

## Research Article

# The Prevalence of Bovine Trypanosomiasis in Quara Woreda, North Western of Ethiopia

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## Abstract

The study was conducted in Quara Woreda, Amhara Regional State, North western of Ethiopia to determine the prevalence of bovine trypanosomiasis and to assess its associated risk factors. Out of the total 384 (198 female and 186 male) animals randomly selected and examined, 26 were found infected with trypanosomes with an overall prevalence of 6.77%. Among which, 1(0.26%) was found to be infected by *T. congolense* while 25(6.51%) were infected by *T. vivax*. Statistically significant difference ( $p < 0.05$ ) was observed in between sexes of animals. The prevalence was higher in male (8.6%) as compared to female animals (5.05%). Regarding to age of animals, the highest prevalence was detected in adult (> 6 years) (8.16%) followed by young animals (2-6 years) (4.46%) while the lowest was in calves (< 2 years) (3.70%). The difference was statistically significant ( $> 0.05$ ). Similarly, the prevalence was significantly higher ( $p < 0.05$ ) in cattle which were in poor body condition (21.92%) as compared to those in good body conditions (3.22%). In conclusion, this study confirmed that trypanosomes were prevalent and poses a serious threat to animals, especially, to cattle production in the area. Therefore, proper strategies ought to be designed and implemented to minimize the effect on livestock production and productivity.

## INTRODUCTION

Ethiopia is known for its high livestock population, being the first in Africa and tenth in the world. The recent livestock population estimates that the country has about 44.3 million heads of cattle, 23.6 million sheep and 23.3 million goats [1].

Agriculture is mainly rain fed has low productivity and vulnerable to natural and manmade climate. Rural poverty is caused by a number of factors, prime amongst which is the fact substantial proportion of the country for tile agricultural low lands is rendered in accessible by the treat of tsetse and *trypanosomes* disease. Tsetse transmitting *trypanosomes* for the most parts, dictate where people live and practices agricultural and keeping livestock. This is a series disease in domestic livestock that causes significant negative impact in food production and economic growth in many part of the world particularly in sub-Saharan Africa [2-6].

*Trypanosomiasis* had impact on livestock, especially cattle production, and its epidemiology was determined largely by the prevalence and distribution of the disease and its vector in the

affected area [7]. *Trypanosomosis* is a parasitic disease caused by different species of unicellular parasites (*trypanosome*) found in the blood and other tissues of vertebrates including livestock, wild life and people [3].

Tsetse flies (*glossina*) inhabit wide range of habitat covering over 10 million km square and about 35% of African continent affecting 37 countries including Ethiopia [8]. Approximately 30% of the total cattle population in Africa and about 50 million people are exposed to animal *trypanosomiasis* and human sleeping sickness, respectively [9]. Tsetse fly transmitted *trypanosomosis* has been reported to cause about three million death of livestock in Sub-Saharan Africa and 10 million square km areas of the Africa's greatest agricultural potential were infested with tsetse fly. The wide occurrence of this disease in people and livestock retards agricultural and economic development in Africa and 30% of the continent cattle population, estimated to be 160 million and comparable numbers of small ruminants are at risk of *trypanosomosis* [6].

In Ethiopia, *trypanosomosis* is one of the most important disease limiting livestock productivity and agricultural

development due to its high prevalence in the most fertile land of South-West and North-West part of the countries following the greater river basin of Abay, Omo, Ghibe and Barro with high potential of agricultural development. Currently, about 220,000 km<sup>2</sup> areas infected with tsetse flies such as *glossinapalidipes*, *G. mortance*, *G. longpennis*, *G. tachnoid* and *G. fuseipes*. The most important trypanosome species affecting livestock in Ethiopia are: - *T. congolense*, *T. vivax*, *T. bruci* in cattle, sheep and goat; *T. evansi* in camel; *T. equiperdum* in horse [10,11]. In Amhara region of North West Ethiopia, trypanosomiasis was considered as an important disease of cattle [12,13].

Anemia, generalized enlargement of the superficial lymph nodes, lethargy and progressive loss of condition are the major signs of *trypanosomosis*. Infected animals can easily be exhausted and lag behind from the herd [14].

*Trypanosomosis* can be diagnosed based on either detection of the parasite by the light microscope (parasitological) conjunction with clinical observation [15]. The stained thin blood smears afford the best means of identifying species of *Trypanosomes* [16]. According to Getachew [11], the control strategies in *Trypanosomosis* concentrate on vector control, parasite control with chemotherapy and chemoprophylaxis and use of inherent *trypanotolerant* trait in some breeds of animals. As part of control and prevention of this economically important disease, regular surveillance of the vector and parasite need to be considered in tsetse infested areas of the country. Therefore, the objectives of the present study were to determine the prevalence of bovine trypanosomosis and to assess its associated risk factors in QuaraWoreda, North Gondar Zone of Ethiopia.

## MATERIALS AND METHODS

### Study area

The present study was carried out in Amhara National Regional state, North Gondar Zone, Quara district, North-western Ethiopia. It is located at 325 km away from Gondar and 1045 km from Addis Ababa. Quara has an area of approximately 7,979.1 square km, bordered by Metema, Alefa, Jawi, Benshangul-gumiz and Sudan. It is divided into two ecological zones; 'Kola' (98%) and 'Woina-Dega' (2%). Its estimated population of 100,594 is made up of three Nations of which the Agew, Amhara and Gumuz are the main mixed farmer groups, keeping cattle, goats, sheep, donkey, camel, chickens; and sesame, sorghum, maize, groundnut and teff are the main cultivated crops. The cattle population is estimated to be 13,564, sheep 5,175 and goats 49,606, poultry 26,294, equine 10,945, camel 492. The mean annual rain fall and monthly temperature of the area are 850 - 1000 mm and 28 - 39°C, respectively.

### Study population

Quara district has an estimated cattle population of 13,564 our study was focused on both sexes and all age groups of cattle (all local zebu cattle).

### Study design

It was a cross sectional study conducted from July 2011 to September 2011. The study animals were classified in different age groups as calf hood age of less than 2 years, the young of

2 - 6 years and the adult age group of greater than 6 years old including the sex factor to assess the trypanosome infection in the cattle population of the study area.

### Sampling and sample size determination

The sample size was calculated using expected prevalence of 50% and desired absolute precision of 5% as per the standard procedure described by Thrusfield [17]. Thus, 384 cattle were considered and simple random sampling method was used to select individual animal for sampling.

$$n = 1.96^2 \times P (1-P)$$

$$d^2$$

Where

P= is estimated prevalence,

d= is absolute precision and

n =is sample size.

### Study methodology

**Sample collection:** Cattle were properly restrained and following aseptic procedures, the marginal ear vein was pricked with the tip of sterile lancet to let blood in to one end of microscopic slide.

### Parasitological Examination

**Thin blood smear and giemsa staining:** For preparation of thin blood smear, first the slide was polished with dry and clean cloth. The blood was expressed approximately 20mm away from one end on the slide. The spreader (another slide) was placed on a head of the drop of the blood approximately at an angle of 45°. The spreader slide was drawn back to make contact with blood. Then, the blood was allowed to run to both ends of the spreader slide and spread the blood along the slide with steady motion. The slide was dried by waving it in the air and fixed for 5 minutes with methyl alcohol. The smear was flooded with Giemsa staining solution for 45 minutes. Excess stain was drained and washed off by using tap water and allowed dry for examination. Then microscopic examination was made under oil emersion objective [18].

### Data management and analysis

Data collected from laboratory assay was stored on Microsoft Excel spread sheet program and analysis was done by using SPSS version 17.0 program. The total prevalence was calculated by dividing the number of positive animals by the total number of animals tested. *P* values < 0.05 were considered as statistically significant.

## RESULTS

### Parasitological result

The parasites that had been identified morphologically in all the positive slides were *T. vivax* and *T. congolense*. A total of 384 animals were examined during a survey period. The overall trypanosomiasis prevalence in cattle was 6.77%. Higher infection rate was recorded in adult (> 5 year) animals and lower infection

rate was recorded in calves (< 2 years) (Table 2). The difference was statistically significant ( $p < 0.05$ ).

In this study, significantly low prevalence of *trypanosoma* infection was recorded in Dokmit (2.86%), which is the highest prevalence of *T. congolense*, whereas Bemure revealed the highest prevalence (12.22%) (Table 1).

In the present study among 26 cattle detected positive, 1(0.26%) were found to be infected by *T. Congolense* and 25 (6.51%) were infected by *T. vivax* (Table 1 and Figures 1,2). In this study, from a total of 384 cattle examined, 198 were females and 186 were male animals.

Out of the total 384 animals examined, 26 were found positive for trypanosomiasis. Of which, 5.05% prevalence was recorded in female animals whereas 8.6% prevalence was recorded in male animals (Table 2). Trypanosome infection in male animals was slightly higher than female animals. The difference between the two sexes was statistically significant ( $p < 0.05$ ).

The animals under study were categorized as calf (< 2 years old), young (2 - 6 years) and adults (> 6 years old). The highest prevalence of *trypanosoma* infection was found in old aged animals (8.16%) followed by young animals (4.46%) while the lowest was in calves (3.70%) (Table 2).

Statistically significant ( $p < 0.05$ ) association was observed in the prevalence of *trypanosoma* infection and body condition of animals. *Trypanosomiasis* infection rate was higher in animals

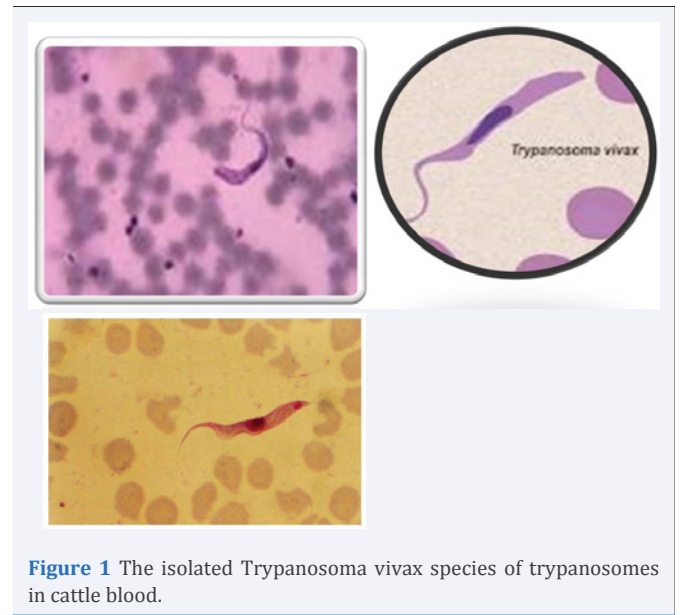


Figure 1 The isolated Trypanosoma vivax species of trypanosomes in cattle blood.

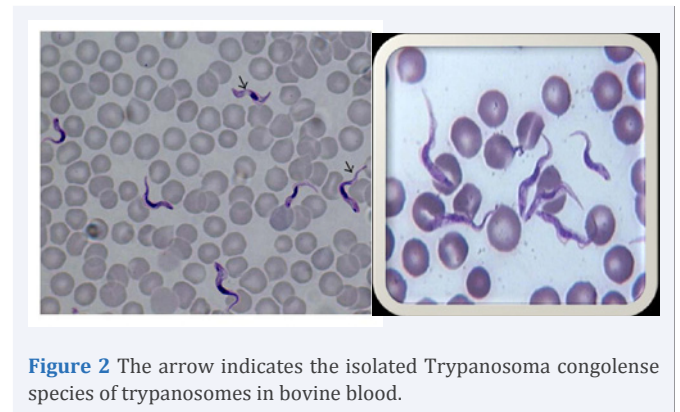


Figure 2 The arrow indicates the isolated Trypanosoma congolense species of trypanosomes in bovine blood.

Table 1: Prevalence of trypanosome infection in different villages of Quara District.

Village	N <sup>o</sup> Examined	<i>T. congolense</i> (%)	<i>T. vivax</i> (%)	Total
Mgechit	103	0	5 (4.85)	5(4.85%)
Farshaho	97	0	4(4.12)	4(4.12%)
Dokimit	35	1(2.86)	0	1(2.86%)
Agamwuha	28	0	3(10.71)	3(10.71%)
Gelegu	31	0	2(6.45)	2(6.45)
Bemur	90	0	11(12.22)	11(12.22)
Total	384	1(0.26)	25(6.51)	26(6.77)

Table 2: Trypanosome infection based on sex, age group and body conditions of cattle.

Category	N <sup>o</sup> of Examined	N <sup>o</sup> of Infected	Prevalence	P-Value
Sex				
Female	198	10	5.05%	p < 0.05
Male	186	16	8.6%	
Age Group				
Calf	27	1	3.70%	p < 0.05
Young	112	5	4.46%	
Adult	245	20	8.16%	
Body Condition				
Good	311	10	3.22%	p < 0.05
Poor	73	16	21.92%	
Total	384	26	6.77%	

with poor body condition (21.92%) as compared to animals with good body condition (3.22%) (Table 2).

## DISCUSSION

The result indicated that most of the animal producers used free grazing for their animals. Due to the scarcity of water and feed, animals had to travel long distance during the dry season and this situation might increase the chance of being remain infected with *trypanosomes* until wet season. The present study indicated that *trypanosomiasis* is still of much concern and represents a major obstacle to cattle production in Quara district of Amhara region, Northwest Ethiopia. The parasitological examination revealed a prevalence of 6.77% for bovine *trypanosomiasis* with *T. vivax* and *T. congolense* being the pathogenic *trypanosome* identified during the study period. As compared to the extensive studies done on tsetse and *trypanosomiasis* in south western Ethiopia, little efforts were exerted in north western parts of Ethiopia.

In this study, significantly low prevalence of trypanosome infection was recorded in Dokmit (2.86%), which is the highest prevalence of *T. congolense*, whereas Bemure revealed the highest prevalence (12.22%).

Age was found one of the risk factors in the present finding.



The highest prevalence was observed in adult animals. This could be associated with the fact that animals travel long distance for grazing and draught to tsetse challenge areas. Rowlands et al. [19], in Ghibe valley indicated that suckling calves don't go out with their dams but graze at homes until they were weaned off.

Higher infection rate was observed in male animals in the present study and similar results were reported by different workers [20,21]. This might be due to male animals were more exposed to draught purpose, travel long distances for draught in areas where tsetse challenge is abundant and as a result the risk of contracting *trypanosomosis* is also high. Female animals usually not used for draught purpose in the study area.

The results indicate that *T. vivax* was the predominant trypanosome species in the study areas with prevalence of 6.51%. However, the present study disagreed with the previous studies of 17.67% for tsetse infected area of Ethiopia [22], 17.20% at PaweNorth West Ethiopia [20], 18% in Bunno [23], 17.20% in Metekel district [24], 19.01% in Goro district [25] and 16.10% in and around Bahir Dar [26]. Relatively lower prevalence of the present finding might be attributed to the high usage of trypanocidal drugs and the increment in agricultural investment.

## CONCLUSION

From this study it is possible to conclude that trypanosomosis is an important disease and a potential threat affecting the health and productivity of animals. During this study the major species of trypanosomes found in the area was *T.vivax* followed by *T.congolense*. A total prevalence of 6.77% bovine trypanosomosis was recorded in selected areas of Quara district. So, the present parasitological finding indicated that bovine *trypanosomosis* is potentially a major constraint to the livestock production in selected areas of Quara district. Strategic control of bovine *trypanosomosis* including vector control and use of trypanocidal drugs should be strengthened to improve livestock production and agricultural development in the selected villages of Quara district.

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