LASSA FEVER IN INTERNALLY-DISPLACED PERSONS' CAMP: A CASE REPORT AT ZABARMARI, BORNO STATE, NIGERIA

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ABSTRACT

Introdution: **Lassa fever is a viral hemorrhagic disease caused by the Lassa virus, a single stranded RNA virus of the Arenavirus family. It is a zoonotic illness spread by rats of the species *Mastomys natalensis*. Between weeks 1 and 17, (2017), 242 suspected Lassa fever cases were reported in Nigeria, with 58 laboratory confirmed cases and 46 fatalities (CFR, 19.01%) from 50 Local Government Areas (LGAs) in 20 States.**

Methods: **We conducted an outbreak investigation and gathered a thorough clinical history of the index case as well as contacts, who were then followed up using the standard viral hemorrhagic fever contact monitoring form. Following that, blood samples were collected from this patient. A total of 54 contacts were tracked for 21 days and their temperatures were recorded using a clinical thermometer. Furthermore, an environmental evaluation of the Zabarmari community and the Madinatu Internally-displaced persons' (IDP) camp was carried out.**

Results: **The index case was a 32-year-old woman who was internally-displaced in Zabarmari community. Her symptoms began with fever and vaginal bleeding and progressed to bleeding from the nose, mouth, and urethra. There was a history of rat exposure as well as inadequate environmental sanitation and hygiene. Real Time PCR detected Lassa fever in the blood sample. The Borno State Ministry of Environment, in partnership with the Ministry of Health, undertook public health education on Lassa fever prevention and implemented excellent sanitary measures.**

Conclusion: **Increased awareness creation on good infection prevention and control practices is crucial among internally-displaced person and health care providers to prevent occurrence and spread of the disease.**

Keywords: Lassa fever, Viral haemorrhagic fever, Index case, Mastomys natalensis.

INTRODUCTION

Lassa fever is an acute viral hemorrhagic fever, first reported in 1969 in Lassa town of Borno State, North-East Nigeria. It is one of Africa's worst hemorrhagic fevers, prevalent in West Africa, and affects 100,000-500,000 people every year, with a fatality rate of 15%-20%.[1]

Lassa fever is a zoonotic illness caused by the Arena viridae virus family, with the virus containing a single-stranded RNA genome and measures 110 to 130nm in diameter. Rodents of the *Mastomys natalensis* species complex act as viral reservoirs, eliminating the virus via saliva, urine, excreta, and other bodily fluids. Man becomes infected by ingesting foodstuffs contaminated with these fluids.[2] Lassa fever is an acute viral hemorrhagic fever that was first reported in 1969 in Lassa village, Borno State, Nigeria. It is one of Africa's worst hemorrhagic fevers, prevalent in West Africa, and affects 100,000-500,000 people every year, with a fatality rate of 15%-20%.[1]

Lassa fever affects people of all ages and both sexes, according to the World Health Organization (WHO).[7]

People living in rural areas, particularly those with inadequate sanitation or congested living circumstances, and where *Mastomys spp*. are prevalent, are more at risk of infection. Similarly, health professionals who care for sick Lassa fever patients without suitable or enough personal protective equipment and infection control methods increase their risk of contracting the deadly virus.

Lassa fever samples from laboratories are potentially hazardous and should be treated with extreme caution. Lassa virus infections may only be definitively detected in reference laboratories utilizing tests like the Reverse Transcription-Polymerase Chain Reaction (RT-PCR) assay, Antibody Enzyme-linked Immunosorbent Assay (ELISA), Antigen Detection Tests, and Virus Isolation by Cell Culture.[7]

The Lassa virus can be found in blood at an early stage of the illness. Death occurs around two weeks following the commencement of disease, with fatal patients exhibiting greater levels of viraemia than survivors.[8] The virus is eliminated from circulation in survivors around three weeks after the onset of symptoms.[9-11] Only a small percentage of patients produce antibodies to immunoglobulin M (IgM) and immunoglobulin G (IgG) within the first few days of illness, and patients with deadly Lassa fever may not build-up antibodies at all. [9, 11, 12] As a result, Real Time Polymerase Chain Reaction (RT-PCR) is an essential technique for the quick and accurate diagnosis of Lassa fever. [9, 12, 13]

When administered intravenously or orally to Lassa fever patients early enough, generally before day 7 of illness, the antiviral medicine Ribavirin, a purine nucleoside with broad-spectrum antiviral characteristics, is extremely effective.[14] Best practices in personal and community cleanliness, adequate environmental sanitation to deter rats from entering houses and contaminating foods, and early detection and treatment of cases and contacts are used to accomplish prevention and control. Standardized safety standards in the healthcare context are crucial, especially when dealing with sick patients.

A suspected case of Lassa fever was considered as "any person with gradual onset of one or more of the following: malaise, fever, headache, sore throat, cough, nausea, vomiting, diarrhea, myalgia, chest pain hearing loss and a history of contact with excreta of rodents or with a confirmed case of Lassa fever". Moreover, a confirmed case was defined as "a suspected case that was laboratory confirmed positive using RT-PCR". A contact was defined as "a person having close personal contact with a suspected or confirmed case (living with, caring for) or the laboratory staff who tests the specimens of a patient in the 3 weeks after the onset of the illness".

This study documented a confirmed case of Lassa fever in Borno State, described the demography and spatiotemporal picture of the event and identified possible risk factors. Furthermore, technical assistance was offered to the state in order to improve investigations and disease control.

CASE PRESENTATION

On February 22nd, 2017, the State Disease Surveillance and Notification Officer (DSNO) received an alert from the WHO field office in Maiduguri concerning a probable case of viral haemorrhagic fever (VHF) at Umaru Shehu Ultra-Modern Hospital (USUMH). The patient was 32 years old. She was an internally displaced person (IDP) who had previously lived in Baga LGA but had been relocated to Zabarmari of Khaddamari ward, Jere LGA, Borno State. Zabarmari is a rural village mostly made up of farmers and fishermen, with mud dwellings and inadequate environmental hygiene. On the 10th of February 2017, she became severely ill in Zabarmari. She suffered fever five days later and vaginal bleeding for two days before leaving for her brother's residence in Maiduguri's Madinatu IDP Camp. He brought traditional medications from a herbalist, which she took. She also went to Madinatu to see a patent medicine vendor.

The patient was transferred to State Specialist Hospital (SSH) on the 20th, where she was evaluated in the emergency department and referred to the gynecological ward evaluation. Two nursing students obtained a urine sample for a pregnancy test on the ward. She was taken to the outpatient section when the pregnancy test came back negative, and she was ultimately visited by a National Youth Service Corps (NYSC) doctor. He admitted after assessing her and demanded blood testing, including grouping and cross-matching of blood for immediate transfusion. She was referred to Umaru Shehu Ultra-Modern Hospital, due to a shortage of bed space. The patient was bleeding from her nose, mouth, and urine when she arrived at USUMH. These were in accordance with the VHF case definition. There was a history of rodent exposure and occasional food exposure, but no history of foreign travel to a place with VHF could be clarified. In March 2017, an advocacy visit was made to the Borno State Ministry of Health. The team met with the Director of Public Health, the State Epidemiologist, and other State authorities, who were all included into the State Rapid Response Team for the outbreak investigation. We also paid advocacy visits to the administration of the health institutions involved

in case management, traditional and religious leaders, and other stakeholders in the affected areas.

Rapid Response Team Activities

To coordinate the response and give comments, the response team met daily with officials from the State Ministry of Health, the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), and the Borno State Environmental Protection Agency (BOSEPA). We interviewed the USUMH case management staff and family of the first verified patient, as well as read her case files, to obtain thorough information. Contact tracing was aided by collaborative efforts between the response team and the local government area (LGA, Disease Surveillance and Notification Officer (DSNO). The laboratory test findings from the National Reference Laboratory for Viral Haemorrhagic Fever, CMUL/LUTH, Lagos State, were followed up thoroughly.

Active case search and contact tracing

Active case investigation in the Zabarmari community where the patient lived. Contacts were traced in Zabarmari, Madinatu IDP camp, Umaru Shehu Ultra-modern Hospital (USUMH), and State Specialist Hospital (SSH), all of which she visited throughout her sickness. A descriptive characterisation of the epidemic was carried out in terms of person, location, and time.

Study Area

Borno State is situated in Nigeria's northeast. With a geographical area of 72,609 square kilometers, it is Nigeria's biggest state. There are 27 LGAs with a population of 5,779,337 people (2019 estimate). It is surrounded by three countries (Niger, Chad, and Cameroon) and three Nigerian states (Adamawa, Gombe, and Yobe states). The epidemic happened in Jere LGA, one of two local government units that comprise Maiduguri metropolis; the other being Maiduguri Municipal Council (MMC).

Study Aids

The following research tools were employed:

1. Form for immediate case-based surveillance reporting (IDSR 001A)
2. Viral Hemorrhagic Fever (VHF) Contact listing form
3. Viral Hemorrhagic Fever (VHF) Contact Form for Daily Monitoring
4. Infrared thermometer for temperature monitoring

Data Collection and Management

Sites Visited

1. Umaru Shehu Advanced Hospital

This hospital provided the background of the index case and her relatives to aid in conducting a thorough case investigation. Using the VHF daily contact monitoring form, twenty-four contacts were located, listed, and their temperatures were monitored daily.

2. State Specialist Hospital (SSH)

In the SSH, five contacts were detected and listed. A National Youth Service Corps (NYSC) medical doctor, a staff nurse, two nursing students, and an ambulance driver were among those present. Because he had been redeployed to Katsina state before contact tracing

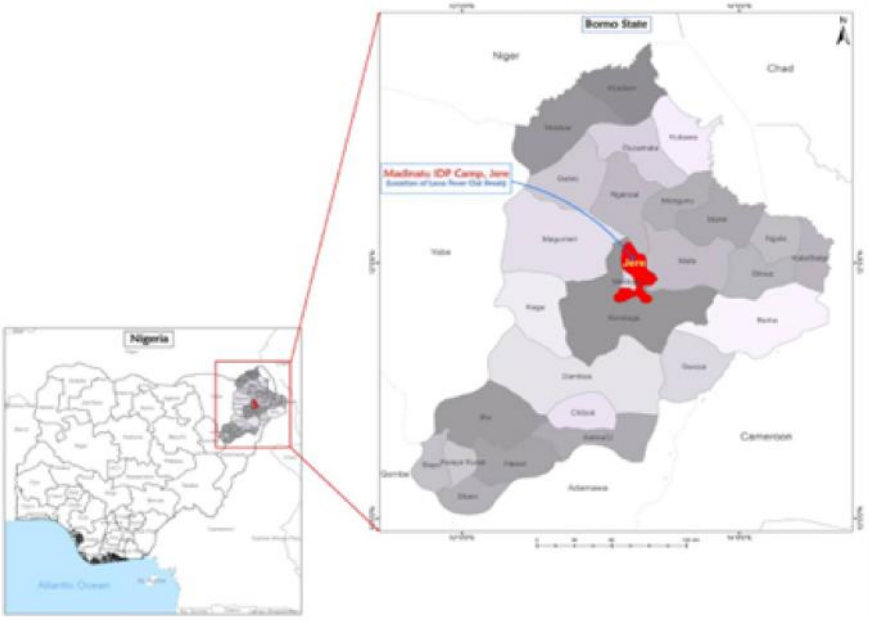

Figure 1: Spatial representation of outbreak location in Borno State, Nigeria (inset map of Nigeria)

began, the medical doctor self-reported his daily temperature measurement. The remaining four contacts were kept under observation at the hospital.

3. Zabarmari Village
Using the VHF daily contact monitoring form, a total of 23 contacts in the Zabarmari community were located, documented, and followed up on.

4. IDP Camp in Madinatu
At the Madinatu IDP camp, seventeen contacts were found. All were recorded and tracked down utilizing the VHF daily contact monitoring form.

Laboratory results
A total of 5 samples were collected. Only one was positive for Lassa by RT-PCR (Table 1)

Table 1: Laboratory results of the test positive sample for Lassa Fever

S/N	Parameters	Values
1.	Packed cell Volume (PCV)	21.0 %
2.	White Blood Cell count (WBC)	11.4 x 109/l
3.	Platelets count	121 x 109/l
4.	Differentials:	
	Neutrophils	53.0%
	Eosinophils	2.0%
	Lymphocytes	40.0%
	Monocytes	5.0%
5.	Electrolytes, Urea and Creatinine (EUC):	
	Sodium	137mmol/l
	Potassium	2.9mmol/l
	Chloride	97mmol/l
	Bicarbonate	20mmol/l
	Total bilirubin	0.5mg/dl
	Conjugated bilirubin	0.3mg/dl
	Aspartate transaminase (ASAT)	7 IU/l
	Alanine aminotransferase (ALAT)	IU/L
	Albumin	45g/dl
	Creatinine	54mmol/l
	Urea	2.2 mmol/l

Treatment History
The patient was isolated, given blood transfusion. Patient was placed on ribavirin for 10 days and completed treatment before being discharged home.

DISCUSSION
Lassa fever continues to pose a public health risk and burden on vulnerable communities in West Africa sub-region, particularly Nigeria. In this study, the index case recovered and was discharged home after complete course of treatment. The patient received supportive care as well as definitive treatment with ribavirin. Although, Ribavirin is currently the known medication for treating Lassa fever in Nigeria, the efficacy is still poorly studied. However, good outcomes have been reported, and in this report, the use of the medication yielded similar outcome for the patient.[20] As the initial stage in early detection of the disease, active surveillance, and rapid response, more reliable and efficient analytical tests capable of detecting five strains of Lassa fever virus are required. This is important when looking for primers for Lassa fever virus strains from certain regions.

The government should explore establishing regional laboratories to encourage early detection and response to viral hemorrhagic fever (VHF) epidemics in the country. It is critical to stress that, in order to successfully combat this epidemic as quickly as feasible, diagnostic kits and laboratory evaluations to verify possible cases, must be freely available. The prompt reaction of the state team must have contributed to the index case's speedy recovery, albeit this still provides room for more study efforts, especially given that numerous contacts discovered were asymptomatic.

Stigmatization of persons with suspected or confirmed Lassa fever is a serious issue in Nigeria, as also indicated by Usifoh *et al.*[21] This frequently discourages patients from getting treatment for such diseases. People still require sensitization and awareness training to address this widespread issue that is not limited to the study area but is prevalent in many parts of the country.[22,23,24]

Limitations to the study
The present research has some limitations. There was no reference laboratory in the State. This necessitated shipment of samples to Lagos making the turn-around

time longer. Also, poor documentation at State Specialist hospitals led to difficulty in tracing contacts.

CONCLUSION

This case report documented the investigation of a case of Lassa fever in Jere Local Government area of Borno State. Index case was a thirty-two-year-old housewife from Zabarmari who was presented with fever per vaginal bleeding, nose bleeding, and bleeding into the urine. Public health intervention strategies were implemented in the affected communities. These included community sensitizations conducted at Madinatu and Zabarmari; sensitization of health care workers at USUMH and training on infection prevention and control and use of PPE; sensitization/ training of students of School of Nursing Maiduguri on correct IPC practices; and distribution of Lassa fever posters and pamphlets to communities. Early warning and response mechanisms are critical for effective disease containment in the fight against Lassa fever.[16,25] Increased awareness creation on good infection prevention and control practices is crucial among health care providers as the usage of expired PPEs was observed. Availability of reference laboratory in this region will facilitate access to diagnosis of viral hemorrhagic fever in the region.

Abbreviations

DSNO: Disease Surveillance and Notification Officer
RT-PCR: Reverse Transcription-Polymerase Chain Reaction
WHO: World Health Organization
LGA: Local Government Area
PCV: Packed Cell Volume
WBC: White Blood Cell
UNICEF: The United Nations Children's Fund
IgM: Immunoglobin M
IgG: Immunoglobin G
MMC: Maiduguri Municipal Council
NFELTP: Nigeria Field Epidemiology and Laboratory Training Programme
USUMH: Umaru Shehu Ultra-Modern Hospital
SSH: State Specialist Hospital
CDC: Center for Disease Control
VHF: viral haemorrhagic Fever
RT-PCR: Real Time Polymerase Chain Reaction
IDSR: Immediate Case-based surveillance reporting
BOSEPA: Borno State Environmental Protection Agency

Data Availability

All data are available upon reasonable request from the corresponding author.

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Authors' Contributions

Conceptualization: TIO; Investigation and methodology: TIO, BD, BA, CE, SI and MTB; Formal Analysis: TIO, MIO and OOA; Writing- original draft preparation: TIO; Writing- review and editing: BA, MIO and OOA; all authors have read and agreed to the published version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest

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