

Rabies in Eswatini: What are the Issues and Challenges?

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Authors' contributions

This work was carried out in collaboration among all authors. All authors contributed and collaborated towards the manuscript. Author BND came up with the study idea and developed all the manuscript drafts as per the comments, advice given. Author SM is the veterinary epidemiologist who performed all the statistical analysis. Authors CM and NEC participated and provided veterinary opinions in this write up. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMB/2020/v20i730260

Editor(s):

(1) Dr. Grzegorz Cieslar, Medical University of Silesia, Poland.

Reviewers:

(1) Ehsan Gharib Mombeni, Shahid Chamran University of Ahvaz, Iran.

(2) R. Velusamy, Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/58714>

Original Research Article

Received 01 May 2020
Accepted 05 July 2020
Published 21 July 2020

ABSTRACT

National efforts to control canine rabies have encountered some challenges, hence the disease is becoming endemic in Eswatini. The purpose of this study was to establish the extent to which resources and other relevant constraints may have an impact on implementing the national rabies programmes in the country. In this study retrospective data going as far back as 1999 to 2018 was used to highlight the rabies situation in the country. The available insight into the existing and previous control measures may become useful guidelines for designing and implementing future control strategies.

The major challenges identified were issues of vaccine and vaccination, government fiscal challenges, High birth rate of stray dogs were responsible for the rabies virus circulation in the domestic environment, provision of diagnostic facilities for testing of vaccine efficacy, vaccine quality, healthy dog carriers, check for vaccination antibody titres.

Observations from this study were that the continuing efforts of the competent authority to

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spearhead the rabies control programmes were acceptable and commendable considering the challenges encountered. A few recommendations are outlined for possible consideration as a contribution towards the rabies disease elimination.

Keywords: Canine rabies; retrospective data; diagnostic facilities; vaccination.

1. INTRODUCTION

The canine rabies problem in Eswatini is predominantly transmitted by the domestic dog [1]. The causative agent for the disease is the *Rabies virus* (RABV), which belongs to the family *Rhabdoviridae* and genus *Lyssavirus*. In Eswatini wild animals act as the reservoir of the disease for other mammalian species. Examples are the African wild dog, jackals, white _tailed mongoose and rodents. Stray dogs act as the vector for transmission and sustenance of the RABV in the domestic environment. Other livestock animals have rarely featured as accidental hosts as a result of a rabid dog bite infection [2].

Rabies is a reportable disease in terms of the national legislation in the country. It is as such, regarded by the competent Veterinary Authority as a high human or animal health risk [1,3]. Evaluation of regular vaccination by active rabies disease surveillance and enforcement of responsible dog ownership is the key to achieving WHO and OIE recommended vaccination coverage [4]. An annual dog vaccination campaign at the WHO-recommended target of 70% would control rabies [5].

Most epidemiological studies can provide the necessary knowledge about zoonoses. They also assist to determine the most suitable methods of disease control [6]. The main objective of this 10 year data retrospective study was to highlight some of the issues as to why rabies is still a problem in all regions in Eswatini.

1.1 Problem Statement

The control of canine rabies has proved to be a very difficult task for the Department of Veterinary and Livestock Services in Eswatini. The national disease control measure has met with some challenges hence, the disease becoming endemic in the country. Apart from the annual government reports, there is limited awareness of the public health risk associated with the rabies in the country. Following, are some of the potential challenges that could contribute to the prevailing disease status.

1.2 Justification of the Study

Rabies is an ancient zoonotic disease that is progressive, incurable and occurs throughout the world [7]. Most of the Southern African countries, including Eswatini are categorised as high risk countries. The basis for this categorization is because rabies occurs in both wild and companion animals. In addition, there is no current published animal health data to challenge or prove the categorisation otherwise. The risk categorization incorporates the presence or absence of rabies in both domestic and wild animals, the national rabies surveillance system of the High Risk country. Also, it is based on the likelihood of the travellers from the United Kingdom getting into contact with and being bitten by a rabid dog [8]. According to Centers for Disease Control (CDC) (2019), high risk means the country is at risk for Canine Rabies Virus Variant (CRVV) transmission as demonstrated by the presence and geographic distribution of the virus and by low quality of or low confidence in the country's surveillance systems and its dog vaccination programs [9].

1.3 Objectives of the Study

1. To determine progress made in the control of rabies in the country.
2. To identify some of the issues contributing towards rabies disease control and prevention challenges in Eswatini.

2. REVIEW OF LITERATURE

2.1 Laboratory Diagnosis in Canine Rabies Cases

Rabies diagnosis in the country is mainly based on the gold standard test of rabies diagnosis in the country. That demonstrates the presence of rabies viral antigens in fresh brain smears of rabies suspicious dog cases by using the Fluorescent Antibody Technique (FAT) [3,10,11,12].

Noteworthy, is that the fluorescent antibody test (FAT), is recommended by both World Health

Organization (WHO) and World Organization for Animal Health (OIE) [11,13].

For the detection of rabies virus antigen from post mortem samples, the Rapid Immunodiagnostic Test (RIDT) is a simple and rapid Immunochromatographic (ICT) Test kit for rabies diagnosis, which was developed and evaluated as a rapid screening test for the disease [11]. The automated Nucleic Acid Sequence—Based Amplification (NASBA) technique is known for easy and rapid testing of samples and has been reported to have a higher sensitivity than conventional PCR assays for detection of rabies viral RNA in ante mortem saliva and CSF samples [4,11].

The Direct Rapid Immunohistochemical Test (dRIT) was developed by CDC [9,14]. The advantage of this test is that it does not require an expensive fluorescence microscope. In addition, the test has been evaluated under field conditions in Tanzania and was found to be 100% sensitive and specific compared to FAT [15,16].

In most developing countries, where rabies is endemic, the availability of funds and resources is a challenge. The use of commercially available ICT test kits could be the answer to the existing challenges, because test kits do not require to be kept in a cold chain during transportation and no complicated training to master how to use them [15,16].

2.2 Control and Prevention of Rabies in High Risk Countries

The Eswatini Department of Veterinary and Livestock Service uses two national strategies for the control of rabies. These include the scheduled routine annual dog vaccination. The second strategy entails the dog tie-up and shoot out campaigns. The Rabies disease outbreak control vaccinations are done in disease epicentres and in official gazetted contact areas. The government gazette facilitate and assist in enforcing the required tie –up order and shoot out campaigns for unconfined “stray dogs” [1,4]. Dogs act as one of the major global reservoir for rabies. Mass vaccination of dogs is the key to the control of this major public health threat and to reduce human rabies deaths [7].

According to Adedeji et al. [17] Rabies is an important endemic zoonotic disease in Nigeria. This is despite the proper vaccination efforts. Some factors that are associated with the

disease status are socioeconomic factors, human activities, hunting with dogs, increase in host population, migration of stray cats and dogs, vaccine and vaccine related problems.

The Rabies Blue print document emphasizes the fact that the adequate provision of funds and resources is most critical for strategically planned and properly managed national programs for rabies vaccination [18,19]. This statement is supported by a similar research that led to a gradual decrease in suspected rabies cases in hospitals within the Ministry of Health in Sri Lanka [20,21]. In another related study, Kongkaew et al. [22] found that there was very limited public awareness about cat rabies amongst households in Thailand. This research finding indicated the need for improved effectiveness of the owned-dog rabies-vaccination campaigns in each community.

2.3 Control of Rabies in Wild Animals

It is very prudent to consider wild animals in any future effort to control and eventually eradicate rabies in a country like Eswatini. A systematic assessment of the risks posed by wild animals may require information about density and distribution, habitat, any perceived contact with domestic animal species, the strain of rabies virus, length of time wild animals could have been exposed to the virus. The role of rabies in wildlife is well supported by a research study from Botswana [23]. A series of 3 pre-exposure rabies vaccination shots is advised for persons planning an extended stay or on work assignments in remote and rural areas, particularly in Africa, Asia, Central America and South America. The pre-exposure series simplifies medical care if the person has been bitten by a rabid animal and gives enough time to travel from a remote area to seek medical attention [24,25]. Efforts to control rabies in wildlife might require the involvement of the Eswatini National Trust Commission (ENTC) and Big Game Parks, Eswatini. As the two main stakeholders responsible for wild life conservation, their contributions are very crucial.

2.4 Control and Prevention of Rabies in Low/No Risk Countries

Japan is one of the rabies free countries with an official record of immunization coverage of less than 40%. The country's success in prevention and control of rabies is attributed to its geographic isolation, registration, vaccination of domestic dogs, quarantine of all animals

susceptible to rabies, research and an updated legislative framework [26]. Developed countries have eliminated canine-transmitted rabies. Western Europe is largely free of rabies following oral vaccination of red foxes and raccoon dogs. Additionally, the no Risk countries have active rabies surveillance that includes a decentralised enhanced laboratory surveillance system [7].

Efforts to reduce the number of stray animals must be done in a humane and sustainable way. In Eastern European countries, the best approach utilised that maybe socially acceptable entails the combination of political, legal, educational, medical and professional considerations [27,28].

3. MATERIALS AND METHODS

The confirmatory diagnosis for rabies was carried out at the Central Veterinary Laboratory (CVL). A laboratory test was performed on tissue samples of the central nervous system following its extraction from the cranium of the rabid suspect animal. The laboratory specimen included the brain stem, cerebral cortex, cerebellum and medulla oblongata. Most often, dog owners and other livestock owners submit the whole head of the rabid suspect animal to the CVL for laboratory confirmation using the OIE recommended FAT method. Laboratory identification of the rabies agent, the primary diagnostic tests such as the direct fluorescent antibody (DFA) test was used [29,25,13,12].

In addition, the official records of the DVLS rabies case reports were utilised to assess progress made in the control of rabies in the

country. In addition, literature review of policies and control strategies employed in both Low/No risk and the so called High Risk rabies countries were undertaken. This was aimed at identifying national shortfalls, by so doing map out potential future research initiatives to address the highlighted challenges [3,11,25].

4. RESULTS AND DISCUSSION

In the year 2000, there were 100 laboratory confirmed cases of rabies and dogs accounted for 60% of the cases [30]. In Fig. 1, the dots show the geographical distribution of rabies cases countrywide. In 2011, the country experienced an increase in rabies accidental hosts. These included bovine, caprine, porcine and canine. A total of 27 cases were confirmed. Also, there were 38 recorded human patients who suffered dog bites from suspected rabies cases. Unfortunately, there was no post mortem conducted on the said dog bite deaths and no laboratory confirmation [30]. This situation may highlight the need for more impetus in implementing the one health approach in the country.

In 2010, rabies cases showed a declining trend (Fig. 2). In 2016, there were 3 rabies cases reported. In the same year, government budgetary constraints led to poor annual vaccination coverage (17%). This situation attributed to the resultant increase of 8 recorded rabies cases in 2017. Accordingly, the annual vaccination coverage was improved to 73%. Such a positive development led to only 3 rabies cases confirmed in 2018 (Fig. 1).

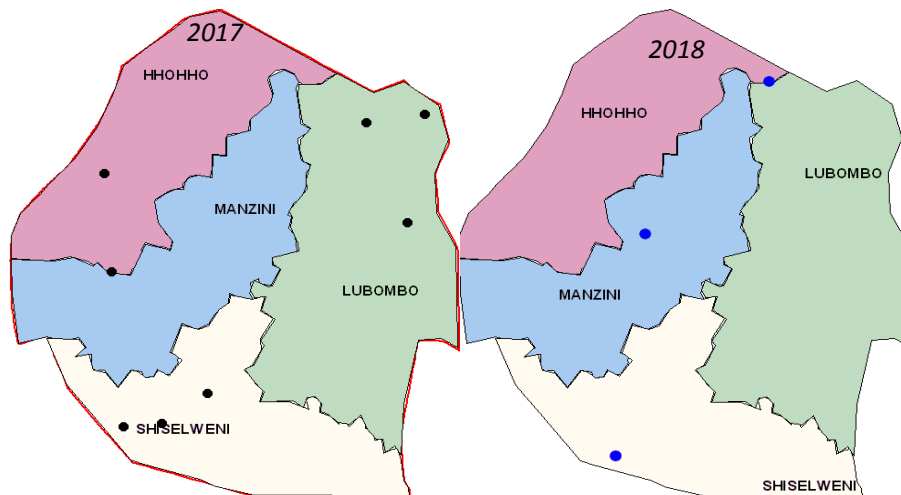


Fig. 1. Distribution of rabies cases in 2017 and 2018 in Eswatini

Source: DVLS, 2018

Table 1. Vaccination coverage for rabies in Eswatini from 2010 – 2019

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Coverage	67%	69%	84%	86%	86%	91%	17%	73%	76%	74%

Source: DVLS, 2019

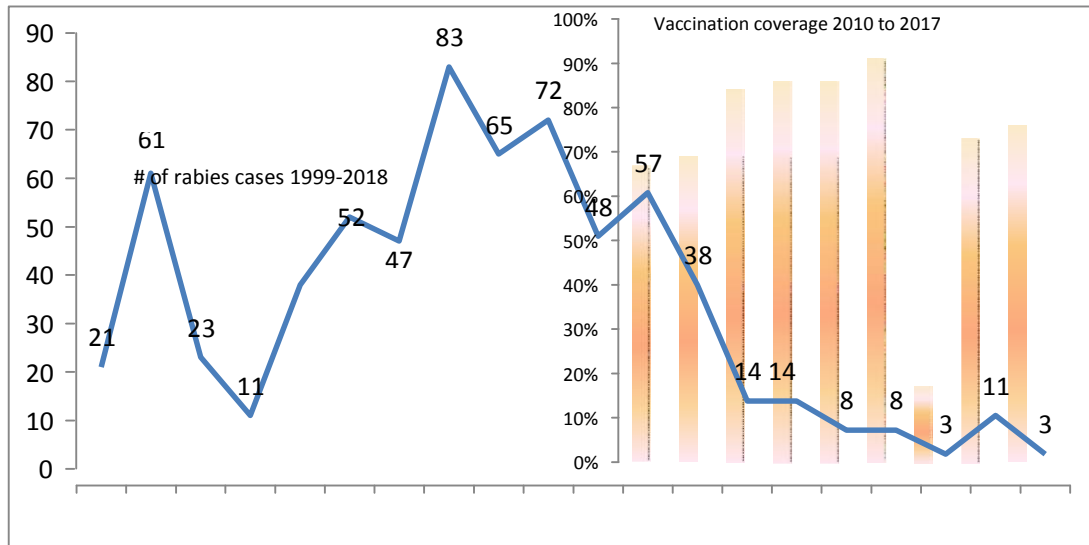


Fig. 2. Total number of rabies cases between the years 1999 – 2018 and vaccination coverage for the years 2010 – 2017

Source: DVLS, 2018

The total dog population for the year 2019, in Eswatini is estimated at 94, 814. The official record for the current dog vaccination coverage is 74%. Table 1 shows improved vaccination coverage with no reported rabies cases in other domestic animals. The high vaccination coverage of above 80% was realized from 2012 to 2015. Similarly, during the years 2017 to 2019, except in 2016, it would appear that the country complied with the WHO/OIE recommendation of a minimum of 70% dog vaccination coverage. That would impact positively on any rabies containment and or elimination efforts [28,31,32].

Dog vaccination against rabies is a proven effective method for controlling the disease, as well as its transmission to humans in many countries. Developed countries have eliminated canine rabies, such as North America and Western Europe. However, a vaccination coverage that focuses only on the dog population at the exclusion of wildlife rabies surveillance might be insufficient in countries such as Tanzania. This is particularly so where wildlife has been found to play an important role in carrying and transmitting the disease [5]. Funds being available, active rabies surveillance that

includes wildlife might contribute towards possible elimination of the problem.

Another issue that may require attention especially if the epidemiology of rabies were to be studied closely by introducing active surveillance in addition to passive surveillance would be to introduce an alternative test method to the direct fluorescent antibody test for rabies diagnosis in Eswatini [16].

The WHO Expert Consultation group on rabies has recommended that all people traveling to rural areas in rabies high - risk areas should make sure to get pre-exposure prophylaxis. Rabies prophylaxis should be administered to children, veterinarians and any persons who are at higher - risk of being in contact with dogs, cats and wildlife animals [29,31]. Provision of PEP as well as controlling the rabies disease in dogs may result in positive impact in terms of alleviating traveller’s fears for visiting a high - risk country such as Eswatini [31,19].

5. CONCLUSIONS

The major indicator for progress made in the control of the disease is the fact that over the

years the rabies vaccination coverage has exceeded the WHO/OIE recommended value of 60 – 70%. Also, the incidence of rabies cases has declined. This is despite the encountered challenges associated with a high birth rate of stray dogs, unmarked vaccinated dogs, and fiscal challenges. The results of this study indicated that the existing measures for the containment of the Rabies problem in Eswatini, spearheaded by the competent veterinary authority are having a positive impact considering the experienced difficulties in terms of accessing the required resources to meet the statutory professional mandate. Although, the prevalence of rabies is declining in the country, there is still a risk of infection that needs attention. The following actions are recommended for the purpose.

1. Promote an integrated control of rabies in the country by applying the 'One Health' concept to minimize delays in administering post-exposure prophylaxis in human rabies cases.
2. Dog population management by Competent Authorities and other relevant stakeholders using reproduction control to prevent the birth of unwanted litters of puppies, identification/markings of vaccinated dogs.
3. Strengthening the laboratory diagnostic facilities that would assist in testing of vaccine efficacy, vaccine quality, existence of healthy dog rabies carriers.
4. Procurement of Rabies test kits that could be used for rabies screening in tandem with the fluorescent antibody test.
5. Carry out sero-surveillance to evaluate efficiency of so many years of rabies vaccination and to determine adequacy of antibody titre response in vaccinated dogs.

ACKNOWLEDGEMENTS

The work contained in this paper was carried out successfully due to the collaboration between all the authors. We are most grateful to Professor M. T. Masarirambi for sharing his knowledge and experience in writing this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/58714>