African Journal of Basic & Applied Sciences 6 (5): 125-130, 2014
ISSN 2079-2034

DOI: 10.5829/idosi.ajbas.2014.6.5.86217

Prevalence of Gastrointestinal Parasites of Small Ruminants in Kuarit District, North West Ethiopia

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Abstract: A cross-sectional study was conducted from November 2013 to April 2014 on 384 randomly selected small ruminants (264 sheep and 120 goats) in Quarit district, North Western Ethiopia, with the objectives of determining the major type of gastrointestinal (GIT) parasites and their prevalence in sheep and goats. Fecal samples collected from all animals were subjected to floatation and sedimentation and McMaster egg counting techniques. The study found that the overall prevalence of gastrointestinal parasites in small ruminants was 56.25% (216/384). Species wise prevalence indicated that 58.71% (155/264) of sheep and 50.83% (61/120) of goats harbored one or more GIT parasites. Different types of helminth parasites with prevalence of 44.90% nematodes, 19.44%, Paraphistomum spp., 21% Moniezia spp. and 9.72% mixed infections (nematodes and Moniezia spp.) in both sheep and goats were recorded. There was a significant difference ($P < 0.05$) in prevalence of GIT helminthosis between different body conditions of animals. Animals with emaciated body conditions were highly infected than animals with normal body condition. However, there was no significant difference ($P>0.05$) in the prevalence of GIT parasites between sex, age and species of animals. Out of 384 sheep and goats examined 54.62%, 25% and 20.37% were lightly, moderately and highly infested by GIT helminthes, respectively. This study showed that, GIT parasites are major health problems of small ruminants in the study area. Therefore, a comprehensive study on species of GIT parasites circulating in the area, cost effective strategic control options and awareness creations to the farmers in the study area should be instituted.

Key words: Gastrointestinal Parasites · Prevalence · Small Ruminants · Quarit District · North West Ethiopia.

INTRODUCTION

Small ruminants are mainly found in arid and semi- arid areas of sub-Saharan Africa. It has been estimated that goats and sheep provide up to 30% of the meat and 15% of the milk supplies in sub-Saharan Africa where thrive in the wide range of ecological regions which are too harsh for the beneficial rearing of cattle [1]. Small ruminants have also been reported to survive better under drought conditions than cattle due to their low body mass and low metabolic requirements which in turn minimize their water requirements and maintenance needed in arid and semi-arid areas. The frequent droughts and large tsetse infested areas in sub-Saharan Africa requires more small ruminants in order to supplement cattle production [2].

The estimated 25.5 million of sheep and 24.06 million of goats in Ethiopia provide an important contribution to the national economy [3]. Despite huge population and importance of small ruminants, the country has benefited little from this enormous resource owning to a multitude of problems, disease being the most important [4, 5]. It has well recognized that in resource poor regions of the world, helminth (Stomach and intestinal worm) infections of sheep and goats are major factors responsible for economic losses through reduction in productivity and increased mortality [6, 7]. Young and malnourished animals of both sexes and lactating animals are most suitable to these parasites. Stomach worms affect specially sheep and goats. Different types of these worms are transmitted when an animal eats grass or drinks water contaminated with larva or eggs. The problem is especially common in the rainy season [8].

Though helminth infections are responsible for significant economic losses in small animals, their effects are not easily detected by smallholders in rural community, especially at period of subclinical infections [6, 9]. Once the clinical diseases are noticed, such

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economic losses in terms of animal productivity have already occurred [7, 10]. Helminth infections are responsible for immunosuppression and enhancing the susceptibility of the animals to other diseases. Helminth infections caused a considerable productivity losses (US $81.8 million annually) in Ethiopia [5].

Gastrointestinal (GIT) parasite infections remain an important disease problem of sheep and goats in Quarit district, North Western Ethiopia. Lack of well-established data on the magnitude, distribution and predisposing factors of small ruminants to GIT parasite infections in the study area initiated this study. Therefore, the main objective of the study was to determine the major type of sheep and goats' (GIT) parasite in circulating in the area and to estimate their prevalence.

MATERIALS AND METHODS

Study Area: The study was conducted from November 2013 to April 2014 in Quarit district, Amhara Regional State, West Gojjam Zone of Ethiopia. Quarit district is located 560 km to the north of Addis Ababa (The capital city of Ethiopia). The main town of Quarit district is Gebeze Mariam. Quarit district is the source of Birr River that contributes to the Blue Nile River. According to the Ethiopian Central Statistical Agency [11]. Quarit district has an estimated population density of 272 people per square kilometer. Teff, maize, bean, peas, potato and wheat are the main crop types cultivated in the district. In Quarit district there were 83,161 cattle, 125,953 sheep and goats, 25,052 equine and 59,109 poultry [12].

Study Population: The study was performed on 384 (264 sheep and 120 goats) small ruminants all of which were local breeds and kept under traditional extensive management system. The different variables such as species of the host, body condition score and age groups of local origin were considered as risk factors. Body condition scoring of sampled animals was categorized into three body scores as poor, medium and good according to the method described by Russel [13]. Age categorization into young and adult was performed as described by Gatenby *et al*. [14] for sheep and Steele *et al*. [15] for goats and sheep and goats less than 1 year were categorized as young and above one year were considered as adult.

Study Design: A cross-sectional study was conducted with an assumption that it would help to understand the current status of the prevalence of gastrointestinal parasites within the study area.

Sampling Methods and Sample Size Determination: In Quarit district five kebeles were selected purposively based on transportation access and number of small animals. The kebeles included in the study were 01 kebele, Gebeze Mariam, Enangia, Zambit and Dingay Tsion. Equal proportions of samples were collected from each site by simple random sampling techniques for the selection of farmers and animals. The selected farmers were identified by their names and their animals were identified by ear tags. The number of animals to be sampled in the study was estimated by the formula described by Thrusfield [16]. Since there was no previous study on gastrointestinal parasites in the study area 50% prevalence was used as expected prevalence of GIT helminthosis. Based on the formula a total of 384 small ruminants were taken as total sample size.

MATERIALS AND METHODS

A fresh fecal samples approximately 10 g were collected directly from the rectum of the each live animal with strict sanitation, placed in air and water tight vials, labeled and kept in cool box before transportation and then taken to the laboratory. The faecal samples were subjected to direct faecal floatation and sedimentation technique for qualitative investigation of the types of gastro-intestinal GIT parasite eggs. Quantitative examinations of faecal samples were made using the modified McMaster technique following standard procedures [9].

Those samples found positive for gastro-intestinal parasites were subjected to EPG counting. Eggs were identified by ova identification keys. The degree of infection was categorized in to three. The animals were then categorized as lightly, moderately and highly infected according to their egg per gram of faeces (EPG) counts. EPG counts from 50-799, 800-1200 and over 1200 eggs per gram of feces were considered as light, moderate and highly infection, respectively [6, 9].

Data Analysis: All data that were collected (Age, species and degree parasitic infection) entered to Microsoft excel sheet and analyzed by using SPSS version 16. Descriptive statistics was used to determine the prevalence of the GIT parasites and Pearson Chi-square ($x2$) test was used to look at the association between variables and GIT parasite infections. In all the analyses, confidence level was held at 95% and P-values less than 0.05 were considered as significant.

RESULTS

Out of 384 animals (264 sheep and 120 goats) examined, 216 (56.25%) were harboring one or more GIT parasites. With respect to the species prevalence of GIT parasites, 155 (58.71%) sheep and 61 (50.83%) goats were found to harbor one or more parasites. In this study the prevalence of GIT parasites between species, sex and age were revealed no significant difference (P>0.05) (Table 1).

Prevalence of GIT Parasites in emaciated body condition of the animals was 173(68.37%) and normal body condition was 43(32.82%). There was statistically significant (P<0.05) difference in the occurrence of GIT between body condition of animals (Table 2).

The overall prevalence of GIT parasites examined in small ruminants was 216 (56.25%) and the species level prevalence was 155 (58.71%) and 61(50.83%) in sheep and goats, respectively. Moniezia spp., Paramphistomum spp. and nematodes the type parasites were identified in the study area (Table 3).

The degree (Severity) of parasitic infection was determined from the total fecal egg count. A total of 216 fecal samples were subjected to EPG count by using McMaster egg counting chamber and found 108 (50%), 54 (25%) and 37 (20%) of the animals were lightly, moderately and highly infected, respectively. An attempt was also made to see the existence of significant difference in degree of parasitic infection with the

Table 1: Prevalence of GIT Parasites in relation to sex, age and species of the animals.

Risk factors	Total number	Number positive	Prevalence (%)	*x*2	P-value
Male	176	92	52.27	3.10	0.21
Female	208	124	59.61		
Total	384	216	56.25		
Young	108	64	59.25	0.89	0.63
Adult	276	152	55.07		
Total	384	216	56.25		
Sheep	264	155	58.71	4.05	0.132
Goats	120	61	50.83		
Total	384	216	56.25		

Table 2: Prevalence of GIT Parasites in relation to body condition of the animals

Body condition	Total animal examined	Number positive	Prevalence (%)	*x*2	P-value
Emaciated	253	173	68.37	45.56	0.00
Normal	131	43	32.82		
Total	384	216	56.25		

Table 3: Prevalence of GIT parasite in study animals

	Sheep	Goat	
Type of parasites	Number positive (%)	Number positive (%)	Overall (%)
Moniezia spp.	39(84.78%)	7(15.21%)	46(21.29%)
Nematode	70(72.16%)	27(27.83%)	97(44.90%)
Paramphistomum spp.	19(45.23%)	23(54.76%)	42(19.44%)
Nematode and Moniezia spp.	16(76.19%)	5(23.80%)	21(9.72

Table 4: Degrees of GIT parasitic infection in relation to species, age and sex of the animals

Variables		Degree of Infection				
		Light	Moderate	High	*x*2	P value
Species	Ovine	91(58.70%)	34(21.93%)	30(19.35%)	3.38	0.28
	Caprine	27(44.26%)	20(32.78%)	14(22.95%)		
Age	Young	24(37.5%)	24(37.5%)	16(21.87%)	2.26	0.51
	Adult	100(65.78%)	20(13.15%)	32(21.05%)		
Sex	Male	38(41.30%)	31(33.69%)	23(25.00%)	3.68	0.29
	Female	60(48.38%)	44(35.48%)	20(16.12%)		

variation of species, sex and age of the animals. However, it was found that no significant difference (P>0.05) in the EPG count (Table 4).

DISCUSSION

The present study revealed that the overall GIT parasites prevalence in the study area was 56.25% with 58.71% and 50.83% prevalence in sheep and goats, respectively. The current finding in line with previous studies on overall prevalence of GIT parasites in small ruminants reported by Gadahi *et al*. [17] in Pakistan with the prevalence of 63.5% and Welemehret *et al*. [18] in and around Mekele town, Ethiopia with the prevalence of 48.21%. However, the prevalence of small ruminants in the present study was slightly lower than the previous studies conducted in different areas of Ethiopia that include: Welinchity, Central Ethiopia with prevalence 76.3% [19] Debre Berhan with prevalence 79.09% [20], Genchi district with the prevalence of 82% [21], Wolayita Sodo with the prevalence of 86% [22], Gondar with the prevalence of 90.4% [23], four Awrajas of Eastern Shoa with the prevalence of 84.3% [24], Illubabor with the prevalence of 91.4% [25], Asella with the prevalence of 90.9% [26] and in and around Bedelle with prevalence [27]. The lower prevalence of GIT parasites in this study might be associated with difference in agro-ecology of the area and seasonal difference of the study period.

The relative prevalence of moniezia species in this study was 84.78% and 15.21% in sheep and goats respectively. In this study the prevalence of Moniezia species was higher than the previous studies with the prevalence of Moniezia species was 30.4% and 40% sheep and goats, respectively [27]. The prevalence of Paramphistomum species (19.44%) was in agreement with the previous study conducted by Ibrahim *et al*. [28] who recorded the prevalence of 22.4% in and around Jimma town, Ethiopia.

Age wise observation in the present study revealed that there was no statistical significant difference in GIT parasite infections. This finding agrees with the reports from Gambia [29] and Semi-arid part of Kenya [30] which indicated GIT parasites affect both ages equally. However, the present finding disagrees with study conducted in Ethiopia (Western Oromia) which indicated young animals were more susceptible to parasite infections than animals older than 1 year of age [31]. A significant difference of GIT parasites infection was observed between body conditions of animals in the current study. A higher prevalence of GIT parasites was recorded animals with poor body condition than other groups of animals which agrees with the previous study conducted by Kiyyu *et al*. [32]. This might be due to malnutrition, other concurrent disease or the current parasitic infection which lead to poor immunological response to infective stage of the parasites [33].

However, there was no statistical significant difference of GIT parasite infections between sex group of animals (P>0.05) in the current study. This finding was in agreement with the reports of Tefera *et al*. [27], Fikru *et al*. [31] and Getachew [34] which showed sex of animals did not show significant association with the prevalence of GIT parasites in small ruminants. However, this observation disagrees with the work of Thrusfield [16], Bashir *et al*. [35] and Mihreteab and Aman [36] who reported higher prevalence of GIT- nematodes in females than in males. Ibrahim *et al* [28] also reported a significant difference of some GIT parasites infection among sex group of animals in which *Paramphistomum* and one nematode species (*Haemonchus*) of parasites infect females higher than males. The similarity of degree of infection among sex group of animals in the present study might be due to both sexes of animals were exposed to similar management system and most of experimental female animals were not in the lactation or pregnancy stages during study period.

CONCLUSIONS

The present study was based only on faecal examination of eggs of GIT parasites to estimate the current prevalence and associated risk factors. It showed that helminthiasis of small ruminants was a prevalent disease in the study area affecting health of small ruminants. During the present study an overall prevalence of 56.25% and 58.71% in sheep and 50.83% goats, respectively were harboring one or more GIT parasites. Body condition of small ruminants was considered as risk factors for the occurrence of the parasitic diseases in the study area. Though the prevalence of GIT parasites in small ruminants in current study was slightly lower than most of the previous studies in different areas of Ethiopia, appropriate control measures against these infections still be necessitates reducing their prevalence to tolerable level. Different risk factors should be considered in designing nationwide control of GIT parasite infection in small ruminants. Further characterization of GIT parasites circulating in the area and appropriate control strategies (Periodic and strategic deworming) should be under taken to combat small ruminants' GIT parasites in the study area.

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