis



by pathogenic and saprophytic leptospira. These tests become positive early in the disease (5-6th day) as they detect specific IgM antibodies and help in the rapid diagnosis of current infection.

Laboratory Criteria for Diagnosis of Current Leptospirosis

Confirmed

1. **Culture:** Positive
2. **MAT:** a) Seroconversion / 4 fold rise in the titer

Probable

1. Rapid tests: Positive
2. MAT: High titer (Single sample)

The approach to diagnostic tests for leptospirosis is given in Table 6.

Comments

1. Rapid tests are adequate for diagnosis of current infection. This can be done in smaller laboratories in both rural and urban areas. If positive, confirm the diagnosis with MAT,

Table 7 : Diagnosis of Leptospirosis-Modified Faine's Criteria

Name:	**Age:**	**Sex:**	**Occupation:**	
Residence (rural / urban):		**Date:**		
Part A: Clinical Data		**Score**	**Part B: Epidemiological factors**	**Score**
Headache		2	Rainfall	5
Fever		2	Contact with contaminated	
Temp > 39° C		2	Environment	4
Conjunctival suffusion		4	Animal Contact	1
Meningism		4		
Myalgia		4		
Conjunctival suffusion			**Part C : Bacteriological Lab findings**	
Meningism		10	Isolation of leptospira in Culture –	
Myalgia			**Diagnosis certain**	
Jaundice		1	**Positive Serology**	
Albuminuria /		2	ELISA IgM Positive	15
Nitrogen retention			SAT - Positive	15
			MAT-Single positive	15
			in high titer	
			Rising titer / seroconversion	
			(paired sera)	25

Presumptive diagnosis of leptospirosis is made of:

Part A or part A & part B score : 26 or more

Part A, B, C (Total) : 25 or more

A score between 20 and 25 suggests leptospirosis as a possible diagnosis.

which would be available in larger specialized laboratories.

2. MAT–Seroconversion / 4 fold rise in the titre is necessary for diagnosis. (2nd sample is essential). Single high titre in MAT combined with positive rapid tests confirms the diagnosis of leptospirosis.
3. Blood culture–not sensitive but can be done in critically ill patient. (As they may not survive to produce antibodies).

Modified Faine's Criteria

Faine has evolved criteria for diagnosis of leptospirosis on the basis of clinical, epidemiological and laboratory data (WHO guidelines). Certain necessary modifications have been made by us in the epidemiological (Part B) and the laboratory criteria (Part C) of original Faine's criteria to make the diagnosis more practical in Indian institutions. (shown in Table 7). In the Modified Faine's Criteria rapid tests (ELISA / SAT) have been introduced in Part C and Rainfall has been included in Part B to make the diagnosis early and simple.[48,49] This criteria can be utilized for diagnosis of leptospirosis in district / teaching institutes[3].

Management

Mild leptospirosis can be treated with Doxycycline or Amoxycillin or Erythromycin and severe leptospirosis with I.V. Penicillin or Ceftriaxone.

Recommendations for Management Based on the Availability of Diagnostic Facilities

In centers where no diagnostic facilities are available (Rural areas)

The common causes of acute febrile illnesses are Malaria, Leptospirosis, Dengue and Viral respiratory diseases. It is difficult to diagnose these illness without laboratory facilities. It is recommended that all febrile patients can be treated with doxycycline and chloroquine which is the empiric therapy for Malaria & Leptospirosis. If there is organ dysfunction and / or fever persists they should be transferred to higher centers for further management. This is being implemented in the state of Gujarat.[11]

In centers where diagnostic facilities are available

Even in centers with laboratory facilities, empiric therapy is recommended for leptospirosis where the disease is endemic, since serological tests become positive only after one week (unless PCR is available). Mild cases can be treated with chloroquine and doxycycline and severe cases with I.V. crystalline penicillin / quinine or artemisinin and doxycycline.[50] If they are admitted later (after a week), rapid tests would confirm leptospirosis and appropriate treatment can be given. It is essential that all febrile patients are investigated for leptospirosis, Malaria and Dengue fever as co-infection can occur.[29] In addition, dialysis and ventilatory support for renal and respiratory failure would definitely decrease mortality.

To conclude, data on leptospirosis is urgently needed from all states of the country. This can be done by making rapid tests available at all district / teaching hospitals. The National Institute of Communicable Diseases (NICD) utilizing the Integrated Disease Surveillance Programme (IDSP) should organize the availability of rapid tests[3]. Appropriate guidelines for management should be implemented to reduce the morbidity and mortality of leptospirosis.

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