ABSTRACT: BACKGROUND: Leptospirosis is a bacterial disease affecting humans and animals alike. It is caused by bacteria of the genus Leptospira. In humans, it can lead to a wide range of presentations, some of which may be mistaken for other diseases commonly occurring in the community. Some infected persons, however, may be entirely asymptomatic. Without treatment, Leptospirosis can be fatal leading to kidney damage, meningitis, liver failure, respiratory distress, and even death. AIM OF THE STUDY: 1) To find out the positive cases of Leptospira infection among patients attending with fever in Silchar Medical College and Hospital, department of Medicine. 2) To evaluate the clinical profile of leptospirosis. MATERIALS AND METHODS: A total of consecutive 100 cases of acute febrile illness with features suggestive of leptospira infection like conjunctival suffusion or sub-conjunctival haemorrhage, myalgia and headache with or without jaundice and/or oliguria were selected for serological test for leptospira. INCLUSION CRITERIA: Leptospira seropositive cases presenting with acute febrile illness were included in the study. RESULTS: 38 cases (23 males and 15 females) in the series were found seropositive for Leptospira and formed the study group. Maximum incidence 15(39.5%) were in the age group 30-39 years. Occupational distribution included businessman 13 (34.2%), students 10(26.4%), housewives 7(19.4%) and farmers 8 (21%) respectively. Other than fever, symptoms on presentation included headache 31 (81.5%), myalgia 20 (52.6%) and jaundice 25 (65.78%) respectively. Laboratory investigations revealed Hemoglobin <10 g/dl in 10 (26.3%), leucocytosis >12000/mm³ in 26 (68.42%) and low platelet count <1.2 lac/mm³ in 19 (50%) of cases. 3 cases (7.89%) had associated uremia and underwent hemodialysis. In present study, 2 (5.2%) patients died. CONCLUSION: Leptospirosis is quiet common in this part of the world and all patients presenting with acute febrile illness, particularly during the monsoon season, should be screened. It affects anyone irrespective of their age and occupation. KEYWORDS: Animals, fever, headache, haemoglobin, jaundice, leptospiira, liver failure, myalgia, oliguria, platelet count.

INTRODUCTION: Leptospirosis is a zoonosis of ubiquitous distribution. The term is used for diseases caused by all leptospira regardless of serotype.[1] Primarily a disease of wild and domestic mammals, man is infected through contact with an infected animal either directly or indirectly by water or soil contaminated with the urine of an infected animal. The spectrum of disease ranges from subclinical infection to a severe syndrome of multiorgan dysfunction.
characterized by headache, fever, myalgia, jaundice, hepatomegaly and convulsions.\[^{2}\] Leptospirosis was first reported in India from the Andaman Islands in 1929, and has since affected all parts of India.\[^{3}\] Natural disasters and poor sanitary conditions have contributed to the multiple epidemics,\[^{4}\] and several outbreaks of the disease have been reported in recent years.\[^{5, 6}\]

Leptospirosis is caused by spirochaete bacteria belonging to the genus Leptospira. 21 species of Leptospira have been identified\[^{7}\] 13 species cause disease or have been detected in human cases.\[^{7, 8}\] Occupations at risk include veterinarians, slaughterhouse workers, farmers, sewer maintenance workers, waste disposal facility workers, and people who work on derelict buildings.

In this part of the world (Barak Valley, Assam), maximum rainfall occurs during the month of May to August. Abundance of rice fields allow water to collect in pools.

Also, Barak Valley is a flood affected area and majority of population lives in rural area. Hence, we studied the clinico-pathological pattern of leptospirosis in patients presenting with an acute febrile illness in SMCH, which is the only tertiary care centre of the region.

**STUDY DESIGN**: Hospital based, Single centred, Observational study.

**METHODS**: This observational study was done at the Department of General Medicine, Silchar Medical College and Hospital, Silchar, India over a 1-year period. A detailed history was taken and examination done in all adult patients (>13 years of age) presenting to the outpatient clinic or inpatients in our department with an acute febrile illness with features suggestive of leptospirosis infection like conjunctival suffusion or sub-conjunctival haemorrhage, myalgia (mainly calf and lower back) and headache with or without jaundice and/or oliguria. Complete blood counts, renal and liver function tests, and urine analysis were done. Leptospira ELISA Test (IBM) was performed in every patient. The ELISA-positive patients formed the study group. In addition, rapid kit test for malaria antigen, blood smear (thick and thin) for malarial parasites, were also done in all the patients. Dengue IgM ELISA and NS1 antigen, Widal test/ IgM antibody for salmonella typhi was screened if indicated.

All patients were tested for hepatitis B surface antigen and antibody to hepatitis C virus. Those patients whose symptoms and signs were suggestive of viral hepatitis, such as disappearance of fever with the appearance of jaundice and marked elevation of liver enzymes were tested for hepatitis A and E viruses.

**Leptospira ELISA Test (IBM)**: Leptospira IgG/IgM ELISA are qualitative and/or quantitative tests for the detection of human antibodies against leptospirosis in serum or plasma. The ELISA test is reported to have a sensitivity of 100% and a specificity of 93%.\[^{9}\]

**RESULTS**: 100 patients of acute febrile illness presenting with clinico-pathological features of similar natures as stated above were tested for IgG/IgM ELISA test for Leptospira and of whom 38(23 males and 15 females) were found to be seropositive. These 38 diagnosed cases of leptospirosis formed the study group and were evaluated. Hence, the incidence of leptospirosis was 38% in this series.
Majority of them, 31(81.57%) presented between the months of July to November, coinciding with the monsoon and post-monsoon season.

The mean age was 37.02 years (range 15–59 years) with maximum incidence 15(39.5%) were in the age group 30-39 years. Variation in occupation was also observed. The distribution included 13 (34.2%) businessman, 10 (26.4%) students, 7 (19.4%) housewives and rest 8 (21%) farmers respectively.

| Age range | No. of patients | % of patients |
|-----------|-----------------|--------------|
| 10-19 yrs | 5               | 13.2         |
| 20-29 yrs | 5               | 13.2         |
| 30-39 yrs | 15              | 39.5         |
| 40-49 yrs | 6               | 15.7         |
| 50-59 yrs | 7               | 18.4         |
| Total     | 38              | 100          |

Table 1: Distribution of patients according to age
Table 2: Occupation wise distribution

| Occupations | No. of patients | Percentage |
|--------------|----------------|------------|
| Businessman  | 13             | 34.2       |
| Students     | 10             | 26.4       |
| Housewives   | 7              | 18.4       |
| Farmers      | 8              | 21         |
| Total        | 38             | 100        |

Table 3: Features on presentation

| Symptom/sign                                      | No. of cases | Percentage (%) |
|---------------------------------------------------|--------------|----------------|
| Fever                                             | 38           | 100            |
| Headache                                          | 31           | 81.5           |
| Myalgia                                           | 20           | 52.6           |
| Jaundice                                          | 25           | 65.78          |
| Conjunctival suffusion/subconjunctival haemorrhage | 23           | 60.5           |
| Hepatomegaly                                      | 10           | 26.3           |
| Echymosis/petechiae                              | 4            | 10.5           |
| Oliguria                                          | 6            | 15.78          |
All patients presented with fever, which was natural as it was one of the inclusion criteria. The other symptoms at the time of presentation included headache in 31 (81.5%), myalgia in 20 (52.6%) and jaundice in 25 (65.78%). On examination, 25 (65.78%) had icterus, 23 (60.5%) had conjunctival suffusion and 10 (26.3%) had hepatomegaly. Ecchymosis and/or petechiae were seen in 4 (10.5%), oliguria was present in 6 patients (15.78%) as the presenting symptom. Meningism, altered sensorium and hemoptysis were absent in all cases.

| Test                          | No. of patients | %     |
|-------------------------------|-----------------|-------|
| Haemoglobin <10 gm/dl         | 10              | 26.3  |
| Leucocyte >12000/mm³          | 26              | 68.42 |
| Platelet count <1.2 lac/mm³   | 19              | 50    |
| Serum creatinine >1.5 mg/dl   | 22              | 57.89 |
| AST >150 U/L                  | 27              | 71    |
| AST >200 U/L                  | 27              | 71    |
| Serum bilirubin >1.2 mg/dl    | 25              | 65.78 |
| IgM Anti- HAV                 | 2               | 5.26  |
| IgM anti-HEV                  | Nil             | Nil   |
| Pf Malaria antigen            | 2               | 5.26  |
| HbsAg +ve                     | 1               | 2.63  |
| Dengue IgM ELISA and NS1 antigen | Nil          | Nil   |

| Table 4: Laboratory findings in patients |

Laboratory investigations revealed Hb <10 g/dl in 10(26.3%), leucocytosis >12000/mm³ in 26 (68.42%) and low platelet count <1.2 lac/mm³ in 19 (50%) of cases.

The serum creatinine was >1.5 mg/dl in 22 (57.89%), serum ALT and AST were high in 27 (71%) with AST > 150 U/L and ALT > 200U/L and serum bilirubin was raised in 25 (65.78%)
of cases respectively. In 3 cases (7.89%) the serum creatinine level was more than 9 mg/dl and were associated with other signs of uremia were subjected to hemodialysis. In 13 (34.2%) of the cases both serum creatinine and ALT/AST levels were raised.

2 cases were co-infected with hepatitis-A, another 2 with malaria and 1 with hepatitis B. Co-infection with dengue or enteric fever were not observed.

In present study, 2 patients died. One of them had co-infection with hepatitis B and died of fulminant hepatic failure, while the other had associated malarial infection and expired due to acute kidney injury.

**DISCUSSION:** The sero prevalence of leptospirosis in patients with an acute febrile illness has been studied less often in north-eastern part of the country. We found that 38 of 100 (38%) patients had serological evidence of leptospirosis in clinico-pathologically suspected cases. A sero prevalence of 8.8% and 21.7% has been reported from Chandigarh and Varanasi, respectively, by Sethi et al.[10] The reported positivity rates are 8.3%, 3.5%, 3.1% and 3.3% in northern, western, eastern and central India, respectively.[11] As the present study is a hospital based study with specific selection criteria, the prevalence of leptospirosis in this region cannot be inferred. However, based on this study it will not be incorrect to state that the prevalence of leptospirosis is higher than assumed in this region.

Present study shows male preponderance of leptospirosis which correlates with the study done by Mathur M et al.[12]

Leptospirosis has a peak during the monsoon and post monsoon months. This association also correlates with the study done by Mathur M. et al.[12]

The highest prevalence is recorded among businessman 13 (34.2%) and students10 (26.4%), possibly occurring more commonly in people living in urban slums with poor sanitation and low hygienic conditions. This finding correlates with findings of study done by Masashi Marita et al.[13] where they found relationship with water mediated transmission of the disease but they found more association in persons associated with water recreation sports (71%) which are scarce in this part of the country. Also association with agricultural and constructional workers (29%) observed in the above study[13] correlates with that of ours (21%).

In the past decade, it has been reported equally from urban and rural India.[14]

Among the clinical features in the present study headache was seen in 81%, myalgia in 52.6% and conjunctival suffusion in 60.5% cases which is comparable with study done by Masashi Marita et al. [13] which showed 86%, 57%, 57% cases with headache, myalgia and conjunctival suffusion respectively. Jaundice and oliguria were seen in 65.78% and 15.78% cases in the present series which is comparable to the study by Mathur M et al.[12] showing 81.4% and 37.6% cases with jaundice and oliguria respectively.

Leptospirosis has two distinct clinical syndromes—a mild anicteric febrile illness seen in 90% of patients, and a severe variety (10%) with jaundice and other manifestations (Weil disease).[13] In the present study the prevalence of severe variety with organ dysfunctions were quiet high. Renal dysfunction was seen in more than 50% of the cases and raised serum transaminases level in 71% of the cases. In present study, 34.2% of the cases had elevated levels of both serum creatinine and ALT/AST. Similar observations were noted by Galya
Gancheva\cite{15} who reported significantly elevated levels of BUN, creatininie, bilirubin, AST and ALT in those group of leptospirosis who had renal involvement.

Chawla et al.\cite{16} encountered leucocytosis in all of their patients in comparison with the present study where leucocytosis was observed in 68.42% of patients. No patient with central nervous system involvement was found in present study. Three of the patients had undergone hemodialysis as they had features of uremia along with serum creatinine above 9 mg/dl. Andrade L et al.\cite{17} observed a significant reduction in mortality of patients suffering from AKI due to leptospirosis, after early hemodialysis. A recent review of cases of leptospirosis associated with AKI in Thailand has shown that therapies such as hemodialysis and hemofiltration, when compared with standard peritoneal dialysis, associated with lower mortality, shorter time of recovery, and a faster reduction in the serum levels of bilirubin, urea, and creatinine.\cite{18}

The present study revealed cases co-infected with hepatitis-A, in 2(5.2%) patients and with malaria, in 2(5.2%) patients. Angnani et al.\cite{19} reported serological evidence of both leptospirosis and hepatitis in 39.4% of their patients. Co-infection with hepatitis B was seen in 1(2.6%) patient. Leptospirosis and hepatitis B co-infection was reported in 22% of patients by Chandrasekaran.

Death was observed in 2(5.3%) cases in the present series. One of them had co-infection with hepatitis B and died of fulminant hepatic failure, while the other had associated malarial infection and expired due to acute kidney injury. The reported mortality rates range from 10.8% to 66% among patients with leptospirosis.\cite{13,15}

**Limitations:** Many infections with leptospirae are subclinical or of mild intensity and recover spontaneously or with symptomatic therapy. Such patients usually do not report to a hospital and may remain undiagnosed. The present study is unlikely to focus on the community prevalence of leptospirosis possibly because of a referral bias in patients attending a tertiary level centre.

**CONCLUSION:** Leptospirosis is quiet common in this part of the world, and all patients presenting with an acute febrile illness, particularly during the monsoon season, should be screened. It affects anyone irrespective of their age and occupation. The presentation may range from a subclinical infection to a severe syndrome of multi-organ dysfunction.

Serodiagnosis by a microagglutination test (MAT) is the gold standard but is not universally available. Leptospirosis can be easily diagnosed using IgM ELISA. It will be prudent to recommend that all persons with fever with headache, myalgia and conjunctival suffusion should be screened for leptospirosis.

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