



(CASE STUDY)



A case study of high burden disease lassa fever in resource constrained setting implementing primary health care services

Tukur Mustapha ¹, Bakam Clement Kure ², Toma Bose. O ³, Ogundeko Timothy Olugbenga ^{4,*}, Bassi Amos Paul ⁵, Hyelshilni Samuel Waziri ⁶, Abdullahi Baba Abdul ⁷ and Maikaje Dominic Bawa ⁸

¹*African Field Epidemiology Network (AFENET) -CDC-NSTOP Kano State, Nigeria.*

²*State Emergency Routine Immunization Coordination Center, State Primary Health Care Board, Kaduna, Nigeria.*

³*Department of Paediatrics, University of Jos/ Jos University teaching Hospital, Jos, Nigeria.*

⁴*Department of Pharmacology and Therapeutics, College of Medicine and Health Sciences, Bingham University, Jos Campus, Nigeria.*

⁵*Department of Community Medicine & Primary Health Care, College of Medicine and Health Sciences, Bingham University, Jos Campus, Nigeria.*

⁶*National Primary Health care Development Agency, Abuja, Nigeria.*

⁷*Accident and Emergency Department, Federal Medical Center Azare, Bauchi State, Nigeria.*

⁸*Department of Microbiology, Kaduna State University, Nigeria.*

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Abstract

The challenge of hyperendemicity of Lassa fever in tropics amidst the current covid -19 pandemic is more devastating. Nigeria and the entire west coast of Africa needs more research, advocacy and welfare support in order to curb the narrative. A 43 year old multiparous pregnant woman at term was referred from a Clinic in Kamuru Ikulu, Zangon kataf LGA to a Mission Hospital in Zonkwa, Kaduna State, Nigeria on February 2016. She exhibited overt vaginal bleeding and absence of foetal movements at presentation. Placental previa was revealed through ultra sound that necessitated an emergency Caesarean Section on the patient by the Medical practitioner, assisted by his team a Nurse and a Community Health Worker. The patient's Glasgow Coma Scale post up was 6/15. The patient died after the surgery while the doctor and the nurse manifested symptoms of Lassa fever. Following the observation, the doctor and the nurse eventually died after 2 and 3 days respectively. Contact tracing involving 33 persons that had physical contact with the index case was carried out in Lisiru, the clinic in Kamuru as well as the Hospital in Zonkwa using structured verbal interviews and blood sample testing. Seventeen (17) of the 33 persons however, exhibited suspected indices of Lassa fever. Blood samples of the index case, 3 health personnel that were involved in the surgery were sent to the Laboratory at Irrua Specialist Hospital, Edo State, Nigeria for Lassa virus molecular investigations. The ELISA test confirmed the index case, the doctor, nurse and one of the 17 suspected contacts as Lassa virus positive while the community health worker and rest 16 turned out to be negative. The positive contact patient was transferred to the contact. Furthermore, the Lassa positive individual was withdrawn to the Infectious Disease Control Centre Kaduna for effective medical care. She recovered and was discharged after 10 days of management with Ribavirin and other supportive therapeutic agents. However, the other 16 and the health worker were followed up for 14 days in order to ascertain their health status. There was delay in the diagnosis of the index case as a result of emergent circumstance that required urgency. The epidemiological knowledge gathered from this case is that Lassa fever is likely endemic in Zangon Kataf LGA and that Ribavirin proved to be the effective drug used in the management of the female positive case that survived the Lassa fever.

Keywords: Delayed Diagnosis; Multiparous Pregnant Woman; Ultrasound; Vaginal Bleeding, Health Workers; Contact Tracing; Lassa Fever; Endemic

* Corresponding author: Ogundeko Timothy Olugbenga

1. Introduction

Infectious diseases have become a global scourge with the present uphill task to combat Covid -19 amidst the pre-existing Lassa fever, Ebola, Dengue fever, hepatitis, HIV/AIDS and even poverty. Lassa fever (LASV) is endemic in West Africa, with estimated tens of thousands of cases annually [1], and the number of sporadic cases outside the endemic regions within and outside Africa is increasing as a result of international travel [2]. Epidemic-prone Lassa fever, caused by Lassa virus, is an endemic disease in the West African countries of Ghana, Guinea, Mali, Benin, Liberia, Sierra Leone, Togo and Nigeria. It's one of the major public health threats in these countries [3]. Lassa fever is hyperendemic in parts of West Africa including Sierra Leone, Liberia, Guinea, and Nigeria; however, other neighboring countries are also at risk, as the animal vector for Lassa virus, the multimammate rat is distributed throughout the region. In 2009, the first case from Mali was reported in a traveler living in Southern Mali; Ghana reported its first cases in late 2011 [4]. The emergence of this hemorrhagic fever confirms the existence of Lassa fever virus in Togo. After a period of intensive Ebola virus transmission from 2013 to 2015, this is an additional call for the establishment and enhancement of infection prevention and control measures in the health care setting in West Africa [5]. Lassa fever (LF) is endemic to Nigeria, where the disease causes substantial rates of illness and death, as report of our analysis of the epidemiologic and clinical aspects of the LF outbreak that occurred in Nigeria during January 1–May 6, 2018. A total of 1,893 cases were reported; 423 were laboratory-confirmed cases, among which 106 deaths were recorded (case-fatality rate 25.1%) [6]. There have been several waves of Lassa fever outbreaks between 1969 till date in Nigeria. Out of “twenty-one outbreaks in Nigeria involving 5442 suspect cases, Lassa fever was confirmed in 768 examined individuals, out of which 631 deaths were recorded [7]. NCDC EPI week 17:20 - 26 April 2020 on Lassa fever situation report was given as: suspected cases- (2323;4558), confirmed cases- (554;987), probable cases- (15;14) confirmed deaths (124;188), case fertility ratio (22.4% : 19.0%) from 21:27 states and 82:128 LGAs for weeks 1 – 17 for the year 2019 and 2020 respectively, [8]. Since the beginning of 2018, 80 cases have been classified as follows: 77 confirmed cases, 3 probable cases with 21 deaths (18 in confirmed, and 3 in probable cases. In the reporting week 4 (January 22–28, 2018), 15 new confirmed cases and two deaths were recorded from five States Edo (6), Ondo (4), Delta (1), Imo (1), and Taraba (3). Case fatality rate in confirmed and probable cases is 27.6% and 7.4% for all cases (including probable, confirmed, and suspected) [9]. Lassa fever occurs in all age groups and both sexes [10]. The disease is especially severe late in pregnancy, with maternal death and/or fetal loss occurring in more than 80% of cases during the third trimester [10]. There are few reports on the perinatal/ neonatal Lassa infection and outcome, however, generally, reports indicate that Lassa fever is devastating to the fetus and the neonate. A prospective study by Price et al in 1988, of 68 pregnant and 79 non- pregnant women in Sierra Leone with confirmed Lassa reported that 87% of fetuses and neonates were lost [11]. Management protocol included use of Chloroquine and antibiotics before confirmation of Lassa infection. Four of the 40 women in the third trimester however received ribavirin, although its effect was not analyzed. Finding the virus in fetal tissues confirms that the fetus has been infected, though no signs of fetal mal -development had been recorded [11]. Lassa virus is known to be present in the breast milk of infected mothers [11]. Neonates are therefore at risk of congenital, intrapartum, and puerperal infection with Lassa virus [11]. In view of the small numbers of surviving fetuses the long term consequences of congenital infections and the possibility of minor abnormalities had not yet been studied and would be difficult to assess [11]. Monson et al in a review in 1987 of 33 Paediatric Lassa fever cases in Liberia, reported a case of congenital Lassa fever [12]. More recently in 2019, Okogbenin *et al.*, [13], in a 10-year retrospective review in Irrua, Nigeria, of 30 pregnant Lassa fever patients treated with early ribavirin therapy and a conservative obstetric approach reported 64.5% fetal or perinatal loss. In contrast, Agboeze [14] et al, in 2019 in a case report from Abakaliki, Nigeria described a positive maternal and fetal outcome in a 29 week pregnant woman who was treated with ribavirin and subsequently delivered a preterm low birth weight baby who was said to be stable at birth, negative for lassa virus infection and transferred to the neonatal unit. However, there was no further report on the neonate. Furthermore, a recent meta- analysis by Kayem [15] *et al* in May 2020 found a pooled fetal case-fatality of 61.50% while the overall neonatal case-fatality proportion was 30.15%. The age at which neonatal death occurred was reported in only five neonates and ranged from a few hours after birth to 18 days. Other perinatal outcomes reported in the literature include prematurity and vertical transmission [15]. This study was aimed to X-ray the inherent occupational risks associated with frontline health workers, pregnant women, neonates and at the grassroot level.

2. Study area and ethical protocol

2.1. Study area

Zangon Kataf is a Local Government Area in Kaduna State, Nigeria. Its headquarters is in the town of Zonkwa. It is also a name of a town in the Chiefdom of the Atyap. It has an area of 2,668 km² and a population of 316,370 at the 2006 census [16]. Zonkwa is the Zangon Kataf Local Government Area as well as the Bajju Chiefdom headquarters, in southern

persons however exhibited suspected indices of Lassa fever. Their blood samples were also sent to the Laboratory at ISH in Edo State, Nigeria for Lassa fever molecular investigations. The other 16 from this group were followed up for 14 days in order to ascertain their health status.

4. Results and discussion

The result of the ELISA test carried out on index case and the three medical personnel that performed the CS on her revealed positive reactions for Lassa fever virus. The woman did not regain consciousness after the caesarian section to save the newborn as she eventually died same day. The Doctor and Nurse died the second and third days after the surgery respectively.

Molecular laboratory investigations further revealed one (1) female positive case out of the 17 suspected cases from contact tracing. This individual was withdrawn to the Infectious Disease Control Centre Kaduna for effective medical care. The patient recovered and was discharged after 10 days of administration of Ribavirin and other supportive therapeutic agents.

The non- immediate documentation of clinical symptoms and signs indicative of Lassa fever for the index case was due to the primary concern to save her life and the foetus which was under threat based on the state of her presentation requiring an emergency Caesarian section.

Subjecting the blood sample taken from the index case to Lassa fever test was decided following the manifestations of typical Lassa fever signs by the surgical team after the demise of this patient.

The confirmation of Lassa fever from the test results of the index case and those of the highly suspected surgical team confirmed that the Medical Personnel in the health facility (St Louis Catholic Hospital) were at high risk of contracting Lassa fever. This is in consonance with the NCDCP who reported that According to the health agency, as at January 28, 2018, 10 out of the 77 confirmed cases were health-care workers from four states Ebonyi-7, Nasarawa-1, Kogi-1, and Benue-1, out of which 4 are now deceased [9].

Elsie et al., [6] also reported that among all confirmed cases, 37 occurred in healthcare workers. The secondary attack rate among 5,001 contacts was 0.56%. Most (80.6%) confirmed cases were reported from 3 states (Edo, Ondo, and Ebonyi). Nosocomial transmission and outbreaks have been described in health care facilities in areas of endemicity [18, 19].

The confirmation of only one Lassa fever case out of the 17 suspects suggest that, the woman was probably the only one who had closet physical contact during which she touched the blood that was flowing from the index case while providing care for her before death.

Approximately, 15–20% of patients hospitalized for Lassa fever die from the illness. The case fatality rate may reach 50% in hospitalized patients during occasional Lassa fever epidemics [20, 21].

The fact that five adult cases and a suspected case of a neonate were diagnosed in Zangon Kataf LGA suggests that this area might be endemic for Lassa fever. It is also possible that Lassa fever cases were being wrongly diagnosed as malaria or typhoid fever, known to be endemic in this study area.

Malaria is the first diagnosis suspected by health workers and community health workers, in case of fever in children, pregnant women, travelers, and adults [22]. This could be attributed to the inadequate health facilities for diagnosis of the LF virus. Furthermore, wrong diagnosis of LV put such individuals at higher risk due to delay in treatment. This is again in tandem with Houlihan and Behrens [23] who reported that Lassa fever has a case fatality rate up to 70% when left untreated.

No vaccine treatment is available [24]. Ribavirin, an antiviral drug, has been used with success in Lassa fever patients. It has been shown to be most effective when given early in the course of the illness. Patients should also receive supportive care consisting of maintenance of appropriate fluid and electrolyte balance, oxygenation and blood pressure, as well as treatment of any other complicating infections [25].

Ribavirin administered early during the first six days of symptoms significantly reduces the fatality rate from 55 to 5%. In endemic areas, 300,000 to 500,000 cases of Lassa fever are estimated to occur yearly, leading to 5,000 to 10,000

deaths in West African countries such as Nigeria, Liberia, Sierra Leone, Guinea, and Mali. Neighboring countries have also declared the presence of the rodent vector of Lassa virus and the occurrence of epidemics in this region [26, 27, 28]. The administration of Ribavirin as a proactive measure to the confirmed female LF case via contact tracing confirmed the survival of same after 10 days of administration. It should however, be noted that Oral administration of the antiviral drug ribavirin is often considered for postexposure prophylaxis, but no systematically collected data or uniform guidelines exist for this indication [29].

Clinical features of suspected Lassa virus infection in neonates were reported in a total of five neonates. These included fever in all five, bleeding in one, and generalized swelling associated with abdominal distension and bleeding referred to as swollen baby syndrome was reported in three neonates [15]. They noted that there are insufficient data on the perinatal complications associated with Lassa fever in pregnancy.

In this case presented, the foetal/ neonatal outcome was challenging to the child healthcare management system as the neonate died before the mother got to the hospital as a result of the Lassa infection. This case report also highlights the challenges faced by health professionals in rural resource constrained settings in the management of Lassa fever in pregnancy. Provision of Personal Protective Equipment (PPE), viable ambulance service and the need for readily available testing and capacity building becomes imperative.

There is paucity of literature to provide adequate management of the perinatal complications such as small-for-gestational-age, intrauterine growth restriction/retardation, low birth weight, birth defects and the risk of vertical transmission as well as clinical features and complications in the newborn and the management of neonates born to mothers with Lassa fever. These are potential areas for further studies, especially that no vaccine is available to protect those at risk, over fifty years since the discovery of the illness [10].

5. Recommendations

Establishment of Laboratories for the diagnosis of Lassa fever is recommended for every Secondary Health facility in Kaduna state to enable prompt diagnostic procedures.

The Government must procure annually adequate personal protective equipment to its health workers as together we control and eliminate Lassa fever until it is no more on the list of diseases of Public Health Importance. Social and cultural practices such as bush burning, drying of grains on the bare surfaces accessible to rodents be discouraged within communities.

Extension of services should be established with aim at creating awareness on Lassa fever manifestations and endemicity in this area.

6. Conclusion

There was delay in the diagnosis of the index case as a result of emergent circumstance that required urgency. The epidemiological knowledge gathered from this case is that Lassa fever is endemic in Zangon Kataf LGA, requiring improved supply of protective equipment of all health workers to reduce the morbidity and mortality experience presented in this paper.

Compliance with ethical standards

Disclosure of conflict of interest

Authors hereby declare no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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