

## STUDY OF HUMAN LEPTOSPIROSIS IN A TERTIARY CARE HOSPITAL, VISAKHAPATNAM

THAMMINA MEHER SRI SAI SUDHA VANI<sup>1b</sup>

Department of Microbiology, Andhra Medical College, King George Hospital Visakhapatnam-530002, Andhra Pradesh, India

\*Corresponding author: Thammina Meher Sri Sai Sudha Vani; \*Email: [drvani286@gmail.com](mailto:drvani286@gmail.com)

Received: 15 Sep 2024, Revised and Accepted: 25 Oct 2024

### ABSTRACT

**Objective:** Prevalence of leptospirosis in humans is found in an alarming number in recent times. This endemic zoonotic disease is widespread and potentially fatal. It is usually seen in areas with poor socioeconomic conditions, water stagnation, garbage accumulation, which becomes breeding sites for the rodents. Infection may turn epidemic during monsoon. Reservoir of infection is rat scientifically named as *Rattus rattus* and infection results from direct or indirect exposure to host animals that carry the pathogen in their renal tubules and shed pathogenic leptospires in their urine. The main objective of this study was to estimate the seropositivity of leptospirosis in patients presenting with undifferentiated acute febrile illness for 5 to 7 days during one year period from February 2023 to February 2024 in a tertiary care hospital, Visakhapatnam, India.

**Methods:** A total of 279 blood samples received from suspected cases of leptospirosis were subjected to IgM ELISA.

**Results:** Out of total 279 cases, 20 were positive for leptospirosis (OD ratio  $\geq 1.00$ ). All the positive cases presented with a fever more than 99.5°F, chills and headache with elevated serum procalcitonin levels. Peak incidence of cases was recorded during July and August 2023.

**Conclusion:** Seroprevalence of human leptospirosis in this study was found to be 7.2%.

**Keywords:** Zoonosis, Leptospirosis, Rodents, Seropositivity, IgM ELISA

© 2024 The Authors. Published by Innovare Academic Sciences Pvt Ltd This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by/4.0/>) DOI: <https://dx.doi.org/10.22159/ijcpr.2024v16i6.5099> Journal homepage: <https://innovareacademics.in/journals/index.php/ijcpr>

### INTRODUCTION

Leptospirosis is known to be endemic in Indian subcontinent since the early 20<sup>th</sup> century. Human leptospirosis is a zoonotic disease caused by spirochete bacteria *Leptospira interrogans*, transmitted by rodent, *Rattus rattus*. Soil or water contaminated with rodent urine or faeces is the commonest and usual source of infection. Leptospirosis causes flu-like symptoms that can worsen into life threatening Weil's Syndrome, which is usually seen in small number of untreated population [1]. Leptospirosis is frequently under diagnosed, due to nonspecific symptoms in the early course of disease [2]. Diagnosis of leptospirosis may be made by demonstration of bacteria microscopically in blood or urine samples, culture and identification by Immunofluorescence technique or dark ground microscopy, which is not available at every laboratory. IgM ELISA has been extensively used among serological tests for diagnosis of Leptospirosis in low-resource settings [3]. The aim of this study, during one year period, is to estimate the seropositivity of

leptospirosis in our unit.

### MATERIALS AND METHODS

This prospective study was conducted from February 2023 to February 2024. Total of 279 blood samples of patients admitted with a history of fever >99.5°F with chills for 5 to 7 d, headache, muscle aches especially lower limb cramps, vomiting, diarrhoea were received in the Virology Laboratory, Department of Microbiology, tertiary care hospital, Viskhapatnam. Serum was separated and stored at 2-8 °C till further processing. Age group and gender of this study was 15 to 25 y, males (table 1). Seasonal occurrence of cases during monsoon have also been recorded (table 2). Seronegative for dengue, typhoid, chickungunya and malaria was the inclusion criteria of the study. IgM ELISA was performed, by RecombiLISA (CTK Biotech, Inc) for the qualitative detection of anti-*Leptospira interrogans* IgM in human serum or plasma. Study of biochemical parameters in all the positive cases was also done.

Table 1: Age-wise distribution of leptospirosis

Age in years	Total tested, n=279	Total positives, n=20	Percentage (%)
15	23	2	8.7
16	29	4	13.8
17	13	1	7.7
18	07	1	14.3
19	11	2	18.2
20	12	1	8.3
21	09	0	0
22	16	2	12.5
23	18	5	27.8
24	11	1	9.1
25	13	1	7.7

### RESULTS

Out of total 279 cases, 20 were positive for leptospirosis. Age wise distribution of higher incidence was seen in 23 y. Peak incidence of cases was recorded during July and August 2023 in this study.

Clinical profile among leptospirosis was fever >99.5°F with chills (20 cases), headache (20 cases), lower limb cramps (16 cases), rash (8 cases), conjunctival injection (12 cases), jaundice (8 cases), vomiting (14 cases), diarrhoea (8cases) (table 3). Laboratory tests for biochemical analysis was carried out for medical management.

Findings were thrombocytopenia (17 cases), elevated serum ALT/AST (15 cases), elevated procalcitonin (20 cases), elevated serum creatinine (6 cases), leucocytosis (8 cases), hyponatremia (15 cases), hypokalemia (16 cases), metabolic acidosis (11 cases),

hyperbilirubinemia (8 cases), elevated serum CRP (18 cases), hyperglycemia (16 cases), leucopenia (12 cases) (table 4).

Specimen OD ratio  $\geq 1.0$  in *Leptospira* IgM was interpreted as positive.

**Table 2: Month-wise distribution of leptospirosis cases**

Month	Total cases tested, n=279	Total positives, n=20	Percentage (%)
February 2023	8	0	0
March 2023	14	1	7.1
April 2023	13	0	0
May 2023	09	0	0
June 2023	26	2	7.7
July 2023	38	6	15.8
August 2023	42	3	7.1
September 2023	31	2	6.4
October 2023	29	2	6.9
November 2023	24	1	4.2
December 2023	19	1	5.3
January 2024	16	1	6.2
February 2024	10	1	10

**Table 3: Clinical profile among positive cases of leptospirosis**

Signs/Symptoms	Total positives n=20	Percentage %
Fever with chills	20	100
Headache	20	100
Lower limb cramps	16	80
Rash	08	40
Conjunctival injection	12	60
Jaundice	08	40
Vomitings	14	70
Diarrhoea	08	40

**Table 4: Laboratory parameters among positive cases of leptospirosis**

Laboratory parameter	Readings in total positives, n=20	Percentage %
Thrombocytopenia	14	70
↑ ALT/AST	16	80
↑ Procalcitonin	20	100
↑ Serum Creatinine	06	30
Leucocytosis	08	40
Hyponatremia	11	55
Hypokalemia	08	40
Metabolic Acidosis	10	50
Hyperbilirubinemia	08	40
↑ CRP	18	90
Hyperglycemia	14	70
Leucopenia	12	60

## DISCUSSION

Leptospirosis is a re-emerging infectious disease with increasing incidence in developing countries like India. Though it is subclinical or mild in most cases, during incubation period, severe illness may end fatally in untreated cases [4]. In this prospective study, seropositivity of leptospirosis was found to be 7.2%. Higher incidence was seen in age group of 23 y (27.8%), who were sanitation workers, occupational farmers. Increased cases were recorded in July, implying correlation between monsoon season and emergence of leptospira infection. The probable reason might be due to breeding season of the rodent, *Rattus rattus*; which have enormous ability to excrete large number of leptospirae in the urine or faeces, which is the main source of contamination incriminating human leptospirosis [5]. Most common laboratory finding were elevated procalcitonin levels, elevated liver enzymes, thrombocytopenia, hypoglycemia and leucopenia [6].

IgM antibodies in leptospirosis begins as early as first week of illness. IgM ELISA has extremely been used for diagnosis of leptospirosis in low resource settings. Performance characteristic of the kit has a relative sensitivity of 86.7%, specificity of 96.8% with an overall

agreement of 94.4%. Specimen OD ratio  $\geq 1.00$  was interpreted positive and value  $< 1.00$  as negative [7]. No equivocal results in this study.

If antibiotics are used to treat leptospirosis, they should be initiated as soon as the diagnosis, despite initial serological results. Early treatment has been shown to offer the best clinical outcomes [8]. Symptomatic and supportive treatment with oral doxycycline, oral antipyretics, analgesics, intravenous 3<sup>rd</sup> generation cephalosporins, intravenous hydration, electrolyte supplementation, platelet transfusion was undertaken [9]. No mortality in this study. Patient review visit was recommended after 5 d of discharge. Programme for Prevention and Control of Leptospirosis has been initiated by Government of India as a Pilot Project during the XI<sup>th</sup> Five-year plan, with approval under financial year 2021 –2022 under Scheme F of the NCDC umbrella scheme with a prime objective to reduce morbidity and mortality due to leptospirosis [10-13].

## CONCLUSION

Leptospirosis re-emerging as an endemic illness, with threat during monsoon; wherein focus should be on strict rodent control

measures, public awareness about personal hygiene, safe garbage dumping practices, improving sewage and draining facilities are necessary. Leptospirosis should be included in differential diagnosis of acute febrile cases and treated for satisfactory outcomes. There should be a proper scope to deal with sudden outbreaks.

#### ACKNOWLEDGMENT

The author would like to thank the contribution of laboratory personnel, VRDL, Department of Microbiology.

#### FUNDING

Nil

#### AUTHORS CONTRIBUTIONS

All authors have contributed equally

#### CONFLICTS OF INTERESTS

There are no conflicts of interest

#### REFERENCES

1. Merck manuals leptospirosis. Available from: <https://www.merckmanuals.com/professional/infectious-diseases/spirochetes/leptospirosis>.
2. Gupta R, Suri P. Seroprevalence of leptospirosis in a Tertiary Care Hospital a retrospective study. *Journal of Gastrointestinal Infections*. 2012;2(1):56-8. doi: [10.5005/jogi-2-1-56](https://doi.org/10.5005/jogi-2-1-56).
3. Ananthnarayan R, Paniker CK. Rickettsiaceae spirochetes. In: *Textbook of microbiology*. 9<sup>th</sup> ed. Universities press; 2013. p. 380-4, 405-14.
4. Bhatia M, Umapathy BL, Navaneeth BV. An evaluation of dark field microscopy culture and commercial serological kits in the diagnosis of leptospirosis. *Indian J Med Microbiol*. 2015;33(3):416-21. doi: [10.4103/0255-0857.158570](https://doi.org/10.4103/0255-0857.158570), PMID [26068347](https://pubmed.ncbi.nlm.nih.gov/26068347/).
5. Venkatesh S, Chabra M, Balakrishnan GN. Zoonotic diseases of public health importance; 2016.
6. Gautam G, Jais MB, Kaur R, Dhakkad MS. Human leptospirosis in patients with undifferentiated acute febrile illness in a Tertiary Care Hospital in New Delhi. *Int J Res Med Sci*. 2021;9(2):485-8. doi: [10.18203/2320-6012.ijrms20210428](https://doi.org/10.18203/2320-6012.ijrms20210428).
7. Recombi LI. *Leptospira Igm ELISA for qualitative detection of anti-Leptospira interrogans IgM in human serum or plasma*. Mfd. By. CA: M/S CTK Biotech Inc; 2020. p. 92064.
8. Sachu A, Madhavan A, Vasudevan A, Vasudevapanicker J. Prevalence of dengue and leptospirosis co-infection in a Tertiary Care Hospital in South India. *Iran J Microbiol*. 2018;10(4):227-32. PMID [30483374](https://pubmed.ncbi.nlm.nih.gov/30483374/).
9. Speelman P. *Leptospirosis*. Harrison's principle of internal medicine. 14<sup>th</sup> ed. 2020. p. 1036-8.
10. National centre for Disease Control Ministry of health and Family Welfare government of India. Designed and developed by IQVIA ADB TA support; 2024.
11. Patil DY, Dahake R, Roy S, Mukherjee S, Chowdhary A, Deshmukh R. Prevalence of leptospirosis among dogs and rodents and their possible role in human leptospirosis from Mumbai India. *Indian J Med Microbiol*. 2014;32(1):64-7. doi: [10.4103/0255-0857.124319](https://doi.org/10.4103/0255-0857.124319), PMID [24399392](https://pubmed.ncbi.nlm.nih.gov/24399392/).
12. Velineni S, Asuthkar S, Umabala P, Lakshmi V, Sritharan M. Serological evaluation of leptospirosis in Hyderabad AP; a retrospective hospital-based study. *Indian J Med Microbiol*. 2007;25(1):24-7. doi: [10.1016/S0255-0857\(21\)02229-5](https://doi.org/10.1016/S0255-0857(21)02229-5).
13. Faine S. Guidelines for the control of leptospirosis. WHO Offset Publ; 1982. p. 67. Available from: <https://www.who.int/handle/10665/37219>.