The Status of Rabies in Aira General Hospital: A Retrospective Recorded Data

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Abstract: Rabies is a fatal viral zoonotic disease largely transmitted to humans from bites by infected animals and is caused by rabies virus genus *Lyssavirus* in the family of *Rhabdoviridae* that affects virtually all mammals. A retrospective study design was conducted at Aira General Hospital in January 2020. The retrospective data showed that a total of 919 animal bite cases were officially registered and followed post-exposure prophylaxis. The majority of suspected cases were children < 15 years (48.6%) and the major source of exposure was the dog (70.1%), followed by a fox (20.9%). In the case of age, there was an insignificant association ($X^2 = 8.520$, P>0.05). This result reveals that a male was more affected than females. However, there was no statistically significant association between sex ($X^2 = 6.11$, P>0.05). Contrary to the common perspective results reported from Ethiopia, the sources of exposure in this study area due to fox bite was high. Among cases registered in the study area due to fox bites, about 70% were from the Kellem Wollega and 30% were from the West Wollega zone. Since the disease is very important in the study area continuous and strategic community awareness should be given for effective control and prevention of the disease in the study area. Then this study is performed to fulfill the objectives, to assess the status of human rabies registered for the last five years in this hospital.

Key words: Aira · Bite · Rabies · Retrospective study · Zoonosis

INTRODUCTION

Rabies is a fatal viral zoonotic disease largely transmitted to humans from bites by infected animals. Historically rabies is registered in all continents except in Antarctica. Once clinical signs present, the disease is characterized by neuroencephalitis with 100% case fatality ratio [1]. It is known to cause large number of deaths in humans and animals each year. People mostly at risk of dying due to rabies being are those who live in rural areas of the Asia and African continents [2]. Rabies is a prime example of a neglected tropical disease that mostly affects poor communities, children and elderly people suffering from inequitable health care. In Africa, the highest recorded human death due to the disease for the year 1998 was reported from Ethiopia. The magnitude of the problem is higher in big cities like Addis Ababa linked with the presence of a large population of stray dogs and associated factors [3]. All mammals are susceptible to infection with these viruses. However, infected animals need to be humanely destroyed and prevented from entering the food chain to avoid human contact during carcass preparation [4].

Rabies is caused by the rabies virus genus *Lyssavirus* in the family of *Rhabdoviridae* that affects virtually all mammals [5]. It is the most widely recognized example of salivary transmission of viruses. Inoculation of infected saliva through the bite of a rabid animal appears to be the predominant mode of rabies. Contamination of broken skin and mucous membranes such as mouth, nasal cavity or eyes by fresh saliva or neurological tissues may also result in infection [6]. Once the rabies virus enters the body, it begins to multiply in the area near the entry site. If the infection is not stopped at this point, the virus will eventually invade the nerve cells in the area. Once the virus is in nerve tissue, it travels along the nerve to the center of multiplication (the brain). The virus may then spread to the salivary glands or other parts of the body. This incubation period lasts a varying amount of time; it can range from days to years, but the average

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length is 3-8 weeks. Though, rabies is one of the vaccine-preventable diseases, it is practically difficult and irreversible for medical treatment after the onset of clinical manifestation of the disease. In spite of the availability of safe and effective preventive tools in the global market, the burden of the disease could not be reduced in developing countries [7].

In Ethiopia individuals who are exposed to the rabies virus often see traditional healers for the diagnosis and treatment of the disease. These widespread traditional practices of handling rabies cases are believed to interfere with the timely seeking of Post-exposure prophylaxis. After exhaustion of traditional medical intervention and usually after the loss of life from family members, rabies patients, especially from rural areas, seek post-exposure care [7]. There is a lack of reliable data on both human and animal rabies [8]. Efforts to combat rabies have advanced in resource-limited countries in Africa and Asia over the past few years and have intensified following a global effort by the World Health Organization and partners to eradicate dog mediated human rabies by 2030. However, limited action has been carried out in most parts of Africa. In Ethiopia, vaccination coverage varies from 18% in urban areas to almost non-existent in rural areas. This coverage is far lower than the 70% recommended by WHO minimum coverage to prevent rabies outbreaks [9]. There was no previously conducted research on cases registered in this study area. Hence, a retrospective study had been carried out in Aira General Hospital among the data registered from 2015 to 2019.

MATERIALS AND METHODS

Study Period and Study Area: The study was conducted at Aira General Hospital from in January 2020. Aira General Hospital is located in Aira Town, the capital of Aira rural district in Oromia National Region, Western Ethiopia. Aira district was separated from the former Aira Gulliso district in November 1999 E.C. Aira district lies at (9° 6 °N latitude, to 35° 24°, E longitude) is 504 Km West of Addis Ababa the capital city of Ethiopia. The district lies at an elevation of 1500 to 1750 m.a.s.l. The district was among the 19 rural districts of the West Wollega Zone had a total of 18 peasant Associations located on 78 Km from Zonal town which is also west direction and agro ecologically categorized as 85% midland and 15% low land (ADAO, 2020).

The mean annual rainfall ranges from 1000 mm to 2000 mm and is characterized by heavy rainfall, with high 28°C and low 10°C of temperatures. This hospital provides services for cases that came from West Wollega, Kellem Wollega and some parts of Ilu Ababor and a few of them were from Benishangul Gumuz regional state and also intermittently some part of Western Ethiopia since 1930 (AGH, 2020). The map of the study area was shown as follows.

Study Design and Study Population: A retrospective study design was conducted to trace back the data registered in the hospital for five years. Retrospectively, counting of the data was performed from 2015 to 2019
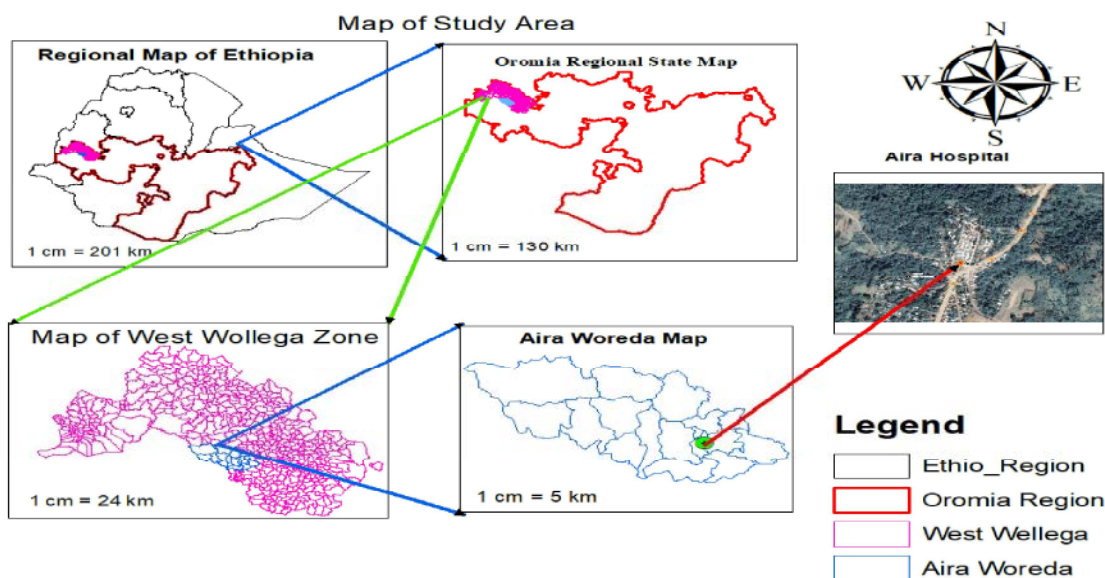
purposively depending on human rabies cases registered on case books to follow antirabies treatment. The study population of this study was the community who served in this hospital for antirabies treatments.

Sample Size Determination: To determine the status of the rabies occurrence in this district and its surroundings, the people who got post-exposure prophylaxis within the mentioned period were counted and the sample size was determined depending on the case registered. Hence, a total of 919 populations who registered on the hospital case books from 2015 to 2019. All registered data in the past five years were taken to determine the status of rabies in this hospital.

Retrospective Data Collection: Data of animal bite exposure registered were retrieved from the PEP registration books. Socio-demographic characteristics of patients (age, sex,) a place where they inhabit, species of animal bite them and year of exposed to bite victims were registered and taken as it is.

Data Management and Analysis: After collected, the data were cleaned and checked for their completeness. The retrospective recorded data was coded and entered into a Microsoft Excel spreadsheet 2007 computer program and imported to SPSS version 20.0 statistical packages for analysis. A Chi-square test was used to measure the association between PEP and certain socio-demographic factors (gender, age, species of animals and years of exposure) for the registered data. P-Value was used to assess if there was an association within socio-demographic factors. Values of $P<0.05$ was considered a statistically significant.

Ethical Consideration: The study was reviewed and approved by Jimma University College of Agriculture and Veterinary Medicine. Then the University sent a letter informing the Hospital management about the study and hence permission obtained from them. Data were collected after obtaining written consent from hospital and confidentiality was maintained throughout the study by using codes.

Inclusion and Exclusion Criteria: All registered case in the past five years for antirabies treatment on rabies registration book in Aira general hospital was included. But other cases those written on the case books were excluded.

RESULTS

Retrospective Study: From the retrospective data registered, almost all 903 (98.3%) of the cases were from Oromia. Among these cases, 486 (52.9%) were from Kellem Wollega followed by West Wollega 405 (44.1%) zone.

Table 1: Geographical location and source of rabies exposure registered (N=919)

Variables	Years in which registrations of cases performed					
	2015	2016	2017	2018	2019	Total (%)
Regions	X^2=24.224, P= 0.002					
Oromia	42	88	241	216	316	903(98.3)
Gambella	0	0	3	0	0	3(0.3)
Beni Shangul Gumuz	0	1	3	9	0	13(1.4)
Zones	X^2=39.836, P=0.005					
West Wollega	20	55	112	92	126	405(44.1)
Kellem Wollega	20	33	125	121	187	486(52.9)
East Wollega	0	0	3	1	1	5(0.5)
IluAba Bor	2	0	1	2	0	5(0.5)
Buno Bedele	0	0	0	1	1	2(0.2)
Location						
In Aira	9	27	63	30	52	181(19.7)
Out of Aira	33	62	184	195	264	738(80.3)
Species of animals	X^2= 74.983, P=0.001					
Dog	27	53	171	178	215	644(70.1)
Fox	11	31	56	27	67	192(20.9)
Human	1	0	3	1	18	23(2.5)
Cat	1	0	6	5	8	20(2.2)
Domestic animal	2	3	10	14	6	35(3.8)
Other wild animals	0	2	1	0	2	5(0.5)
Total						919(100)

Table 2: Age and sex of antirabies attendants at Aira General Hospital from 2015 to 2019(N=919)

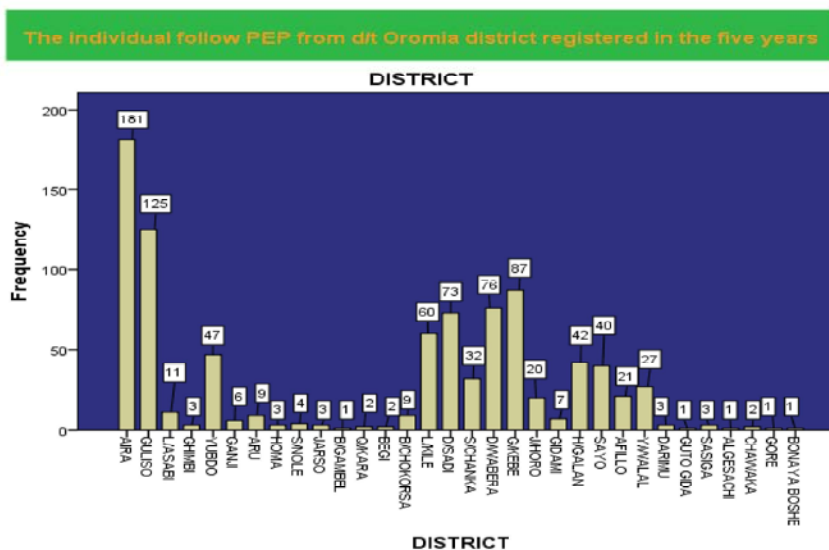| Variables	2015	2016	2017	2018	2019	Total (%)
			Years in which registrations of cases performed			
Age			X^2=8.52, P=0.74			
From 1-15	22	39	118	107	161	447(48.6)
From 16-30	12	27	71	70	74	254(27.6)
From 31-45	4	15	34	27	40	120(13.1)
≥ 46 years	4	8	24	21	41	98(10.7)
Sex			X^2= 6.117, P=0.191			
Male	31(73.8)	54(60.7)	165(66.8)	131(58.2)	202(63.9)	583(63.4)
Female	11(26.2)	35(39.3)	82(33.2)	94(41.8)	114(36.1)	336(36.6)
Total	42	89	247	225	316	919(100)

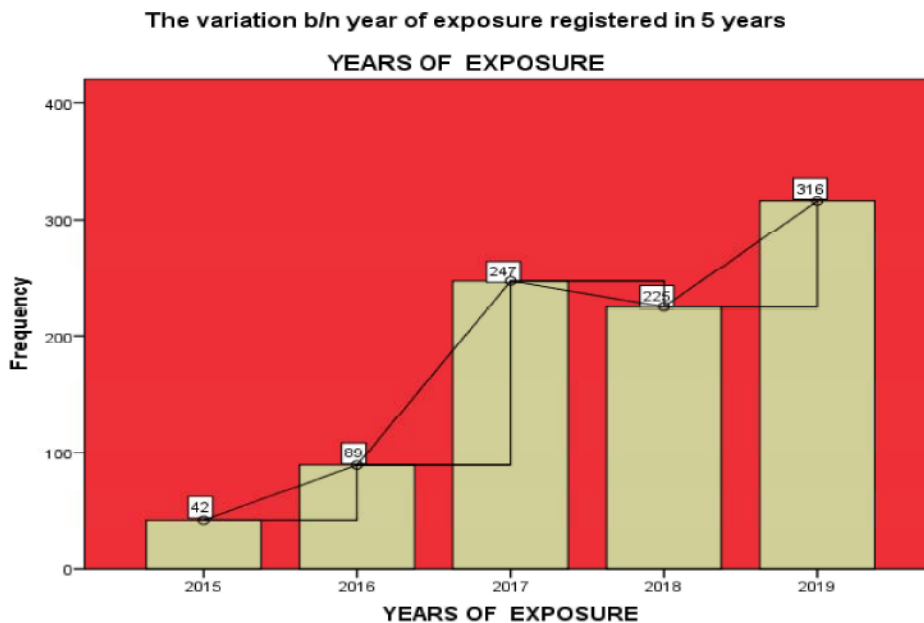Fig. 1: The bar chart diagram showing districts of the antirabies followers

Fig. 2: Bar-chart figure showing the years of registration of data in five years

The age of exposed groups followed antirabies in the past five years
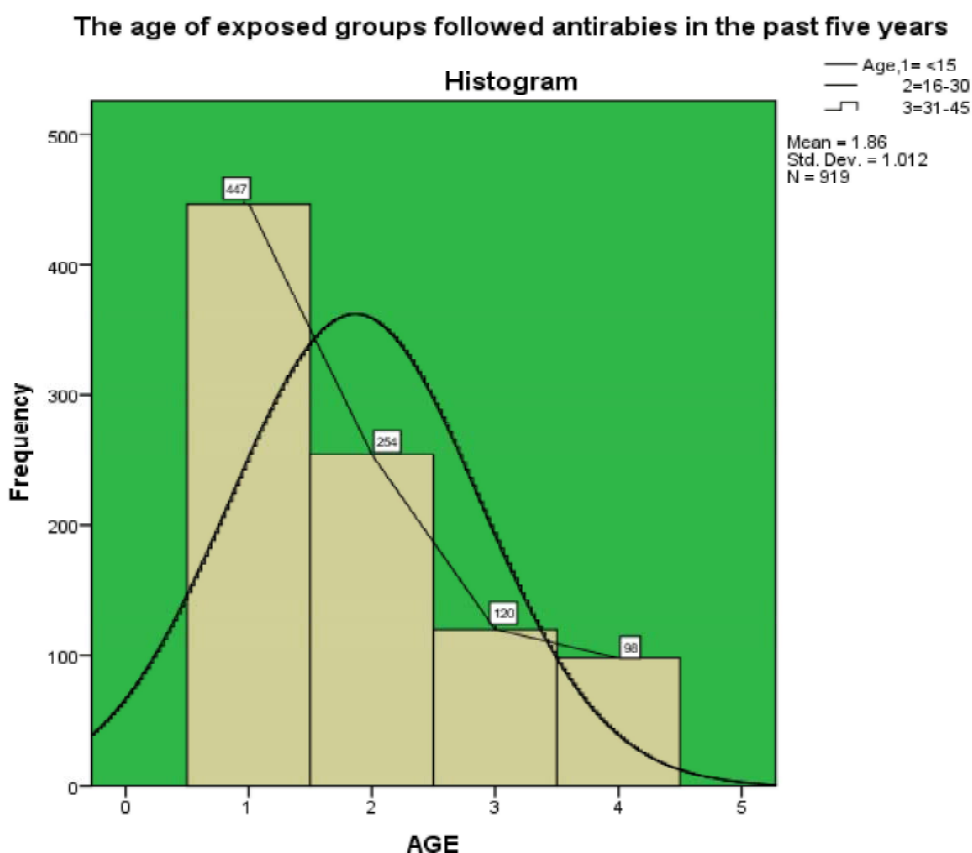

Fig. 3: Histogram showing ages of PEP followers in the past five years

A majority of rabies exposure cases were due to a bite by a dog 644 (70.1%) followed by fox 192 (20.9%) in this study (Table 1).

The retrospective data showed that the majority of suspected cases were males 583/919 (63.4%) and 336 (34.6%) are females, this happened all year round. Children, less than 15 years of age were the most affected 447 (48.6%) as registered in all years (Table 2).

The antirabies receiver resided in Oromia regional states, came from 5 different zones, 32 districts. Among the mentioned district Aira was the most affected ones 181(19.7%) (Figure 1).

The number of human rabies exposure cases were sharply increased in the study years with the highest recorded in 2019 (316/919 (34.4%) (Figure 2).

In this study when comparing the age of antirabies followers with wild animal bite victims, persons greater or equal to sixteen years were the most affected by a fox bite than children 103/192(53.6%). The age-specific distribution showed that children less than 15 years of age were the most affected 447/919 (48.6%), (Figure 3).

DISCUSSIONS

Retrospective Study of Rabies: In the present study, a significant proportion of the population 909 in the catchment area of the hospital was found to be exposed to animal bites and received antirabies. The present finding was slightly in agreement with the finding of Tamiru *et al.* [3], 209 rabies exposed patients were recorded within one year period in and around Ambo town, Ethiopia and this finding was lower than the finding of Deressa *et al.* [7] 17, 204 patients received post-exposure treatment within and around Addis Ababa. The majority of the exposed peoples were from Aira district 181(19.7%) as compared with all other districts. This was in line with the finding of Tamiru *et al.* [3] from Ambo town (54.3%) in the case of residence-based exposure but different results were recorded. This may be because in this work the data were retrieved only from Aira general hospital case book history, found in this district and individuals who were exposed to animal bites resided in this district had the chance to sought medical

care for antirabies only at this hospital. Of the total exposed individuals to animal bites and registered in the past five years, majorities 583 (63.4%) were males. It reveals that males were more affected than females. However, there was no statistically significant association between sex ($X^2 = 6.11$, P>0.05). This was in agreement with studies performed in southwestern Jimma (68.8%), northern Gondar (62.8%) and northwestern Tigray (63%), by Kabeta *et al.* [10], Yibrah and Damtie [11], Gebru *et al.* [12], respectively and also from Nigeria (56.7%) [13], in which male was more affected. In this study, males were highly exposed to fox bites 129/192(67.2%). This might be explained by the activities, males are regularly involved in or do more nightly and outdoor activities like wander in the forest for many purposes while females are more likely to remain indoors due to cultural and religious reasons. In Ethiopia, males travel long distance during night times that increase their risk of exposure [7].

Regarding ages, children less than 15 years of age were the most affected 447/919 (48.6%). In the case of age, there was an insignificant association ($X^2= 8.520$, P>0.05). This finding was in line with studies done at Gondar, Ethiopia (38.5%), Yibrah and Damtie [11], around Ambo town, West Shoa, Ethiopia (49%) by Tamiru *et al.* [3] and in Jimma (40%) by Kabeta *et al.* [10].

This result is also similar to the research done in Nigeria (52.9%) of children less than 15 years were the most affected [13]. This could potentially be explained by the fact that children are more likely to provoke dogs and are also less likely to be able to defend themselves, children play with dogs, thereby being more exposed to dog bite injuries. The WHO data reported that most (30% to 50%) of the victims of rabies reported from Africa and Asia were children [14].

According to retrospective data registered for five years in a selected hospital, the most source of animal bite human was a dog (70.1%) followed by a fox (20.9%). This study was similar to a study performed in Kazakhstan in 2015, wild carnivores (foxes, wolves, jackals) (16.8%) were a source of exposure [15]. This result is different from the common perspective, according to another research conducted in Ethiopia; almost all sources of exposure were a dog. For instance [11] reported, dog bite was the only source of rabies exposure at Gondar, Ethiopia, another study by Kitala *et al.* [16] also reported that 97% of humans used post-exposure treatments were due to dogs' bite in Machakos district, Kenya. The reason for the difference in this study, there

might be due to the suspect that in Kellem Wollega zone, Gawo Kebe district, Dahati national park was established that might be performing the weak sentinel at that area which could increase the risk of the exposure.

Chronologically the order of registration on case book from 2015 to 2019, 42(4.6%), 89(9.7%), 247(26.9%), 225(24.5%) and 316 (34.4%) of the data were recorded in 2015, 2016, 2017, 2018 and 2019 respectively. These results show the number of human rabies exposure cases increased figuratively across the study years with the highest recorded in 2019. The reason for the increment of the cases from year to year might be associated with a weak registration or poor handling of the data. The actual number of rabies exposure cases might be more than this figure if there is well and strong registration in the hospital. Even they could not have data regarding the status of the exposed person after being vaccinated. This means there are no strong follow-up and tracing system once the patient is treated and back home or even if treatments are interrupted. There were no recorded mortalities among dog bite victims reported to the hospital. This study coincidence with research reported from the Tigray region, Ethiopia in 2017 where human rabies exposure cases increased across the study years with the highest recorded in 2014 Teklu *et al.* [17].

CONCLUSION AND RECOMMENDATIONS

This study shows that the principal host of rabies in the study area was the dog followed by a fox. Contrary to the common perspective results reported from Ethiopia, the sources of exposure in this study area due to fox bites were high (20.9 %). Among cases registered in the study area due to fox bites, about 70% were from the Kellem Wollega and 30% were from the West Wollega zone. The registered data indicated that the majority of humans suspected of rabies cases were males and children. There was no strong follow-up and tracing system of the patient after treatment and back to their home or even if treatments are interrupted in the hospital. As the study of retrospective and KAP of the community about rabies indicated that, rabies was endemic in the study area. Based on this finding the following recommendations were forwarded;

- Since the disease is very important in the study area continuous and strategic community awareness should be given for effective control and prevention of the disease in the study area.

- Ethiopian Federal Ministry of Health, Federal Agency of Livestock and fishery resources, Dambidollo and Wollega University should work in cooperation and collaboration to perform a mass vaccination campaign against rabies and supply the vaccine.
- Preparing the standardized protocols for patient care and follow-up on dog bite victims is mandatory.

Supporting Information: Retrospective Study-Rabies in Aira General Hospital.

Conflict of Interest: The authors have not declared any conflict of interest.

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