

## Research Article

# Study On the Prevalence and Associated Risk Factors of Camel Gastro-Intestinal Parasites in Southern Ethiopia

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## Keywords

• Borana zone; GIT parasites; Indigenous camel; Prevalence; Risk factor

## Abstract

The study designed to determine the prevalence of Gastrointestinal parasites (GIT) parasites and factors associated with occurrence of GIT parasitic infection in indigenous camels managed traditionally. A cross sectional study was conducted from November 2018 to May 2019 in Southern Ethiopia. Fecal samples were collected and transported to Yabello Regional Veterinary Laboratory. The feces examined by simple floatation and sedimentation technique to screen the presence of GIT parasite eggs in the feces. Nematodes, Trematodes, Cestodes eggs and Protozoan oocysts were found in fecal samples. Out of the 250 samples, 188 (75.2%) were found to harbor different GIT parasites. Result showed that 67.2% of eggs identified were those of *Trichostrongylus* followed by *Strongyle* species (60.45%), *Strongloides* (25.2%) *Nematodirus* (8.4%) and *Tricuris* (7.2%) and Trematodes (*Paraphystomum* 13.2%) Cestodes (*monozia* 5.6%) and Protozoan oocysts (coccidiosis) 9.2%). There was statistically significant difference in the prevalence of GIT parasites between age groups ( $p=0.000$ ,  $p<0.05$ ). This study revealed that gastrointestinal (GIT) parasites are a major problem of camels in study area. Therefore, more emphasis should be given to appropriate prevention and control options based on detailed epidemiological study, the environment condition and seasons.

## INTRODUCTION

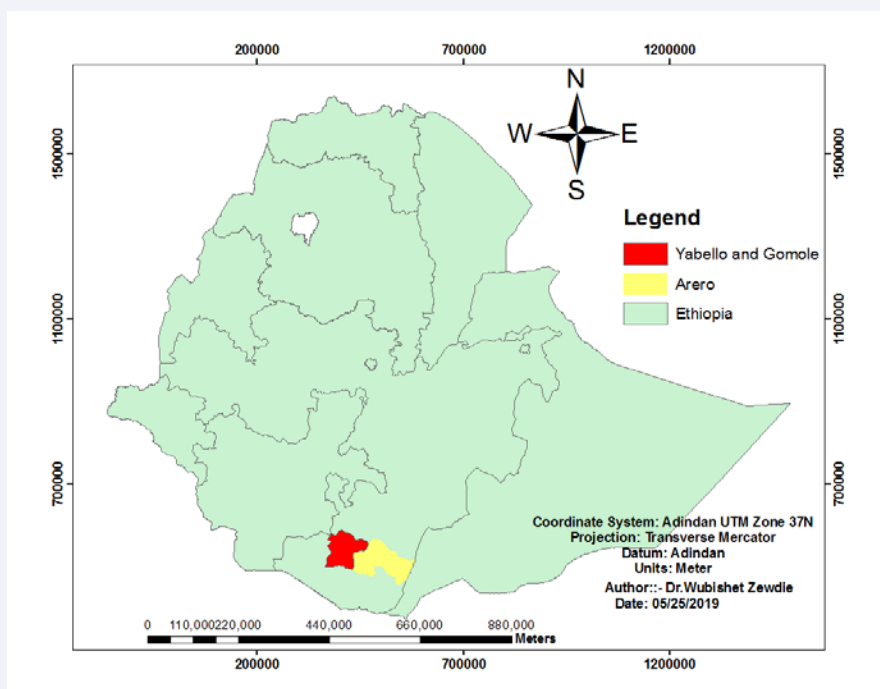
Camels are sources of milk, meat, drought power and serve as means of transportation, and hence, they support the survival of millions of people in semi-arid and arid areas of the world. The ability of the camel to survive in harsh areas of the world, its endurance in prolonged drought, and above all its high potential to convert the scanty resources of the desert into milk and meat makes them more important to the pastoralists [1]. Camels are versatile animal species in ensuring food security and fulfilling the livelihood priorities of pastoral households in the arid and semi-arid areas of Ethiopia. They provide pastoral communities with income, food supply, transportation services and other social benefits such as prestige (social status), ceremonial uses insurance and risk buffering options [2].

The major ethnic groups owning camels in Ethiopia are the Beja, Afar, Somali, and Borana [3]. The camel is a more reliable milk provider than other classes of livestock in arid areas, during both dry seasons and drought years. There is also an increasing demand for camel milk and meat in local towns with increasing demand at Kenya side Moyale. A traditional camel milk market chain has already been established along Yabello - Moyale Kenya milk shades [4].

However, camel production practiced by pastoralist communities under diverse constraints that hampering potential

performances of animals [5]. In Ethiopia gastrointestinal parasites are one of major obstacle in the growth and development of animal health. Factors like constant exposure to parasitic infestation, include variable geo-climatic conditions, shortage of food and lack of knowledge of pastoralists in treating gastrointestinal parasites play an important role in proliferation of parasites and their diseases [6]. Gastrointestinal helminthes infestation is one of the major causes of impaired milk and meat production, as well as impaired fertility and low calving rates of camels. It cause losses through morbidity and hidden effects on feed intake, efficiency of nutrient utilization and also reduce growth rate in young animals. As a result, it leads to reduction in productivity and performance of the infested animal [7].

Numerous parasites infect camels, many of whom are responsible for enteric infection [8]. Camels can acquire helminthes infection by grazing on infected pastures or by ingesting infective larvae with drinking water [9]. A number of these helminthes are camelids specific, but some are also common to other hosts, especially domestic ruminants and wild animals [10]. Helminthes infestation is very much prevalent in camel and it imposes considerable constraints on camel health and production, thereby causing economical losses to camel owners [10]. *Haemonchus longistipes* is the most pathogenic enteric nematode of camels that may be associated with



**Figure 1** Electrospun nanofibers membrane of poly-ε-caprolactone visualization after 21 days of human Osteoblasts culture (Cells visualization in blue (nucleus /DAPI) and PLL<sup>FITC</sup> labelled nanofibers in green): colonization and proliferation of osteoblasts into the nanofibers membrane.

Trichostrongylus species infection which may contribute to the debilitating effects of gastrointestinal nematodes [11].

Although importance of camels in the subsistence economy pastoral areas of the country, knowledge on Gastrointestinal parasites (GIT parasitic diseases control is still very unreliable. The sufficient information on Gastrointestinal parasites (GIT parasite of camel is not available in Ethiopia. Researches that have been conducted research on camel GIT helminthes prevalence are very limited particularly in Borana Zone, Oromia Regional State, Ethiopia. Therefore, this study designed to estimate the prevalence of camel gastrointestinal helminthes and factor associated with occurrence gastrointestinal parasitic infection in selected district of Borana Zone, southern Ethiopia

## MATERIALS AND METHODS

### Description of study area

The study design was carried out in the population of camels at house hold, in three conveniently selected districts of Borana Zone, namely Yabello, Arero and Gomole districts, Southern Ethiopia. A total of six pastoral associations (PAs) were selected from the three districts. From Yabello district two PAs, namely, Haro bake and Cholkasa, from Gomele district two PAs, such as Arboro and Gora and from Arero district two PAs, namely, Allona and Gada in Borana Zone the Southern part of Ethiopia.

The Borana area is characterized by bimodal pattern of rain, with the main rainy season locally known as "Ganna" extending from mid of March to May and small rainy season termed "Hagayya" from mid of September to mid November.

The other two seasons are the cool dry season "Adoolessa" extending from June to August and the major dry season "Bona"

extending from December to February. Animal husbandry in the region is characterized by extensive pastoral productions system and seasonal mobility. Cattle are the dominant animal species followed by goats, camels and sheep.

### Study Population

The study animals consisted of indigenous breeds of one humped camel (*Camelus dromedarius*) reared under pastoral management system which allows free grazing, usually mixed with livestock from other villages, the animals move from feed shortage area to feed abundant areas especially during drought season. Camel of all age categories and both sexes were included in this study. The study was conducted from October 2018 to May 2019.

### Study Design and sample size

A cross sectional study was conducted to estimate the prevalence and associated risk factors for the occurrence of camel gastrointestinal parasites in the study area. Sample size was determined based on earlier study result (80.73%) prevalence of camel GIT parasites at Yabello district [12].

Then the sample size is calculated as per the method described by Thrusfield [13] by with 5 % acceptable error and 95% confidence level.

$$n = (1.96^2(p_{exp})(1 - p_{exp}))/d^2$$

Where n = required sample size,  $P_{exp}$  = expected prevalence (80.73%) and d = desired absolute precision (5%).

The study was conducted on 250 camels selected by simple random sampling method that include Camel of all age categories and both sexes for this study. The pastoralist associations (PA)

were select randomly and then 4 herds of camels per PAs were randomly selected.

### Sampling, transport and handling

Camel herds were visited and sampled early in the morning before released browsing. Fecal samples were directly collected from the rectum using clean hand gloves and approximately 15g amount of feces was placed into separate universal bottles. Proper date, labeling and coding of the sample were done on the spot. Animal attributes such as sex, age and body condition score were also recorded for each camel. Collected fecal samples were immediately transported to Yabello Regional Veterinary Laboratory through perfectly maintained icepack and stored there at 4 °C or maximum of one day until the analysis was commenced.

### Coprological examination

Fecal samples were grossly visualized determining color, consistency and presence of adult worms or other contaminants. Qualitative fecal examination was conducted in which fecal samples were processed by applying fecal floatation and sedimentation techniques for detection of parasite eggs.

### Data analysis

Data collected from each study animal and laboratory analysis were coded and entered in a Microsoft Excel spreadsheet. Prevalence tabulated by SPSS data analyzing software version 20. An attempt was made to analyze association between prevalence of GIT infection and different risk factors using Chi-square test. For an epidemiological study and to measures of effects (Risk factors) Relative Risk (RR) and Odds Ratios (OD) were used.

The idea of risk factor that you presented at your manuscript is wrong, you should describe as variables that may influence the GIT infection.

## RESULTS

Out of 250 examined camels, 188 (188/250, 75.2%) were diagnosed as harboring Nematodes, Trematodes, Cestodes eggs and Protozoan oocysts at varying frequencies. The proportion of camel harboring nematodes eggs was considerably high in which *Trichostrongylus* is the most prevalent (67.2%) followed by *Strongyl spp* (60.4%), *Strongloides* (25.2%), *Nematodirus* (8.4%) and *Tricuris* (7.2%). Other gastrointestinal parasite encountered includes Trematodes, *Paraphysitomum* (13.2%), Cestodes, *monesia* (5.6%) and Protozoan oocysts, *Eimeria* and *Buxtonella* (9.2%).

Regarding types of infestation, single parasite infestation, 12 (4.8%); two type of parasitic infection, 70 (28%); three type of parasitic infection, 88 (35.2%); four type of parasitic infection, 15 (6%) and five type of parasitic infection, 3 (1.2%) (Table 3). There was no significant difference ( $p>0.05$ ) in probability of being infected by helminthes between male and female camels. (Table 2). Host age was found to be a significant factors for the prevalence of GIT parasites ( $p<0.05$ ) with eggs or oocysts being detected frequently in age categories of  $>6$  years than  $<3$  years and 3-6years (Table 4). However, prevalence of GIT helminthes of camels in Arero district was slightly higher than Yabello

and Gomole districts (Table 1). Body condition scores was not significantly associated with prevalence of parasite infestation ( $p>0.05$ ).

## DISCUSSION

The present work revealed an overall GIT parasites prevalence of 75.2% in camels. This finding is in agreement with the 80.73% reported so far [12] in Yabello, highly agreement with the 75.1% [14] from Iranian camels and 75% [7] from East Ethiopia and 78% [15] from Sokota metropolis. However, it was relatively lower than the prevalence rates from Jordan 98% [16] from East Ethiopia 96.92% [17]. The result of this study indicated that there was statistically significant difference in the prevalence of GIT helminthes in relation to age groups ( $p=0.000$ ). It revealed higher prevalence in camels with  $>6$  years and older (81.25%), followed by camels between 3-6 years (76.74%) in which camels  $<3$  year had lowest prevalence (38.71%). This is in agreement [12] who reported increasing rate of infestation with age of camels in Yabello. The tendency of higher prevalence in older age in the present study can be associated with the increase chance of parasitic encounter along with the decrease of body immunity against infestation [12]. In contrary to this result observed higher prevalence in 6-10 years old (70%) followed by camels  $>10$  years old (60.5%) [18].

## CONCLUSION AND RECOMMENDATIONS

This study showed that camels of the area harbor different gastrointestinal parasites that could have enough implication on the health and production status of the animals. In the current study the prevalence of GIT parasites was higher from which

**Table 1:** Prevalence of GIT parasites in association with origin of camels.

District	Total animal examined	No. of positive	prevalence	X <sup>2</sup>	P-value
Yabello	50	37	74%		
Gomole	55	35	63.64%	5.8	0.056
Arero	145	116	80%		
Total	250	188	75.20%		

**Table 2:** Prevalence of GIT parasites in relation to age, sex and body condition score.

Risk factor	Total animal examined	No. of positive	prevalence	X <sup>2</sup>	P-value	
Sex	Male	53	41	77.36%	0.168	0.682
	Female	197	147	74.62%		
	Total	250	188	75.20%		
Age	$<3$ years	31	12	38.71%	25.64	0
	3-6 years	43	33	76.74%		
	$>6$ years	176	143	81.25%		
	Total	250	188	75.20%		
BCS	Poor	12	9	75%	0.017	0.991
	Medium	63	47	74.60%		
	Good	175	132	75.40%		
	Total	250	188	75.20%		

**Table 3:** Prevalence of GIT parasites observed in mixed and single infestation.

Parasite		Sex				Total	Prevalence
		Male	Prevalence	Female	Prevalence		
Mixed infestation	No parasite	12	22.64%	50	25.38%	62	24.80%
	Two parasites	9	16.98%	61	30.96%	70	28%
	Three parasites	23	43.40%	65	33%	88	35.20%
	Four parasites	6	11.30%	9	4.56%	15	6%
	Five parasites	0	0%	3	1.50%	3	1.20%
Single infestation	<i>Tricostongylus</i>	3	5.60%	7	3.55%	10	4%
	Strongloides	0	0%	2	1%	2	0.80%
Total		53	100%	197	100%	250%	100%

**Table 4:** Prevalence of individual GIT parasites in both single and mixed infestation.

Parasite class	Parasite spp	Number of positive animals	Prevalence (%)
Nematodes	<i>Tricostongylus</i>	168	67.20%
	Strongly spp	151	60.45%
	Strongloides	63	25.20%
	<i>Nematodirus</i>	21	8.40%
	<i>Tricuris</i>	18	7.20%
Trematodes	<i>Paraphystomum</i>	33	13.20%
Protozoa	Coccidiosis	23	9.20%
Cestodes	<i>Monesia</i>	14	5.60%

nematodes accounted the highest number. The study also revealed that mixed infestation was more common in the area than single infestation. Therefore, awareness creation for camel's owners and strategic deworming should be practiced to prevent GIT infections. In addition, the government and researchers should give attention to camel production; and further study should be conducted to determine the pathological importance and impact of parasitic infections in study area.

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