

Knowledge, attitude and practice of post exposure prophylaxis for Lassa fever among health care workers in a specialist teaching hospital in South-South Nigeria

Al Onoabhagbe

FO Erah*

P Akhideno

Department of Community
Medicine, Irrua Specialist Teaching
Hospital, Irrua, Edo State, Nigeria

***For correspondence:**

Tel: +2348033546812

Email: francozenith@yahoo.com

Abstract

Introduction: Lassa fever is a zoonotic illness caused by an arena virus, first reported in 1969, with several outbreaks occurring till date. It's a well-recognized occupational risk for health care workers in endemic areas and its nosocomial outbreaks is associated with high mortality. The role for post exposure prophylaxis is vital. The objective of this work is to assess the knowledge, attitude and practice of Post Exposure Prophylaxis (PEP) for Lassa fever disease among health workers with a view of making appropriate recommendations to the authorities where necessary.

Methods: In a descriptive cross-sectional study, 300 healthcare workers (HCWs) in a tertiary health care facility were surveyed using self-administered questionnaire that focused on knowledge, attitude and practice of post exposure prophylaxis (PEP). Based on the data collected, good knowledge, positive attitude and good practice of post exposure prophylaxis (PEP) were determined as the proportion of respondents who scored 75% and above in each of the category. Chi square test was used to find out the association between two variables with a level of significance put at 95% and $p < 0.05$.

Results: Majority of the 300 respondents (97.0%) had good knowledge of PEP. A higher proportion of them (65.7%) also had a good attitude towards PEP and knowledge of PEP had a strong positive association with attitude. Majority of respondents (69.2%) who admitted to risky exposure to Lassa fever took PEP and majority (72.2%) completed the prescribed regime. Reasons for non-completion of PEP was mainly due to adverse effects of ribavirin.

Conclusion: The knowledge, attitude and practice of PEP against Lassa fever among HCWs surveyed was good which is a clear sign of adequate orientation of staff concerning Lassa fever.

Keywords: Attitude, Health workers, Knowledge, Post Exposure Prophylaxis, Practice

Introduction

Lassa fever (LF) is a zoonotic illness caused by an arenavirus. It was first reported from Northern Nigeria in 1969 [1,2]. Since then, several outbreaks have occurred in the West African countries including Nigeria, Sierra Leone, Liberia and Guinea where the disease is endemic with attendant morbidity and mortality [1]. Outbreaks have also been reported in Ghana and serological evidence of human infection found in Ivory Coast, Senegal and Mali [3]. It has been imported into non-endemic countries by returning travelers [4].

Humans contract Lassa virus primarily through contact with urine and excreta of the rodent *Mastomys natalensis*, which is the natural reservoir [3]. Secondary transmission of Lassa virus between humans occur through direct contact with infected blood or bodily secretions, such as saliva, vomit, stool, urine or via sexual intercourse [4,5]. Nosocomial transmission and outbreaks have been described in health care facilities in areas of endemicity [6-8]. The illness which has an incubation period of 2-21 days [9], is characterized by fever, muscle aches, sore throat, nausea, vomiting, chest pain and abdominal pain [10]. There are estimated 300,000-500,000 cases of Lassa fever each year, with 5,000 related deaths, and about 10%-15% of admissions to hospitals annually [11].

Lassa fever is a well-recognized occupational risk for health care workers in endemic areas like Nigeria and post exposure prophylaxis (PEP) with oral ribavirin is commonly prescribed following occupational exposure to Lassa fever viral infection. The association of Lassa fever virus with nosocomial outbreaks with high mortality [6], suggests a clear role for PEP in Lassa fever outbreaks. The inability to diagnose Lassa fever during the incubation period and the attendant anxiety aroused when health care workers or family members are exposed to persons who were diagnosed with Lassa fever may also suggest a role for PEP [12,13]. Ribavirin (1-β-D-ribofuranosyl-1, 2, 4-triazole-3-carboxamide) is a guanosine analogue with broad-spectrum antiviral activity. The drug has been used, with varying degrees of proven clinical efficacy, for the treatment of Lassa fever and other arenavirus infections. Various mechanisms of action of ribavirin have been suggested, including direct inhibition of viral Ribonucleic Acid (RNA)-dependent RNA polymerases, inhibition of host inosine monophosphate dehydrogenase, modulation of the host immune response, inhibition of viral capping enzymes, and lethal mutagenesis [14-16].

Oral ribavirin has been strongly recommended for use for PEP in high-risk exposure to Lassa fever. High-risk exposure is defined as one with penetration of skin by sharp contaminated instrument, contamination of mucous membrane or broken skin with blood or bodily secretion, prolonged contact with infected patients during medical evaluation in an enclosed space without appropriate PPE [13,17]. The Nigeria Center for Disease Control (NCDC) recommends that oral ribavirin be used for post exposure prophylaxis to Lassa fever high risk contact at a dose of 500mg by mouth every 6 hours for 7 days [17].

The main objective was to assess the knowledge, attitude and practice of post exposure prophylaxis for Lassa fever disease among health care workers in a specialist teaching hospital with a view to making appropriate recommendations where necessary. The specific objectives were to determine the knowledge of post exposure prophylaxis for Lassa fever among health care workers in a Specialist Teaching Hospital; to ascertain the attitude of health care workers towards post exposure prophylaxis for Lassa fever and to determine the extent of practice of post exposure prophylaxis for Lassa fever among health care workers in a specialist teaching hospital.

Methods

Three hundred (300) health care workers were interviewed with the aid of a self-administered questionnaires using a cross-sectional descriptive study design. Sample size was determined using the Cochran formula for sample size determination in a cross-sectional survey [18] with the formula $n = \frac{z^2pq}{d^2}$ where P (prevalence) was 26.5% of doctors

among 1665 exposed health care workers with occupational exposure to blood and body fluid and HIV post exposure prophylaxis in health care facilities giving a sample size of approximately 300 [19]. Adapted self-administered questionnaire [20,21] was used to conduct the survey in which respondents were expected to complete a multicomponent questionnaire. The questionnaire comprised of sociodemographic section, knowledge, attitude and practice of PEP among respondents. Inclusion criteria were all health care workers including nurses, doctors, mortician, record staff, laboratory scientist, cleaners, pharmacist and administrative staff and all the health care workers who agreed to participate in the study were recruited for the study giving a response rate of 100%. Data were collected, entered and analyzed using statistical package for scientific solution (SPSS) version 23.0. Results were presented in tables and chart and association between two variables were determined using chi-square test with 95% confidence level at $p < 0.05$. Good knowledge, positive attitude and good practice of PEP were determined by the proportion of respondents who scored above 75% in each of the category.

Results

More of the respondents in this study were in the age group 31-40 years (51.3%) and most respondents were married (70.3%). Majority of them had tertiary education (86.0%) and most were Christians (95.0%). Over one-third (38.4%) were doctors while more than half of all respondents (53.3%) worked in clinical areas (Table 1). Majority of respondents (77.0%) have heard about PEP and clinical training was the commonest source of information on PEP (68.8%). Most of the respondents (97.0%) had good knowledge of PEP (Table 2).

More of the respondents in the age group of 30-39 years have good knowledge and this association was found to be statistically significant ($p = 0.042$) (Table 3). A greater proportion of the respondents (65.7%) had positive attitude towards PEP for Lassa fever. The higher the level of education, the better the attitude but this was not statistically significant ($p = 0.702$) and more males have good attitude but this was also not statistically significant ($p = 0.732$, Table 4). A greater proportion of the respondents with good knowledge (67.2%) of PEP also have positive attitude towards PEP and this association was found to be statistically significant ($p = 0.005$). About two-third (69.2%) of those that had risky exposure to Lassa fever took PEP. Majority (80.6%) of them who took PEP reported adverse event(s) (Table 5).

There were no statistically significant associations between socio-demographic variables assessed (age, sex, marital status and level of education) and use of PEP (Table 6).

Table 1: Socio-demographic characteristics of health care workers (HCWs)

Variable	Frequency (n=300)	Percent
Age group (years)		
21-30	57	19.0
31-40	154	51.3
41-50	66	22.0
51-60	23	7.7
Mean age: 37.7±7.7		
Marital status		
Married	211	70.0
Single	72	24.0
Divorced	9	3.0
Widowed	5	1.7
Co-habiting	3	1.0
Educational status		
Primary	13	4.3
Secondary	29	9.7
Tertiary	258	86.0
Religion		
Christianity	285	95.0
Islam	15	5.0
Ethnicity		
Esan	115	38.3
Igbo	57	19.0
Etsako	34	11.3
Bini	33	11.0
Yoruba	25	8.3
Owan	23	7.7
*Others	13	4.4
Cadre		
Doctors	115	38.4
Administrative staff	69	23.0
Lab. scientists	41	13.7
Nurses	34	11.3
Other support staff	15	4.8
Mortician	13	4.4
Record staff	13	4.4
Duration of employment (years)		
<1	26	8.7
1-5	115	38.3
6-10	110	36.7
>10	49	16.3
Primary area of work		
Clinical services	160	53.3
ILFRC	59	19.7
Administration	48	16.0
Records	24	8.0
Mortuary	9	3.0

ILFRC = Institute of Lassa Fever Research and Control; *Others; Germans 5 (1.7%), Americans 5 (1.7%), Filipinos 3 (1.0%)

All of the respondents who use PEP have good knowledge but this was not statistically significant.

P=0.093. More of the respondents with positive attitude use PEP but this was not statistically significant (p = 0.597, Table 7).

Table 2: Knowledge of post-exposure prophylaxis for Lassa fever among HCWs

Variable	Frequency (n=300)	Percent
Heard of PEP		
Yes	231	77.0
No	69	23.0
*Source of information (n=231)		
Clinical training	159	68.8
Mass media	40	17.3
Friends	21	8.7
Journals	6	2.6
Seminars	5	2.1
Knowledge grade		
Good	291	97.0
Poor	9	3.0

*Multiple responses

Discussion

Findings from this study showed that more of the respondents in this study were in the age group 31-40 years (51.3%) with a mean age of 37.7±7.7. Most of the respondents (97.0%) had good knowledge of PEP with two third of respondents indicated clinical training as source of knowledge. A greater proportion of the respondents (65.7%) had positive attitude towards PEP for Lassa fever. About two-third (69.2%) of those that had risky exposure to Lassa fever took PEP and majority (80.6%) of them who took PEP reported adverse event(s).

The discovery that the mean age of health care workers studied was 37.7 ± 7.7 years is in tandem with the population of Nigerians who work in the civil service of the federation. Also, the findings from this study that most of the respondents had good knowledge of PEP for Lassa fever is not quite similar to a study carried out in Owo, Ondo state were about half of the respondent had good knowledge and the researcher assessed 451 HCWs on the disparities in knowledge, attitude and practice of infection prevention and control of Lassa fever [22]. About two third of the respondents in this study had clinical training as their source of information. This is similar to another study where clinical training was the major source of information among respondents with 20% of respondents picking mass media as their source of information [20] but this contradicts a study carried out in Pakistan where one fifth of the respondents picked clinical training as source of information [21]. Clinical training remains a major and most relevant source of vital information for health care workers. This information comes either during consultant's clinical ward rounds or through other academic programs such as seminar presentations, lectures, clinical procedures, assignments or personal study.

Table 3: Socio-demographic characteristics of respondents and knowledge of PEP

Variable	Knowledge grade		Chi-square	P-value
	Good	Poor		
Age				
20-29	40	4	8.185	0.042
30-39	138	1		
40-49	88	3		
50-59	25	1		
Sex				
Female	118	4	0.055	0.815
Male	173	5		
Level of education				
Primary	12	1	1.890	0.389
Secondary	29	0		
Tertiary	250	8		

Table 4: Sociodemographic characteristics and attitude of HCWs towards PEP

Variable	Attitude (n=300)		χ^2	P value
	Positive	Negative		
Sex				
Female	79	44	1.018	0.732
Male	118	59		
Age group				
20-29	31	13	1.018	0.781
30-39	89	50		
40-49	59	32		
50-59	18	8		
Level of education				
Primary	9	4	0.708	0.702
Secondary	21	9		
Tertiary	167	90		

Table 5: Practice of PEP for Lassa fever among respondents

Variable	Frequency	Percent
Had risky exposure (n=300)	104	34.7
Took PEP (n=104)	72	69.2
Completed PEP (n=72)	52	72.2
Adverse effect (n=72)	58	80.6

Table 6: Socio-demographic characteristics of respondents and use of PEP against Lassa fever infection

Variable	Use of PEP (n= 104)		χ^2	P value
	Yes	No		
Sex				
Female	31	12	0.279	0.597
Male	41	20		
Age of respondents				
20-29	7	3	1.097	0.778
30-39	37	14		
40-49	23	11		
50-59	5	4		
Marital status				
Single	10	9	3.181	0.365
Married	56	21		
Divorce	4	1		
Widowed	2	1		
Level of education				
Primary	1	2	2.647	0.266
Secondary	12	3		
Tertiary	59	27		

Table 8: Association between knowledge and attitude of HCWs to PEP and use of PEP against Lassa fever

Variable	Use of PEP (n= 104)		Test statistic	P value
	Yes	No		
Knowledge of PEP				
Good	72	30	Fishers' exact	0.093
Poor	0	2		
Attitude				
Positive	51	21	Chi-square 0.279	0.597
Negative	21	11		

In addition, about two-third of respondents in this study had positive attitude towards PEP. This is in tandem with a study carried out in Lagos University teaching hospital [23]. This is not surprising as training is also expected to impact on attitude and most workers heard of PEP through clinical training. Attitude of health care workers studied was significantly associated with their knowledge ($P=0.005$) also supporting the assumption that with training comes knowledge and possibly positive attitude.

Furthermore, findings from this study showed that a larger proportion of health care workers who had risky exposure to Lassa fever used PEP for Lassa fever. This however differ from another study where only about a third of health care workers with needle stick injury took PEP [20]. This attitude of HCWs in this study may have arisen from the orientation they receive on regular basis from the hospital infection prevention and control committee or consultants ward rounds on the need to prevent Lassa fever infection among staff.

Findings from this study also showed that a greater proportion of the respondents with good knowledge of PEP also have positive attitude towards PEP and this association was found to be statistically significant. This is in tandem with a study carried out in Gondar, North West Ethiopia which found that a greater proportion of respondents who had good knowledge also had positive attitude towards PEP against HIV [24]. This however contradicts a study carried out in Lagos University Teaching Hospital where respondent who had good knowledge of PEP had negative attitude towards PEP for HIV [25].

Majority of respondents (81%) who took PEP had adverse reactions to Ribavirin. This is similar to another study which noted that compliance with Ribavirin was poor as a result of adverse drug reactions [26].

Conclusion

The findings of this work shows that the HCWs had good knowledge, attitude and practice of PEP against Lassa fever. This is a clear sign of adequate orientation of staff concerning Lassa fever.

List of abbreviations

HCWs, Health care workers; ILFRC, Institute of Lassa Fever Research and Control; Laser fever; PEP, post exposure prophylaxis.

Declarations

Ethical approval

None declared.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

No conflict of interest associated with this work.

Funding

No funding was received for this work

Contribution of Authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

Acknowledgements

None declared.

Open Access

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited.

References

1. Dahmane A, van-Griensven J, Van-Herp M, Van den Bergh R, Nzomukunda Y, Prior J, Alders P, Jambai A, Zachariah R. Constraints in the diagnosis and treatment of Lassa fever and the effect on mortality in hospitalized children and women with obstetric conditions in a rural district hospital in Sierra Leone. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 2014; 108(3):126-132.
2. Peterson A.T, Moses L.M, Bausch D.G. Mapping transmission risk of Lassa fever in West Africa: the importance of quality control, sampling bias and error weighing. *PLoS ONE* 2014; 9(8): e100711.
3. Richmond JK, Banglolle DJ. Lassa fever: Epidemiology, clinical features and social consequences. *BMJ*. 2003; 327:1271-75
4. Gunther S, Emmerich P, Laue T, Kuhle O, Asper M. Imported Lassa fever in Germany: Molecular characterization of a new Lassa virus strain. *Emerg. Infect. Dis.* 2000; 6: 466-76
5. Enria D, Mills JN, Flick R. *Arena virus infection*. In: Guerrant RL, Walker DH, Weller PF. *Tropical infectious diseases: Principles, pathogens and practice*. 2Ed. Philadelphia; PA: Elsevier, 2006: 734-55
6. Fisher-Hoch SP, Tomori O, Nasidi A, Perez-Oronoz GI, Fakile Y, Hutwagner L, McCormick JB. Review of cases of nosocomial Lassa fever in Nigeria: the high price of poor medical practice. *BMJ* 1995; 311: 857-9
7. Carey DE, Kemp GE, White HA, Pinneo L, Addy RF, Fom AL.. Lassa fever: epidemiological aspects of the 1970 epidemic, Jos, Nigeria. *Trans R Soc Trop Med Hyg* 1972; 66: 402-408.
8. Drosten C, Kummerer BM, Schmitz H, Gunther S. Molecular diagnostics of viral haemorrhagic fevers. *Antiviral Res* 2003; 57: 61-87.
9. WHO: Lassa fever fact sheet. World Health Organization, 2017. Accessed at <http://www.who.int/mediacentre/factsheets/fs179/en/> April 26th 2018 at 2.26pm
10. CDC: Imported Lassa fever. New Jersey: CDC MMWR. *Morb Mortal Wkly Rep*. 2004; 53(38): 894-7
11. McCormick JB, Webb PA, Kreb JW, Johnson KM, Smith ES. A Prospective Study of the Epidemiology and Ecology of Lassa fever. *J infect. Dis.* 1987; 155: 437-44
12. Bausch DG, Hadi CM, Khan SH, Lertora JJ. Review of literature and proposed guidelines for the use of oral Ribavirin as post exposure prophylaxis for Lassa fever. *CID*. 2010; 51(12): 1435-41
13. McCormick JB, King IJ, Webb PA, Scribner CL, Craven RB, Johnson KM, Elliot LH, Belmont-Williams R. Lassa Fever: Effective therapy with Ribavirin. *N Engl J Med*. 1986; 314: 20-6
14. Crotty S, Cameron CE, Andino R. RNA virus error catastrophe: direct Molecular test by using Ribavirin. *Proc Natl Acad Sci USA*. 2001; 98: 6895- 6900.
15. Crotty S, Maag D, Arnold JJ, et al. The broad-spectrum antiviral ribonucleoside ribavirin b is an RNA virus mutagen. *Nat Med* 2000; 6: 1375- 1379.
16. Cameron CE, Castro C. The mechanism of action of ribavirin: lethal mutagenesis of RNA virus genomes mediated by the viral RNA-dependent RNA polymerase. *Curr Opin Infect Dis* 2001; 14: 757-64.
17. NCDC. Standard operating procedures for Lassa fever case management. Nigeria Centre for Disease Control. 2017: 13
18. Cochran G. *Sampling Techniques*. In: *Sampling statistics*. 3rd Ed. New York. John Wiley and Sons, Inc; 2004. 89-96
19. Republic of Kenya, Ministry of Health 2016 technical report. Occupational exposure to blood and body fluid and HIV post exposure prophylaxis in health care facilities in Kenya 2011-2014. Available at www.pdfs.semanticscholar.org. accessed 31st March 2022.
20. Okoh M, Saheeb BD. Assessment of knowledge, attitude and practice of post exposure prophylaxis against blood-borne viral infection among dental surgeons in a teaching hospital. *South Afr J Inf dis*. 2017; 32(1): 17-22.
21. Singh G, Din Ahmad MUD, Muneer S, Sabah NU, Baig W, Khan A. Assessment of knowledge, attitude and practice of post exposure prophylaxis for HIV among health care professionals in Lahore. *Occup Med Health Aff*. 2015; 3 (4): 208-1
22. Ukmenya O, Fuwape TA, Fadahunsi TI, Ilesanmi OS. Disparities in knowledge, attitude and practices of infection prevention and control of Lassa fever among health care workers at federal medical centre, Owo, Ondo State, Nigeria. *Pan Afri Med J*. 2021; 38(357). Doi: 10.11604/pamj.2021.38.357.26208
23. Ajibola S, Akinbami A, Elikwu C, Odesanya M, Uche E. Knowledge, attitude and practices of post exposure prophylaxis amongst health workers in Lagos University Teaching Hospital. *Pan Afri Med J*. 2014; 19: 172-80
24. Mathewos B, Birhan W, Kinfe S, Boru M, Tiruneh G, Addis Z and Alemu A. Assessment of Knowledge, attitude and practice towards post exposure prophylaxis for HIV among HCWs in Gondar, North West Ethiopia. *BMC Public health*. 2013; 13(508). Doi: 10/1186/1471-2458-13-508
25. Ajibola S, Akinbami A, Elikwu C, Odesanya M and Uche E. Knowledge, attitude and practice of HIV post exposure prophylaxis among HCWs in Lagos University Teaching Hospital. *Pan Afri Med J*. 2014; 19(172). Doi: 10.11604/pamj.2014.19.172.4718
26. Martella V, Bianchi A, Bertolotti I, Pedrotti L, Gugliatti A, Catella A, Cordioli P, Lucente MS, Elia G, Buonavoglia C. Ribavirin for Lassa Fever Post Exposure Prophylaxis. *Emerg Inf Dis*. 2010; 16(12): 2009-11.