

Research article

Lassa Fever: Awareness of Preventive Measures Among Residents Of Ilorin East Local Government of Kwara State, Nigeria

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Abstract

Background: Lassa fever outbreak is a yearly occurrence in Nigeria because the disease is endemic in Nigeria. The disease out-break in 2018 was widespread with the involvement of 10 states out of 36 and 140 confirmed cases with 30 deaths. The Case Fatality Rate (CFR) was significantly high at 53% of all cases. Even currently in early 2020 an out-break of Lassa Fever has been reported by the Nigerian Center for Disease Control and so far 365 cases have been confirmed with 47 deaths and involving 23 of the 36 states in Nigeria with a case fatality rate of 12.9%. The high virulence, attendant significant mortality and morbidity as well as non-specific mode of presentation of Lassa fever has made it a disease of public health significance. It therefore became necessary to study the awareness of the disease among residents of Ilorin East Local Government Area of Kwara State. This descriptive cross-sectional study was carried out from January through February 2018.

Objectives: The study sought to assess the awareness of the cause of Lassa fever and the preventive health measures among residents of Ilorin East Local Government Area of Kwara State, Nigeria.

Methodology: A multi - stage sampling technique was used to select respondents for the survey. The first stage involved using the mechanical balloting system names of the 12 wards in Ilorin East Local Government were printed and placed in a container. With eyes closed, the wards were selected. Thereafter 3 villages/towns were selected. Potential respondents were selected in households and schools in the three villages to make up the sample size of 300. A research questionnaire (interview schedule) was administered on the respondents. Five research questions were set and the hypotheses were tested.

Results: At the end of six weeks, two hundred and seven respondents provided usable copies of the questionnaire interview schedule. The data and information gathered were analyzed based on the research questions and the null-hypothesis. All the respondents had heard of Lassa fever, however, only two-thirds of the respondents were aware of the cause. The respondents also had a high level of awareness of the preventive measures against the disease.

Conclusion: Although, awareness of Lassa fever in this study is very high, sustained efforts should be made to increase the awareness through health campaigns and to improve community attitude to preventive measures against Lassa fever.

Keywords: Lassa Fever; Awareness; Preventive Measures; Vector; Prevalence

Introduction

Lassa virus is zoonotic. It spreads to humans from rodents, specifically the multi-mammate mice (*Mastomys natalensis*); [1] it is probably the most common rat in equatorial Africa, ubiquitous in human households and eaten as a delicacy in some areas [2].

Infection in humans typically occurs by exposure to animal excrement through the respiratory or gastrointestinal tracts [2]. Inhalation of aerosolized

particles of infectious material is the most significant means of exposure. It is possible to acquire the infection through broken skin or mucous membranes that are directly exposed to infectious material.

The virus enters the human body through the bloodstream, lymph vessels, respiratory tract, and/or digestive tract [2]. It then multiplies in cells of the reticulo-endothelial system. Virus replication in the reticulo-endothelial cells causes capillary lesions. These capillary lesions lead to erythrocyte and platelet loss, with mild to moderate thrombocytopenia and a tendency towards bleeding. Capillary lesions also cause increased vascular permeability and hemorrhage in

various organs, such as the stomach, small intestine, kidneys, lungs, and brain.

Lassa fever was first discovered in Sierra Leone, West Africa in the 1950s but the virus responsible for the infection was not known until 1969 when two missionary nurses died of the infection. This fever was named after a village called Lassa in Borno State, Nigeria. It has been estimated that 300,000 to 500,000 cases and 5000 deaths from Lassa fever occur yearly across West Africa [3] with endemic and high sero-prevalence rates reported in Nigeria, Sierra Leone, Guinea, and Liberia [4]. In Nigeria, outbreaks of the infection have been reported in some States which include Edo, Ebonyi, Ondo, Taraba, Plateau, Anambra, Nasarawa, Yobe; and recently Rivers. Specifically, Edo state has had the highest number of both suspected and confirmed cases [5] of Lassa fever. Earlier studies have shown that the sero-prevalence in Nigeria is about 21% [6]. Large number of those infected are asymptomatic while a significant proportion of infected individuals only develop mild illness [7]. Recently, epidemic instances of the disease have been reported in healthcare workers and within health facilities, often resulting in severe morbidities and mortalities.

Lassa fever occurs in all age groups and both sexes. Persons at greatest risk are those living in rural areas where *Mastomys natalensis* is usually found, especially in communities with poor sanitation or crowded living conditions.

After an incubation period of 6 to 21 days, an acute illness with multi-organ involvement develops. Nonspecific symptoms include fever, facial swelling, and muscle fatigue, as well as conjunctivitis and mucosal bleeding. The other symptoms arising from the affected organs are:

Systems	Symptoms
Gastrointestinal tract	Bloody vomiting and diarrhoea, dysphagia, hepatitis
Cardiovascular system	Pericarditis, hypertension, tachycardia
Respiratory system	Cough, chest pain, dyspnoea, pharyngitis
Nervous system	Encephalitis, meningitis, unilateral or bilateral hearing defect

The term prevalence of Lassa fever usually refers to the estimated population of people who are managing Lassa fever at any given time. The prevalence of antibodies to the virus in the population was 8-52% in Sierra Leone, [8] 4-55% in Guinea, and 21% in Nigeria. Sero-positivity has also been found in the Central African Republic, Democratic Republic of the Congo, Mali, and Senegal [9].

Prevention are actions aimed at eradicating, eliminating or minimizing the impact of disease and disability, or if none of these are feasible, retarding the progress of the disease and disability. There are 5 levels of prevention namely: primordial prevention, primary prevention, secondary prevention, tertiary prevention and rehabilitation.

Olayinka and co-workers [10] while studying the awareness of Lassa fever in a rural community in South Western Nigeria found that majority 82.2% of the respondents had not previously heard of the disease.

Rine and Silas [11] indicated that 87% of the sub-urban respondents had heard about Lassa fever from different sources, while it was 89% of respondents in the urban areas. The finding was in

agreement with the reported (82.2%) from Owo, Ondo State, Nigeria by Olayinka and colleagues [10]. Nevertheless, in Edo State 95% of studied health workers were aware of Lassa fever [12].

The level of awareness that the rat is a vector of Lassa fever among the rural people in Ijebu-North Local Government, Ogun State, Nigeria was studied by Adefisan [13] who reported that illiterate rural inhabitants were not aware that Lassa fever was carried by rat. It was reported that large number of the people did not attach any health importance to a common rat/rodent, let alone associate it within the deadly disease.

A study in Republic of Guinea had shown that rodent infestation was much higher, food was more often stored uncovered and most strikingly, peri-domestic rodents were hunted as a protein source by 91.5% of the population. Furthermore, most of the respondents did not believe in the existence of Lassa fever virus, that is why most of them feed on rodents and foods contaminated by rodents without caution. Booner et al [14] stated that the poorer state of houses increased risk for rodents infestation and for transmission of Lassa virus in the houses immediate surroundings.

There is paucity of data on the awareness of Lassa fever preventive measures in Kwara State in particular and Nigeria in general. The aim of this study was to assess the awareness of cause of Lassa fever among inhabitants of Ilorin East Local Government Area of Kwara State and ascertain the level of awareness of the preventive health measures against Lassa fever.

Methodology

Study Centre

Ilorin East Local Government Area of Kwara State, Nigeria, is one of the sixteen Local Government Areas of the state. It has twelve (12) political wards namely; Apado Ward, Agbeyangi/Gbadamu Osin Ward, Gambari Ward I, Ibagun Ward I, Ibagun Ward II, Iponrin Ward, Magaji Are Ward I, Magaji Are Ward II, Marafa/Pepele Ward, Maya/Ile-Apa Ward, Oke-Oyi, Oke-Ose/Alabubosa Ward and Sango Ward. Due to the historical background of Ilorin Emirate, the Local Government is made up of various ethnic groups which include the Yoruba, Hausa, Fulani and Nupe. Major towns within Ilorin East Local Government Area include, part of Ilorin, Iponrin, Apado, Oke-Oyi, Panada, Agbeyangi, Ile-Apa, Lajiki, Elesinmeta, Budo Are. It has an area of 486km² and a population of 204,310 as at the 2006 census.

Ethical Approval

Ethical approval for the study was obtained from the Ethical Review Committee of the University of Ilorin Teaching Hospital Ilorin and approval was also obtained from the Chairman of Ilorin East Local Government, as well as the chiefs in each community before the process of community entry.

Sample Size Determination

The sample size was estimated using the Lesley Kish [15] statistical formula.

$$n = \frac{z^2 pq}{d^2} \quad | \quad q = 1 - p$$

n = designed sample size

p = best estimate of prevalence of Lassa fever in Nigeria, using 21% from a previous study as the best estimate of prevalence of Lassa fever

in Nigeria (Tomori and colleagues).

d = degree of accuracy desired usually set at 0.05

z = standard normal deviation, usually set at 1.96 which corresponds to 95% confidence level. Thus an estimated sample size of 300 was used for the study since the population is greater than 10,000.

Sampling Method

A multi - stage sampling technique was used to select respondents for the survey. The first stage involved using the mechanical balloting system: name of each of the 12 wards in Ilorin East Local Government was printed on 12 pieces of paper and placed in a container. The container was gently shaken to achieve proper mixing of the pieces and guaranteed equal chance of picking any of the papers. With eyes closed, the first four pieces of paper were selected from the container. Thereafter 3 villages/towns: Panada, Babanloma and Iponrin, were selected. Potential respondents were selected in households and schools in the three villages to make up the sample size of 300 inhabitants.

Data Collection

Self-administered, semi-structured questionnaire was used to collect data from consenting respondents and these were those who could read and write in English language. The semi-structured questionnaires had questions which were precisely worded and asked in a specified order. The same instrument was used as an interview protocol for the uneducated but with interpretation. Section A was made up of demographic data, Section B was on awareness about cause of Lassa fever, while Section C was on awareness of methods of prevention of Lassa fever.

Awareness of Lassa fever was assessed using a set of questions ranging from agents, vectors and methods of prevention at community level. Questionnaire was designed after an intensive literature review.

Research Questions

Research Question 1: What was the level of awareness of the cause of Lassa fever among inhabitants in Ilorin East Local Government Area of Kwara State?

Research Question 2: What was the level of awareness of preventive measures against Lassa fever among inhabitants?

Objectives of the study

Objective 1: What was the relationship between socio-demographic factor and awareness of preventive measures against Lassa fever among Inhabitants?

Objective 2: To describe the t-test analysis of the levels of awareness of male and female inhabitants about prevention of Lassa fever.

Pre-testing

The question was pre-tested in Ilorin West Local Government using 10% (30 respondents) of the estimated sample size. A pre-test or pilot study served as a trial run which identified potential problems with the proposed study and the need to make necessary revisions. The test-retest technique was used for the reliability of the questionnaires.

Five research assistants who had been adequately briefed distributed the questionnaire to the subjects. Informed consent was sought from the respondents. They were made to understand that participation was voluntary with no consequences for non

participation (maleficent, non-malevolent). All information obtained was treated with confidentiality.

Information collected from the respondents was entered into Statistical Package for Social Sciences version (SPSS) 15 software. The alternative responses for the terms in the instrument were weighted thus: Yes = 1; No = 0 frequencies and proportions were used to answer the research questions. The student's t statistic was used to test the null hypotheses posited.

Data Analysis

The data was analyzed using the Statistical Packages for Social Sciences (SPSS) version 20 statistical software (SPSS Inc. Chicago, Illinois, USA). Continuous variables, means and standard deviations were calculated and the means compared using the independent samples t-test. Pearson Chi-Square test was used to determine the relationship between fasting plasma glucose and socio-demographic factors. p values <0.05 were considered statistically significant.

The selected characteristics of the sample of 207 respondents were age, sex, level of formal education.

Results

Figure 1 shows the distribution of respondents by age and level of formal education. Seventy-five percent of the respondents were young adults, while 25% were older adults. Of the 207 respondents 118 (57%) were female while 89 (43%) were male. Seven percent of the respondents did not have formal education. Forty four and forty nine percent of the respondents were educated and highly educated respectively.



Answering the Research Questions

Table 1 answers the Research Question 1: What was the level of awareness of the cause of Lassa fever among inhabitants in Ilorin East Local Government Area of Kwara State?

The frequencies of yes were converted into scores by giving Yes a (1) and No a (0). The mark score and maximum score are shown in (Table 1). The level of awareness was calculated by dividing the total score by the maximum score to convert into percentage. The result was 63.7%, representing a high level of awareness of causes of Lassa fever.

Table 1: Distribution of respondents by age.

Age Range	Description	Frequency	Percentage
18 – 47	Young Adults	156	75
48 – 77	Old Adults	51	25
Total		207	100

Table 2 answers the Research Question 2: What was the level of awareness of preventive measures against Lassa fever among inhabitants?

The level of awareness shown in Table 2 was very high (91%). The ranking of the importance of the eleven preventive measures presented to the inhabitants showed that public health education followed by blocking of all hideouts of rats; proper storage of foodstuffs; proper refuse disposal and covering food and water – to mention only five – topped the list in order of importance.

Table 2: Profile of respondents by level of formal education.

Level of Formal Education	Description	Frequency	Percentage
None	Uneducated	14	7
Primary/Secondary	Educated	91	44
Tertiary	Highly Educated	102	49
Total	-	207	100

Table 3 highlighted the study objective 1: What was the relationship between socio-demographic factor and awareness of preventive measures against Lassa fever among inhabitants?

It was observed that the levels of awareness by men and women were 63% (high) and 79% (very high) respectively.

Table 3: Awareness of causes of Lassa fever among the inhabitants of Ilorin East LGA.

S/No	Causes	Awareness	
		Frequency Score	Percentage
1	Agent causing Lassa fever	108	52
2	Vector of transmission of Lassa fever	189	91
3	Type of rat causing Lassa fever	98	47
4	Number of people living a room	133	64
	Total Score	528	-
	Maximum score 207 x 4 = 828	828	

Table 4 addressed the study objective 4: To describe the t-test analysis of the levels of awareness of male and female inhabitants about prevention of Lassa fever.

The level of awareness among those without formal education was the lowest (60%). The levels of awareness of the preventive measures among the uneducated, educated and highly educated inhabitants were 60 percent, 84 percent and 82 percent respectively. The levels were high, very high and very high respectively.

Table 4: Awareness of preventive measures by inhabitants of Ilorin East LGA.

S/No	Preventive Measures	Awareness	
		Frequency Score	Rankings
1	Proper storage of foodstuffs	201	3
2	Proper disposal of refuse	200	4
3	Avoiding consumption of rats	189	7
4	Avoiding contact with rats	182	8
5	Blocking all rat hideouts	202	2
6	Avoiding overcrowding in a room	160	11
7	Public health education	207	1
8	Periodic fumigation	168	9
9	Covering food and water property	200	4
10	Cooking food thoroughly	198	6
11	Personal hygiene	167	10
	Total Score ... (a)	207	-
	Level of Score Possible ... (b)	207 x 11 = 2277	-
	Level of awareness a/b x 100	91%	

Table 5: Levels of awareness of preventive measures against Lassa fever by male and female inhabitants.

S/No	Preventive Measures	Awareness	
		Male = 89	Female = 118
		Frequency	Frequency
1	Proper storage of foodstuffs	71	93
2	Proper disposal of refuse	68	89
3	Avoiding consumption of rats	67	75
4	Avoiding contact with rats	67	78
5	Blocking all rat hideout	69	90
6	Avoiding over-crowding in a room	43	63
7	Public health education	72	101
8	Periodic fumigation	61	70
9	Covering food and water property	58	70
10	Cooking food thoroughly	58	70
11	Personal hygiene	56	70
	Total Score	690	868
	Maximum score	89 x 11 = 979	118 x 11 = 1298
	Awareness level	63%	79%

Table 6: Levels of awareness of preventive measures against Lassa fever by young and old adults.

S/No	Preventive Measures	Awareness	
		Young Adults N – 156	Old Adults N – 51
		Frequency	Frequency
1	Proper storage of foodstuffs	140	45
2	Proper disposal of refuse	140	44
3	Avoiding consumption of rats	110	42
4	Avoiding contact with rats	136	47
5	Blocking all rat hideout	137	50
6	Avoiding over-crowding in a room	101	28
7	Public health education	141	50
8	Periodic fumigation	136	42
9	Covering food and water property	136	43
10	Cooking food thoroughly	138	30
11	Personal hygiene	89	30
	Total Score	1404	421
	Maximum score	156 x 11 = 1716	51 x 11 = 56
	Level of awareness	82%	75%

Table 7: Levels of awareness of preventive measures against Lassa fever by uneducated, educated and highly educated.

S/No	Preventive Measures	Awareness		
		Uneducated N = 14	Educated N = 91	Highly Educated N = 102
		Frequency	Frequency	Frequency
1	Proper storage of foodstuffs	8	82	95
2	Proper disposal of refuse	9	80	93
3	Avoiding consumption of rats	6	76	82
4	Avoiding contact with rats	10	80	87
5	Blocking all rat hideout	11	83	99
6	Avoiding over crowding in a room	6	62	68
7	Public health education	13	89	100
8	Periodic fumigation	7	63	70
9	Covering food and water property	7	83	80
10	Cooking food thoroughly	8	70	78
11	Personal hygiene	8	70	70
	Total Score	93	838	922
	Maximum score	14 x 11 = 154	$\frac{91 \times 11}{1001} =$	102 x 11 = 1122
	Level of awareness	60%	84%	82%

Table 8: T – test analysis of the levels of awareness of male and female inhabitants about prevention of Lassa fever.

Variables	N	Mean	Std.Dev.	Df	t-cal	t-tab
Male	89	7.8	10			
Female	118	11	21	205	3.6	1.968
Total	207	Significance level = 0.05				

Table 9: T – test analysis of the levels of awareness of young and old adults about prevention of Lassa fever.

Variables	N	Mean	Std.Dev.	Df	t-cal	t-tab
Young Adults	156	9	11			
Old Adults	51	8.3	13	205	3.3	1.968
Total	207	Significance level = 0.05				

Table 10: T – test analysis of the levels of awareness of prevention of Lassa fever by uneducated and educated inhabitants.

Variables	N	Mean	Std.Dev.	Df	t-cal	t-tab
Uneducated	14	6.6	9			
Educated	193	9.1	12	205	2.8	1.968
Total	207	Significance level = 0.05				

Discussion

The objectives of this study was to assess the awareness of cause of Lassa fever among the inhabitants of Ilorin East Local Government Area (LGA) of Kwara State and to ascertain the levels of awareness of the preventive health measures against Lassa fever among the inhabitants of Ilorin East LGA of Kwara State. Two research questions and three null hypotheses were raised to guide the study.

In this study, all the 207 respondents had heard of Lassa fever. This was similar to the study by Aigbiremolan et al [16] in Edo State, Nigeria where 100% awareness of Lassa fever was reported. This was comparable to the study of Tobin and co-workers [17] where 97.0% respondents had previously heard of Lassa fever. Asogun, et al [18]

while studying Lassa fever awareness and practices in a Nigerian rural community reported that 36% of the respondents had heard about the disease, mainly through the electronic media. The public enlightenment embarked upon by various arms of Government and non-governmental organizations in Nigeria had therefore been a huge success.

Two - thirds of the respondents were aware of Lassa fever in terms of the virus and the rat responsible as well as the risk of body contact with the infected people. In the Nassarawa study, between 41.5 and 50 percent described virus as the cause and urine of rats as the mode of transmission. In Adebimpe’s [19,20] study in the slums of Southwestern Nigeria, it was found that community awareness of the rodent control measures was high. About 83 percent of the respondents were aware of the disease transmission and 80 percent of preventive measures. These findings were supported in this study. The 207 respondents had a high level (63.7%) of awareness of the cause of Lassa fever, and a very high level of awareness (91%) of the preventive measures against the disease. Findings of the study were a clear indication that the level of awareness among the uneducated was lower than in the educated. This was comparable to the study of Olayinka and co-workers [15] who reported that awareness of Lassa fever was more evident among those who had tertiary education. Hence, it was obvious that with basic literacy, the general population was sufficiently aware of the causes, prevention and control of the Lassa fever vector and Lassa fever even without advanced knowledge of Biology or Health Science. Female respondents showed higher level of awareness than their male counterpart. The high level of awareness showed by women might be due to their regular visits to health centres especially the pregnant ones, on the grounds of malaria attack or gynecological complaints where issues concerning Lassa fever might crop up.

In the current study sex, age and formal education were found to have significant influence on the level of awareness of preventive measures against Lassa fever. Young adults had a higher level of awareness than older adults; and females had a higher level of awareness than males and the uneducated had a lower level of awareness (60%) than that of the educated (84%) and the highly educated (82%). It was reasonable to assume that the uneducated was not able to benefit from public health education as much as the educated inhabitants. This was probably why there was the difference recorded in the area of influence of formal education on levels of awareness among the inhabitants of Ilorin East LGA of Kwara State.

Conclusion

In this study, all the respondents were aware of Lassa fever, however only two-third were aware of the cause of Lassa fever in terms of the virus and the rat as a vector. Although, awareness was very high, sustained efforts should be made to increase the awareness of the populace through health campaigns and to raise community awareness about the multi-mammate rat (*Mastomys natalensis*) as the vector of virus that transmits Lassa fever. There is need to improve community attitudes to preventive measures in relation to rodent control.

Limitation of the Study

Like all cross-sectional studies, it was difficult to established causal association between independent and dependent variables. The relatively small sample size may be a potential limitation, but its

calculation estimated this number as sufficient for the study.

Recommendations

The three tiers of government and Non-Governmental Organizations (NGOs) in Nigeria should intensify effort in adequately educating the populace through enlightenment campaigns most especially through the mass-media; print and electronic as well as through religious groups on the mode of transmission of the disease, and its signs and symptoms. There is need for further health education campaigns to improve environmental hygiene and a modification of practices that promote the spread of Lassa fever. It is pertinent for the local government to practice appropriate refuse disposal in the community and for the health facilities to be improved. There should also be community participation to ensure sustained development. Health authorities like the National Primary Health Care Development Agency (NPHCDA) and state ministries of health should on a regular basis organize practice – oriented training programmes for health workers on infectious disease control. The Federal Government programmes on Universal Basic Education (UBE) should be implemented so that future generations of Nigerians will acquire not just the basic literacy skills but also the right orientation and attitude to embrace modern healthcare seamlessly. A social mobilization campaign should be launched to prevent Lassa fever epidemic. This may take the form of Lassa fever outreach that will be responsible for undertaking grassroots activities.

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