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

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*Correspondence:
Dr. Jacob K. Jacob,
E-mail: jacobkjacob@yahoo.com

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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 Leptospires 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.1 It is more commonly seen in the tropical regions, because of the long survival of Leptospires in the environment and frequent exposure of humans to contaminated environments.2 Even though leptospirosis is considered to be a rural disease, people living in cities may also be exposed, notably to rats.3 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.4

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.3 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.5 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.6
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 1st January 2018 to 31st 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 15th August 2018 to 30th 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.

| 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) |

| 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     | 0.003   |
| Icterus                    | 7          | 2              | 9     |         |
| 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...
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. But the most common age group involved was 16-30 years in another study by Rachna et al.

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. 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. Delayed initiation of therapeutic antimicrobials was related to an increased risk of death.

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. Fever, myalgia, and headache were the common symptoms in a study conducted by Parmar et al. Icterus and calf tenderness were also seen significantly higher among post flood leptospirosis patients. This was similar to another study in Kerala.

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. Thrombocytopenia was seen in 56% of leptospirosis patients in a study conducted in Mumbai where majority had contact with flood water. 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.

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.

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.

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