



ORIGINAL ARTICLE

**Clinical and Laboratory Profile of Leptospirosis in a Tertiary Care Hospital at Kolar**

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**Abstract**

**Introduction:** Leptospirosis is an acute treponemal infection with high mortality and morbidity. Due to varied presentations in different geographical areas and unexpected seasonal patterns, clinical diagnosis is difficult. The present study aims to analyze the varied clinical presentations and epidemiological factors in correlation with laboratory diagnosis.

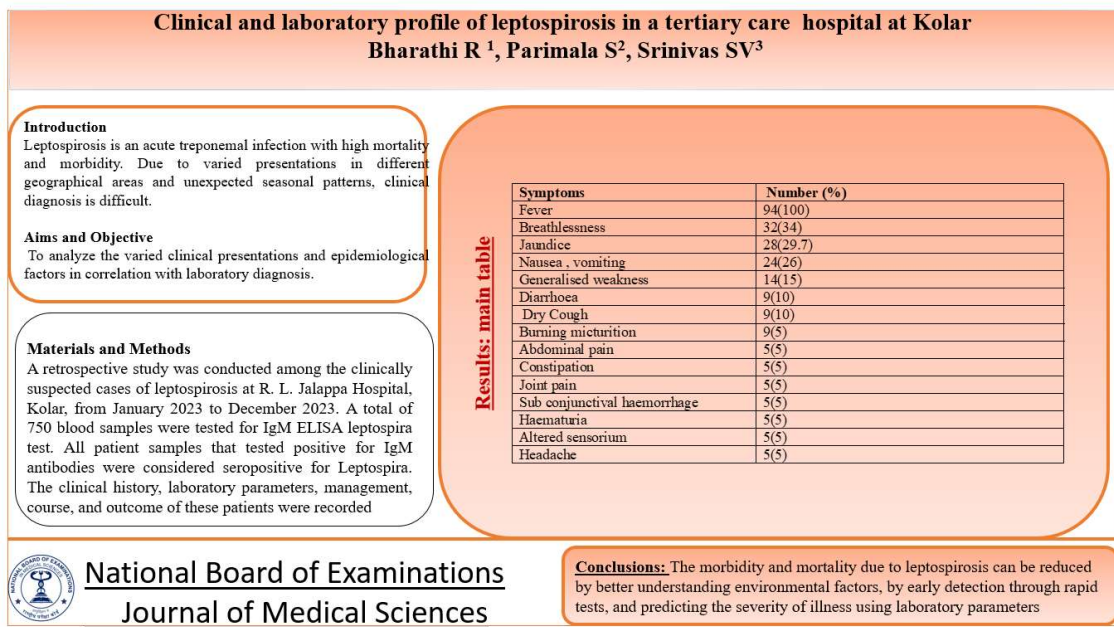
**Materials and Methods:** A retrospective study was conducted among the clinically suspected cases of leptospirosis at R. L. Jalappa Hospital, Kolar, from January 2023 to December 2023. A total of 750 blood samples were tested for IgM ELISA leptospira test. All patient samples that tested positive for IgM antibodies were considered seropositive for Leptospira. The clinical history, laboratory parameters, management, course, and outcome of these patients were recorded. **Results:** The majority of the affected population were in the 41-60 year age group. Males were more affected than females. Due to unexpected rains, cases peaked in March. Thrombocytopenia was observed in 32 patients (34%), hyperbilirubinemia in 28 patients (30%), raised transaminases in 27 patients (29%), followed by low hemoglobin levels in 27 patients (28%). Severe acute respiratory illness (SARI) was the most common complication, seen in 24 patients (26%), followed by renal failure in 11 patients (12%).

**Conclusion:** The morbidity and mortality due to leptospirosis can be reduced by better understanding environmental factors, by early detection through rapid tests, and predicting the severity of illness using laboratory parameters.

**Keywords:** Leptospira, ELISA, Thrombocytopenia, Rapid tests

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## Graphical Abstract



### Introduction

Leptospirosis is an acute infection that can be severe and fatal in some patients [1]. It is a zoonotic infection caused by *Leptospira* species [1]. The mode of transmission is through the ingestion of food and water contaminated with the urine of infected rats [2]. This infection is commonly found in sewage workers, farmers, and rice planters [2].

Leptospirosis exists in two forms: an asymptomatic anicteric form and a symptomatic icteric form [3]. In the asymptomatic anicteric form, a flu-like illness with fever, chills, abdominal pain, muscle pain, headache, and vomiting is observed<sup>3</sup>. In the severe form of leptospirosis, patients present with altered sensorium, acute renal failure, respiratory failure, hypotension, and arrhythmias [3].

Due to the varied clinical presentations, it is often misdiagnosed as scrub typhus, dengue, or goes undiagnosed

[3]. If diagnosed at the right time, the prognosis of the disease is good. Serological tests are widely employed in the routine laboratory diagnosis of leptospirosis [4]. In view of the apparent re-emergence of leptospira cases, there is a need to analyze the varied clinical presentations and treatment modalities.

The present study aims to analyze the varied clinical presentations and epidemiological factors in correlation with laboratory diagnosis.

### Materials and Methods

This is a retrospective study of leptospirosis cases diagnosed at R. L. Jalappa Hospital, Kolar, from January 2023 to December 2023. During the study period, from clinically suspected cases, a total of 750 blood samples were received for IgM ELISA testing for leptospira.

The test procedure was performed using the IgM ELISA kit (J. Mitra Lepto

IgM Microlisa, New Delhi, India). The test procedure was conducted according to the protocol provided with the kit. The results were interpreted according to the manufacturer's instructions, i.e., values  $\leq 9$  units were considered negative, 9–11 units equivocal, and  $\geq 11$  units positive. For samples showing equivocal results, another blood sample was drawn after a period of 10 days, and the test was repeated. Negative and positive controls were included with each test run.

Out of the total 750 blood samples tested, 94 patient samples were positive for IgM anti-leptospira antibodies. All patient samples that tested positive for IgM antibodies were considered seropositive for Leptospira. The clinical history, laboratory parameters, management, course, and outcome of these patients were recorded.

### Statistics

Data processing included basic tests of descriptive statistics and was performed using SPSS software version 22.0 (SPSS Inc., Chicago, IL, USA).

### Results

Out of the 94 serologically confirmed leptospira-positive cases, the majority were males (59.5%) (Figure 1). Most of the patients belonged to the age group of 41-60 years (45.7%). The most common symptoms were fever, cough, and myalgia. Other symptoms noted were subconjunctival hemorrhage, burning micturition, and syncopal attacks (Figures 2 and 3).

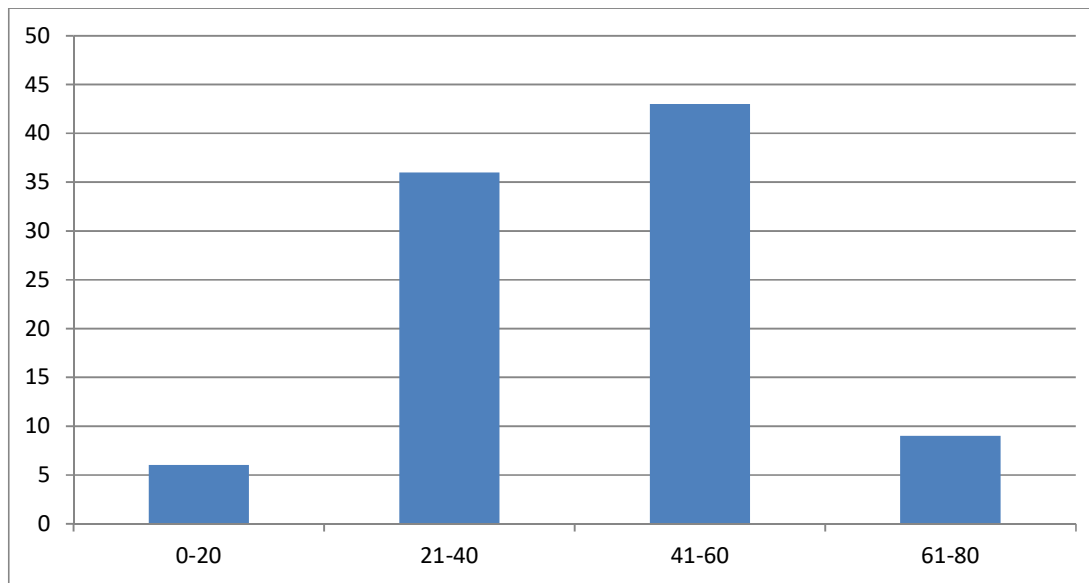


Figure 1. Age wise distribution of cases.

The majority of the patients were between 41-60 years of age, followed by those between 21-40 years of age

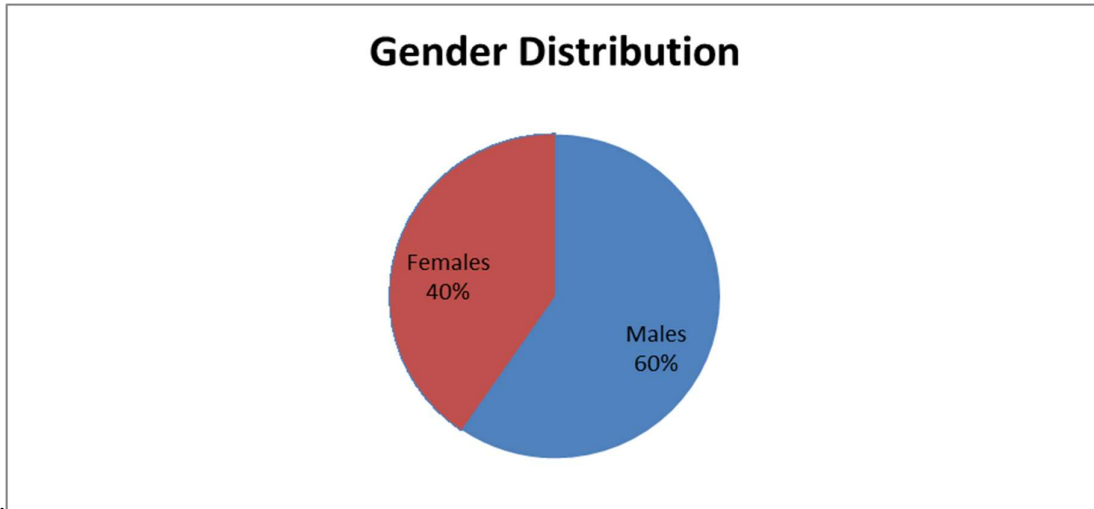


Figure 2. Gender wise distribution of seropositive leptospira cases

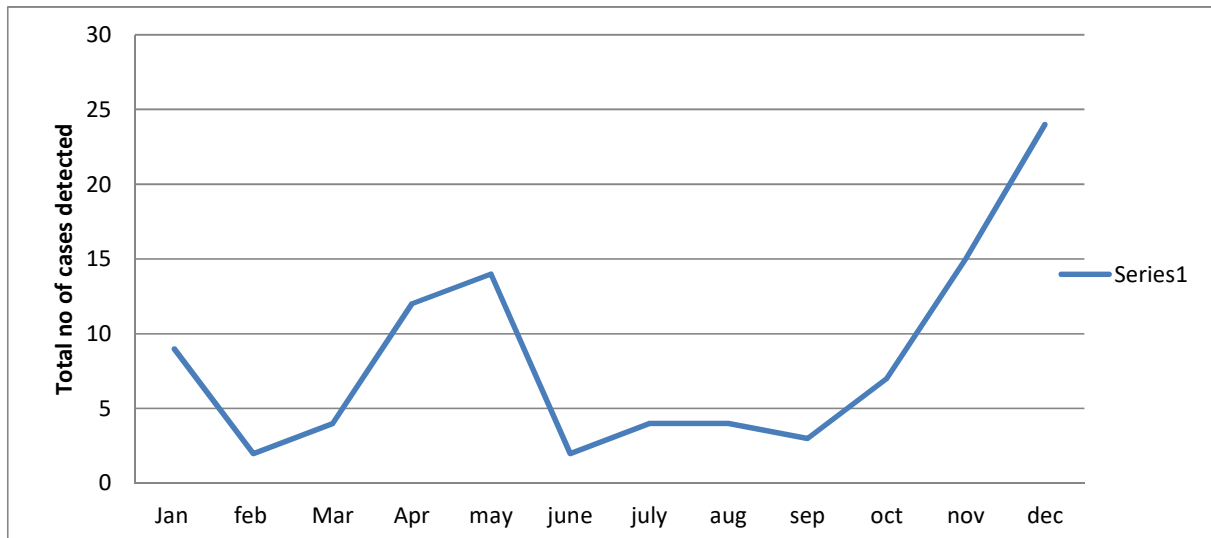


Figure 3. Seasonal distribution of leptospira cases over a year

The leptospira cases were at peak in the month of March, April, May. Decline in the cases in the months of June, July and August. Followed by sustained

raise in the cases from September, October, November. Cases were at its peak in month of December (Table 1).

Table 1. Clinical presentation of 94 leptospirosis cases

Symptoms	Number (%)
Fever	94(100)
Breathlessness	32(34)
Jaundice	28(29.7)
Nausea, vomiting	24(26)
Generalised weakness	14(15)
Diarrhoea	9(10)
Dry Cough	9(10)
Burning micturition	9(5)
Abdominal pain	5(5)
Constipation	5(5)
Joint pain	5(5)
Sub conjunctival haemorrhage	5(5)
Haematuria	5(5)
Altered sensorium	5(5)
Headache	5(5)

Fever (94/94 =100%) was the most common symptom, followed by breathlessness (32/94=34%), Jaundice (28/94 =30%). Nausea and vomiting 26%,

Generalised weakness 15%, Diarrhoea 10%, Dry cough 10%, Burning micturition 5%, were other symptoms (Table 2).

Table 2. Laboratory findings of Leptospirosis cases

Lab parameters	Number (%)
Thrombocytopenia	32(34)
Hyperbilirubinemia	28(30)
Elevated AST, ALT	27(29)
Anemia <10.0	27(28)
Leukocytosis >11000/mm	24 (20)
Increased prothrombin time	16(17)
D-dimer positive	13(14)

The laboratory parameters seen among the seropositive leptospira cases were Thrombocytopenia 32(34%),

Hyperbilirubinemia 28(30%), raised transaminases 27(29%) followed by low Hb levels 27 (28%).

Table 3. Complications seen among the patients diagnosed with Leptospirosis by IgM ELISA leptospira.

Complications	Number (%)
Total	51(54.2)
SARI	24(26)
Renal failure ( Creatinine level >1.4mg/dl)	11(12)
Encephalopathy	8(9)
Conjunctivitis	8(9)

About 54.2% of the total leptospira positive cases had complications. SARI 24(26%) was common complication followed by renal failure 11 (12%).

### Discussion

The reports of an increase in leptospira cases imply knowledge and awareness about leptospirosis. In rural settings, the diagnosis of leptospirosis was often by chance due to limited diagnostic facilities. The prevalence of leptospirosis in Kolar is 12.5% (94/750). This study was conducted in a rural area; it was observed that most of the patients were between 41-60 years of age, followed by those between 21-40 years (Figure 1). The study in the coastal part of Karnataka [5] has similar findings, whereas in Chennai, the 20-40 years age group was affected [6]. Our study findings imply that the working population involved in outdoor activities and the migratory population were the populations affected.

In the gender-wise distribution of cases, a male preponderance was seen in our study (Figure 2). Our findings are in concordance with the study done by Padma et al. [6]. The male preponderance is seen as they are more involved in agricultural activities, construction of buildings, and migratory activities to other areas for better job opportunities compared to females. Leptospirosis, a tropical

disease, peaks between July and October [9] (Figure 3). The positivity rate of leptospirosis in South India is 25.6%, while 3.5%, 3.3%, 3.1%, and 8.3% were seen in the western, central, eastern, and northern parts of India, respectively [9]. In our study, an unusual rise in cases was seen in March with a peak in April and May. This pattern of rise is probably due to unexpected rainfall in March due to the effect of a cyclone. The rise in cases during July to October is similar to the findings of the study done in Chennai [6].

Fever was the usual symptom in our study (Table 1). This finding is in concordance with the studies done in South India [10] and North India [11]. Severe acute respiratory illness was the most frequent complication seen in our study. In 34% of the cases, breathlessness was the most frequent presentation. A similar study done by Ahmad N in North India [12] reports breathlessness in 33.3% of cases, but studies from the West report pulmonary involvement in 20-70% of cases [13]. The pulmonary manifestations in leptospirosis are probably due to vasculitis mediated by toxins and an exaggerated immune response [14].

Jaundice was a presenting complaint in 30% of cases. We found high bilirubin levels in 30% and raised transaminases in 34% of cases (Table 2). The study done by Sunil [11] reports

hyperbilirubinemia in 76.7% and raised transaminases in 81.4% of cases. The rise in transaminases is due to the disruption of cellular cohesion, plugging of bile canaliculi, and occasional acute inflammatory infiltrates<sup>15</sup>. Other gastrointestinal symptoms noted in the study were nausea and vomiting (26%), diarrhea (10%), and abdominal pain (5%). Haake et al. opine that these symptoms may be associated with raised transaminase levels or acute pancreatitis [16]. These symptoms contribute indirectly to dehydration, leading to acute renal failure if not treated in time.

A few neurological presentations like headache (5%), altered sensorium (5%), and encephalopathy (9%) were noted in our study (Table 3). In a similar study done in North India, altered sensorium (38.4%), headache (37.2%), and cases with focal neurological deficits (2.3%) were observed [11]. Leptospirosis contributes to aseptic meningitis in 5-13% of cases [11]. In endemic areas, neuroleptospirosis is included in the differential diagnosis in patients presenting with hepatorenal dysfunction [17].

About 5% of cases showed haematuria and subconjunctival haemorrhages were noted. (Table 2). Thrombocytopenia (29%), increased prothrombin time (17%), and D-dimer positivity (14%) shows the association of haemorrhagic manifestations with leptospirosis. The probable hypothesis for the haemorrhagic complications in leptospirosis is the effect of leptospira toxins on the vascular endothelium leading to increased permeability, the participation of cytotoxins, and the presence of disseminated intravascular coagulation<sup>18</sup>. Our findings were in consensus with the study done in coastal South India [10].

Decreased haemoglobin levels (<10 gm/dL) were observed in 28% of the study population. This finding was observed in 57% of patients in a study done in North India [11]. Anemia probably occurs due to endothelial damage and haemolysis<sup>19</sup>. From the literature review, it is evident that haemorrhage in leptospirosis showed a 71.75% risk of mortality [20].

The increase in WBC count in leptospirosis cases occurs due to increased bacterial counts and immunological reactions [21]. A similar report of WBC count >15,000 / $\mu$ L was found more often in icteric leptospirosis than in non-icteric cases<sup>19</sup>. In our study, 20% of the cases showed an increase in WBC counts. A similar finding was noted in 62.5% of cases in a study done by Nadeem [12]. The case fatality rate due to leptospirosis varies from region to region. Out of 94 IgM ELISA-positive cases, 54% presented with complications, mortality was noted in 2%, and the rest recovered without complications. The study done in coastal South India reports a 3.5% case fatality rate [10].

The epidemiological and clinical patterns of infectious diseases evolve with time and place; this applies even to leptospirosis [22]. Hepatic and renal complications were the most common among the leptospirosis cases reported from Karnataka in 2004 to 2005 [23]. In our study, pulmonary complications were most common compared to hepatic or renal involvement. This implies changing patterns in the clinical presentation of leptospirosis over the years.

## Conclusion

The unexpected changes in seasonal patterns have an influence on the sudden rise in leptospira cases. Decreased

haemoglobin levels, raised WBC count, and low platelet count can be considered in predicting the severity of leptospirosis. The morbidity and mortality due to leptospirosis can be decreased by a better understanding of environmental factors, early detection with rapid tests, and predicting the severity of illness using laboratory parameters.

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**Conflicts of interest** The authors declares that they do not have conflict of interest.

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