



INCIDENCE AND MORTALITY FROM A NEGLECTED TROPICAL DISEASE (RABIES) IN 28 AFRICAN COUNTRIES

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ABSTRACT

Rabies, a zoonotic disease, is one of the deadliest and most serious threats to public health as it has an almost 100 % case fatality rate. The global estimated mortality of the virus is between 40,000 to 70,000 deaths annually with most of the death occurring in the developing countries of Africa and Asia. The objective of this study was to present the incidence and mortality rates from rabies in 28 African countries from 2005 to 2018. Secondary data were obtained from the World Organization for Animal Health Database. The data from 2005 to 2018 were used, as this was the period with available data in the database. The data were analysed using SPSS version 25 and other descriptive statistical tools. The highest combined rabies incidence and mortality in the time range (2005—2018) was 1601 in 2006, while the lowest was 157 in 2005. Just five countries (Angola, Central African Republic, Kenya, Mozambique and Senegal) had 65 % of the rabies cases and mortality. Notably, the data on the incidence and mortality were 100 % similar, as all of the cases of rabies in the 28 African countries within

2005—2018 resulted in death. Therefore, more work should be devoted to research on rabies prevention and cure. Toward that goal, practices and policies should be implemented to enable the acquisition of accurate and consistent rabies data.

Key words: Africa; incidence; mortality; Neglected Tropical Diseases; rabies

INTRODUCTION

Rabies being a zoonotic disease, makes it one of the most deadly and serious threats to public health with an almost 100 % case fatality rate [5]. This virus infects domestic and wild animals; with dogs being the most significant reservoirs and they pose the greatest risk to humans. The infection is passed from animals to animals or from animals to humans through bites, scratches or mucous membrane exposure from these animals. The global estimated mortality of the virus is between 40,000 to 70,000 deaths annually with most of the deaths occurring in the develop-

ing countries of Africa and Asia [1]. The annual preventable deaths in these countries occurs where animal control, vaccination programs and post exposure prophylaxis are not properly implemented [14].

The genus *Lyssavirus* is the causal agent of rabies infection. It is a single stranded, negative-sense RNA virus that belongs to the family *Rhabdoviridae*. The virus replicates locally at the site of injury and gains entry to the central nervous system (CNS) [7, 22]. At these sites a productive infection ensues and the virus travels outwards to innervated organs; most notably the salivary gland. As a result, bite injuries are the most common first step in the acquiring of human rabies infection [14]. The domestic dog is an important vector in the transmission of human rabies that contributes about 97% of all rabies related deaths in humans worldwide [25]. The disease is endemic in the rural poor communities where measures to prevent dog to human transmission have not been properly implemented [10]. Safety measures such as wound cleansing within a few hours after bites from suspected rabid animals may inhibit the onset of rabies and death. An average of 15 million people worldwide receives post exposure preventive regimen for rabies at an annual cost of \$ 583.5 million with most of the beneficiaries living in developed countries [13]. Therefore, the most cost-effective approach to the elimination of the global burden of human rabies is by controlling canine rabies rather than the expansion of prophylaxis for human control. The resultant effect of mass vaccination campaigns of dogs and the control of the canine population has led to the elimination of rabies in terrestrial carnivores in several countries worldwide [14].

The regions that are mostly affected by rabies virus are the tropical countries in Africa, Asia, South America and Oceania. In Africa, rabies is considered as under reported, due to the absence of reliable surveillance data. Active surveillance studies have shown the difference between “officially recorded” and “likely occurring” rabies deaths [14]. Also, death following the onset of the clinical signs of the disease makes it difficult for most rabies cases to be reported or diagnosed in health facilities. In addition, the misdiagnosis of other neurological infections specifically in malaria endemic areas are common [12]. The dearth of life-saving post-exposure prophylaxis (PEP) and centres that provide PEP [18] for bite victims, as well as poor monitoring sales of PEP to private suppliers, all contributes in complicating the collection of appropriate data. Therefore,

in the absence of reliable active wide spread surveillance studies, extrapolations are relied on to estimate the global burden of rabies [2].

The objective of this study was to make the best possible estimate of the burden of rabies in Africa, following its trend in the various African countries by combining and analysing all available data that allows us to estimate missing components. We built upon earlier data that allowed us access the current status of canine rabies in Africa and make available country specific assessments of the disease burden. This information is essential in planning effective control strategies.

MATERIALS AND METHODS

This study involved the use of secondary data on rabies incidence and mortality from the countries with available data on the World Organization for Animal Health Database [24]. The authors had to compile the data on an excel sheet as data on a specific indicator, year and country so that they could be compared. The data from 2005 to 2018 were used as this was the period with available data in the database. The descriptive statistics of frequencies, mean and standard deviations were used in analysing the data. Also, the data were analysed using the Statistical Package for Social Sciences version 25. No ethical approval was obtained for the study as this was not applicable.

RESULTS

The data were obtained for 40 African countries but only 28 could be used as the remaining 12 had very sparse data. Table 1 shows more details about the incidence data in years 2005, 2010, 2015 and 2018 and the mean values for the data from 2005 to 2018.

The highest combined rabies incidence in the time range (2005—2018) was 1601 in 2006, while the lowest was 157 in 2005. Mozambique was responsible for almost all cases (92.9%) in the year with the highest rabies cases (2006). Also, Kenya had the highest number of rabies cases throughout the time period (2005—2018), i.e. 2262. Just five countries (Angola, Central African Republic, Kenya, Mozambique and Senegal) had 65% of all rabies cases. One of the most drastic changes in the rabies incidence

Table 1. Rabies incidence and mortality in 28 African countries

Countries	2005	2010	2015	2018	X (Mean)*
Algeria	31	9	20	–	19.45
Angola	–	151	69	–	170
Benin	–	–	5	–	7.67
Burkina Faso	–	–	8	–	14.3
Burundi	–	–	22	–	15
Central African Republic	–	–	–	–	436.33
Congo (Dem. Rep. of the)	–	–	27	–	36.25
Cote D'Ivoire	–	2	–	25	9.56
Egypt	–	–	55	–	57.75
Eritrea	–	–	10	13	13.5
Ethiopia	–	28	–	–	197.67
Ghana	1	19	25	–	13.75
Guinea-Bissau	–	–	9	–	4.29
Kenya	–	3	–	744	226.2
Lesotho	9	–	4	–	64.63
Mali	–	18	7	2	31.25
Malawi	8	–	3	–	31
Morocco	25	19	19	18	20.38
Mozambique	43	24	29	69	155.36
Namibia	30	13	23	1	14.9
Nigeria	–	–	120	11	106.2
Senegal	–	2	2	1	105.73
South Africa	7	16	8	16	11.36
Sudan	–	9	–	–	5.67
Tanzania	–	–	45	93	54.8
Togo	–	17	1	–	12.18
Tunisia	3	–	6	3	3.33
Zimbabwe	–	–	2	14	11

– —No available data

*—Mean value is for the data from 2005 to 2018 and not for the years presented in the table

occurred in Mozambique as it increased from 43 in 2005 to 487 in 2006 and 53 in 2007.

Notably, Kenya's rabies incidence and mortality has been greater than 700 every year since 2016. Guinea-Bissau, Tunisia and Zimbabwe had a fairly low constant rabies incidence and mortality with the highest number of cases

less than 20. Table 1 shows the data on mortality in the 28 African countries in some selected years (2005, 2010, 2015 and 2018). Notably, the data on incidence and mortality are 100 % similar. All cases of rabies in the 28 African countries within 2005—2018 resulted in death.

DISCUSSION

There is a dearth of information on the rabies incidence and even mortality rates in a lot of African countries. Rabies causes an estimated 21,000–25,000 deaths in Africa [4, 6]. However, due to an absence of awareness in a lot of communities and a lack of instituted control strategies, surveillance data are not reliable and this is a key factor in the negligence in countries with high rabies burden [21]. The WHO, OIE, FAO and GARC have proposed a strategic global plan to end canine mediated human rabies by 2030 [8, 23].

Africa is yet to acknowledge rabies as an urgent public health problem; this may be due to a lack of understanding of the disease burden and poor surveillance. To tackle this, policies should be instituted to raise awareness of rabies right down to the grassroots level and collaboration between necessary agencies to initiate changes in rabies policies [3]. In a global survey carried out in rabies endemic countries, 49 of the 54 African countries were classified as moderate to a high risk for human rabies while, of the 23 countries that responded to the survey, 16 had ineffective surveillance systems [26]. The WHO meetings in Geneva held in 2018 on “Driving progress towards rabies elimination” pointed out that political commitment is a crucial factor as governments would drive the coordination of the elimination strategies and provide leadership.

The highest combined rabies incidence and mortality in countries for the time range was 1601 in 2006 while the lowest was 157 in 2005. Mozambique had the most cases of rabies (92.9%) in 2006 which was also the year with the highest rabies cases and mortality. This was worrisome as it denoted a huge absence of surveillance and prevention policies. The rabies incidence in Mozambique increased from 43 in 2005 to 1487 in 2006 and declined to 53 in 2007.

Kenya had the highest number (2262) of rabies cases and mortality throughout the time period (2005–2018). Kenya's rabies incidence and mortality has been greater than 700 every year since 2016; this is despite of the fact that Kenya instituted a rabies elimination strategy in 2014. This may be due to factors such as low vaccination as vaccination coverage in Kenya was only 0.5% [6]. The increased use of dogs as guard and companion animals may have led to an increased number of dog bites and thus the transmission of rabies, especially in areas where dogs roam freely [9, 27]. The cost of treating for dog bites has been raised

because of post exposure prophylaxis and rabies immunoglobulin utilization in human health facilities [15].

Five countries—Angola, Central African Republic, Kenya, Mozambique and Senegal had rabies cases and mortality at 65% of all rabies cases. Guinea-Bissau, Tunisia and Zimbabwe had a fairly low constant rabies incidence and mortality with the highest number of cases less than 20 per year. These figures may be due to low reporting and surveillance and thus lower data on rabies cases.

The findings from the data obtained showed that all reported cases of rabies led to death in the investigated period. This may be because bite victims may delay in seeking medical treatment either due to ignorance, cost of treatment or unavailability of treatment options. Also, this shows there is a lot to be done in the rabies prevention and treatment in the research area.

The epidemiology of rabies in Africa is not well defined; thus, government support for its control is low. Authorities may consider rabies control to be bogus as the task and cost involved for vaccinating numerous owned and stray dogs is high and so is the level of vaccination coverage needed for rabies control [11]. Furthermore, Africans need to lead this change as they are one of the worst hit by the rabies virus [16]. Thus, rabies control is not a priority when compared to other diseases of public health concerns. Effective surveillance systems are necessary and that is the major challenge especially in rural areas. Effective surveillance systems include some key features; first rabies has to be regarded as a notifiable disease; this would aid collation of information and allow authorities better monitoring of this disease. Health care professionals should be trained in surveillance methods and diagnosis of the disease according to internationally recognized standards. The active involvement and participation of the local community is also a key feature. They must be made aware of the disease and its risks to encourage reporting of suspected cases and early treatment. Furthermore, following the significant findings of recent studies (17–20), more work needs to be carried out to identify effective vaccines for rabies.

Limitations

Data was not available for a number of years, hence more sophisticated analysis could not be carried out.

Under-reporting of diseases is prevalent in Africa, hence this might not completely reflect the true state of rabies incidence and mortality.

Recommendations

More work should be devoted to research on rabies prevention and cure.

Policies should be put in place to enable good and consistent data. This would contribute toward positive decisions on issues related to rabies.

CONCLUSIONS

Rabies is a fatal zoonotic disease and greatly affects African and Asian countries. The data on rabies which describes practices and policies are very sparse. The analysis of the existing data on rabies incidence and mortality from 28 African countries was conducted which demonstrated that all cases of rabies led to death within the study period (2005–2018). There is therefore a lot to be done to put this fatal and deadly disease at bay.

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