THE SITUATION OF RABIES IN THE SOUTHERN HIGHLANDS ZONE OF TANZANIA BETWEEN 2000-2003

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SUMMARY

A study to investigate the status of rabies and its control in the Southern Highlands Zone of Tanzania over a period of four years i.e. 2000–2003 is reported. The study involved perusal of Veterinary and Medical records from 19 (90.5%) councils out of 21 constituting the zone, with the aim of examining the incidence, control measures and the general importance of rabies in both animals and humans. A total of 6,710 human cases of animal bites that resulted into 41 human deaths and other hundreds who underwent post exposure therapy were recorded. 98.4% of all the human cases of animal bites were due to dog bites. Domestic cat bites contributed 64.8% of all 105 human cases of animal bites other than the dog. Wildlife namely jackals, hyenas, and monkeys, contributed 21%, 9.5% and 4.8% respectively of the 105 human cases of animal bites. Fragmented prophylactic measures such as poor vaccination campaigns with coverage of about 21.7% of all dog populations over the four-year study period plus ineffective destruction of stray dogs during rabies campaigns are pointed out to be the cause of failures in control of the disease in the zone. It is concluded that rabies is endemic in the Southern Highlands Zone of Tanzania warranting proper control strategies and improved diagnostic capability in animals involved in human bites. It is recommended that concerted efforts should be made to enforce laws and by-laws pertaining to control of stray dogs and adherence to vaccination programmes as well as provision of pre exposure vaccination to persons occupationally at high risk of contracting rabies from infected animals.

INTRODUCTION

Rabies is a highly fatal zoonotic viral infection of the central nervous system, which occurs in all warm-blooded animals and is transmitted by the bites of infected animals. It is manifested by motor irritation with clinical signs of mania attacking

complex, ascending paralysis (Blood et al., 1983). More than 2.5 thousand million people live in regions where rabies is endemic and it is estimated that each year at least 50,000 people die from rabies and more than 10 million receive post exposure vaccination against this disease. Children aged 5-15 years are at particular risk. More than 99% of all human deaths from rabies occur in Africa, Asia and South America (World Health Organization, 2002). In Tanzania the problem has been recorded to be endemic (Rweyemamu, et al., 1973, Loretu, 1988, Magembe, 1985, Cleaveland and Dye, 1995, Cleaveland, 1998, Mpelumbe-Ngeleja et al., 2003).

For proper planning and evaluation of rabies control, information on the ecology of the disease, incidence, geographical distribution, reservoir hosts, methods of persistence in the environment and of transmission from one host to another is required (Ezeokoli, et al., 1984). It is, however, difficult to get such streamlined information in Tanzania due to inadequate veterinary services. In spite of this shortcoming, assembling and evaluating the available data can gather some useful information. This paper presents and analyses data and information on the situation of rabies and its control in the Southern Highlands Zone of Tanzania between 2000 and 2003.

MATERIALS AND METHODS

Source of data and information

The data on rabies incidence and control measures was obtained using structured questionnaires from the Veterinary Investigation Centre (VIC) of the Southern Highlands Zone of Tanzania as well as from District Veterinary/Livestock Officers, District Medical Officers, and Health Centres from 19 (90.5%) out of 21 local councils of the four regions (Iringa, Mbeya, Rukwa, and Ruvuma) constituting the Southern Highland Zone. Where extra information and clarification was required, the relevant officers were contacted in person.

Type of data and information collected

The type of data that was collected for each year between 2000-2003 included:
a) Dog population, b) Number of human bite cases and animal species involved, c) Number of suspected rabies cases and animal species involved, d) Criteria for diagnosis of rabies in the field, and laboratory confirmation, e) Control measures in terms of annual vaccinations and number of stray dogs that has been destroyed,

and f) Problems encountered in implementation of rabies control programmes.

Analysis of data

The data was complied and analysed using Statistical Package for Social Science (SPSS) programme in an attempt to assess the overall rabies problem and its control in the Southern Highlands Zone of Tanzania.

RESULTS

The results on compiled and analysed data are summarized in Tables 1-5.

a) Dog population

Table 1 shows the estimated dog population in the different local councils between 2000-2003. It is evident form Table 1 that there was an increase in the number of dogs in each region every year.

Table 1: Estimated dog population in the Southern Highlands Zone between 2000 and 2003

Region	Local Council	2000	2001	2002	2003
		Dog	Dog	Dog	Dog
IRINGA	Iringa Urban	970	1,150	1,195	1,240
	Iringa Rural	11,221	11,782	12,077	12,371
	Mufindi	4,000	4,450	4,925	5,400
	Njombe	1,147	1,646	1,800	2,010
	Ludewa	2,315	2,415	2,483	2,550
	Makete	3,018	3,040	3,069	3,098
MBEYA	Mbeya Urban	1,313	1,897	2,987	3,400
	Mbeya Rural	4,056	4,117	4,170	4,262
	Chunya	1,204	1,281	1,698	2,115
	Mbarali	10,350	10,400	10,950	11,545
	Ileje	4,811	4,977	5,049	5,1 20
	Kyela	4,786	4,974	5,400	5,750
RUKWA	S'Wanga Urban	3,515	3,600	3,665	3,730
	S'Wanga Rural	10,310	10,210	8,632	8,100
	Nkasi	5,273	5,272	5,601	5,830
	Mpanda	14,389	15,600	19,891	21,900
RUVUMA	Songea Urban	1,462	1,594	1,619	1,643
	Songea Rural	6,100	7,630	8,060	8,480
	Mbinga	22,005	23,105	24,250	25,473
TOTAL		112,245	119,140	127,521	134,017

b) Number of human bite cases and animal species involved

Table 2 shows a summary of human bite cases. The data indicates that during the study period human bites cases were on an increase each year from a grand total of 1,443 in 2000 to a grand total of 1905 in 2003 a significant increase of 32% in a 4-year period. The data also shows that out of 6,710 human bite cases during the study period the majority at 98.4% were due to dog bites. Out of 105 (1.6%) human bites due to other animal species, other than the dog, the domestic cat led by contributing 64.8% followed by the wild animals mainly the jackal at 21%, the hyena at 9.5%, and the monkey at 4.8%.

c) Number of suspected rabies cases and animal species involved

Table 3 shows a total of 1,160 number of rabies suspect cases in eight different animal species as per field observation in 17 local councils. 1,012 of the suspected cases were domestic dogs. Eight (47.1%) of the local councils reported human rabies suspected cases totalling 41 as follows: Iringa(8), Mufindi(4), Njombe(3), Mbeya Urban(7), Chunya(4), S'wanga Urban(9), Nkasi(3) and Mpanda(3). All these people who were hospitalized died and were confirmed to have succumbed to the disease.

d) Criteria for diagnosis of rabies in the field and laboratory confirmation

The field criteria for reporting suspect rabies cases was found to be mainly based on the furious form of the disease, where animals showed fearlessness; roamed around aimlessly; unprovoked biting of human beings, livestock or any other object. The paralytic or dumb forms of rabies were frequently misdiagnosed. Some were recorded as poisoning cases.

During the 4-year period only 19 animal brains from Iringa local councils were retrieved and sent to the laboratory for rabies confirmation. Fourteen (73.7%) were dog brains, 3 (15%) hyena brains and two were feline brains. Laboratory confirmation was performed at either the Animal Diseases Research Institute (ADRI), Dar-Es-Salaam or at the Faculty of Veterinary Medicine, Department of Veterinary Pathology at SUA. Thirteen (93%) out of the 14 dog brains and all of the three hyena brains (100%) as well as one (50%) of the feline brains were positive for rabies by either the standard histopathological technique demonstrating Negri bodies or by the FAT method.

Table 2: Number of human cases of animal bites and animal species involved in the Southern Highlands Zone between 2000 and 2003

Local Council	**2000**		**2001**		**2002**		**2003**		**Total**	
	Dog	Other Spp.	Dog	Other Spp.	Dog	Other Spp.	Dog	Other spp.	Dog	Other Spp.
Iringa Urban	-	-	-	-	86	-	177	-	263	-
Iringa Rural	108	2 C	122	2C	143	-	224	1 C	597	5
Mufindi	135	1 C	141	-	173	-	242	-	691	1
Njombe	127	-	77	8 C	48	-	62	-	314	8
Ludewa	38	-	43	6 C	16	8 C	9	-	106	14
Makete	2	-	3	-	1		4	-	10	-
Mbeya Urban	153	3 M	226	4 C	184	5 C 2 M	243	4 C	806	18
Mbeya Rural	8	-	10	-	8	-	11	-	37	-
Chunya	54	-	120	-	131	4 H	32	-	337	4
Mbarali	46	-	57	1 C	19	-	29	-	151	1
Ileje	7	-	18	2 J	17	-	13	1 J	55	3
Kyela	75	-	63	1 C 1J	83	-	65		286	2
S'wanga Urban	83	-	86	1 C	96	-	91		356	1
S'wanga Rural	43	-	54	-	93	-	41		231	-
Nkasi	73	-	87	1 C 1 H	52	1 H	95	2 C 1 H	307	6
Mpanda	100	4 J 2H	98	6 J 1 H	119	-	196		513	13
Songea Urban	150	-	45	2 C	297	3 C	199	1 J	691	6
Songea Rural	98	11 C	120	5 J	115	5 C 2 J	138	-	471	23
Mbinga	110	-	187	-	52	-	34	-	383	-

Grand Total = 6710 , Cat 68=64.8%, Jackals-22=21%, Hyenas-10=9.5% Monkeys-5=4.8%

Table 3: Number of suspect rabies cases and animal species involved

Local Council	Species	2000	2001	2002	2003	Total
Iringa Rural	Dog	21	22	21	30	94
	Human	2	1	2	3	8
	Cat	-	1	2	1	4
	Hyena	1	-	1	-	2
	Cattle	-	1	-	-	1
Mufindi	Human	-	-	2	2	4
	Donkey	1	-	-	-	1
Njombe	Dog	12	21	8	2	43
	Human	2	-	1	-	3
Ludewa	Dog	40	36	18	6	100
	Goat	-	4	5	-	9
Makete	Dog	-	-	1	1	2
Mbeya Urban	Dog	30	41	53	36	160
	Human	2	3	-	2	7
	Cat	1	4	5	1	11
	Monkey	3	-	2	1	6
Mbeya Rural	Dog	8	10	8	11	37
Chunya	Human	-	-	4	-	4
	Hyena	-	-	4	-	4
Mbarali	Dog	46	57	19	29	151
	Cat	-	1	-	-	1
Ileje	Dog	14	16	17	9	56
	Goat	-	-	3	-	3
	Jackal	-	2	-	1	3
Kyela	Dog	24	27	20	24	95
	Cat	-	1	-	-	1
S'wanga Urban	Dog	2	3	6	4	15
	Human	2	1	4	2	9
	Cattle	-	1	-	-	1
S'wanga Rural	Dog	34	29	9	34	106
Nkasi	Dog	2	3	8	1	24
	Human	-	-	2	1	3
	Hyena	-	1	1	1	3

Mpanda	Dog	6	9	5	13	33
	Human	-	3	-	-	3
	Cattle	-	1	-	-	1
	Goat	4	-	2	-	6
	Hyena	2	1	-	-	3
	Jackal	4	6	-	3	10
Songea Urban	Cat	4	-	2	-	6
	Jackal		5	2	-	7
Mbinga	Dog	37	41	29	13	120
Total 1,160						

e) Control measures undertaken against rabies

Table 4 shows the number of dogs vaccinated against rabies as a control measures against the disease. Although anti rabies vaccination coverage on yearly basis differed among different local councils, the vaccination coverage ranged between 20 and 24% with an average of 21.7% throughout the study period. Destruction of dogs as a complementary measure in rabies control is summarized in Table 5. The number of dogs destroyed differed greatly among different local councils with the highest being recorded in Sumbawanga urban where a total of 1,016 dogs were destroyed during the 4-year period. On the other hand Table 5 shows that no dogs were destroyed in Makete District.

Table 4: Number of dogs vaccinated against rabies in the Southern Highlands Zone between 2000 and 2001

Local Council	2000			2001		
	Dogs vacc	Total dogs	%	Dogs vacc	Total dogs	%
Iringa Urban	469	970	48.4	463	1150	40.3
Iringa Rural	3504	11,221	31.2	3621	11,782	30.7
Mufindi	3600	4000	90.0	390	4450	8.8
Njombe	741	1147	64.6	920	1646	55.9
Ludewa	860	2315	37.1	1850	2415	76.6
Makete	244	3018	8.1	-	3040	0
Mbeya Urban	319	1313	24.3	22.82	1897	120.3
Mbeya Rural	0	4056	0	1560	4117	37.9
Chunya	720	1204	59.8	600	1281	46.8
Mbarali	398	10350	3.8	2740	10400	26.3
Ileje	360	4811	7.5	410	4977	8.2
Kyela	781	4786	16.3	819	4974	16.5
S'wanga Urban	830	3515	23.6	1597	3600	44.4
S'wanga Rural	0	10,310	0	1700	10,210	16.7
Nkasi	1250	5273	23.7	450	5372	8.4
Mpanda	6628	14,389	46.1	823	15,600	5.3
Songea Urban	440	1462	30.1	1317	1594	82.6
Songea Rural	980	6100	16.1	1600	7630	21
Mbinga	599	22,005	2.7	893	23,105	3.9
TOTAL	**22,723**	**112,245**	**20.2**	**24.035**	**119,240**	**20.2**

Table 4 cont: **Number of dogs vaccinated against rabies in the Southern Highlands Zone between 2002 and 2003**

Local Council	2002			2003		
	Dog vacc	Total dogs	%	Dogs vacc	Total dogs	%
Iringa Urban	860	1195	72	1118	1240	90.2
Iringa Rural	6758	12077	56.0	6872	12,371	55.5
Mufindi	3800	4925	77.2	4500	5400	83.3
Njombe	1428	1800	79.3	1250	2010	62.2
Ludewa	1250	2483	50.3	1300	2550	51.0
Makete	74	3069	2.4	-	3098	0
Mbeya Urban	1570	2987	51.6	1942	3400	57.1
Mbeya Rural	1016	4170	24.4	1119	4262	26.3
Chunya	900	1698	53.0	680	2115	32.2
Mbarali	2450	10950	25.1	3470	11545	30.1
Ileje	330	5049	6.5	1110	5120	21.7
Kyela	904	5400	16.7	800	5750	13.9
S'wanga Urban	2000	3665	54.6	693	3730	18.6
S'wanga Rural	1300	8632	15.1	1440	8100	17.8
Nkasi	770	5601	13.7	2600	5830	44.6
Mpanda	700	18,981	3.5	2419	21,900	11.0
Songea Urban	542	1619	43.2	784	1643	47.7
Songea Rural	810	8060	10.0	320	8480	3.8
Mbinga	461	24,250	1.9	240	25,473	0.9
TOTAL	**28,205**	**127,661**	**22.1**	**32,657**	**134,017**	**24.4**

Table 5: Number of dogs destroyed as a control measure against rabies

District	2000	2001	2002	2003	TOTAL
Iringa Urban	-	-	-	78	78
Iringa Rural	27	46	73	-	146
Mufindi	-	-	46	46	92
Njombe	12	14	8	2	46
Ludewa	40	36	18	6	100
Makete	-	-	-	-	-
Mbeya Urban	-	79	48	56	183
Mbeya Rural	8	10	8	-	26
Chunya	34	42	47	26	149
Mbarali	34	19	23	17	93
Ileje	12	10	11	13	46
Kyela	94	107	220	124	545
S`wanga Urban	166	200	300	350	1,016
S`wanga Rural	34	29	9	34	106
Mkasi	-	10	8	122	140
Mpanda	9	12	5	13	39
Songea Urban	2	12	4	16	34
Songea Rural	95	75	48	30	248
Mbinga	30	19	23	17	89
TOTAL	**591**	**720**	**899**	**951**	**3,161**

f) Problems encountered in the implementation of rabies control programmes

Problems faced by the field staff in the control of rabies, ranged from lack of proper gear when dealing with suspect cases, lack of knowledge on how to deal with dead dogs suspected to have died of rabies, as well as lack of tools and chemicals for preservation of brain samples. Prophylactic measures were also hampered by lack of vaccines and insufficient cold chain facilities, poor

quarantine enforcement measures, and meagre operational funds to meet ammunition, and transport requirements.

DISCUSSION

Despite some data deficiency complicated with underestimated figures in the reports, the results of this study show that rabies is still a very serious problem in the Southern Highlands Zone. Evidence shown by this study that the dog is the main reservoir and transmitter of the disease is in agreement with previous studies report by Rweyemamu, et al., (1973), Gascoyne et al., (1993), Ngeleja et al.,(2003) and falls in line with the universal observation that dog rabies predominates in parts of Africa, Asia, Latin America and Middle East (Blood, et al., 1983, Susan and Asa, 1998).

This study has also shown that cat bites were second in frequency to dog bites (Table 2). It is, therefore, important for cats to be given due consideration when it comes to rabies control bearing in mind their close association with human beings and dogs at home. Cats are known to be very susceptible to the rabies virus and in some advanced countries such as the United States of America (USA) reported cases of rabies in domestic cats have outnumbered those in dogs, every year since 1987 (Susan and Asa, 1998).

The importance of wildlife in the spread of rabies has been reported in Tanzania (Cleaveland and Dye 1995, Mlengeya, 1999). The results in this study (Table.2) show that jackals, hyenas and monkeys have a role in the spread of rabies. Epidemilogically some overlapping could be occurring between the domesticated canine species and wildlife. Jackals and mongoose have been recorded to be associated with rabies spread in Southern Africa and certain other parts of Africa (Susan and Asa, 1998), but no record of hyenas has been documented before. It would seem, therefore, that in the Southern Highlands Zone and in Tanzania in general jackals and hyenas do contribute significantly to the spread of rabies only that a true picture is not being reflected due to difficulties of getting such information from the remote rural areas where wildlife co-exist with domestic carnivores and human beings.

All the 41 human beings who were admitted for suspect rabies and later confirmed to be rabid died of the disease. The outcome confirmed the nature of the disease that, once the symptoms of rabies appear, no treatment is successful. The figure is likely to be an underestimate taking into

account that most cases that appear in the remote rural areas go unrecorded.

Clinical diagnosis of rabies is difficult, especially in localities where rabies is uncommon, whereby in the early stages it can easily be confused with other diseases or with normal aggressive tendencies. Therefore, when rabies is suspected and definitive diagnosis is required, laboratory conformation is the only choice. Immunofluorescence microscopy on samples from the hippocampus, medulla oblongata and cerebellum can establish a highly specific diagnosis within a few hours hence, greatly reducing the time in getting the results and streamlining the unnecessary use of the expensive post exposure vaccine (Susan and Asa, 1998).

During the 4-year period only 19 brain samples originating from Iringa were submitted for laboratory confirmation. Fourteen (73.7%) of these brain samples submitted were from dogs. Although this percentage appears big, the real number of dog brain samples out of a total of 1,182 suspect rabid dogs in the zone is only 1.2%. Submission of such a small number of brain samples for diagnostic purposes indicates that many people in the Southern Highlands Zone are not aware of the importance of diagnosing rabies. Furthermore, based on the fact that brain samples were only submitted form Iringa where there is a veterinary investigation centre, justifies the importance of outreach programmes of the centres in order to create awareness in the diagnosis of rabies. It is important, therefore, to set up rabies diagnostic facilities at least in each region, and to offer training to Certificate and Diploma holders in animal health on specimen collection, preservation and transportation.

For proper rabies epidemiological studies, diagnosis of the disease plus proper data collection and management has to be efficient. The erratic and sometimes outright missing data as was observed in some council during the compilation exercise is detrimental to rabies epidemiological studies when plans and strategy formulations are required to combat the problem. Moreover, problems facing the field extension staff pointed out in this study have to be addressed.

Table 4 shows that there was an unimpressive and fluctuating vaccination coverage of between 20.2 and 24.4%, and a small number of dogs destroyed over the 4-year period. These findings are a clear testimony of the weak control measures against rabies. Beran (1971) recommended a stringent vaccination rate of 80% of the susceptible population that

would reduce the infection rate below the threshold for a rabies outbreak. WHO (1992) through an expert committee on rabies recommended a 75% vaccination rate.

Lack of proper planning and enforcement of control measures make the statutory control of rabies hardly implemented effectively in most of the councils studied. What is usually witnessed instead is a "fire fighter" type of approach in terms of mass vaccination and destruction of stray dogs following outbreaks. As pointed out by Ezeokoli, et al., (1984), during quite periods such campaigns are hardly implemented thus allowing fresh building up of susceptible hosts enough to support another outbreak. To curb this trend it is essential to enforce the regulations on keeping of dogs.

In conclusion, this study has shown rabies to be still a serious problem in the Southern Highlands Zone. It is recommended, that laws and by-laws pertaining to control of stray dogs and adherence to vaccination coverage should be put in place before engaging private veterinarians. As recommended by WHO (2002), health centres in the zone should also be equipped with both pre and post exposure treatment regimes to carter for persons occupationally at high risk of contracting rabies from infected animals.

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