Global Veterinaria 22 (2): 63-70, 2020
ISSN 1992-6197

DOI: 10.5829/idosi.gv.2020.63.70

Assessment of Farmers' Knowledge Against Bovine Trypanosomosis in Selected Tsetse Infested Districts of Western Amhara Region, Northwest Ethiopia

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Abstract: This study was conducted in Dembecha and Jabitehenan districts of Western Amhara region from February 2017 to January 2018 based on cross sectional study. A questionnaire survey with the objectives of assessing farmers' knowledge against bovine trypanosomosis was administered randomly to 278 farmers. Most farmers (46.76%) reported that majority of cattle reared in the area were kept mainly for drought power where oxen and sometimes cows used for this purpose. Cattle also used for milk and fattening purpose as source of income. Based on the interview result, animal diseases, insufficient grazing land and scarcity of modern veterinary service were reported to be the major constraints to livestock production. Trypanosomosis was considered by 92% of the respondents as the most economical important cattle disease compared to major top diseases. Most of the respondents (63%) indicated that the cause and transmitters of trypanosomosis is the environment while only 29% respondents considered biting flies are as cause and transmitters of trypanosomosis. Respondents (48%) also explained that the seasonality of the disease and its vectors reach peak level during September to November months of the year. Draft power losses due to sickness of oxen was the most important impact of trypanosomosis for 41.1% of respondents, whereas trypanosomosis induced mortalities and milk loss were the other important impact for 10% and 16% of the respondents respectively. About 98% respondents reported management of the disease mainly through treatment of affected animals with modern trypanocidal drugs.

Key words: Cattle · District · Knowledge · Respondent · Trypanosomosis · Tsetse Fly

INTRODUCTION

Ethiopia is believed to have the largest livestock population in Africa with 53.99 million cattle, 25.49 million sheep, 24.06 million goats, 1.91 million horses, 0.35 million mules, 6.75 million donkeys and 0.92 million camels [1]. It is an important sector in Ethiopia's economy as it contributes 35.6% to the agricultural Gross Domestic Product, equivalent to 16.5% of the national GDP [2] and 37-87% to the household incomes [3]. Farmers keep livestock to generate household income through sale of animals or sale and consumption of animal products. Livestock are form of savings and insurance for the poor as sale of animals provide immediate cash to deal with significant or unexpected expenditures (as school or medical fees); livestock provide social and cultural contributions like, gifts for friends and relatives, inheritance, marriage (bride wealth, dowry), compensation, making peace after conflict [4].

Despite the enormous contribution, productivity is constrained by several factors from which disease being the most important [5]. Diseases are an important cause of reduced productivity of meat and milk as well as draft, hides and dung fuel. Trypanosomosis is among the well-known constraints to livestock production in Africa as it causes a serious and often fatal disease of livestock mainly in rural poor community and rightfully considered as a root cause of poverty in the continent [6].

It is a fatal and debilitating disease of various domestic livestock and wild animals which is caused by a protozoan parasite of the trypanosomes species [7]. Bovine trypanosomosis is one of the diseases that are

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caused by this flagellated protozoal parasite belonging to the genus. trypanosome The disease is transmitted biologically by the tsetse fly (Glossina species) and infects animals over an area known as the 'tsetse belt', which extends approximately 10 million km^2 across 37 countries in Africa, from the Sahara Desert in the North to South Africa in the south [8]. Trypanosomosis is also mechanically transmitted by tsetse and other biting flies through the transfer of blood from one animal to another.

Biting flies, especially tabanids and stomoxyes, but possibly other biting insects (including tsetse flies) are the mechanical vectors of *T. vivax* [9].

Trypanosomosis of cattle locally referred as "Ghendi" in many province of Ethiopia which is one of the most important disease limiting livestock productivity and agricultural development due to its high prevalence in the most arable and fertile land of south-west and north-west part of the country [10]. The impact of bovine trypanosomosis is not restricted to livestock production alone, but extends to changes in land use and exploitation of natural resources use, access to available and cultivable land and restriction of opportunities for diversification of agricultural production [11].

Although trypanosomosis may be found almost in all parts of the Amhara National Regional State, the problem is much more severe in most areas of west Gojjam, part of east Gojjam and Awi administrative zones. In western part of Amhara Regional State bordering the Abay river, one of the North Western tsetse belt areas of Ethiopia, tsetse transmitted trypanosomosis is becoming a serious threat for livestock production and agricultural activity [12]. The problem was seen to be prominent in districts bordering the Abay river basin where both cyclically and mechanically transmitted trypanosomosis were reported. Dembecha and Jabitehenan, districts of west Gojjam zone are such districts where there are serious complaints of the disease. Previous studies revealed by Dagnachew [13] with a total prevalence of 20% for these two districts.

Even though few studies have been conducted on the prevalence of this disease in these districts, there has no or very limited work carried out to assess farmers' knowledge against bovine trypanosomosis. In order to fill the information gap in western Amhara region particularly in west Gojjam, the study at hand was conducted to evaluate farmers' Knowledge as well as current status of the bovine trypanosomosis in the study area.

Therefore, the objective of this research work was to assess farmers' knowledge about trypanosomosis in the study area.

MATERIALS AND METHODS

Study Area Description: The current study was carried out in five kebeles of Dembecha and Jabitehenan districts of west Gojjam administrative zone of Amhara regional state. West Gojjam Zone is located at 10°30' North latitude and 37°29' East longitude. The climatology of the area alternates with long summer rainfall between June-September and winter dry season between December-March with mean annual rain fall of 1200-1600 mm. The mean temperature is between 10-20°C and the altitude of each district; 1100-1500 m.a.s.l for Jabitehenan and 1400-2300 m.a.s.l for Dembecha. The river valleys altitude level ranges from 1700 m.a.s.l. from the main road of Addis Ababa to Bahirdar to 1300 m.a.s.l. to the lower valley of Abbay. The areas are occupied by cultivated land, grazing land, forest shrub, bush and woodland, water bodies and the remaining is engaged by settlement population. The livestock population includes cattle, sheep, goat and equines which are an integral part of the livelihood of the people. Cattle are particularly important in the agricultural activities where the farmers are dependent on oxen power for crop production [1].

Study Population: Animals used in this study were indigenous zebu cattle which are usually kept under traditional extensive husbandry management system with communal herding. Animals are kept to graze freely during the day and housed in poorly constructed barns at night. Animals obtain water in the rainy season from seasonal rivers while in the dry season from perennial rivers flowing long in their locality.

Study Design: The study design was based on cross sectional study including questionnaire survey that was carried out from February 2017 to January 2018. Questionnaire survey was targeted to generate information on farmers' knowledge against bovine trypanosomosis.

Sampling Technique: Two districts and five kebeles were selected purposively from tsetse infested areas of Amhara National Regional state to represent trypanosomosis of western Amhara region. From each kebeles, villages were selected based on their accessibility. Care was taken to make sure that the study villages were geographically representative to the rest of the villages in the study districts. Households were selected by using simple random sampling as final sampling units.

Sample Size Determination: A total of 278 randomly selected farmers or livestock keepers (150 from Dembecha district and 128 from Jabitehenan district) were participated in house-to-house interview in order to assess their knowledge against bovine trypanosomosis. The sample size for respondents of house-to-house interview was determined using the formula (n = 0.25/SE2) given by Arsham [14] at the standard error (SE) of 0.03 with 95 % confidence level.

Data Management and Analysis: The response of interviewed farmers were recorded using questioner format. The recorded data were entered and managed using Microsoft Excel spread sheets program to create a data base. IBM SPSS statistics version 20 statistical analysis tools was used to analyze and interpret the data. Descriptive statistics (frequency, percentage and average) were used to analyze the qualitative data.

RESULTS

Cattle Importance: The majority of livestock reared in the area were cattle followed by small ruminant and equine. The average numbers of cattle in household was 6cattle/household and 7cattle/household in Dembecha and Jabitehenan district respectively. Most farmers kept the cattle mainly for drought power where oxen and sometimes cows used for this purpose as shown table below. Cattle also used for milk and fattening purpose as source of income.

Livestock Production Constraints: Based on the interview result, the majority of farmers in both districts considered animal disease as the most important constraints associated with livestock production. This was followed by insufficient grazing land and watering points and scarcity of modern veterinary service in that order as indicated in figure below. According to the description of respondents, there is no sufficient livestock feed due to insufficient grazing land especially during dry season when almost all the grazing land is over grazed. Better feed is available during the late and early rainy season when the pasture is green and the feed biomass is relatively high.

Almost 92% of the respondent revealed trypanosomosis was the most important livestock constraint limiting the overall agricultural activity and livestock productivity mainly for cattle among the major top diseases in the study districts. Trypanosomosis is a disease of livestock locally known as "Ghendi or Mich". All diseases described in local terms were assigned to the equivalent English/scientific disease group. The respondents recognized different diseases as indicated in figure. The major cattle diseases described by respondents were trypanosomosis, pneumonia, internal parasite, blackleg, external parasite, LSD, anthrax, abortion and FMD.

Farmers' Knowledge of Trypanosomosis Clinical Diagnoses: The reported clinical signs of trypanosomosis noticed by the farmers that can be easily identified through visual observation. However, the level of precision depends on the experience of the farmer. The symptoms of trypanosomosis described by respondents were not different from what is available in literature [15, 16]. The most frequently reported clinical signs of trypanosomosis were indicated by respondents.

Farmers' Knowledge Towards Bovine Trypanosomosis Etiology: Most of the respondents (63%) indicated that the cause and transmitters of trypanosomosis is the environment while only 29% respondents considered that biting flies are as cause and transmitters of trypanosomosis to their cattle. When asked to characterize the fly type, they call it locally as "Wegie" which are equivalent to tabanids and muscids flies. The other flies they described it as having long legs, small in size, brown in color biting their animals when the animals move to the forest and savanna vegetation types. They might be equivalent to tsetse fly. Only 5% of the interviewed farmers didn't know any about the cause and transmitter of trypanosomosis. Some respondents (3%) associated trypanosomosis with tick bites, grazing hours and watering at certain rivers or streams.

Farmers' Knowledge on the Presence and Impact of Tsetse and Trypanosomosis: Draft power losses due to sickness of oxen was the most important impact of trypanosomosis for 41.1% of the respondents, whereas trypanosomosis-induced mortalities and milk loss were the other most important impact for 10% and 16% of the respondents respectively. Furthermore, treatment costs were most important for 25.3% of the farmers and 3% of them also reported that biting flies are causing nuisance to cattle. Some farmers (4.6%) also considered this disease as the cause abortion.

Table 1: Purpose of animal breeding in the study area

Importance	Frequency	%
Drought power	130	46.76
Milk	19	6.83
Milk and drought power	126	45.32
Fattening (for sell of live animal)	3	1.07

Table 2: Major clinical signs of trypanosomosis frequently observed by respondents

	Dembecha (N=150)		Jabitehenan (N=128)		Total (N=278)	
Clinical signs	N	Proportion (%)	N	Proportion (%)	N	Proportion (%)
Ruffled hair	125	83.3	106	82.8	231	83.1
Emaciation	112	74.7	97	75.8	209	75.2
Anorexia	100	66.7	86	67.2	186	66.9
Physical weakness	90	60	82	64.1	172	61.9
Ocular discharge	76	50.7	71	55.5	147	52.9
Eating soil	73	48.7	68	53.1	141	50.7
Diarrhea	70	46.7	65	50.8	135	48.6
Constipation	58	38.7	50	39.1	108	38.9
Swollen lymph nodes	55	36.7	38	29.7	93	33.5
Cut off tail	42	28	38	29.7	80	28.8
Salivation	30	20	22	17.2	52	18.7

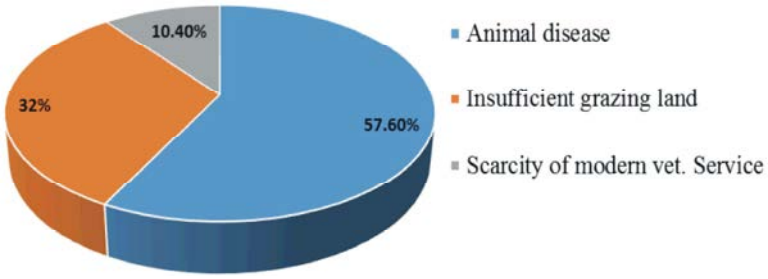

Fig. 1: Major Llivestock production constraints reported in the study districts

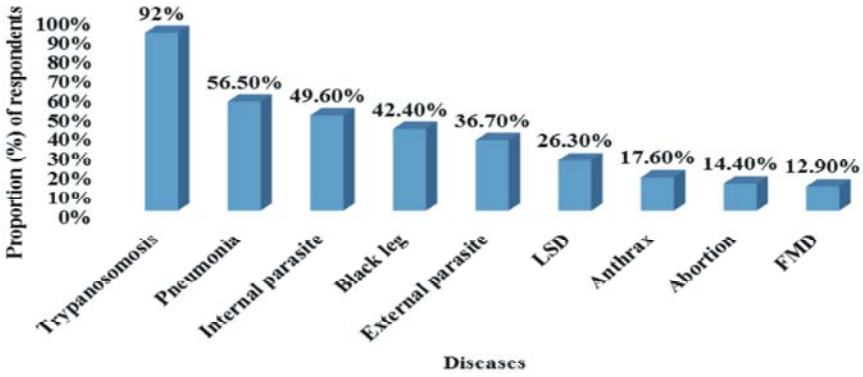

Fig. 2: Major livestock diseases mentioned by respondents in the study districts

Knowledge on Seasonality of Trypanosomosis and Tsetse Fly Challenges: Most of the respondents explained that trypanosomosis and its vectors challenge reach peak level after short and long rainy season in terms of profound morbidity and mortality effect of the disease, fly density and fly nuisance effect. This lies from April to June (26%) and September to November (48%). Farmers reported that these seasons condition is favorable for the growth and reproduction of both vector flies and the trypanosomes. On the other hand, majority of the respondents ascertained that the challenges of trypanosomosis and its vectors become mild in the dry season. Only 10% and 16% of the respondents in the study districts reported that infection with the disease was observed during the month of October to May and August to November respectively.

Management of Trypanosomosis: The control measures were carried out only for bovine by using trypanocidal drug and tsetse control (pour-on, traps and targets). Now a day almost all of the respondents (98%) stated that control of trypanosomosis was carried out mainly through treatment of affected animals with modern trypanocidal drugs.

Chemotherapy is the main practice for the treatment of animals affected by trypanosomosis for the last 20-30 years. 100% respondents reported that Diminazine aceturate (Berenil) locally known as "Bicha" or "Kosho" and Isometamidium chloride (Trypamidium) locally known as "Buna" have been used extensively for long time. 78% of the treatment was given to clinical cases and 22% to non-clinical cases. Most of the farmers (59.2%) in the both districts used diminazine aceturate and only 12.2% of the respondents used isomethamidium for the treatment of disease. 28.6% of farmers also reported that they used both drugs. These drugs have been mainly sourced from private legal or illegal drug shops, veterinary clinics and both. In this aspect, 55% and 50% interviewees have declared that both private drug shop and veterinary clinics were the main drug source in Dembecha and Jabitehnan district respectively. None of the respondents use traditional medicine for treating the disease.

About 30% of farmers reported that the treatments of infected animals were done by themselves / family members at home while 60% of them treat their animal by both farmers and veterinary post personnel and 10% by veterinary post personnel in Dembecha district. In Jabitehenan district, 25% of farmers reported the treatments of infected animals were done by the farmers, 55% by farmers and veterinary post personnel and 20% by veterinary post personnel. Respondents stated that trypanocidal drugs treatment frequency ranges from three to seven times per year per animal. The average treatment frequency in the study area per animal per year was 4 times.

DISCUSSION

This survey was conducted with the objective of investigating farmers' knowledge against bovine trypanosomosis by face to face interview in selected districts of West Gojjam, North West Ethiopia. According to the farmers' response to the questionnaire administered, most farmers kept the cattle mainly for drought power where oxen and sometimes cows used. Cattle also used for milk and fattening purpose as source of income. Of the reported diseases, trypanosomosis has been perceived as the number one obstacle to cattle production and impediment for agricultural development in the study areas. Furthermore, scarcity of grazing land and watering points and lack of veterinary service were reported to be challenges for development of the area. This was in agreement with Dagnachew [13] reported the same constraints from the Abbay basin north west of Ethiopia. The results revealed that most respondents in both study districts were familiar with bovine trypanosomosis which they locally called "Ghendi". It was reported to be the most and the first important livestock constraint affecting animal health by 92% of interviewee. The same result was reported by Seyoum [17] in Guraferda and Gimbo districts in the Baro Akobo and Gojeb River basins, where 95.2% of the interviewed respondents responded that trypanosomosis was the major disease of cattle.

My studies showed that trypanosomosis was persistent throughout the year in current study area, but the incidence of disease reaches its peak after long rainy season and after short rainy season. Seasons of peak trypanosomosis challenge identified in my studies are in line with the findings of Dagnachew [12] from the Abbay basin West of Ethiopia. The report of Seyoum [17] indicated that infection was observed at peak level during rainy season (August-September). Cherenet [18] also reported that the density of Glossina tachinoides, Glossina morsitans sub morsitans, biting flies as well as the corresponding prevalence of trypanosomosis was higher in the long rainy season than the dry season.

Although trypanosomosis does not have pathognomonic signs, most farmers in the study areas were able to recognize the usual clinical signs suggestive of bovine trypanosomosis that are commonly described for the disease [19; 20]. Similarly, studies conducted in tsetse-infested areas of Ethiopia Stein J [21], Dagnachew [12] and Seyoum [17] have revealed that most of the interviewed farmers were able to mention the common symptoms that are used as diagnostic tool for trypanosomosis suspected cases.

According to 41.1% of the respondents in the present survey, bovine trypanosomosis is most severe in draft oxen. This might be attributed to stress associated with work overload. Similarly, Tesfaye [22] reported that 50.9% farmers ranked draft power loss of oxen as the most important impact of the disease. As Swallow [23] and Taylor and Authié [24] reported that animals with work overload are highly susceptible to the diseases.16%

and 10% of respondents have emphasized that in cattle suspected of trypanosomosis, noticeable reductions could be observed on milk production together with body condition and induce mortality in untreated cases respectively.

According to the result from the questionnaire survey, the majority of trypanosomosis cases in the area were treated by the farmers themselves or family members. They were administering drugs due to the long history of the disease in the study areas they developed the habit of frequently treating their animals. The results were in accord with survey reports from other tsetse infested regions of Ethiopia [17, 25] and Kebede [26] who reported from neighboring districts of West and East Gojjam zones, Northwest Ethiopia. Isomethamidium chloride (Veridium) and Diminazene aceturate were the most commonly used trypanocides in the area. The present study indicates that majority of the respondents confirmed that they use Diminazine aceturate may be due to its fast curative response. Similar finding was reported about the drugs used by previous researches in many parts of the country [27].

The frequency of treatment per animal per year reported in the present study was higher than earlier reports from neighboring Bure and Womberma districts of west Gojjam Zone, North West Ethiopia [28]. But it was lower than the report of Seyoum *et al*., (2013) in Guraferda and Gimbo districts in the Baro Akobo and Gojeb River basins who reported a mean frequency of 6 times per animal per year. In this study, the majority of the respondents used veterinary drug store for their source of trypanocidal drugs and injections is encouraging, a proportion of them are still using drugs from illegal sources and administering it by their own. This indicated that there is high risk of development of drug resistance in the areas. Seyoum [17] reported similar findings at Gojeb and Baro-Akobo river Basins.

CONCLUSION AND RECOMMENDATIONS

The study conducted on the farmers' knowledge against bovine trypanosomosis in Dembecha and Jabitehenan districts of western Amhara region, northwest Ethiopia provided important information. In this study, farmers' are familiar with bovine trypanosomosis and strongly acknowledged that it is the main constraint to livestock development in the study area. Livestock owners also identified the vector, tsetse fly and associated it with the disease trypanosomosis. They also had good knowledge of the suggestive signs of trypanosomosis and its impact on agricultural activity and on the livelihood and wellbeing of cattle as well as on the owners themselves. Most of respondents (98%) stated that control of trypanosomosis is carried out mainly through treatment of affected animals with modern trypanocidal drugs. The presence of illegal sources of these drugs and the practice of injection by cattle owners or their family signals the presence of drug failures due to trypanocidal resistance.

Therefore based on the above conclusion the following recommendations are forwarded:

- Sustainable tsetse fly control strategies besides chemotherapeutic service in order to control trypanosomosis effectively should be designed and implemented by government in the area.
- The design and implementation of tsetse fly and trypanosomosis control programs should be incorporate with farmers' knowledge about trypanosomosis.
- Continuous community awareness creation should be done about use of veterinary services as appropriate source, administration of the drugs and drug resistance.
- Trypanocidal drug efficacy studies should be undertaken using the common drugs circulating in the area.

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