

Surveillance of animal rabies in Burkina Faso: A retrospective laboratory data from 2008 to 2012

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Research note

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Abstract

Objectives: Rabies causes more than 59 000 deaths each year worldwide with 95% of cases in Africa and Asia. It is endemic in most of African countries and 99% of human rabies cases are dogs mediated rabies. This study aimed to review data on animal rabies surveillance in Burkina Faso from 2008 to 2012. **Results:** From 2008 to 2012, 1579 animal samples were analyzed for rabies confirmation with an average of 315 samples by year. Canine rabies was most suspected with 88.6% of samples. On overall, 79% of samples were positive and the highest positive percentage was on 2012 (90%). Rabies was confirmed from dogs, cats, monkeys, shrews, rodents, horses, donkeys, and sheep but canine rabies was the most prevalent (87.8%). Regarding dogs rabies, positive samples were found among vaccinated dogs and during year 2012, 91.4 % of samples received from vaccinated dogs were positive.

Introduction

Rabies is a tropical neglected zoonosis with high public health and economic importance. It causes around 59,000 human deaths worldwide each year with 36.4% located in Africa and 8.6 billion USD economic losses annually [1]. Most (99%) of human cases are dogs mediated rabies and result from the bite of rabid dogs[2,3]. Regarding its public and economic importance, the World Health Organization (WHO), the World Organization for Animal Health (OIE), the Food and Agriculture Organization (FAO) and the Global Alliance for Rabies Control (GARC) have established “United Against Rabies”, as a global collaborative program that is working towards achieving the goal of “zero human rabies deaths by 2030”[3].

Burkina Faso, is a rabies endemic country in which human rabies cases are noted each year, mainly in children, with dogs as main vector [2]. The country have got involved in the collaborative program for rabies elimination by 2030 and passive surveillance actions have been implemented for animal rabies in the country by the National Livestock Laboratory (LNE) since 2000. In this surveillance program, samples from each rabies suspected animal, from different region in the country, are sent to the LNE for rabies diagnostic confirmation using Fluorescent Antibody Test (FAT). The aim of this paper is to review data of this surveillance program from 2008 to 2012 to generate information that could be useful to public advocacy toward rabies elimination in Burkina Faso. This paper describe data on animals involved in rabies cases, their distribution according to region, months of the years and the situation of dogs rabies in Burkina Faso.

Methods

This retrospective record review covered five years from 2008 to 2012 and was based on rabies passive surveillance data in Burkina Faso. Samples from suspected rabid animals are sent to National Livestock Laboratory (LNE) for rabies confirmation. Each sample is sent to the laboratory with a notification sheet containing data on species, years and months of the year, dogs’ vaccination status, origin and age class

of dogs. After laboratory analysis, results are reported in a records sheet with information of notification sheet to build a database.

Samples were head of suspected animals kept at 4°C and sent to LNE. In the laboratory, brains from animals were aseptically collected and brain smears were prepared and subjected to Fluorescent Antibody Test (FAT) which is a gold standard for rabies diagnosis [4]. Briefly, impression smears of a cut section of the brain stem and the cerebellum were made, fixed in cold acetone and stained with a cocktail of three fluorescein-labelled monoclonal antibodies directed against the nucleocapsid (N) protein of rabies virus. Slides were observed under the fluorescent microscope and rabies positive smears gave apple colour fluorescence.

Results

Confirmed animal rabies per year, species, period and region from 2008 to 2012

Regarding confirmed case most of samples received was confirmed positive. During these five years, 1579 samples were received for animal rabies confirmation with 79% of positive samples (Table 1). Respectively 74%, 78%, 76%, 81% and 90% of samples received on 2008, 2009, 2010, 2011 and 2012 was positive. Canine rabies was the most prevalent with 87.8% of rabies cases (Table 1).

Regarding the region of origin, animal rabies cases were confirmed in all regions with most of cases coming from Centre (Table 1). According to period of the year, excepted 2008, most of confirmed cases were noted from January to March and October to December. The highest confirmed cases were noted from January to March 2012 (Figure 1).

Situation of canine rabies in Burkina Faso from 2008 to 2012

Each year, vaccinated dogs are found to be positive to rabies (table 2). Excepted 2008, more than half of vaccinated animal was found positive to rabies in LNE. During year 2012, 91.4% of positive rabies cases were found among vaccinated dogs' samples. Regarding age classes, most of confirmed (69.5%) cases were in dogs less than one year old and confirmed cases were scarce in animals more than 5 years old (Table 2).

Discussion

Each year, more than 70% of suspected case of animals' rabies has been confirmed in the laboratory. This situation suggests that animal rabies is endemic and represents a serious public health concern and veterinary problem in Burkina Faso. Different species could be vectors of rabies in the country as they were found positive but dogs remain the most affected species and often the vectors to others species rabies. This situation has also been noted in Ethiopia where dogs are the principal vector for animal

rabies [5,6]. This could explain why dogs are the most involved in human rabies cases in Burkina Faso[2]. Rabies is widely distrusted in the country but most of the cases come from the Centre region which capital is Ouagadougou. This situation could be linked to an under-reporting of animal rabies in the other regions because of poor accessibility to the diagnostic laboratory, the affordability of sample shipment from other regions to LNE at Ouagadougou and the lack of knowledge of the rural population about dog rabies. This situation has been reported in other African countries [7,8] and it could lead to an underestimate of the overall rate of animal rabies in the country.

Canine rabies has been confirmed for vaccinated and unvaccinated dogs each year but with a high proportion in unvaccinated animal except for 2012. The detection of rabies virus in vaccinated dogs could be due to vaccine failure. In Burkina Faso, we face frequent power disruption, lack of cold chain during transportation of vaccines or during vaccination campaign. Thus, administration of the product does not necessarily guarantee the wanted protection. Some fluctuation of the occurrence of dogs' rabies was noted through the year but the disease was most diagnosed during January and March. This period corresponds to reproductive period of dogs in Burkina Faso and during this period dog's fights and bites is very common and it can lead to rabies transmission. All dogs from different age groups were positive but most of rabid dogs were less than one year old. These observations are different from those found by Reta et al. [6] in Ethiopia. The finding of the present study could be linked to the high proportion of samples received from animals aged less than one year. Whatever, results of this study suggests that rabies is widely distributed in Burkina Faso and dogs are the most affected animals.

For now the proportion of vaccinated animal remains low and according to Kaare *et al.* [9] the percentage of vaccinated dogs to eliminate rabies in dogs populations and prevent future outbreaks is predicted to be around 70%. In the case of Burkina Faso, the proportion of vaccinated dogs is difficult to estimate as no data on dog population are available. To better control dog mediated rabies, it is very important to monitor dogs' mass vaccination campaigns with a follow up of vaccines and vaccination practices to reduce the importance of vaccination failure. It is also needed to estimate dogs' population in the country and their ecology and ownership.

In conclusion, to be more effective future vaccination campaigns against dog rabies need to be accompanied by a scientific evaluation in the light of data generated from an active rabies surveillance system, on-going studies on knowledge about the awareness of the human populations and further field studies focused on vaccine efficacy, monitoring of antibodies level in vaccinated animals, dog demography and ecology as well as the optimal timing and periodicity of vaccination campaigns.

Limitations

During the study, we have noted that information about age, sex, origin and vaccination status of some animals was not included in the records sheet.

Declarations

Ethics approval and consent to participate

Not required. Animal samples were collected with the approval of animal owners and the Ministry of animal and fish resources within the frame of the rabies surveillance in Burkina Faso. Also, samples from other regions of the country were limited.

Consent for publication

Not applicable.

Availability of data and materials

Data can be made available from the corresponding author when requested.

Competing interests

The authors declare that they have no competing interests.

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Authors did not received fund for the implementation of the study.

Authors' contributions

GM, KE, OL coordinated laboratory analysis performed by KSA, OV, TY and KI. DLD drafted the manuscript revised by MS, TD and AHBC. All co-authors read and approved the final version of the manuscript.

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Tables

Table 1: Distribution of animal confirmed rabies per year, species and region.

	2008	2009	2010	2011	2012	Total	Percentage (%)
Species							
Dogs	170	220	222	224	269	1105	87.8
Cats	18	21	29	26	25	119	9.5
Monkeys	1	1	1	1	2	6	0.5
shrews	2	0	3	1	0	6	0.5
Rodents	3	3	3	3	3	15	1.2
Horse	0	0	2	0	0	2	0.1
Donkey	0	1	1	0	0	2	0.1
Sheep	1	0	1	1	0	3	0.2
Total	195	246	262	256	299	1258	100
Percentage (%)	15.5	19.6	20.8	20.3	23.8	100	-
Region							
Centre	199	251	246	234	266	1196	
Est	6	4	8	6	0	24	
Boucle du Mouhoun	4	1	1	0	0	6	
Cascades	0	0	2	0	0	2	
Centre-Est	4	7	10	6	2	29	
Centre-Nord	5	6	0	0	4	15	
Centre-Ouest	0	2	3	4	3	12	
Centre-Sud	2	0	2	1	1	6	
Haut-Bassins	4	2	3	5	1	15	
Nord	0	0	9	7	8	24	
Plateau Central	7	10	8	11	8	44	
Sahel	4	3	9	5	3	24	
Sud-Ouest	0	1	0	1	0	2	
Total	235	287	301	280	296	1399	

Table 2: Number of confirmed canine rabies according to age classes and vaccination status

	2008	2009	2010	2011	2012	Total
Age classes						
≤ 1 year	77	104	121	144	135	581
]1 - 5 years]	37	43	31	38	54	203
]5 - 10 years]	7	7	8	14	9	45
]10 - 15 Years]	0	2	3	2	0	7
Total	121	156	163	198	198	836
Vaccination status						
Vaccinated	43.2	51.1	53.6	53.4	91.4	
Not Vaccinated	77.7	81.6	78.3	85.1	90.1	

Figures

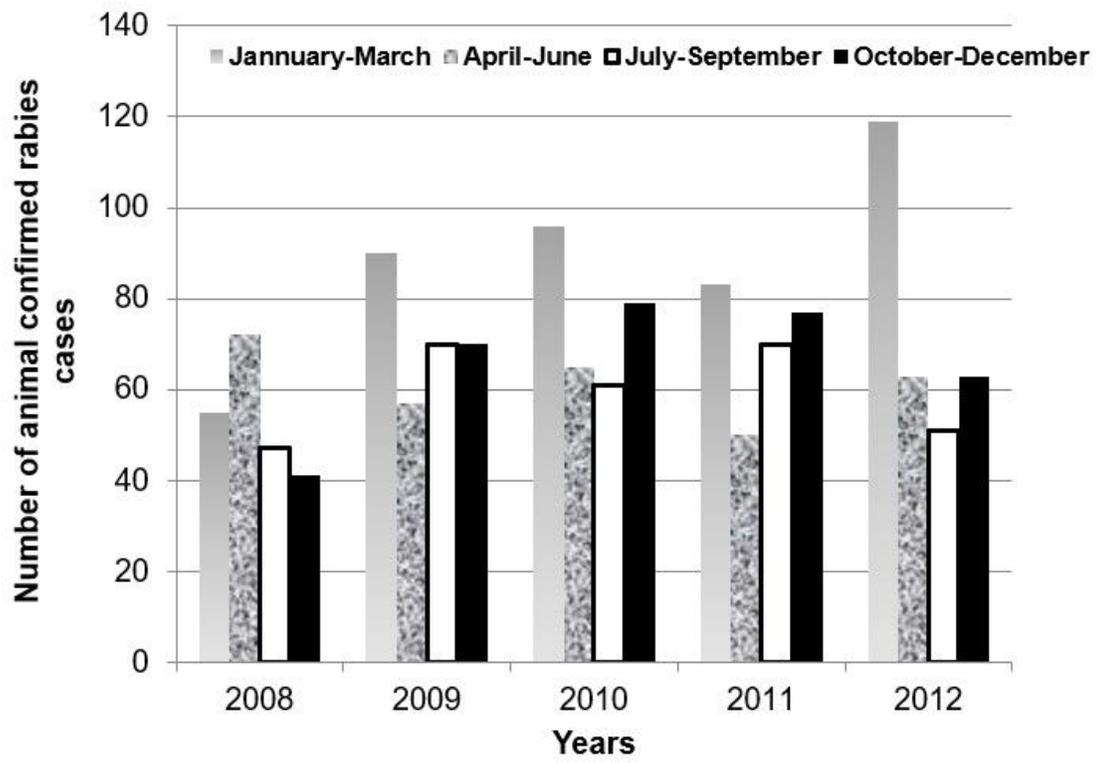


Figure 1

Variation of confirmed animal rabies according to period of the year