

## Original Research Article

# Comparison of clinical profile of leptospirosis patients during post flood and non-post flood periods

Bhagyanath, Jacob K. Jacob\*, Suma Samuel, Rakhi R. Kurup, Reshnu Ravindran

Department of Medicine, Government Medical College, Kalamassery, Ernakulam, Kerala, India

**Received:** 15 April 2021

**Revised:** 02 June 2021

**Accepted:** 03 June 2021

**\*Correspondence:**

Dr. Jacob K. Jacob,

E-mail: [jacobkjacob@yahoo.com](mailto:jacobkjacob@yahoo.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** Leptospirosis is a zoonotic infection with high mortality rates. The incidence of leptospirosis is more during floods. The aim of the study was to find the difference in clinical profile of leptospirosis during post flood and non-post flood periods.

**Methods:** This was a cross sectional observational study comparing the clinical profile of leptospirosis patients admitted in Government Medical College Ernakulam, Kerala during the post flood period of 2018 with that of non-post flood period. The data with respect to clinical features and investigations were retrieved from the hospital records.

**Results:** Out of the 42 patients studied 15 were from the post flood period and the rest 27 patients were from the non-post flood period. The mean age in the post flood group was 40 years and that in the non-post flood group 43 years. Myalgia, icterus and calf tenderness was significantly higher in the post flood group. The mean platelet count was significantly lower in the non-post flood period (p value=0.011). Mean serum urea and total bilirubin were significantly higher in the post flood group compared to non-post flood group (p value=0.001). Cardiac complications were seen only among the post flood group.

**Conclusions:** The clinical profile and complications were different in leptospirosis patients during post flood and non-post flood periods. These findings help the treating physicians to formulate different approaches in treating patients during the post flood and non-post flood period.

**Keywords:** Leptospirosis, Flood, Clinical profile

### INTRODUCTION

Leptospirosis caused by *Leptospira* is one of the most widespread zoonoses in the world. The incidence of leptospirosis outbreaks is increasing in both developed and developing nations in recent years.<sup>1</sup> It is more commonly seen in the tropical regions, because of the long survival of *Leptospira* in the environment and frequent exposure of humans to contaminated environments.<sup>2</sup> Even though leptospirosis is considered to be a rural disease, people living in cities may also be exposed, notably to rats.<sup>3</sup> Because of the changing rainfall patterns and rising temperatures, climate change is expected to have a

significant effect on the burden of infectious diseases that are transmitted through contaminated water.<sup>4</sup>

Leptospirosis has a very high case fatality rate ranging from 5-30%. Renal failure, cardiopulmonary failure, and widespread haemorrhage are the important causes of death.<sup>3</sup> Weekly antimicrobial prophylaxis with doxycycline has been found to be protective against clinical leptospirosis during high levels of water exposure and outbreaks and may even reduce mortality. But conclusive evidence for this is still lacking.<sup>5</sup> Floods are an important cause of leptospirosis outbreaks. Leptospirosis has been a major threat to the state of Kerala for many years with more than 1000 cases being reported annually.<sup>6</sup>

The 2018 flood in Kerala state was an important cause for the rise in leptospirosis cases during that year. The source from where the patient gets exposed to contaminated water and the duration of exposure are different during the flood and non-flood periods.

The aim of the study was to find out the difference in clinical profile during the post flood and non-post flood period.

**Objectives**

*Primary objective*

The objective of this study was to investigate the clinical profile of leptospirosis patients admitted in Government Medical College, Ernakulam.

*Secondary objective*

The objective of this study was to compare the clinical profile of post flood leptospirosis with non-post flood leptospirosis.

**METHODS**

This was a cross sectional observational study done on leptospirosis patients admitted to Government medical college, Ernakulam, Kerala during a year period from 1<sup>st</sup> January 2018 to 31<sup>st</sup> December 2018. Patients more than 12 years of age with leptospirosis confirmed by either ELISA or PCR or both were included in the study.

All other cases of acute febrile illness, patients with bleeding disorders and patients with cardiac/liver/respiratory diseases were excluded. Details of the patients including clinical features and laboratory features were noted. Patients were divided into two groups. Post flood and non-post flood. Post flood period was taken as the 6 weeks from 15<sup>th</sup> August 2018 to 30<sup>th</sup> September 2018.

Data was coded and entered into MS excel and analysis was done using SPSS software. Quantitative variables

were summarized using mean and SD. Association between quantitative variables were tested using t test. Ethical clearance was obtained from Institutional Ethical Committee.

**RESULTS**

A total of 42 leptospirosis confirmed patients during the study period were studied. Out of them 15 were after the post flood period and the rest 27 patients were from the non-post flood period.

Majority of the patients with leptospirosis did not take doxycycline prophylaxis. Therapeutic crystalline penicillin was given to majority of the patients (Table 1).

Males outnumbered females in the post-flood period and also during non-post flood period. Out of the 42 patients, 33 were males and 9 were females. History of contact with contaminated water was obtained significantly higher during post-flood period than non-post flood period (Table 2).

The mean age in the post flood group was 40 years and that in the non- post flood group 43 years.

Myalgia, icterus and calf tenderness was significantly higher in the post-flood group (Table 3).

There were no CNS features like convulsions or neck stiffness in any of the patients. The mean platelet count was significantly lower in the non-post flood period. Mean serum urea and total bilirubin were significantly higher in the post-flood group compared to non-post flood group (Table 4).

Cardiac complications were seen among 4 post flood patients, but not among non-post flood patients. There was no significant difference in renal and hepatic complications between the post flood and non-post flood group (Table 5).

There was only one death each in the post flood and non-post flood period.

**Table 1: Comparison of characteristics among post flood and non-post flood patients.**

Characteristics	Post flood (%)	Non-post flood (%)	Total (%)
Male	13 (86.66)	20 (74.07)	33 (78.57)
Contact with contaminated water	13 (86.66)	10 (37.03)	23 (54.76)
Doxycycline prophylaxis	2 (13.33)	5 (18.5)	7 (16.66)
Crystalline penicillin	13(86.66)	20 (74.07)	33 (78.57)

**Table 2: Contact with contaminated water in leptospirosis patients.**

Contact with contaminated water	Post flood	Non-post flood	Total
Yes	13	10	23
No	2	17	19
Total	15	27	42

$\chi^2=9.587$ , p value=0.002.

**Table 3: Clinical features of leptospirosis patients.**

Clinical features	Post flood	Non-post flood	Total	P value
Fever	15	27	42	
Myalgia	15	17	32	0.007
Vomiting	6	7	13	0.344
Headache	4	6	10	0.746
Convulsions	0	0	0	
Loose stools	2	6	8	0.482
Abdominal pain	2	8	10	0.235
Hemoptysis	0	0	0	
Oliguria/anuria	6	4	10	0.066
Bleeding manifestations	2	2	4	
Rash	2	2	4	
Icterus	7	2	9	0.003
Enlarged lymph nodes	0	0	0	
Calf tenderness	5	0	5	0.001
Conjunctival congestion	2	6	8	0.482
Hepatomegaly	0	1	1	
Hypotension	0	4	4	
Chest crepitations	2	1	3	
Splenomegaly	0	2	2	
Neck rigidity	0	0	0	

**Table 4: Laboratory features of leptospirosis patients.**

Laboratory features	Post flood (mean)	Non-post flood (mean)	P value
Hemoglobin (g/dl)	12±0.45	11.96±0.35	0.810
Total count (cells/cumm)	10534±1354	9800±714	0.244
Neutrophil (%)	72.24±5.48	67.89±3.26	0.703
Platelet count (lakhs)	2.26±0.49	1.27±0.16	0.011
ESR (mm/hour)	55±8	53±5.6	0.925
S. urea (mg/dl)	90.46±28.8	48.59±6.34	0.001
S. creatinine (mg/dl)	2.45±0.65	1.74±0.31	0.065
S. sodium (mmol/l)	134±0.94	131.4±0.88	0.809
S. potassium (mmol/l)	3.58±0.13	3.65±0.11	0.817
T. bilirubin (mg/dl)	4.96±2.01	1.67±0.27	0.009
ALT (IU/l)	65.86±16.1	57±8.74	0.385
AST (IU/l)	61.33±9.76	63.81±12.34	0.765
ALP (IU/l)	111±11.21	105.6±10	0.360
S. albumin (mg/dl)	3.14±0.15	3.35±0.1	0.973
RBS (mg/dl)	105.9±7.29	146.9±17.69	0.091

**Table 5: Complications in leptospirosis patients.**

Complications	Post flood	Non-post flood	Total	P value
Cardiac	4	0	4	
Renal	7	14	21	0.747
Hepatic	11	12	23	0.071
Any complication	11	17	28	0.495

## DISCUSSION

Kerala is a state with a large number of paddy fields and outbreaks of leptospirosis. Floods also contribute to many leptospirosis outbreaks. In 2018, Kerala witnessed heavy rainfall followed by a massive flood. We studied the clinical profile of leptospirosis patients and compared the

profile of leptospirosis during flood time with that of non-flood time. In our study, males outnumbered females both during the flood period and the non-flood period.

This was comparable to many other studies and was because males were the predominant group who went outside for work and got contact with contaminated

water.<sup>7-9</sup> The mean age group was comparable in both groups and was 40 years in post flood and 43 years in the non-post flood group. This was comparable to a study by Mendoza et al where the mean age group was 38.9 years.<sup>7</sup> But the most common age group involved was 16-30 years in another study by Rachna et al.<sup>8</sup>

History of contact with contaminated water was significantly higher in the post flood period compared to non-post flood period. Most of the patients did not take oral doxycycline prophylaxis on time. This was because of the decreased awareness among people regarding the need for doxycycline prophylaxis. But crystalline penicillin was administered to most of the patients after admission. Prophylaxis with oral doxycycline was found to reduce the number of leptospirosis cases after high-risk exposure in many studies.<sup>10,11</sup> A study by Chusri et al showed that a single dose of 200 mg doxycycline prophylaxis appears to be protective against leptospiral infection but not against leptospirosis. It was also demonstrated that the effect of doxycycline was more when there was a lacerated wound.<sup>12</sup> Delayed initiation of therapeutic antimicrobials was related to an increased risk of death.<sup>13</sup>

Myalgia was seen as a symptom in all the patients in the post flood period. Myalgia and conjunctival suffusion were seen as the most common presenting symptoms apart from fever in a study by Amilasan et al.<sup>13</sup> Fever, myalgia, and headache were the common symptoms in a study conducted by Parmar et al.<sup>14</sup> Icterus and calf tenderness were also seen significantly higher among post flood leptospirosis patients. This was similar to another study in Kerala.<sup>9</sup>

Mean platelet count was significantly lower among the non-post flood group patients. In a study by Elizabeth et al showed that thrombocytopenia was associated with lengthy stay and acute kidney injury during hospital stay in leptospirosis patients. And there was a tendency towards more frequent usage of crystalline penicillin in patients with thrombocytopenia.<sup>15</sup> Thrombocytopenia was seen in 56% of leptospirosis patients in a study conducted in Mumbai where majority had contact with flood water.<sup>16</sup> Serum urea and total bilirubin were significantly higher among post flood group. Cardiac complications were seen only among post flood patients. In a study by Agampodi et al, myocarditis was seen among 4 out of the 32 leptospirosis patients studied during the post flood period.<sup>17</sup>

Hepatic and renal were the commonest complications in both post flood and non-post flood period. This was similar to a study conducted by Clerke et al in Gujarat during monsoon season.<sup>18</sup>

### Limitations

The sample size was small because the study duration was only one year. Moreover, many cases of probable leptospirosis cases were excluded from the study as there

was no serological positivity. No statistical inference could be made regarding mortality as there was only one death each in the two groups.

### CONCLUSION

The clinical profile, complications and risk factors for death in leptospirosis patients varied in different studies depending on the geographical area affected. We also noticed that the clinical profile and complications were different among post flood and non-post flood leptospirosis patients from the same locality. This helps the treating physicians to formulate different approaches in treating patients during the post flood and non-post flood period.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

### REFERENCES

1. Sehgal SC. Epidemiological patterns of leptospirosis. *Indian J Med Microbiol.* 2006;24(4):310-1.
2. Kawaguchi L, Sengkeopraseuth B, Tsuyuoka R, Koizumi N, Akashi H, Vongphrachanh P, et al. Seroprevalence of leptospirosis and risk factor analysis in flood-prone rural areas in Lao PDR. *Am J Trop Med Hyg.* 2008;78(6):957-61.
3. WHO. Human leptospirosis: guidance for diagnosis, surveillance and control. Geneva: WHO; 2003: 292.
4. Shuman EK. Global climate change and infectious diseases. *N Engl J Med.* 2010;362(12):1061-3.
5. Dechet AM, Parsons M, Rambaran M, Mohamed RP, Florendo CA, Persaud S, et al. Leptospirosis outbreak following severe flooding: a rapid assessment and mass prophylaxis campaign; Guyana, January-February 2005. *PLoS One.* 2012;7(7):39672.
6. James S, Sathian B, Teijlingen E, Asim M. Outbreak of Leptospirosis in Kerala. *Nepal J Epidemiol.* 2018;8(4):745-7.
7. Mendoza MT, Roxas EA, Ginete JK, Alejandria MM, Roman ADE, Leyritana KT, et al. Clinical profile of patients diagnosed with leptospirosis after a typhoon: A multicenter study. *Southeast Asian J Trop Med Public Health.* 2013;44(6):1021-35.
8. Rachna P, Vipul S, Bansal RK, Pawar AB, Vandana D, Kalpana D, et al. Post-Flood Profile Of Leptospirosis Cases At Teaching Hospital Of Municipal Medical College In Surat City. *Natl J Community Med.* 2010;1(1):9-11.
9. Kuriakose M, Eapen CK, Paul R. Leptospirosis in Kolenchery, Kerala, India: epidemiology, prevalent local serogroups and serovars and a new serovar. *Eur J Epidemiol.* 1997;13(6):691-7.
10. Schneider MC, Velasco HJ, Min KD, Leonel DG, Baca CD, Gompper ME, Hartskeerl R, et al. The Use of Chemoprophylaxis after Floods to Reduce the

- Occurrence and Impact of Leptospirosis Outbreaks. *Int J Environ Res Public Health.* 2017;14(6):594.
11. Supe A, Khetarpal M, Naik S, Keskar P. Leptospirosis following heavy rains in 2017 in Mumbai: Report of large-scale community chemoprophylaxis. *Natl Med J India.* 2018;31(1):19-21.
  12. Chusri S, Neil EB, Hortiwakul T, Charernmak B, Sritrairatchai S, Santimaleeworagun W, et al. Single dosage of doxycycline for prophylaxis against leptospiral infection and leptospirosis during urban flooding in southern Thailand: a non-randomized controlled trial. *J Infect Chemother.* 2014;20(11):709-15.
  13. Amilasan AS, Ujiie M, Suzuki M, Salva E, Belo MC, Koizumi N, Yoshimatsu K, et al. Outbreak of leptospirosis after flood, the Philippines, 2009. *Emerg Infect Dis.* 2012;18(1):91-4.
  14. Parmar G, Kava D, Mehta S, Mallick K, Prasad R, Bansal RK, Rupani M. Socio-demographic, Clinical and Laboratory Profile of Leptospirosis Cases registered at SMIMER, Surat. *Natl J Community Med.* 2013;4(3):507-11.
  15. Daher EF, Silva GB, Silveira CO, Falcao FS, Alves MP, Mota JA, et al. Factors associated with thrombocytopenia in severe leptospirosis (Weil's disease). *Clinics.* 2014;69(2):106-10.
  16. Sharma J, Suryavanshi M. Thrombocytopenia in leptospirosis and role of platelet transfusion. *Asian J Transfus Sci.* 2007;1(2):52-5.
  17. Agampodi SB, Dahanayaka NJ, Bandaranayaka AK, Perera M, Priyankara S, Weerawansa P, et al. Regional differences of leptospirosis in Sri Lanka: observations from a flood-associated outbreak in 2011. *PLoS Negl Trop Dis.* 2014;8(1):2626.
  18. Clerke AM, Leuva AC, Joshi C, Trivedi SV. Clinical profile of leptospirosis in South gujarat. *J Postgrad Med.* 2002;48(2):117-8.

**Cite this article as:** Bhagyanath, Jacob JK, Samuel S, Kurup RR, Ravindran R. Comparison of clinical profile of leptospirosis patients during post flood and non-post flood periods *Int J Res Med Sci* 2021;9:1913-7.