

# Lassa fever outbreak in adolescents in North Central Nigeria: report of cases

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## Abstract

**Background:** Lassa fever (LF) is a viral haemorrhagic fever endemic to West Africa. The clinical presentation and course is variable, making diagnosis difficult.

**Aim:** To report the outbreak and identify the common clinical presentations of LF in paediatric patients in Jos, Plateau State, North Central, Nigeria.

**Methods:** This was a retrospective review of patients managed for LF during the June–August 2017 outbreak. LF was suspected in cases with: fever of less than 3 weeks' duration that had not responded to antimalarials or antibiotics, myalgia, abdominal pain, prostration and history of contact with any person diagnosed with LF. LF was confirmed by a positive reverse transcriptase polymerase chain reaction test (RT-PCR).

**Results:** Ten adolescents were studied. The common presenting complaints were fever (100%), prostration (90%) and headache (70%) while the commonest clinical signs were pyrexia (temperature >38.0°C; 90%), prostration (80%) and abdominal tenderness (80%). Leukocytes were present in urine in 60%. Eight individuals recovered fully, one adolescent died and one developed intestinal perforation necessitating laparotomy.

**Conclusion:** In settings such as North Central Nigeria, LF should be suspected in any patient with fever that is unresponsive to antimalarials and antibiotics, especially in the presence of prostration, tachypnoea, tachycardia or abdominal tenderness. Early diagnosis and treatment is needed to reduce mortality from the disease and protect against transmission to health personnel.

Keywords: Lassa fever, adolescent presentation, ribavirin, Nigeria

## Introduction

Lassa fever (LF) is a viral haemorrhagic fever (VHF) endemic to countries in West Africa. It is a zoonotic disease whose animal reservoir is the 'multimammate rat', a rodent of the genus *Mastomys*, which shed virus in their urine and faeces [1,2]. LF is known to be endemic in Benin, Ghana, Guinea, Liberia, Mali, Sierra Leone and Nigeria [1,3].

The clinical course of the disease is variable and made difficult by the wide spectrum of clinical manifestations, ranging from asymptomatic to multi-organ system failure and death. The overall case-fatality rate is 1% while the observed case-fatality rate among patients hospitalised with severe forms of LF is 15–50% [1–3].

Lassa virus is classified as a Biosafety Level 4 (BSL4) and National Institutes of Allergy and Infectious Disease (NIAID) Biodefense category A agent, with no vaccine available for use in humans to date. The only available treatment, ribavirin, is effective if administered early in infection (within the first 6 days after disease onset) [2,3].

According to the World Health Organization (WHO), the current outbreak of LF in Nigeria started in December 2016 and involved 17 states of Nigeria. By June 2017, there were a total of 501 suspected cases including 104 deaths with a case fatality rate of 21% [4]. In August 2017, two cases of LF were also reported in Lagos state in adults, both of whom died [5].

In Plateau state, located in the north-central highlands of Nigeria, 10 suspected cases of LF were recorded among school children between June and August 2017. Of these, a single child died. In this study, we report our experience on the clinical presentations and outcomes of these cases.

## Materials and methods

We performed a retrospective analysis of the 10 children with suspected LF at the Paediatrics Department of Jos University Teaching Hospital (JUTH) between June and August of 2017. Ethical approval was obtained from the Ethics Committee of JUTH.

LF was suspected in patients presenting with: fever of less than 3 weeks' duration that had not responded to antimalarials or antibiotics, and myalgia, prostration or abdominal pain as well as history of contact with any patient with LF. Each patient had a detailed history and physical examination documented.

The diagnosis of LF was confirmed with an RT-PCR test performed at the national reference laboratory at Lagos University Hospital, Lagos. In addition, all cases had a full blood count, liver function test, urine culture, blood culture, microscopy for malaria parasites and urinalysis performed. Contacts were identified and screened for LF and all high-risk contacts received oral ribavirin prophylaxis. The adolescents were followed up for 3 months after discharge.

Socioeconomic class was calculated by adding the educational and occupation classes for each parent and dividing by 2, then adding the two values of the two parents together. Socioeconomic class 1 includes professionals with a tertiary education level; those in socioeconomic class 5 have no formal education and were either unemployed or small traders or similar. The monthly family income was ₦100,000 (UD\$286).

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**Table 1.** Demographics, symptoms, signs and outcomes of suspected Lassa fever in 10 adolescents

ID	Age/sex	Alive	Positive RT-PCR for LF virus	Presence of symptoms, signs and laboratory abnormalities						Urine leukocytes	Other labs	
				Fever	Prostration	Headache	GI	Renal	Other symptoms/signs			
1	17/m	Yes	Yes	Yes	Yes	No	No	No	Conjunctivitis	No		
2	14/f	Yes	Yes	Yes	No	Yes (abdominal pain, vomiting, tenderness)	Yes (dysuria, CVTA)	None	None	Yes	<i>Proteus</i> spp in the urine, positive malaria parasite, PCV 35%	
3	14/f	Yes	No	Yes	Yes	Yes (abdominal pain, tenderness)	No	Conjunctivitis, tachypnoea, tachycardia	Yes	Yes	Positive malaria parasite and PCV 32%	
4	12/f	Yes	No	Yes	Yes	Yes (abdominal pain, tenderness)	Yes (dysuria, CVTA)	None	None	No		
5	12/f	Yes	No	Yes	Yes	Yes (abdominal pain, tenderness)	No	Bleeding, conjunctivitis	None	No		
6	13/f	Yes	Yes	Yes	Yes	Yes (abdominal pain, diarrhoea)	Yes(dysuria, CVTA)	None	None	Yes	PCV 29%	
7	15/f	Yes	Yes	Yes	Yes	Yes (abdominal pain, vomiting and tenderness)	Yes (dysuria, CVTA)	Neck stiffness	Neck stiffness	Yes		
8	16/F	Yes	Yes	Yes	Yes	Yes (abdominal pain, vomiting, diarrhoea, tenderness)	Yes (CVTA)	Tachypnoea, tachycardia, hypotension, hepatosplenomegaly, with ileal perforation	Yes	No	PCV 27%	
9	16/f	No	Yes	Yes	Yes	Yes (abdominal pain, vomiting, diarrhoea, tenderness)	Yes (dysuria and CVTA)	Tachypnoea, tachycardia, conjunctivitis, bleeding from all orifices	Yes	Yes		
10	15/m	Yes	No	Yes	Yes	Yes (vomiting, diarrhoea, abdominal tenderness)	Yes (CVTA)	Tachycardia	Tachycardia	<i>Proteus</i> spp in the urine		
Overall (% Median with signs and symptoms)				100%	90%	70%	90%	70%	70%	60%	60%	40%

CVTA: costovertebral angle tenderness; PCV: packed cell volume

Statistical analysis was performed using SPSS version 16 (SPSS Inc, Chicago, IL, USA).

## Results

A total of 10 adolescents (mean age 14.4±1.7) were studied. Information on each case is presented in Table 1.

Malaria co-infectivity was seen in 20% of cases diagnosed by microscopy. Bacterial blood culture yielded no growth for all cases, 60% had leukocytes in the urine and haematocrit was 30% and above in 80% of cases. Liver function tests were normal for all

One patient died, eight recovered fully and one developed intestinal perforation that necessitated laparotomy (this patient also recovered fully). No nosocomial cases were recorded.

## Discussion

The outbreak of LF occurred during the wet season (June–August), which was in contrast to previous reports where the peak incidence occurred during the dry season (January–March) [6–9]. This finding is consistent with reports from Sierra Leone where the peak incidence was observed during the wet season (May–November) [8–10]. The reason for a wet-season epidemic could have been due to overflow of the sewers, forcing rats to relocate to areas of human habitation, or the occurrence of a different strain of the virus. Further investigation is needed to maintain proper sanitation for safety reasons.

We observed no significant association between age or socio-economic class and a diagnosis of LF. This is in conformity with previous findings that showed all age and socioeconomic groups are susceptible to LF [1,10].

The commonest clinical presenting features observed in the adolescents in this outbreak were fever, prostration, headache and abdominal pain. It is noteworthy that bleeding, a hallmark of the disease was present in only 20% of cases. Other common clinical signs included pyrexia, prostration, abdominal tenderness and positive renal angle tenderness. Interestingly, no patient had abnormal liver function test results.

According to the clinical staging of LF [11], sore throat with exudates and proteinuria are common second-stage signs but they were not observed in our patients. However, on urinalysis, leukocytes were the present in 60% of cases. Others have documented haematuria [12].

We recorded one death, giving a case-fatality rate of 10%. According to WHO and the Centers for Disease Control and Prevention (CDC), case fatality among admitted patients with LF ranges from 15% to 50% [1,3]. There have also been reports of case fatalities being highest in children under the age of 18 years [10]. In a study in southern Nigeria the reported case fatality rate was 65% [13]. The relatively low mortality rate observed in our study could be attributed to early presentation, a high index of suspicion and prompt treatment. For all patients, when the index of suspicion was high, prompt treatment was commenced with ribavirin and other supportive measures were taken while awaiting confirmation of the LF diagnosis. Ribavirin was provided at no cost to either patients or their contacts. Supportive therapy and personal protective equipment (PPE) were provided for personnel who came in contact with the patients. Contact tracing and repeated public enlightenment campaigns were also rolled out. No members of the hospital staff were infected. This was in contrast to the observation by Fisher-Hoch *et al.* [13] on the

outbreak of LF in two hospitals in southern Nigeria where 26.5% of cases were health personnel who had managed patients with LF. It therefore follows that with proper barrier nursing, use by patients of personal protective equipment and proper handling of patient samples, the risk of nosocomial spread of the disease can be reduced significantly.

PCR was used to test for LF virus and six of the 10 patients with clinical suspicion of LF were found to be positive. It is important to note that complementing the PCR by antibody testing would further improve the reliability of the diagnostics, thereby reducing the number of missed diagnoses. Antibody testing detects infected patients in the convalescent stage when the viral load has dropped below the limit of detection for PCR [14,15].

## Conclusion

Lassa fever, an endemic VHF in our environment, should be suspected in any patient presenting with fever unresponsive to antimalarials, antibiotics and other treatments and especially if associated with the clinical signs of prostration, tachypnoea, tachycardia and abdominal tenderness. Standard precautions at all times and transmission-based precautions for VHF for all suspected cases as well as prompt commencement of ribavirin is essential for the survival of LF patients and for the protection of the attending hospital personnel.

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## Conflict of interests

All authors declared no conflicts of interest

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