

# Research paper on lassa fever in temne community in sierra leone

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## **Introduction**

This paper discusses Lassa fever, an infectious disease with regard to its causality organism, transmission, epidemiology, and factors causing the illness, clinical manifestation and diagnosis and the role of the nurse in controlling the illness. Lassa fever is a severe viral hemorrhagic infection caused by Lassa virus, which is affiliated to arenaviridae virus family. Sierra Leone comprises of approximately 90% Africans of various tribal groups. The Temne people occupies approximately 30% of the total population in Sierra Leone and reside in the Northern part of the country. The current prevalence rate of the infection in the entire west Africa is approximately 300-500 thousand cases and 5000 deaths annually.

The occurrence of the disease among the Temne ethnic group is influenced by various factors such as geographical location, housing accessibility to

healthcare facilities, water and sewerage treatment, and levels of income. The Northern part of Sierra Leone that has dense forests, which are assumed to increase the rate of the illness. Poor sewerage and water treatment is likely to result rodent infestation, which ultimately cause Lassa fever (World Health Organization, 2011). Low levels of income among Temne people make them unable to afford quality healthcare services, which in turn increases the prevalence. Poor housing in some parts of the country, characterized by mud-walled houses, provide holes to rodents for their survival

## **Organism and transmission**

Lassa virus, the causality of the Lassa fever belongs to genus arena virus and arenaviridae family (Adewuyi, Fowotade, & Adewuyi, 2009). The virus is enveloped, mono-stranded, and double-segmented having Ribonucleic Acid as genetic material. The virus might display various dissimilar shapes hence varied pleomorphism characteristics measuring approximately 80 to nanometer in thickness. The viral envelope or covering is studded with glycoproteins comprising of tetrameric composites that belong to viral glycoproteins GP1 and GP2. The virus has the capability of managing its replication process rapidly, which is two-step progression. The initial step is the transcription of mRNA copies. This process is essential to the virus since it guarantees sufficient provision of viral proteins for the forthcoming replication step, which involves transformation of proteins N and protein L from the messenger ribonucleic Acid (Ogbua, Ajuluchukwub, & Unekec, 2009). This is followed by the formation of viral complimentary RNA copies

abbreviated as vcRNA from the plus-sense genome. The viral complementary RNA acts as a model for generation of minus sense offspring and synthesis of mRNA. The generated mRNA from vcRNA is transformed to form the G proteins and Z proteins (Ogbua, Ajuluchukwub, & Unekec, 2009). The above two processes reveal the control of the virus over its replication process, hence not easily recognized in the immune system of the host. Research on the virus has revealed that Lassa virus contains four lineages recognized in several West African countries like Nigeria, Guinea, Liberia, and Sierra Leone.

World Health Organization (2011) affirms that, Lassa virus has receptors on its cell surface called the alpha-dystroglycan (alpha-DG) used for gaining access into the host cell. The receptor is flexible and is composed of the proteins of the extracellular matrix. The flexibility of the receptor is extended to its usage by the prototypic arena virus lymphocytic choriomeningitis virus. Lassa virus' receptors are distinguished by a particular sugar alteration on alpha-DG referred to as glycosyltransferases (Branco & Boisen, 2011). Additionally, alpha-DG is employed as a receptor by New World clade C viruses. Lassa virus uses an endocytic pathway that lacks clathrin, caveolin, dynamin, and actin unlike other enveloped viruses. The virus carries a speedy delivery of endosomes once in the host cell through vesicular.

The modes of transmission of the infection to human beings exist in different forms. The two modes are natural reservoir and vectors. The multimammate rat scientifically referred to as *Mastomys natalensis* is the natural reservoir of Lassa virus, which causes Lassa fever. The precise species of the rodent associated with disease has not yet been discovered, but it is largely

believed that species natalensis is responsible for fever. The distribution of the virus depends on various reasons. Rodents are present inside houses where people live and some of these rodents are the reservoir of the Lassa virus (Fichet-Calvet & Rogers, 2009). The multimammate rat breeds regularly, infecting their progeny with during birth. The resultant effect is long chain of the viral infection to host and host to people.

Vector mode transmission involves the shedding of the virus in the rodents' excreta, urine, and feces. The transmission is considered zoonotic since it spreads from rats to humans. Rats have an asymptomatic state of the virus, which is the reason why they can survive without being affected. According to Beeching N, Fletcher T, Hill, & Fletcher (2010), Human infections normally results from contact to the rodents' excretion wastes through the respiratory or gastrointestinal systems. Aerolization of the feces and urine makes the viral tiny particles vulnerable inhalation by human beings. However, injured skins or mucous membranes expose the body fluid infective substances. Some propositions also exist advocating that the disease can be transmitted through sexual intercourse.

## **Epidemiology and contributing factors**

The most relentlessly affected part of Sierra Leon is the forest area of the country, inhabited by the Temne community, an epicenter of the disease. Lassa fever has been declared an epidemic among the Temne people and in the entire Sierra Leone, with pervasiveness rate of 8-15%, which approximates to ten thousand cases per year. Morbidity rate of the disease in Temne society is estimated to be 200 people per year. Notably, the

endemicity of the Lassa fever is not restricted to political borders but instead by geographical areas. Studies affirm that other countries in West Africa, other than the severely hit have experienced sporadic outbreaks among humans or human sero-prevalence or rodents. Detection of Lassa Virus in rodents in southern Mali implies that the prevalence of the infection is likely to increase (Solen et al, 2009).

Contributing factors of the infection are classified as biological, cultural, and infrastructural. Biological factors include contagion of food or food source and habitat by the rodents. These rodents are popular near farmhouse where cereals are stored hence tainting the food. Consumption of such food exposes human beings to the virus, which contributes to the illness.

Moreover, poor storage of harvest, a common practice among the people of Temne community accelerates the rate of escalation of the illness (Tyring & Yen-Moore, 2002). Another biological factor is the microorganisms from rat excretions, which can survive and float in the air and be inhaled by humans. The disease is also passed on through contact of secretions of infected people.

Cultural contributing factors of Lassa fever are attributed to the way Temne people live and their beliefs. An observation shows that Temne people have been ensnaring rats for food and other purposes as a tradition. Most of them did not have the knowledge of the type of rat they were eating or handling due to ignorance and lack of proper research. Moreover, food shortages have forced the community to resolve to eating rats as food. This tradition has led to deaths of many sierra Leoneans inclusive of the Temne people, who handled *Mastomys natalensis*, the causality of Lassa fever. Sanitation officers

affirmed that Temne people would not want the rats killed during periods of food shortage since it would mean destroying their source of food (Ehichioya et al, 2010). Sanitation efforts especially water and sewerage treatment in sierra Leon have proved to be a hard task for a very long time, not until people of Temne realized that the popular farmhouse rodent was the cause of the deadly disease.

Infrastructural causalities are mainly attributed to a given population ignorance and human activities. The increase in rat population contributes to the fatal illness since rodents are common in filthy and eyesore environment due to human activities of negligence such as dumping. Such environment increases the breeding of the rodents resulting to escalating cases of illnesses inclusive of Lassa fever. Overcrowding especially in or dense population in major cities such as Makeni, an area inhabited by Temne increases the rate of dumping and human-to-human infections (Solen et al, 2009). Airborne infections spread rapidly in a congested place since the distance between people is much shorter. Illiteracy among Temne ethnic group is another infrastructural factor and patients who would not seek medical treatment until the infection got severe evidence it. This poses a lot of difficulty in treatment since doctors had to deal with severe cases only. Improved political environment and security has enable people in Sierra Leon to move freely, spreading the disease to uninfected areas, which increases case reporting (Branco et al, 2011).

## **Clinical manifestations and Diagnosis**

Patients suffering from Lassa fever experience slow inception of fever and malaise. The fever can last for a period of 2-3 weeks accompanied by myalgia. Fatal prostration, associated to particular organs and serosa are also signs of the infection. Additionally, sternum pains with coughing are frequently indicators of Lassa fever (Peter, Titus, & George, 2009).

Bleeding is another symptom among patients suffering from the infection. Gum bleeding is an instance and it is susceptible to some patients. The stomach, kidneys, small intestines, lungs, and brain start hemorrhaging due to abrasions in the capillaries. Fatal circumstances of the infection might result to vascular collapse and shock, preceded by death. Previous studies affirm that shock is caused by the dysfunction of the platelet and endothelial that brings forth hemorrhage allowing body fluids to seep out into the intravascular system (Tyring & Yen-Moore, 2002).

Other popular symptoms include abdominal pains, vomiting and nausea, constipation or diarrhea. Conjunctivitis and pharyngitis might also arise due to soreness of the mucous membrane and other fundamental parts of the pharynx. Accelerated vascular permeability also begins to occur because of pleural effusions. The urine of an infected person contains proteins causing proteinuria. Approximately 10-30% of infected patients have swellings in the neck and face.

The varied expression of the virus and presence of other similar symptoms have made the diagnosis of the Lassa fever difficult. ELISA test is the most preferred and used diagnostic tool. The test comprises of segregating the



virus from urine, throat washings, and blood during the vehement phase of the infection. The test is effective since it pinpoints Lassa virus antibodies and patient's serum antigen. Another diagnostic test is the Reverse Transcription Polymerase Chain Reaction (RT-PCR), though essentially employed in research studies. Leukocyte and platelet counts, albuminuria, AST level and chest X-rays among others are clinical tests deployed in the diagnosis of Lassa fever (Marshall Cavendish Corporation, 2007).

## **Role of the nurse**

Evading rodents, which are reservoir source is the only sure way of preventing the primary infection particularly in the society such as Temne characterized by growing cases of outbreaks. Safekeeping food practices that will deny the mastomys rats' access to food will significantly reduce the infection rate. Improving sanitation standards at homes and not using rats a source of food is essential to ensure that the disease prevented. Eradicating the reservoir source, rodent seems to be impossible due to its high population hence trapping them will be helpful in reducing their numbers. As a result, outbreaks will drop. Nurses play a key role in ensuring patients evade the rodents and their excretions by providing clean environment encouraging proper sanitation methods (Huynh-Hoa et al, 2007).

Nurses have a role in taking care of patients having Lassa fever. This exposes them to the risk of person-to-person transmission. As such, nurses have to adhere to some preventive measures that will safeguard them from contacting patient secretions. This method of taking care of patients while

considering precautions is referred to as barrier nursing. Barrier nursing might entail wearing of masks, gloves, gowns, and protective clothes (Fichet-Calvet & Rogers, 2009). Sterilization of medical equipment and patient isolation to prevent spread to people are some of the nursing practices that are aimed at stopping or reducing outbreak.

Huynh-Hoa (2007) affirms that nurses play an essential duty of teaching Lassa fever patients and their families on how to manage the illness, which are majorly post-treatment home care demands. This will instill knowledge among various affected people on transmission of the illness. People providing homecare services to the patient also needs to protect themselves from person-to-person transmission. As such, nurses are important source of knowledge on prevention of Lassa fever.

Nurses play a critical role by facilitating measuring of outcomes Lassa fever, which is a major problem in many healthcare institutions, because of inadequate accurate data. Records and reporting systems about cases of Lassa fever handled by nurses in health institutions improve and facilitate accurate results of the prevalence of Lassa fever in affected areas. The information in health records is vital in prevention and monitoring of Lassa fever (Ogbua, Ajuluchukwub, & Unekec, 2009). The maintenance of patient records by nurses is important in averting the epidemic.

The provision of Lassa fever treatment requires and relies heavily on efficiently trained healthcare system. Nurses who have wide experience on infectious diseases such Lassa fever can only accomplish this task. Moreover,

roles such prescription and diagnostics of Lassa fever can be imposed on nurses through public health approach (Fichet-Calvet & Rogers, 2009).

## **Conclusion**

Lassa virus causes Lassa fever and its natural reservoir is a rodent, scientifically referred to as *mastomys natalensis*. The prevalence rates among the Temne people is due to factors such as use of rats as source of food, poor sewerage and water treatment, and high population in urban centers, forest vegetation, and low income among Sierra Leoneans. Symptoms of the disease include malaise and fever, gum bleeding and intestinal lesions. Nurses reduce the occurrence of the disease by using barrier-nursing methods and teaching the community on how to manage Lassa fever patients to prevent the spread of the disease.

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