

Original article

SOCIO-DEMOGRAPHIC, CLINICAL AND LABORATORY PROFILE OF LEPTOSPIROSIS CASES REGISTERED AT SMIMER, SURAT

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ABSTRACT

Context: Leptospirosis is a zoonotic disease with worldwide distribution caused by pathogenic leptospira. Leptospirosis is more prevalent in South Gujarat due to heavy rain fall and clay soil structure. The current study was conducted to analyse the profile of patients with Leptospirosis admitted in Surat Municipal Institute of Medical Education and Research (SMIMER), Surat.

Methods and Material: This prospective study, involves patients visiting SMIMER hospital during the time period of 1st August to 31st October 2011 who were suspected for Leptospirosis. Their presenting complaints, examination findings, lab findings, treatment and outcome were recorded and analyzed based on the modified Faine's criteria.

Results: Among the 24 suspected cases of Leptospirosis, 14 (59%) were males and age of patients ranged from 10 to 65 years with mean age of 34 years. Fever, myalgia, and headache were predominant complaints and all had history of contact with animals or contaminated environment. Liver functions and renal functions were deranged in 96% and 63% cases respectively. Fifteen patients were found positive for Leptospirosis. Fifteen (63%) patients had Weil's syndrome and 8 had ARDS. There were 4 deaths, all were males, had ARF and presented with systolic hypotension.

Conclusions: The disease prevalence usually increases during rainy season. Most cases were from rural origin and all had history of contact with animals. Myalgia (calf tenderness), jaundice and conjunctival suffusion were characteristic physical examination findings. Jaundice and renal failure are associated with severity of the disease and are considered bad prognostic signs with high mortality rate (16%).

Key words: Leptospirosis, Modified Faine's criteria, ARDS

INTRODUCTION

Leptospirosis, a zoonotic disease, is an emerging infectious disease of global importance with clinical manifestations varying from in apparent infection to fulminant, fatal disease.¹ After its first report from Andaman Island in 1929 it has been reported from other parts of India and it has hit virtually all parts of rural and urban India.² In

the year 1994, Leptospirosis cases were seen for the first time in Gujarat in the Chikhli block of the old Valsad district.³ Since then cases of Leptospirosis are continuously reported from Surat, Navsari and Valsad districts of South Gujarat. In the year 2006 there were heavy floods in Surat city which resulted in occurrence of 379 cases of Suspected Leptospirosis in the city itself with 43

deaths.³ Leptospirosis is an occupational disease in relation to agriculture and animal husbandry activities.³ There exists a close association between rains, rice fields, rodents & Leptospirosis. The existing paddy cultivation and sugar cane growing along with flooding pattern of irrigation of rice fields, contaminated with urine of rodents and cattle which are reservoir of leptospira. When field workers work in such fields for long hours with bare feet and without using any gum boots or hand gloves, the chances of them getting infected with leptospira spirochetes are substantial as their feet are likely to have a number of major and minor occupational injuries. There is heavy and prolong rainfall (>65 days) in South Gujarat districts. All these factor leads to endemicity of Leptospirosis. However, the case fatality rate in severe Leptospirosis may be as high as 20.² A particular problem is that Leptospirosis is likely to be misdiagnosed, due to its wide spectrum of symptoms which may mimic the clinical signs of many other diseases, such as malaria, dengue fever and hepatitis and Hantavirus infection.

Our main aim was to study the case profile of febrile patients who were suspected for leptospirosis using district specific guideline. Thus we can efficiently study the epidemiology of the disease and help reduce its burden by health education and early intervention.

CASE DEFINITIONS⁴

(A) Fever case (B) Presumptive Case: Fever case with bilateral conjunctival suffusion and/or frontal headache **(C) Suspected case:** Fever case with severe myalgia (calf back and abdomen muscles) or oliguria/Anuria or yellowish discoloration of urine/eyes or meningism or blood in cough/vomiting or gabharaman (Uneasiness) or breathlessness or cold extremities or Irregular pulse **(D) Confirmed cases :** Rising antibody titre in paired serum sample by ELISA(Four Fold) or rising MAT titre in paired serum or PCR positive

SUBJECTS AND METHODS

This prospective study was done at Surat Municipal Institute of Medical Education and Research (S.M.I.M.E.R.) is a 450 bedded hospital, a tertiary centre and has a medical college. A separate ward was created at S.M.I.M.E.R. for patients suspected for Leptospirosis. In this ward 15 physicians were available round the clock. Critical patients were transferred to medical in-

tensive care unit (M.I.C.U.) of S.M.I.M.E.R. The study involved patients who presented at S.M.I.M.E.R. with pyrexia and who were suspected for Leptospirosis. Their presenting complaints including age, sex, address, duration of pyrexia, degree of temperature rise, conjunctival suffusion, headache, meningismus, myalgia, jaundice and contact with animals or flood water were recorded. Examination, laboratory findings, treatment and outcomes were recorded and analyzed based on the modified Faine's criteria and analysis was done calculating simple proportions.

RESULTS

Socio-Demographic profile

The number of patient studied is 24 and the age range of patients studied was 10 to 65 years with a mean age of 34 years. Seventeen (70%) patients belonged to age group of 20-50 years. The distribution of cases according to age and gender is shown in table 1. Twelve (50%) were farmer and 3(13%) were labourer. Twenty two (91%) of patients were from Surat district and 22 (91%) of patients were from rural area of South Gujarat. Six (25%) were smoker and 9(37%) were having alcoholic habits.

Table 1: Age and gender-wise distribution of patients (n=24)

Age group in years	Female (n=10)	Male (n=14)	Total (n=24)
10-19	2 (8.3)	2(8.3)	4 (16.7)
20-29	0 (0)	4(16.7)	4(16.7)
30-39	3(12.5)	1(4.2)	4(16.7)
40-49	3 (12.5)	6(25.0)	9 (37.5)
50-59	1 (4.2)	1(4.2)	2 (8.3)
60-69	1 (4.2)	0	1 (4.2)

Figures in parenthesis indicate percentage

Clinical profile

All 24 patients had fever and history of contact with animals, 19 (80%) of the admitted patients were in first week of pyrexia and the mean duration of pyrexia was 5 days. We calculated 95% C.I. for clinical profile features. If we extrapolate the result to total number of cases of Leptospirosis in South Gujarat the various clinical features will be seen in 95% C.I. range. Distribution of clinical features is shown in Table-2.

Table 2: Clinical Profile of patients (n=24)

Clinical profile features	Patients	Percentage (95% CI)
Fever	24	100
Myalgia	19	79.1 (59.5 - 90.7)
Headache	13	54.1 (35.0 - 72.1)
Oliguria/anuria	12	50 (31.4 - 68.5)
Jaundice	06	25 (12.0 - 44.9)
Conjunctival suffusion	05	20.8 (9.2 - 4.0)
Breathlessness	02	8.3 (2.3 - 25.8)

Laboratory investigations:

Liver function was deranged in 23(96%) patients, while 15(63%) patients had abnormal renal function. Creatinine phosphokinase enzyme levels (CPK-T) were raised in 15(63%). Anaemia was found in all 24(100%) patients, thrombocytopenia in 11(45%) of patients while Prothrombine time was increased in 17(70%) of patients.

Table 3: Laboratory profile of patients (n=24)

Laboratory findings	Patients	95% CI
Hemogram		
Anaemia ^{#5}	23	95.8 (79.7-99.3)
Leucocytosis (>11X10 ⁹ /L) ⁶	10	41.7 (24.5 - 61.2)
Thrombocytopenia (<150 X 10 ⁹ /L) ⁷	11	45.8 (27.9 - 64.9)
Thrombocytosis (>450 X 10 ⁹ /L) ⁷	4	16.7 (6.7 - 35.8)
Hyperglycemia (>110 mg/dl) ⁸	8	33.3 (17.9 - 53.3)
Renal function test		
Blood urea (>40 mg/dl) ⁹	14*	58.3 (38.8 - 75.5)
S. Creatinine (>1.5 mg/dl) ¹⁰	8	33.3 (17.9 - 53.3)
Liver function test		
SGOT ¹¹ (>40 I.U./L)	12	50 (31.4 - 68.5)
SGPT ¹¹ (>45 I.U./L)	8	33.3 (17.9 - 53.3)
Direct bilirubin(>0.8 mg/dl) ¹²	10	41.7 (24.5 - 61.2)
Indirect bilirubin(>0.2mg/dl) ¹²	23	95.8 (79.7-99.3)
High CPK-T ¹⁰⁵	15	62.5 (42.7 - 78.8)
CPK-MB(>25 U/L) ¹⁰	10	41.7 (24.5 - 61.2)

* Two patients were not tested for blood urea due to lack of facility; [#]<13g/dl in males and <12g/dl in females⁵; ^s>195 U/L in males and >170 U/L in females

DIAGNOSIS, TREATMENT AND OUTCOME

District specific guideline⁴ was used to identify suspected Leptospirosis cases. There were 12 cases (50%) positive for Lepto-Check test (rapid immunochromatographic test) while 13 (54%) were positive for ELISA test. All 24 patients were tested with PCR of which 12 (50%) were confirmed. Out of these 12 cases confirmed with PCR, 7 were farmers. All 24 patients were nega-

tive for malaria, HIV, HbsAg, HCV. According to modified Faine's criteria, 15 (63%) were positive for current Leptospirosis. Out of 24 patients, 15(63%) patients had been given Doxycycline, 15(63%) had been given Doxycycline and Crystalline Penicillin, 15(63%) had been given Methyl Prednisolone. Renal failure had developed in 15(63%), out of which 1 patient had undergone dialysis who died later on. Eight patients had developed ARDS during their course in ward, all of them were treated with ventilator and out of which 4 died. Out of these 4 patients, only 1 patient had been given Doxycycline. Out of 4 patients who died all developed ARF, 3 had developed pulmonary haemorrhage and 1 developed septicaemia during their course in ward and 3 had history of chronic alcoholism and 1 had smoking history, 2 were farmer and 3 were from rural area. All 4 patients who died were males and had systolic hypotension at the time of admission. All the 4 patients who died had developed decline in pH during their course in ward (metabolic acidosis) and reported an increase in temperature as well as deranged liver functions.

Table: 4 Diagnostic tests of patients (n=24)

Tests	Positive N	95% CI
Rapid test	12	50 (31.4 - 68.5)
PCR	12	50 (31.4 - 68.5)
Elisa 1	13	54.1 (35.0 - 72.1)
MAT 1	1	4.1 (0.7 - 20.2)

DISCUSSION

Leptospirosis, in its early stage mimics other tropical infections like viral hepatitis, malaria, dengue, scrub typhus and Hantavirus. South Gujarat region is endemic for malaria. But in the present study the Pf - Pv antigen test is negative in all patients. HIV, HbsAg, HCV all tests are non-reactive in all patients in spite of that Surat has shown high incidence of HIV, 2.5 times more than state incidence.¹³

Two-thirds of cases in this study belonged to 15-40 years of age-group and were male, which are usually involved in labour and farming and represent the economically productive age group. Age distribution is comparable to the report done by Bhardwaj P. et al¹⁴ as well as other studies.¹⁵⁻²⁰ While male preponderance is not seen in some other studies.²¹ Male preponderance is believed to be due to occupational differences rather than sex linked susceptibility. In our study, the patients were mostly from a rural setting

where exposure to cattle and rodents is present. Out of 24 cases, 12 (50%) were farmers and 3 (13%) were labourers i.e. 15 (63%) cases were from a work group who may have to work in water logged areas which is in accordance with epidemiology of leptospirosis.

The most frequent presenting symptom was fever followed by muscle pain and headache a reflection of the study done by Chauhan et al²¹ wherein 100% of the patients had fever, headache(92%), muscle pain(77%). Study done by Prasad R. et al¹⁵ shows fever(93%), vomiting(66%), bodyache(63%), muscle pain(46%), headache(40%). Another study done by Margarita et al¹⁶ shows fever(100%), headache(50%) and epigastric pain(42%). In the study done by Alora et al¹⁷, the most frequent symptoms noted were fever, chills, myalgia, and headache.

In this study, the most common physical examination findings were myalgia (calf tenderness), jaundice and conjunctival suffusion which is comparable with the study done by Chauhan et al²¹, Villanueva et al¹⁹ as well as those reported in the literature.^{15,17,18}

Anaemia was the most common laboratory finding in this study followed by elevated liver function tests, azotemia, thrombocytopenia and leucocytosis. Study done by Margarita et al¹⁶ shows azotemia followed by leucocytosis and elevated liver function tests. In the study done by Chauhan et al²¹ azotemia, leukocytosis and deranged liver functions were most frequent findings. While the study of Alora et al¹⁷ shows hematuria, albuminuria and leucocytosis were the most frequent findings, while in the study presented by Sulit, elevated liver function tests followed by albuminuria and pyuria were found.²² In our study, levels of creatine phosphokinase (CPK) were elevated in up to 50% of patients with Leptospirosis during the first week of illness, which help to differentiate leptospirosis infection from viral hepatitis. In anicteric Leptospirosis, peripheral leukocyte counts range from 3000 to 26,000/L, with a left shift; in Weil's syndrome, leukocytosis is often marked.¹ Mild thrombocytopenia occurs in up to 50% of patients and is associated with renal failure. In 37% of cases, Leptospirosis manifests as an acute febrile illness with a biphasic course and had an excellent prognosis. In 63% of cases, the presentation was more dramatic, and the infection had a mortality rate of 16.7%.

Severe Leptospirosis, characterized by jaundice, renal dysfunction, and hemorrhagic diathesis, is

referred to as Weil's syndrome.¹ Oliguria/anuria due to renal failure was the most common complication also seen in study done by Margarita et al.¹⁶ Sulit reported that one of the outstanding features of the disease is acute renal failure and all the cases seen had oliguria, anuria and profound azotemia.²² This is in contrast to the study done by Lal Sohan et al²³ where no patient suspected of Leptospirosis or positive for Leptospirosis were found to have jaundice or oliguria. In our study, fifteen (63%) patients had developed renal failure, out of which 1 had undergone dialysis who died later on and eight (33%) patients had developed ARDS during their course in the ward, all of them were treated with ventilator and out of which 4 died.

Lepto-check done in our patients suspected for Leptospirosis, is a rapid quantitative diagnostic test. Twelve patients were positive for Lepto-check and 13 (54%) were positive for IgM ELISA. Twelve (50%) patients were confirmed with PCR. IgM antibodies became positive by 5th day. MAT (Microscopic Agglutination Test) does not have any diagnostic significance in 1st week and peak about 3rd week. Hence IgM ELISA for Leptospirosis should be done at the end of first week and MAT can be done in the 3rd week. Modified Faine's criteria is a more a practical methods to diagnose Leptospirosis.²⁴ Availability of simple diagnostic tests (ELISA - IgM or SAT) should help in diagnosis of milder forms (anicteric) of Leptospirosis, which is more common (90%) than severe Leptospirosis (10%).²⁴ Applying modified Faine's criteria 15(63%) were positive for Leptospirosis.

Four patients died in our series of cases accounting for a mortality rate of 16%. All four patients who died were males and presented with systolic hypotension at the time of admission. All patients died of renal failure as seen in study done by Margarita et al.¹⁶ In the study presented by Sulit²², 9 patients died accounting for a mortality of 42%, out of which 5 cases were attributed to renal failure.

CONCLUSION

Majority of the patients were male whose age range from 20 to 54 years and all had history of contact with animals. Prominent clinical symptoms include fever, muscle pain and headache. Myalgia (calf tenderness), jaundice and conjunctival suffusion were characteristic physical examination findings. Anuria and/or oliguria

accompanied by azotemia indicate acute renal failure which is the most dreaded complication. Jaundice and renal failure are associated with the severity of the disease and are considered bad prognostic signs with high mortality rate. Mortality in Leptospirosis cases is high (16%). Patients presenting with fever, bilateral conjunctival suffusion and frontal headache at a primary health centre during rainy season should be suspected for Leptospirosis and should be referred immediately to higher centre and should be treated intensively to prevent mortality in such patients.

RECOMMENDATIONS

Medical professionals and the general public (especially at risk of occupational exposure) need to be educated about the disease and the need to seek early medical intervention. Realizing the epidemic potential of the disease, laboratory facilities should be provided in the S.M.I.M.E.R. for the confirmatory tests. A continuation of this study to include a large number of patients from different medical colleges is recommended.

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