Epizootiology and Animal Health in West Africa is a peer-reviewed scientific journal that provides a home for high quality work which covers the areas of geographic information systems in veterinary science, ecology, epizootiology, exposure science, preventive medicine, spatial statistics and zoonoses surveillance. The journal focuses on answering epizootiological questions where citizen science, spatial and temporal approaches are appropriate. The methods should help to advance our understanding of infectious and non-infectious diseases in animals and humans in the sub-region.

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Epizootiology and Animal Health in West Africa

Volume 9 (2), July - December 2013

Christian Onyebuchi Chukwu
Rabies: Under-reported disease in West Africa. Can we address the challenge? 71

Improving rabies control in West Africa: perspectives from the Nigerian Federal Ministry of Health 73

Abdel Kader Traore, Ousmane Kone, Lamine Diarra and Zakaria Keita
Is rabies neglected in West Africa? The case of Bamako, Mali 81

Problems of rabies in Nigeria: a review 86

Richard D Suu-Ire, Yaa Ntiamoah-Baido, Andrew A Cunningham and James Wood
Lyssavirus surveillance in fruit bats in Ghana, 2008-2012 106

Nykoi D Jomah, Tolulope O Ososanya, Charles K Mulbah and Babasola O Olugasa
A descriptive and categorical analysis of age, gender and seasonal pattern of dog-bite cases and rabies-like-illness among humans in Liberia, 2008-2012 113

Roland Suluku, Ibrahim Abu-Bakarr, Jonathan Johnny and Felixtina Johsyn- Ellis
The use of animal health club to promote rabies awareness and control in Sierra Leone 125

Anthony E.J. Okoh
Rabies and rabies-related viruses in Nigeria: an overview 136

Babasola O Olugasa
Development of a geospatial data management strategy for modernizing rabies surveillance education, science and service in West Africa 147
Rabies: Under reported disease in West Africa. Can we address the challenge?

Christian Onyebuchi Chukwu

Girolama Fracastoro, a Verona born Italian doctor had observed the devastating effect of rabies virus which connects the saliva of infected animals with this disease in human beings (victim). He gave the name rabies which in Latin means 'to rage' to this incurable (but preventable) disease. Ancient texts described the existence of this disease in Mesopotamia or Babylonian empire and from these locations, the virus is thought to have spread to Europe and then, following patterns of human colonization, to Africa. More recently however, scientists have been able to determine a common origin of all dog viruses circulating globally and to propose that the ancestor of these viruses existed 1500 years ago, perhaps in the Indian subcontinent.

Following Dr. Fracastoro’s report on this clinical finding, it took Louis Pasteur, a chemist turned microbiologist about 300 years to discover the rabies vaccine. Prior to this discovery, animals and human beings suspected of having symptoms attributed to rabies were shot, suffocated or poisoned. This prompted a firm legislation in 1810 in France to stop the murder of innocent people.

An estimated 55,000 cases of rabies are reported yearly mainly in under-developed areas of Africa and Asia. The commonest sources of infection are from infected dogs and recently, there has been an explosion of cases of rabies vaccinations in the United State which mean, few cases are found in domestic animals. Fears have been expressed regarding a mutated strain of rabies in Arizona which appears to spread through social contact, rather than bites.

Rabies vaccine is available and many lives are saved every year but the vaccine must be injected within 24 hours following exposure case to give the body required time to create needed antibodies against the invading virus. If the rabies vaccine is not given quickly and the rabies virus is allowed to progress, the outcome is almost always death.

Although wild animals (example bats, skunks, foxes or raccoons) which are the commonest sources of this viral infection in develop countries accounting for about
90% of reported cases. Unfortunately, infection from domestic animals including dogs and cats are the commonest carriers of this virus in developing countries.

Rabies virus gains access to the human body through bite wounds, scratch and sometimes through the mucosa lining including the conjunctiva although, there are reports of inhalational route of infection of this deadly virus from bat droppings in caves. This notifiable disease is probably under reported in Nigeria and across West African sub-region. This poses dangers associated with the challenge of eradicating this deadly disease and it is my candid belief that the West Africa conference on rabies will address issues relating to poor notification, education, control and prevention, hence proffer a lasting panacea to the menace of this disease.

The Honourable Minister of Health,

Minister's speech was delivered at the Rabies in West Africa Conference, December 2012 by Professor Temitope O. Alonge, Chief Medical Director, University College Hospital (UCH) and Professor of Orthopeidic Surgery, College of Medicine, University of Ibadan, Ibadan, Nigeria
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Improving rabies control in West Africa: perspectives from the Nigerian Federal Ministry of Health


Summary

The mandate of the Federal Ministry of Health is to ensure equitable access to and timely dispatch of high quality health care as well as public health services to all Nigerians. The ministry formulates health policies through recommendations received across the country and ensures that these policies are implemented. The Federal Ministry of Health is also to build and conduct baseline surveillance database on health and disease indices through its Integrated disease surveillance and response (IDSR) system, which is a system whereby case pattern and incidence of disease across the country are reported. The data in turn are interpreted at the Epidemiology Unit of the Federal Ministry of Health, which helps to predict other locations or areas in the country which may have disease outbreak and require critical attention. Based on such findings, state epidemiologists or commissioners of health can then be informed of increasing reports of disease in their localities. This helps to check epidemics and trend of disease across the country. The reported outbreak of rabies in southern Nigeria in 2012 was a case in context. Through collaboration with the Centre for Control and Prevention of Zoonoses, University of Ibadan, the ministry forges a network for surveillance and control of Rabies in West Africa (RIWA) in a unique initiative that engages experts in addressing the challenge of rabies in West Africa.

Keywords: Challenge, collaboration, epidemiology, rabies, West Africa.

Introduction

The neglect of rabies has resulted in a high proportion of preventable human deaths in West Africa. Nigeria in particular, compared with some other countries that confronted the problem of rabies with all seriousness. The review meeting of Generic Technical Guideline on Integrated Disease Surveillance and Response (IDSR) for World Health
Organization (WHO) African Regional Office (AFRO), in Quïda, Republic of Benin, 2008 (WHO, 2010a) issued a call. The meeting further requested member states to collaborate and give priority to the problems of neglected zoonotic diseases, rabies inclusive.

In response to this call, the Federal Ministry of Health in collaboration with Ahmadu Bello University and Centres for Disease Control, Rabies Division, organized three National Conferences, with the aim of imparting skilled knowledge, stimulating the populace and steering the need to focus on the control, prevention and containment of rabies within the society by the government and the people of Nigeria.

Based on scientific evidence that rabies can be effectively controlled, the idea of a sub-regional conference was conceived and formulated during the experts meeting on Rabies in the America's (RITA) conference in Quebec, Canada 2009, and recommendation on the “idea formulation” was presented to the Honourable Minister of Health, Onyebuchi Chukwu on the 27 January 2011 by Albert Bankole Ogunkoya. This was embraced by the Honourable Minister of Health.

Thus, Nigeria was able to host an inaugural conference on Rabies in West Africa (RIWA) in December, 2012. The maiden conference was sponsored by the Federal Ministry of Health, Abuja and the Centre for Control and Prevention of Zoonoses (CCPZ), University of Ibadan, Nigeria. The opening session of the conference was held at the International Conference Centre, University of Ibadan, Nigeria.

Since 1912, when the official reports on the endemicity of rabies in the country was made known, the impact of the disease on both animals and humans remain perpetual. The accurate epidemiologic situation of the disease in the country has not been established. As a result, it is virtually impossible to achieve control and eradication of the disease. Rabies situation in West African countries is the same. Whereas, rabies is generally recognized as a trans-boundary problem. That means, it will be unlikely that any country in this sub-region will achieve a rabies free state, for the following reasons;

a) The boundaries are very porous and there is free movements from one country to another, with little or no check.

b) Unrestricted dog movements through the boarders with consideration of the situation in neighbouring countries.

c) Dog markets are now of serious economic importance in this sub-region, which will make it more difficult to control rabies. These human-animal interface markets have the frequency of contact thereby increasing and introducing new strains of rabies virus into countries around this interface.

This scenario calls for all countries in the sub-region to come together to tackle the menace of rabies. The mission of the conference was to exchange information on the nature of the endemicity of rabies in each country, work
out the modalities for the reduction of
dog-bite related deaths by 50% within the
next five years and progressively leading
to the control and eradication of this
deadly disease in the West Africa sub-
region.

Mandate of the Federal Ministry of
Health

The mandate of the Federal Ministry of
Health is to ensure equitable access to and
timely dispatch of high quality health
services as well as public health services
to all Nigerians. The ministry formulates
health policies through recommenda-
tions received across the country and
these policies are well implemented.
Epidemiological investigation on rabies
in southern Nigeria has been on course at
the Federal Ministry of Health since April
2011 when 2-3 deaths were recorded.

A case of rabies is considered to be an
epidermic because of the violent way in
which the patient dies. Therefore, the
Federal Ministry of Health in collabo-
ration with the Federal Ministries of
Agriculture and Information to harness
knowledge to control this disease in a
more effective and efficient manner
nationwide. As a result, the FMOH works
with the National Veterinary Research
Institute (NVRI), Vom, Plateau State and
withCentres for Disease Control and
Prevention (CDC), Abuja, Nigeria and
Atlanta, Georgia, USA.

The Federal Ministry of Health recog-
nizes the importance of promoting
collaboration (WHO, 2010b) with Center
of Excellence (CoE) in epidemiological
research and education for control and
rabies across West Africa. Strategic at this is
the position of the University of Ibadan
Centre for Control and Prevention of
Zoonoses (CCPZ), through its West African
network for education, science and service.
The Federal Ministry is in partnership with
CCPZ in order to integrate and intensify
efforts for sub-regional training for
surveillance and control of diseases at the
human-animal-environment interfaces.
Since rabies is 100% vaccine preventable, the
FMOH's policy is to offer yearly budget
recommendation for anti-rabies vaccines to
be procured by the federal government for
equitable distribution nationwide. The
FMOH is committed to ensuring quality
public health services in rabies elimination in
Nigeria in pursuit of the millenium
development goal of the United Nations.

Following the incidence of rabies epidemic in
Cross River State, Nigeria in 2012, the
Honourable Minister of Health has mandated
expert team to offer national capacity
building to mitigate such occurrence.

Recent Nigeria Experiences

Cross River State reported Human Rabies

Cross River State reported human deaths
from rabies infection between June and
August, 2012. All persons had a history of
dog bites and demonstrated signs of
hydrophobia, aerophobia, and difficulty in
swallowing prior to death. This outbreak was
reported to Federal Ministries of Agriculture
and Health by the Cross River State
Government. The State government provided
funds for public sensitization and mass
 canine vaccination. In addition, the State
Ministry of Agriculture specifically requested
outside assistance to strengthen canine
rabies surveillance, identify recent dog-bite
victims, and assist in providing disease
prevention and control measures.

Sanni-Adeniyi et al., Improving rabies control in West Africa: perspectives
from the Nigerian Federal Ministry of Health
Following this request a multisectoral/multidisciplinary team was formed by the Federal Ministries of Agriculture and Health and the Nigerian Field Epidemiological and Laboratory Training Program (NFELTP) to respond to the outbreak.

**Human dog-bite victims**

Eight human deaths from the suspected rabies were recorded between March and September, 2012 at the University of Calabar Teaching Hospital and Ekana Medical Center. All of them had history of dog bite. The first mortality was on the 20th of March, 2012 and had the dog bite 3 months earlier (12th December, 2011). The victim became ill on 17th March, 2012 and died on the 20th of March, 2012. All the 8 deaths presented with at least two of the following clinical signs, fever, hydrophobia, restlessness, photophobia, aggression, confusion, convulsion/Spasms, muscle aches, excessive salivation. During the period, March to September, 2012, a total of 90 dog bite cases were reported in the four Local Government Areas (LGAs) studied, resulting in 8 deaths (Case Fatality Rate: 9%).

**Kaduna State reported Rabies in Cattle**

A pastoralist in Unguwar Zubairu located in Giwa Local Government Area with herd of 130 cattle reported history of sick animals to the Ahmadu Bello University (ABU) Veterinary Teaching Hospital, Samaru, Zaria. Many of the cattle were bitten by a dog at the end of January and some of the animals in the herd were then dying. On March 26th, 2013, a preliminary investigation was carried out by the ABU team who ultimately confirmed rabies in a sick calf that had died. Some of the animals were reported to have been slaughtered and sold in the open market.

Following this report a multi-sectoral team was formed by the Federal Ministries of Health and Agriculture and the Nigerian Field Epidemiology and Laboratory Training Program (NFELTP) to respond to this outbreak.

1. **Index Household**

The outbreak occurred in a herd of 231 White Fulani cattle in Unguwar Zubairu following bites from a suspected rabid dog belonging to the herdsman. The herd was moved to Unguwar Ajiya, a neighboring settlement after the onset of an outbreak.

2. **Exposure in the index household**

Five persons in the index household were at risk of exposure through handling of the cattle and playing with suspected rabid dog but findings by the team revealed that the number could be higher than the whole members of the index household.

3. **Exposure through handling and slaughtering**

Four butchers were identified as those who handled and slaughtered the sick cattle from the index herd. The number could also be higher.

4. **Human Dog bite victims**

Records of 27 dog bite victims were obtained from various health centers in Unguwar Zubairu and surrounding settlements. Contact tracing revealed one with traceable address who met
the working case definition. The others did not meet the case definition nor had traceable contact. The health centers visited were as follows:

1. Rafin Yashi clinic (Unguwar Zubairu)
2. Karau-Karau health center (Unguwar Zubairu)
3. Sick Bay, ABU, Samaru Zaria (23 dog bite victims records were obtained)
4. Giwa PHC, Giwa LGA
5. Giwa General Hospital, Giwa LGA
6. Gambo Sawaba General Hospital, Zaria (1 dog bite victim record was obtained)
7. ABU Teaching Hospital, Tudun Wada, Zaria
8. St Luke Anglican Hospital, Wusasa, Zaria (3 dog bite victims records were obtained)

**Ondo State Rabies in Bat Study**

Emerging diseases and other zoonoses from bats around the world raises pressing questions about the health risks of populations that directly or indirectly come in contact with bats. Outreach and enhanced surveillance activities to areas and populations that may be at risk are necessary to detect emerging diseases risk due to human contacts with bats.

Insight into the knowledge, Attitudes and Practices (KAP) of people occupationally exposed to bats and/or bat habitats (e.g. caves) in Nigeria may help in determining the extent and nature of bat exposures and assessing potential exposure risk to bat zoonoses. It will also improve our understanding of risk perception and health-seeking behaviors among individuals with exposure to bats and aid efforts to improve education of the public on health risks associated with bats. In addition, information obtained from such a study will help to focus ongoing bat-targeted surveillance related emerging zoonoses.

Community leaders and local authorities were contacted to coordinate permits, logistics, and announcements to residents regarding survey activities in the study areas. The study recruited individuals in their homes or returning from caves. All children were eligible to participate but were only included with parental permission and assent (when applicable). The parents answered the survey when a child is below 9 years old and children 9 years old and above answered the survey directly. Pregnancy was not used as an exclusion criterion.

**Inaugural conference of Rabies in West Africa**

The inaugural conference on Rabies in West Africa (RIWA) organized by Federal Ministry of Health and Center for Control and Prevention of Zoonoses,
(CCPZ) was held at the University of Ibadan between 4th and 7th December 2012 noted the following: The conference host global experts and one or more delegates from each Anglophone West African country (but the Gambia), that presented in-country rabies surveillance and control activities at the conference.

Discussion and Conclusion

A common observation about presentations made was that reasonable and dependable data were lacking for standard epidemiological characterization, to be able to determine, frequency and total number of exposed people to rabies annually. Only a fraction of exposed people usually report to health facility.

In the same vein, the conference acknowledged that the situation of true epidemiological status of rabies is still eclipsed in term of accuracy of methodology for control and eradication. Also, it was noted that government in each country had not developed a budget for rabies control and eradication due to an oversight of the importance of this zoonotic problem. This alone, gives rabies the opportunity to flourish and take its toll on human lives as such observation of the upsurge of the rabies outbreaks in West African sub region as noted in Cross Rivers, 2012 outbreak of Rabies with resultant high mortality occurrence. The conference, therefore, calls for the adoption of a resolution towards the elimination of Rabies in all West Africa countries.

The conference also agreed that:
- Some of the basic principles of zoonoses prevention and control mentioned are applicable to rabies, and likewise, documents such as proceedings of the inaugural conference, should be published and made available for circulation at the next RIWA conference in Accra Ghana 2014
- Although rabies related viruses have been isolated with evidence of the presence of rabies and rabies related viruses in bats in Nigeria, the epidemiological implication of this wild life has not been well explored in the control of rabies. Consequently, there is need to focus on the control of this wild-life species in West Africa.
- More than 55 000 people die of rabies every year out of which 44% occur in Asia and Africa. The true figure for West Africa is not well known due to inadequate data and a poor surveillance and reporting system
- About 40% of people who are bitten by suspect rabid animals are children under 15 years of age.
- Dogs are the source of the vast majority (>98%) of human rabies deaths. Therefore, the control and eradication of rabies in dog should be made top most priority.

The conference adhered to the strategic vision of the World Organization for Animal Health (OIE) and WHO to reduce disease burden that results from neglected zoonotic diseases like rabies through integrated approaches to prevention, surveillance and timely response (WHO, 2004; 2010c). The participants at the conference were convinced of the need for political
commitment and action of the Federal Government to consider rabies as one of the priorities and an important emerging and re-emerging disease; and to provide resources for human and animal health services noting that it is not the number of people killed by this disease that is matter but the fact that the gruesome way the disease kills its victim and of course the disease is 100% preventable. It is pertinent to acknowledge the socio-economic implications of rabies and its impact to meeting the Millennium Development Goals.

The hosting right for RIWA conference in February, 2014 was granted to Ghana, and Sierra Leone, 2015, with support from all participating countries. Provisions should be made by the Steering Committee to formally incorporate countries in the region that were unable to participate in the inaugural conference, Nigeria 2012. National Governments are urged to promptly attend to the immediate supply of human antirabies vaccines and immunoglobulins for exposure treatment and management of humans in hospitals in at-risk communities. Each country should carry out dog population census to guide dog vaccination in West Africa.

It was therefore recommended that:

1. There is a need for improved public education on rabies in major West African languages and within indigenous context, using graduates of CCPZ drawn from countries of the sub-region as the core foundation of the network, with a view to dispelling myths about the disease in both rural and urban communities.

2. The CCPZ curriculum should ensure the delivery of teaching modules to enhance knowledge and interaction between specialists in Schools of Medicine, Veterinary Medicine, Nursing, Health Technology and the humanities in West Africa;

3. Schools and colleges of medicine and veterinary medicine in West Africa should be enabled to serve as diagnostic laboratories for rabies surveillance and confirmation in collaboration with the National Zoonoses Centre in Nigeria and other West African countries.

4. To this end, a Steering Committee that is located in the subregion and an Advisory committee of RIWA situated in Centres for Disease Control and Prevention (CDC), Atlanta, Georgia was agreed upon to facilitate liaison with ECOWAS Ministerial Conference on needed action in the sub-region, networking with VET-GOV Project of the AU-IBAR, FAO, OIE and WHO;

5. The use of established national youth organizations such as Sierra Leone's Animal Health Clubs and Nigeria's National Youth Service Corps as conduits for rabies awareness promotion, regional dog population census programmes incorporated into Polio Eradication Programmes and such infectious diseases in line with Ghanaian prototype to establish basis for effective dog vaccination programmes;

6. The use of community theatre to educate communities about rabies that includes information regarding means of spread, prevention
strategies, treatment of dog bites and dog vaccination programme is encouraged. The steering committee will also consider the feasibility of coordinating diagnostic facilities in West Africa and encourage research into the factors limiting production capacity, cost and distribution of human and animal vaccines in the region.

Acknowledgment

Delegates at Rabies in West Africa conference enabled the inauguration of a sub-regional network. Center for Control and Prevention of Zoonoses, University of Ibadan and Ahmadu Bello University, Zaria facilitated rabies surveillance networking in West Africa. The United States Centres for Disease Control and Prevention (CDC) stimulated sub-regional RIWA network.

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Is rabies neglected in West Africa? The case of Bamako, Mali

Abdel Kader Traoré, Ousmane Koné, Lamine Diarra, Zakaria Keïta

Summary
Rabies is a viral disease of humans and animals, usually transmitted through infected bites. Once symptoms begin, the mortality is usually 100% both in human and animal. Case records of rabies in two urban areas in Mali from 2007 to 2009 were investigated. Prevalence of dog bite in humans was estimated. Risk factors associated with human and animal rabies were evaluated. We reviewed treatment of bite exposures during the study period. Records on all reported animal bites and rabies cases in humans were retrieved (n = 3211) from all the registers in Medical Centers, Veterinary services and the Central Veterinary Laboratory in Bamako. There were 2053 bite cases in male individuals and 1158 in females during the study period. Ages of bite victims varied from 1 month to 87 years old. Individuals less than 20 years old accounted for 68%. Use of local treatment was recorded in 97.3% (3038/3123). No pre-exposure vaccination policy was in place, however, post-expo-vaccination was available. The price of 8590 CFA (about US$ 17.18) was the same everywhere. Rabies immunoglobulin (RIG) was not available for treatment. During the 3 year period, there were 28 cases of human rabies confirmed in the study area, an incidence of 0.4 for 100000 hab. Death occurred in 1 to 4 days after admission to the hospital. Most patients were exposed to dog (more than 90%). This study shows that rabies is a real problem in Mali, yet there is low level of notification. An effective system of epidemiologic surveillance is needed to control the disease in Bamako, Mali.

Introduction
Fatal encephalopathy, rabies is caused by a Lyssavirus (Dacheux et al., 2011) transmitted to humans due to the breaking of