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A Survey on the Prevalence of Bovine Babesiosis and its Associated Risk Factors in and around Wajaale District, Somaliland

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Abstract

Babesiosis is caused by intra-erythrocytic protozoan parasites of the genus Babesia that infect a wide range of domestic and wild animals. The disease is tick transmitted and distributed worldwide. The major economic impact of Babesiosis is on the cattle industry and the two most important species in cattle, *Babesia bovis* and *Babesia bigemina*. A total of 100 blood samples collected from cattle and examined by thin smear using Giemsa stained the Giemsa stained blood smears revealed an overall prevalence rate of Bovine Babesiosis as 70 (21%).

Prevalence of the disease was recorded in both sexes, age, housing and nutrition with in all cases insignificant difference were detected (P>0.05). However; association was made between the *B. bovis* and presence tick in the study areas. Therefore, strong statistically significant difference (P<0.05) was observed. In conclusion the results of this study have indicated that Bovine Babesiosis was moderate in the study area. This result leads to appropriate tick control and strategic prophylactic treatment in order to decrease the current challenges in the study areas.

Keywords: Babesiosis; Prevalence; Risk factor; Giemsa stain; Wajaale district somaliland

Introduction

Somaliland has the large livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country. Estimate indicates that the country is a home for about 5 million cattle, 8.5 million sheep and 9.06 million goats [1].

From the total cattle population 98.95% are local breeds and the remaining are hybrid and exotic breeds (Leta and Mesele). In spite of having the large livestock population in Africa, the contribution for the economic aspect of the country is still lowest and disease can be considered as major constrain [2].

Disease is among the major factors that affect the production and productivity having negative effects on the health of the livestock. The presence of diseases caused by haemoparasites is broadly related to the presence and distribution of their vectors. Arthropod transmitted haemoparasitic disease of cattle is caused by the trypanosome, babesia, theileria and anaplasma species [3]. Arthropod transmitted haemoparasitic diseases are economically important vector-borne diseases of tropical and subtropical parts of the world including Ethiopia [4].

Ticks and tick-borne diseases (TBDs) affect the productivity of bovines and leads to a significant adverse impact on the livelihoods of resource-poor farming communities [5]. Four main TBDs, namely anaplasmosis, babesiosis, theileriosis, and cowdriosis (heart water) are considered to be the most important tick-borne diseases (TBDs) of livestock in sub-Saharan Africa, resulting in extensive economic losses to farmers in endemic areas [6]. They are responsible for high morbidity and mortality resulting in decreased production of meat, milk and other livestock by-products [7].

Babesiosis is a tick-borne disease of cattle caused by the protozoan parasites *Babesia bovis*, *B. bigemina*, *B. divergens* and others. *Rhipicephalus (Boophilus) spp*., the principal vectors of *B. bovis* and *B. bigemina*, are widespread in tropical and subtropical countries.

The major vector of *B. divergens* is Ixodes ricinus Bovine *babesiosis* is the most important arthropod-borne disease of cattle worldwide that causes significant morbidity and mortality. It is the second most common blood-borne parasitic disease of mammals after the trypanosome [3]. Babesiosis is a haemolytic disease and characterized by fever (40-42°C) which may be sudden in onset, anemia, icterus, haemoglobinuria, listless, anorexic, jaundice and death [8].

Although some species of *Babesia* such as *B. microti* can affect healthy people, cattle parasites seem to cause disease only in people who are immunocompromised. *B. divergens* causes serious disease in humans who have had splenectomies [9].

Active prevention and control of Babesiosis is achieved by three main methods: immunization, chemoprophylaxis and vector control [8]. The use of genetically resistant cattle such as *B. indicus* can also decrease the incidence of disease [10].

In Somaliland, now days, there is no adequate emphasis has been given to livestock disease, particularly, to Bovine Babesiosis, despite of its devastating effect on cattle and other livestock's [11].

In Somaliland there are no previous studies that indicated the

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occurrence of bovine Babesiosis and this search will discover prevalence of bovine Babesiosis following, its associate risk factors in Gabilay region. There is a research gap on Bovine Babesiosis in Somaliland, in addition to that since Somali people accustomed to eat and drink milk and meat from infected bovine which have negative impact to the public health and economics so as to establish an baseline information on the nature of Bovine Babesiosis and economic impact of the problem need to be known. The main aim of this study was to estimate the overall the prevalence of bovine babesiosis and its associated risk factors in Gabilaye district.

Methods and Materials

Study area

The current study was conducted in and around Wajale district in western part of Somaliland. The areas are characterized by large population of cattle, unreliable and erratic rainfall with a precipitation ranging from 300 to 600 mm per annum, temperature ranges of 18 to 24 °C. The area also contains sparsely distributed vegetation cover that is dominated by Acacia species, Cactus and bushy woodlands [12]. Agro-geographically speaking, the study sites cover both arid and semi-arid lowlands lying at an altitude of 1,334 meters above sea level and are not suitable for crop production. In these areas, Bovine is herded by nomadic pastoralists who mainly rely on livestock husbandry for their livelihood (Figure 1).

Study design

A cross-sectional type of study will be undertaken on 100 cattle which are traditionally managed in several selected households. The study took place during the months of April, May, June and August 2021 in Wajale, Caratuul, Banka Wajale, Kala bayadh, and Bali xuur villages of wajale districtbabesiosis.

Ahmad sampling techniques

A single-visit, multiple-subject diagnostic survey (ILCA, 1990) was used to assess the occurrence of Babesiosis and associated risk factors. A total of 67 households who own cattle and who are familiar with camel husbandry were selected from Wajale (n= 13), Carrotuul (n= 80), Banka wajale (n= 73), Kala Bayadh (n= 47) and Bali xuur (n= 110) using purposive sampling technique. The selection in each district based on cattle population, administered to the household head or any other household member conversant with the cattle management.

The age of the cattle was estimated (by observing the eruption and wearing of the front permanent teeth) since there were no records available. Accordingly, they were categorized as young (4-6 years), adults (6-8 years inclusive), and older ones (> 8 years). The stage (length) of lactation was categorized as early (1st to 4th month), mid (4th to 8th month), and late (> 8th month). Furthermore, the number of parity was categorized as few (≤ 3 calves) moderate (4-7 calves) and many (> 7 calves). The SSQ were also used to capture data from direct observations in addition to one-on-one interviews with the camel owners (Table 1).

Sample size

Accordingly, the prevalence of cattle Babesiosis in Jigjiga was estimated at 30.2% as was reported by. Thus, adopting a p of 29% and L of 5%, a total of 323 cattle blood samples were sampled for the present study

Sampling collection

Blood samples were collected according to the National Babesiosis Council guideline (NBCG, 1990) with slight modification. Briefly, the site of jugular was washed with tap water and dried when there is a considerable amount of dirt to be removed. Then syringe with vacoutainer tube with EDTA was used to collect blood. The blood samples were transported in an icebox to Hargiesa Veterinary Laboratory center

Data Analysis

Data was entered and analyses Statistical Package for Social Science (SPSS) version 2010. And was used to summarize in descriptive statistics such as frequency and Percentages, Chi-square (χ^2) test were used to determine the prevalence and toassess the association the prevalence

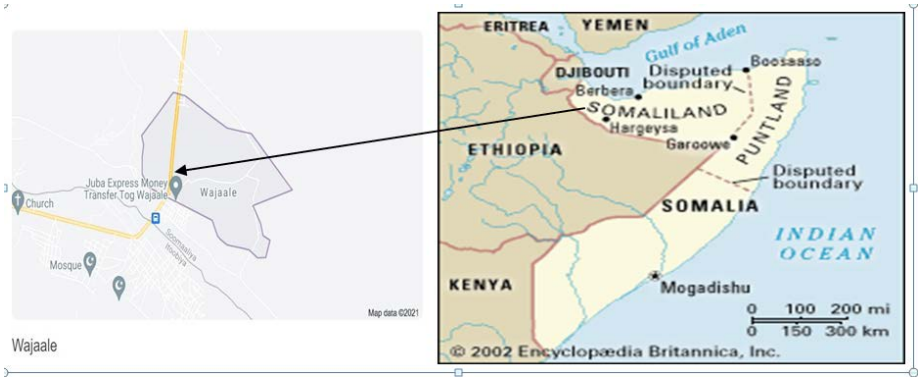

Figure 1: Map/location of the study area, Hargiesa district (MOP, 1961).

Table 1: Prevalence of babesiosis at animal at village levels based on geimsa stain.

Sample	Geimsa Stain		Prevalence (%)
	Number tested	Number of positive	
Cartuulka	80	5	6.25%
Banka wajal	73	13	17.80%
Kala baydh	47	15	31.91%
Wajaale	13	5	38.46%
Balixuu	110	32	29.09%
Total	323	70	21.60%

of babesiosis in cattle of study area. P-value < 0.05 was considered indicative of a statistical significant difference were confidence interval 95%.

Results

Prevalence of study area

A total of 323 clinically healthy cattle were examined for Babesiosis using Geimsa stain during the study period. In general, positive from Babesiosis positive 538.46%) from Wajaale village, 15 (31.91%) positive from Kala Baydh, 5 (6.25%) positive from Carratuul, 13 (17.80%) from Banka wajale, 32 (29.09%) from Balixuur. Were collected from the 323 cattle during the study period. Accordingly, the overall Babesiosis prevalence was 70 (21.6%).

The prevalence of female and male babesiosis in study area

Out of the 323 blood samples examined for Geimsa Stain, the prevalence of Male level babesiosis was found to be highly infected with prevalence of 26.34% (47/167*100). While Female was found be less infected with prevalence of that quarters were highly affected 16.67% (26/156*100). The adjusted crude odds ratio (OR) was 2 indicating that babesiosis infection and the sex of animals were significantly associated (Table 2).

Crude Odds Ratio at 95% confidence interval; Chi-square= 5, P-value= 0.24; 1Reference.

The results from the table above showed that there were associations between the sex of the animal and the occurrence of Babesiosis at p>0.05. This is because the calculated chi- square value in the table is more than the critical value of 3.84 at 95% confidence.

The prevalence of Adult and Young babesiosis in study area

The associated risk factors such as age examined cattle based on prevalence of *Babesiosis* according the age; Young 5 (11.11%), adult 65 (23.38%), also there is no statistical significance among age group in cattle (Table 3).

Discussion

With the overall prevalence rate of *bovine babesiosis* was found to be 30% *B.bovis* were identified using Giemsa stained microscopic examination. This finding was lower than the earlier 42% prevalence reports from Malaysia [13] 40% prevalence reports and near to the prevalence of 26.6% from a cattle raised nearby forest in Salakpra Wildlife Sanctuary in Kanchanaburi province [14] and higher from previous findings 16.9% by [3] 9.9% from study conducted in Khyber Pakhtunkhwa, Pakistan [15] and 6.6% from Malakand Agency [16] and Sargodha District, Pakistan.

However, this current study finding was also higher than the prevalence (0.6%) reported in Debre zeit, Addis Ababa University by [4]. The results also indicated that the most affected animals were male with high prevalence of 18% and 12% in female the present study dis agrees with similar study which indicated that the female has high prevalence 20% than male 12%.

Conclusion and Recommendations

The present findings indicated that bovine babesiosis had high prevalence in the study area that might be to high tick infestation rate and enhanced monumental practices. *B. bovis* and *B. bigemina* were identified as the species responsible for bovine babesiosis with greater prevalence of *B. bovis*. In order to keep it up and alleviate the existing problem and to promote the status of livestock production more feasible in these areas, regular strategic prophylactic treatment and use of acaricides should be enhanced in order to control Babesia parasite.

Microscopic examination is not suitable for detecting the carrier or chronic phases of piroplasmosis. However, it remains the most rapid confirmatory method for detecting this infection in acute phase of the disease. Furthermore, Babesiosis is one of the most important diseases in our countries because it occurs sometimes in acute forms with serious recognized clinical manifestations yet lowering the productive performance of the affected animals.

Based on above conclusion the following recommendations are forwarded:

- Further research should be conducted to elucidate the impacts and epidemiology of bovine *babesiosis* using immunological methods to implement better control measure against ticks and tick borne diseases of cattle and to validate the present study.
- Somaliland government should develop and implement surveillance systems and action plans to prevent bovine *babesiosis* from spreading
- Epidemiological studies should be conducted on bovine *babesiosis* to provide the necessary incidence and prevalence data.
- Various control strategies should be adopted in order to prevent

Table 2: Prevalence of male and female babesiosis in study area.

Sex	Positive	Negative	Total	Prevalence	*COR95%CI	X^2	P-value
Male	44	123	167	26.34.2%	5		0.024
Female	26	130	156	16.67%		0.12	
Total	70	253	323	21.67%			

Table 3: Compare prevalence of age.

Age	Positive	Negative	Total	Prevalence	*COR95%CI	X^2	P-value
Adult	65	213	278	23.38%	5		0.043
Young	5	40	45	11.11%		21	
Total	70	253	323				

the day by day increasing losses to livestock industry and vaccines should be practiced in control

- And prevention of *babesiosis.*
- Awareness should be given livestock owners in relation to vector control as one option of controlling bovine *babesiosis*.

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