

Original Article

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A Clinico-Epidemiological Profile of Cases of Leptospirosis in a Tertiary Care Hospital

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Abstract

Introduction: Leptospirosis is an emerging global health problem. However, very little is known regarding its true incidence. Estimates indicate that more than 500,000 cases of Leptospirosis occur each year globally with 0.1 to 1 per 100 000 people living in temperate climates. The incidence can even rise to 100 or more per 100000 during outbreaks. Leptospirosis is endemic in many states in India which include Kerala, Tamil Nadu, Gujarat, Andamans, Karnataka, Maharashtra, Andhra Pradesh, Orissa, West Bengal, Uttar Pradesh, Delhi & Puducherry. The disease is also endemic in Mangalore and its surrounding areas. The present study has been undertaken to study the epidemiological and clinical profile of Leptospirosis cases admitted during last six years i.e. from 2009 to 2014, in a tertiary care hospital in Mangalore. **Materials and Methods:** A record-based study was undertaken to determine the demographic and clinical profile of all Leptospirosis cases admitted from 01 January 2009 to 31 December 2014 to a teaching hospital in Mangalore. The clinical data including demographic parameters of all patients were retrieved from MRD and subsequently analyzed. **Results:** A total of 108 patients were admitted in the hospital from 01 Jan 2009 to 31 Dec 2014. Highest admissions, i.e. 28.70 % were noted in the month of September, while the lowest admissions were seen in the month of November, December and March. The majority of the patients were males, 82(75.92 %) while females constituted a small number 24.07%. A large number of patients suffered from deranged hepatic functions (34.25%), Acute Renal Failure (12.03%) ARDS (10.18%), Hemorrhages (5.55%) and Acute Myocarditis (3.07%). There were 16(14.81%) deaths mainly due to complications. **Conclusion:** Leptospirosis is more common during the

monsoon. Common complications include renal failure and hepatic dysfunction. Death is due to multi-organ failure.

Keywords: Zoonotic; Endemic; Rashes; Complications; Morbidity.

Introduction

Leptospirosis is an emerging infectious zoonotic disease, with epidemic potential. It is caused by a bacterium *Leptospira interrogans* which has more than 200 serological variants [1]. It has been recognized as an important emerging global public health problem because of its increasing incidence in both developing and developed countries. Man usually acquires infection through direct contact with the urine of infected animals. The bacteria enter the body through cuts or abrasions on the skin, or through the mucous membranes of the mouth, nose and eyes. Human-to-human transmission is rare. The disease has a wide clinical spectrum varying from mild influenza like illness to fulminant and often fatal presentation with multi-organ involvement. Out of all patients infected with *Leptospira*, 40% seroconvert asymptotically; of the remaining 60%; 90% suffer the milder an-icteric form and 10% the severe icteric form [2]. The classic presentation of Leptospirosis is a biphasic illness, with complications occurring in the second phase. Important causes of death include renal failure, cardiopulmonary failure, and widespread hemorrhage[3]. The disease with multiorgan involvement carries a poor prognosis and is more common in patients in whom there has been a delay in the initiation of treatment.

Estimates indicate that more than 500,000 cases of Leptospirosis occur each year globally. The majority of reported cases have severe manifestations,

for which mortality is greater than 10% [4]. However, very little is known regarding its true incidence. It is estimated that 0.1 to 1 per 100 000 people living in temperate climates are affected each year and the incidence can even rise to 100 or more per 100 000 during outbreaks [5].

Leptospirosis was considered earlier a rare disease in India, and had been grossly under reported and under diagnosed due to a lack of awareness and appropriate laboratory diagnostic facilities in most parts of the country [6]. However, since 1980's the disease has been consistently reported from various states especially during monsoon months [7]. The disease is endemic in Kerala Tamilnadu, Gujarat, Andamans, Karnataka, and Maharashtra. It has also been reported from Andhra Pradesh, Orissa, West Bengal, Uttar Pradesh, Delhi & Puducherry [8]. According to State Health Directorates, during the year 2013 highest number of cases (2887) were reported from Tamil Nadu, maximum deaths (38) were recorded in Gujarat, while in Karnataka there were 355 cases and 10 deaths, though actual number of cases as well as deaths could be much higher [9].

Leptospirosis is endemic in Mangalore and its surrounding areas [10]. The present study has been undertaken to study the epidemiological as well as clinical profile of Leptospirosis cases admitted during last six years i.e. 2009 to 2014, in a tertiary care hospital in Mangalore (Karnataka).

Materials and Methods

A record-based retrospective observational study was undertaken to determine the demographic and clinical profile of all patients who were admitted

from 01 January 2009 to 31 December 2014 to the teaching hospital of AJIMS&RC, Mangalore, Karnataka; and were found positive by immunoglobulin M enzyme linked immunosorbent assay (IgM ELISA) for *Leptospira*. A total of 108 patients were included in the study. Details of the patient pertaining their age, gender, clinical features, investigations, complications and outcome were recorded on a pro forma after retrieving their records from MRD department of the hospital and were subsequently analyzed.

Limitations: Present study has the limitations that are inherent to any record-based study and these include likelihood of many manifestations having been missed in the case sheets. There is also a probability of inclusion of some false negatives cases as some infections such as dengue may rarely show a false positive for LEPTO IgM. There was also lack of information on rainfall and other meteorological data for the period of study.

Results

A total of 108 patients were admitted in the hospital from 01 Jan 2009 to 31 Dec 2014. During the period of study, highest admissions, i.e. 31 (28.70 %) were noted in the month of September, followed by August 20 (18.51%), July 14 (12.96%), while the lowest admissions were seen in the month of November, December and March i.e. 02 each (1.85 %)[Fig-1]. The majority of the patients were males, 82(75.92 %) while females constituted a small number 26 (24.07%). Maximum numbers of cases belonged to the age group of 30–44 years, i.e. 37(34.25 %), while the numbers of cases among under fourteen were only 02 (1.85 %). Most of the cases i.e. 59 (54.62%) were unskilled laboureres. (Table-1).

Table 1: Socio-Demographic Profile of Patients (N=108)

Characteristics	Number	Percentage
Age Group in Yrs		
<14	02	1.85
15-29	21	19.44
30-44	37	34.25
45-59	34	31.48
>60	14	12.96
Gender		
Male	82	75.92
Female	26	24.07
Occupation		
Unskilled	59	54.62
Semi -Skilled	21	19.44

Skilled	08	7.40
Professional	02	1.85
House wives	18	16.66

Year wise analysis of admission data, revealed maximum admissions were made in the year 2011, i.e.24 (22.22 %), while the succeeding years showed a relative decline with lowest admissions in 2013 i.e. 14(12.96%). However, the highest death rate (28.57%) was also recorded during 2013 [Table-2]. Average duration of stay of these dengue cases in hospital was 14.65 days. As seen in [Table-3], fever was present in all cases, i.e. 108 (100.00 %), followed by myalgia 97(89.81%), abdominal pain 87(80.55%), headache 69(63.88%) while 44(40.74%) had rashes. Jaundice was seen in 37 (34.25 %) patients while 29(26.85%) patients suffered from oliguria and 19(15.74%) cases had complaints of breathlessness. A large number of patients suffered from various

complications. The main complications were deranged hepatic functions (34.25%), Acute Renal Failure (12.03%) ARDS (10.18%), Hemorrhages (5.55%) and Acute Myocarditis (3.07%) were accounted for most of the deaths. (Figure-2)

A large number of patients 67(62.03%) were found to be anemic while 33(30.55%) patients showed raised blood urea levels. A total of 41 patients (37.96 %) suffered from thrombocytopenia i.e. platelet count below 100,000/cumm. Biochemical and hematological parameters of patients have been given in Table-4. All cases were managed well and responded to the treatment, while a small percentage i.e.16 (14.81%) resulted in fatality.

Table 2: Year wise admission and deaths

Year	Admissions	Deaths
2009	19	3(15.78%)
2010	16	2(12.50%)
2011	24	4(16.66)%
2012	17	1(5.88%)
2013	14	4(28.57%)
2014	18	2(11.11%)

Table 3: Main symptoms among patients (N=108)

Symptoms	Number	Percentage
Fever	108	100
Myalgia	97	89.81
Vomiting	74	68.51
Headache	69	63.88
Abdominal pain	87	80.55
Skin Rash	44	40.74
Orbital Pain	67	62.03
Jaundice	37	34.25
Oliguria	29	26.85
Breathlessness	17	15.74

Table 4: Biochemical parameters of patients (N=108)

Parameters	Number	Percentage
Anaemia (Hemoglobin <11.0 g/dl)	67	62.03
Leucocytosis (>11000/mcl)	43	39.81
Thrombocytopenia (<100,000/mcl)	41	37.96
Blood urea (>40 mg/dl)	33	30.55
S. Creatinine (>1.5 mg/dl)	26	24.07
Raised Serum-Bilirubin	41	37.96
Raised Liver Enzymes	47	43.51

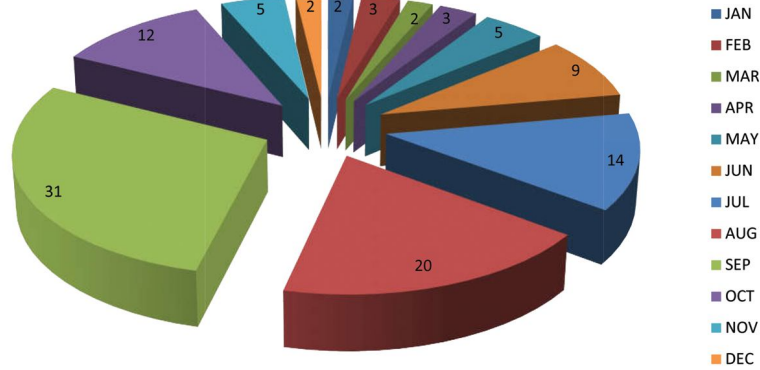


Fig. 1: Pie Diagram Showing Month Wise Breakdown of Cases

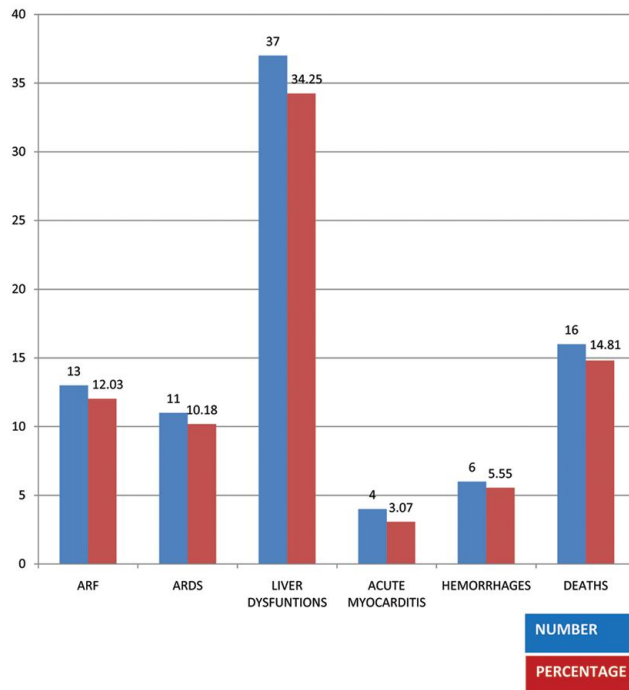


Fig. 2: Main Complications/Deaths Among Patients (N=108)

Discussion

The term Leptospira (Greek ‘leptos’=fine and Latin ‘spira’=coil) is used for diseases caused by all Leptospira regardless of serotype. Although it is endemic in many rural and urban slum communities, little is actually known about the true disease burden and consequently, the disease has been neglected [11]. In India, it was first reported from the Andaman Islands in 1929, and since then it has affected all parts of country [12]. The spectrum of disease ranges from subclinical infection to severe syndromes including multiorgan failure and death. It is emerging as an important public health problem in India with many states already showing significant endemicity. Studies suggest that Leptospirosis

accounts for about 12.7% of cases of acute febrile illness responsible for attendance at hospitals [13]. Natural disasters and poor sanitary conditions predispose to outbreaks.

On analysis of demographic data, it was observed that the majority of the patients were males, (72.92%), while females constituted only a small number (24.07%). Maximum number of cases belonged to the productive age group of 15–44 years (53.70 %). Further, the majority of the cases (54.62%) were from low socio-economic strata belonging to unskilled labour class. [Table-1]. Bhardwaj P. et al [14] in their study of “Risk factors of Leptospirosis at Surat” also reported that most affected people belonged to the productive age group, where more than two third of the cases were in the age group 15 to 34 years and

belonged to low socio-economic class. Parmar G et al [15] in another study on "Socio-demographic, clinical and laboratory profile of Leptospirosis cases at Simmer" also reported similar findings where they found (70%) patients belonged to the age group of 20-50 years, while 63% of these were laboureres/farmers. Similar results were also been observed by Patil V C et al [16] in their study from western Maharashtra who reported (78.26%) patients as farmers and (21.73%) as laboureres with (91.30%) males and (8.6%) females with mean age of 32 years. High incidence of Leptospirosis among laboureres and farmers can be attributed to their occupational exposure to rodents and other mammals while working bare feet in fields, coupled with frequent injuries, abrasions and cuts in lower extremities making them even more vulnerable.

It is thus seen that Leptospirosis generally affects the population in productive age group belonging to low socio-economic class, especially laboureres and farmers; leading to loss of income to the affected household nearly for duration of 2-3 weeks thereby further adding to the economic misery and burden of the involved people. Age distribution is comparable to other similar studies [17-22]; while male preponderance is not seen in some other studies [23].

To identify the seasonal variations of the disease, a month wise analysis of all admissions was carried out. Highest admissions were recorded during the month of September (28.70%) followed by August (18.51%) and July (12.96%); which are basically monsoon months [Fig-1]. This implies that *Leptospira* multiplies where water remains stagnant for longer periods after the rains, and since farmers/laboureres walk barefoot, the risk of Leptospirosis in this population increases even further. In another study on "Clinical profile and outcome of Leptospirosis at tertiary care centre in western Maharashtra" Patil V C et al [16] reported (17.39%) cases in the month of July, (21.73%) in August, and (26.08%) in September, while they found (78.26%) of these were farmers and (21.73%) were laboureres. Sethi S et al [24] in their study on "Increasing Trends of Leptospirosis in Northern India" found maximum cases in the months of July-September. They found most of the patients (70%) were young adults in their 2nd, 3rd, and 4th decades of life. Major epidemiological risk factors observed by them included wet environmental living conditions, lack of protective footwear, working in farm lands, contact with animals and history of unprotected contact with dirty stagnant water. Similar observations were also made by Sehgal SC [25] in his study in Port Blair, Andaman and Nicobar Islands on "Epidemiological patterns in

Leptospirosis". The correlation between occurrence of Leptospirosis cases and the monsoon season is clearly evident in this study and is further supported by similar findings by many other researchers [26-30].

In present study the most common symptom was fever (100%) which was present in all cases, followed by, muscle pain (89.81%), abdominal pain (80.55%) vomiting (68.51%), headache 63.88%, rash (40.74%), jaundice (34.25%), oliguria (26.85%) and breathlessness (15.74%). Similar symptoms were also observed by Parmar G et al [15] in their study of "Socio-demographic, clinical and laboratory profile of Leptospirosis cases at, Surat" wherein they found (100%) cases had fever, (79.1%) muscle pain, (54.1%) headache, (50%) oliguria, while (25%) patients reported with jaundice. In another study by Chauhan et al [23] in sub Himalayan regions of North India, (100%) patients reported with fever, followed by headache (92%) and muscle pain (77%). Similar findings have also been reported by Prasad R. et al [17] and Margarita et al [18] in their studies. However, Aora BD et al [19] in their study on "Leptospirosis in Santo Tomas University Hospital" reported fever, chills, myalgia, and headache as the most common symptoms.

The most common physical findings in this study were pallor, muscle tenderness, icterus, hepatomegaly and conjunctival suffusion; which is comparable with the studies done by, Parmar G et al [15], Chauhan et al [23], Villanueva et al [19] as well as many other studies [19,20]. In present study, anemia was found in (62.03%) of the cases, followed by raised liver enzymes (43.51%), leucocytosis (39.81%) increased serum bilirubin (37.96%) azotemia (32.55%) and thrombocytopenia (37.96%). Study done by Parmar G et al [15] and Margarita et al [18] also reported similar findings in their studies. In another study by Chauhan et al [23] leukocytosis, azotemia and deranged liver functions were most common findings. However, in a study by Aora et al [19], haematuria, albuminuria and leucocytosis were more common findings.

In this study 13(12.03%) patients developed Acute Renal Failure, out of which 7 underwent dialysis, 11 (10.18%) patients developed ARDS, 4(3.07%) developed Acute Myocarditis while 6 (5.55%) showed evidence of hemorrhages. Parmar G et al [15], in their study also found Acute Renal Failure (66.3%) and ARDS (33%) as the most common complications. Renal failure was also found as the most common complication by Margarita et al. [18] Sulit [31] also reported after a "Review of cases of Leptospirosis admitted to a hospital in Philippines",

that Acute Renal Failure is nearly an essential feature of the disease. However, in contrast, Lal Sohan et al [32] in their study in Andhra Pradesh found no patient of Leptospirosis having jaundice or oliguria. All patients admitted in the hospital were managed well. However, 16 (14.61%) patients could not be saved.

In our study mortality rate was found to be (14.81%). Similar mortality rates have been reported by Parmar G et al, [15] (16%), Margarita et al, [18] (11%) and study 16 (14.81%), while a high mortality rate (42%) was reported by Sulit [31]. However, much lower mortality rates (4.34%) were reported by Patil et al [16] in their study of "Clinical profile and outcome of Leptospirosis at tertiary care centre in western Maharashtra".

Conclusion

Leptospirosis is an important emerging public health problem in India. Keeping in view with its high mortality, fulminant course and epidemic potential, medical professionals and the general public, especially those at risk of exposure, need to be educated about the disease and the need to seek early medical intervention. Poor socioeconomic and environmental conditions and occupational habits of people are main determinants of the incidence of the disease in our country. To coordinate and direct global research and action against human Leptospirosis, the World Health Organisation (WHO) has established "Leptospirosis Burden Epidemiology Reference Group" (LERG) to develop tools to estimate disease burden and suggest measures for its prevention and control to its member states. Needless to say that with the present understanding of the eco-epidemiological and cultural characteristics of community, dedicated control programs, and strong surveillance system Leptospirosis is preventable.

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