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Prevalence of Small Ruminant Gastrointestinal Helminthes in and Around Kombolcha Town, North East Ethiopia

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Abstract: Study on GIT parasites of small ruminants was conducted from November 2011 to April 20012 in and around Kombolcha. This study has objectives which are determining GIT parasites and their prevalence in sheep and goats. During this study, a total of 384 fecal samples (218 sheep and 166 goats) were collected for qualitative and quantitative fecal examination. The fecal culture was made for those samples which was somewhat difficult to differentiate by egg morphology (strongly eggs). In this study 199 (91.3%) sheep and 145 (87.3%) goats were found to harbor eggs of GIT helminthes. All species and age groups were infected with identical parasite species, but with different level of infection. Seven genera of nematodes with prevalence of (32.6%) *Haemonchus* species, (13.3%) *Trichuris* species, (16.1%) *Trichostrongylus* species, (9.1%) *Oesophagostomum* species, (11.5%) *Bunostomum* species, (8.1%) *Ostertagia* species and (10.2%) *Chabertia* species were found in both species sheep and goats. Similarly two types of Cestodes and a single Trematode were recovered with prevalence of (10.9%) *Monezia* species and (11.7%) *Avetellina* species. From Trematods, (17.7%) *Paramphystomum* was recovered. There was no significant ($p>0.05$) difference in the prevalence of GIT helminthosis with species, sex, ages and body condition of animals. However, there was significant ($p<0.05$) difference in the prevalence of parasite burden with the body condition of the animal. Out of (344) sheep and goats examined 125 (32.6%) were massively affected, 105 (27.3%) moderately affected and 144 (29.0%) were lightly affected. The study indicated that GIT parasites are major problems of small ruminants in the study area. Therefore; broad study on GIT parasites, drug resistance development of parasites, effective and strategic treatment and creation of awareness to the people should be instituted in the study area.

Key words: Caprine · Helminthes · Nematodes · Ovine · Prevalence

INTRODUCTION

Livestock play an important role in the lives of people in Africa. Small ruminants in Africa represent 21% of world small ruminant population. The population of sheep in Africa represents 17% of the total world population while goats represent 30% [1]. Sheep and goats are mainly found in arid and semi-arid areas of sub Saharan Africa. They have been estimated to provide up to 30% of meat and 15% of milk supplies in these area [2]. Small ruminants kept for many reasons, the major ones being that they are source of food (milk and meat), fiber (wool and skins), cash and a form of manure for soil fertilization. They have short generation cycles and high reproduction rates which lead to high production efficiency. They are also highly adaptable to a broad range of environment [1].

The estimated 25.01 million of sheep and 21.9 million goats in Ethiopia [3] provide an important contribution to the national economy [4]. Although small ruminants represent a great resource for the nation, the productivity per animal is low. Helminthosis which is the infection caused by internal parasite called helminthes are of economic importance in the tropics. It is one of the diseases causing great economic loss in world wide. It affects small ruminant productivity and may lead direct loss (death) especially the young ones and indirect loss like poor body condition, drop in milk production and meat quality. The major effects of these diseases are slow growth of animals, weakness and lowered resistance to other diseases [1].

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Helminthes can be divided as Platyhelminthes or flat worms (Trematodes and Cestodes) and Nemathelminthes or round worms (Nematodes). Temperature, rainfall and type of soil determine the occurrence of a given parasite. Although these parasites are widely prevalent, the clinical signs they cause in infected animals can be less obvious than signs of other livestock diseases. Partly for this reason, infection with GIT and other helminthes parasites are among the most neglected areas of veterinary care in much of the developing world [1].

The large numbers of parasites are found in the intestinal tract from where they can absorb food and suck blood from the wall of the intestine. A heavy worm load may block the intestinal tract [1]. GIT worms are transmitted when an animal eats grass or drinks water contaminated with larvae or eggs of helminthes. The problem is common in the rainy season [5].

Even though Ethiopia gifted with large number of sheep and goat population, the study about the health aspect of this animals has been limited. Small ruminant diseases, poor management and lesser efforts provided to improve the performance of the animals are to be responsible for the reduced productivity [6]. Lack of well-established data on the magnitude and distribution of small ruminant GIT helminthes in the study area initiates this study. The objectives of this study are therefore,

- To see the major GIT helminthes of small ruminants
- To find out the prevalence of those helminthes and their relation with different risk factors in the study area.

MATERIALS AND METHODS

Study Area: The study was conduct in and around Kombolcha town which is found in South wollo administrative zone of Amhara National Regional State in North Eastern Ethiopia. It located 376km North of Addis Ababa with an altitude of 1840 meters above sea level. Kombolcha experiences a bi-modal rainfall, the short rainy season occurs usually from March 15 to May. The minimum and maximum mean annual rainfall in and around Kombolcha ranges from 750 to 900mm. the average minimum and maximum daily temperature during long and short rains are 23.9 and 11.7°C respectively and the relative humidity of the area varies from 23.9% to 79%.

Study Population: The total small ruminant population in and around kombolcha is 17, 098 of which 10, 665 sheep and 6, 433 goat which are kept under extensive and semi intensive system (Kombolcha agricultural office). Out of these, a sample size of 384 sheep and goats were randomly selected and subjected to qualitative and quantitative corpological examination. Out of which, (218) sheep and (166) goats are examined. All species, sex and age groups of local animals were included in this study. Adults are above one year and young are less than one year was considered in the study according to Tewdros [7]. And the body condition of animals classified as good, poor and medium according to Nicholson and Butter worth [8].

Study Design: The study design for this survey was cross-sectional study conduct on 384 randomly selected animals. During fecal sample collection all the necessary data like species, sex, age and the body condition of the animal was taken.

Sample Size and Sampling Method: Simple random sampling strategy was followed to collect feces from the individual animals. The sample size was calculated based on th formula of Thrusfield [9]. By taking 95% confidence interval at 5% desired absolute precision and by assuming the expected prevalence of 50%.

Study Methodology: The faecal sample was collected per rectum with new unused gloves for each animal. Collected sample was put in to faecal pots and labeled before examination or store at temperature of 4°c for a maximum of one day before processing but most of the sample was processed immediately after sampling. The sedimentation and flotation techniques as described by Soulsby [10] were used to detect the presence of eggs of helminthes in the sample. Positive fecal samples were subjected to McMaster egg counting technique and the degree of infection was categorized based on Soulsby [10]. The animals were then categorized as lightly, moderately and severely (massively) infected according to their egg per gram of faces (EPG) counts. Egg counts from 50- 799, 800-1200 and over 1200 eggs per gram of faces were considered as light, moderate and massive infection respectively. Fecal culture was also performed for some strongyl eggs to identify larvae of parasites according to Taylor, Coop and Wall [11].

Data Management and Analysis: All the data collected (species, age, sex, body condition and parasite burden) from the area was entered in to Ms-Excel spread sheet and

analyzed using SPSS version 15. Descriptive statistics was used to determine the prevalence of parasites and Chi-square test (X^2) was used to look the significant difference between age, species, sex and body condition of the host with GIT parasites and degree of parasite infection. In all the analyses, confidence level was held at 95% and P< 0.05 was set for significance.

RESULTS

Out of 384 animals (218 sheep and 166 goats) examined, 344 (89.6%) were harboring one or more GIT parasites. With respect to the species prevalence of GIT parasites, 199 (91.3%) sheep and 145 (87.3%) goats were found to harbor one or more parasites. In this study species, sex, age and body condition were considered as risk factors and revealed no significant (P> 0.05) difference with GIT parasites (Table 1).

The degree (burden) of parasitic infection was determined from the total fecal egg count. A total of 384 fecal samples were subjected to EPG count by using McMaster egg counting chamber and found 125 (32.6%) were massively, 105 (27.3%) moderately and 114 (29.0%) lightly affected. An attempt was also made to see the existence of significant difference in degree of parasitic infection with the variation of species, sex, age and body condition. However, it was found no significant difference (P>0.05) in the EPG count with the variation of risk factors species, sex and age (Table 2).

There was significant (P<0.05) difference in the degree of parasite infection with the variation of body condition. Comparisons of prevalence of GIT helminthes in different body condition animals showed higher prevalence in poor body condition (50.4%) medium (22.9%) and good (26.1%) body condition. The present study indicates that massively infected animals found poor and lightly infected animals found good in body condition (Table 3).

Table 1: Prevalence of GIT parasites in relation to their species, sex and age and body condition of the animals

Variables	Risk factors	Total number	Number of positive	Prevalence (%)	X^2 (P_{-value})
Sex	Male	171	150	87.7	1.148 (0.284)
	Female	213	194	91.1	
Age	Adult	254	232	91.3	2.477 (0.116)
	Young	130	112	86.2	
Species	Ovine	218	199	91.3	1.5640 (0.211)
	Caprine	166	145	87.3	
Body condition	God	188	168	89.4	4.616 (0.099)
	Medium	83	70	84.3	
	Poor	113	106	93.8	
Total		384	344	89.6	

Table 2: Degree of GIT parasitic infection with species, age and sex

		Degree of infection				
Variables	Risk factors	Massively	Moderate	Light	Chi-squire	P-value
Species	Ovine	72 (33.0%)	61 (28.0%)	70 (32.1%)	3.075	0.380
	Caprine	53 (31.9%)	44 (26.5%)	49 (29.5%)		
Age	Adult	80 (31.5%)	74 (29.1%)	82 (32.3%)	4.927	0.177
	Young	45 (34.6%)	31 (23.8%)	37 (28.5%)		
Sex	Male	58 (33.9%)	40 (23.4%)	54 (31.6%)	3.320	0.345
	Female	67 (31.5%)	65 (30.5%)	65 (30.5%)		

Table 3: Degree of GIT parasitic infection with body condition

		Degree of infection				
Variable	Risk factors	Massive	Moderate	Light	Chi-squire	P-value
Body condition	Good	49 (26.1%)	49 (26.1%)	72 (38.3%)	34.751	0.00
	Medium	19 (22.9%)	23 (27.7%)	28 (33.7%)		
	Poor	57 (50.4%)	33 (29.2%)	14 (15.8%)		

Table 4: Relative prevalence of GIT parasites examined in sheep and goats

	Ovine		Caprine		
Species of parasite	No. of positive	Percent (%)	No. of positive	Percent (%)	Overall (%)
Hemonchus species	84	38.5%	41	24.7%	125 (32.6%)
Trichostrongylus species	35	16.1%	27	16.3%	62 (16.2%)
Trichueis species	28	12.8%	23	13.9%	51 (13.3%)
Bunostomum species	23	10.6%	21	12.7%	44 (11.5%)
Oesophagostomum species	20	9.2%	15	9.0%	35 (9.1%)
Ostertagia species	14	6.4%	17	10.2%	31 (8.1%)
Chabertia species	22	10.1%	17	10.2%	39 (10.2%)
Monezia species	24	11.0%	18	10.8%	42 (10.9%)
Avetelina species	23	10.6%	22	13.3%	45 (11.7%)
Paramphystomum species	41	18.8%	27	16.3%	68 (17.7%)

In this study ten types of GIT helminthes were identified during the study period on the morphology of eggs described by (11) and (10) (Table 4).

DISCUSSION

The present study found that the prevalence of GIT helminthes was 199 (91.3%) and 145 (87.3%) in sheep and goats respectively. This result coincides with the results of Gebreyesus and Esayas and Tesfalem [12-14]. They have reported a prevalence of 96.38% in goats of Ogaden range lands, 90.41% and 82.13% in sheep and goats in and around Wolayita Soddo, 88.1% and 84.32% in sheep and goats in and around Mekele, 91.43% in sheep in and around Kombolcha respectively.

Out of 384 sampled sheep and goats 125 (32.6%) were massively, 105 (27.3%) moderately and 114 (29.0%) lightly affected. The majority of infected animals had fecal egg count over 1200egg per gram of faces. Based on this result sheep and goats which have good body condition can have a resistance to be affected by large number of GIT parasites due to the presence of active defense mechanisms. Rather sheep and goats which have poor body condition susceptible to larg number of GIT parasite infection due to their depressed defense mechanisms. The occurrence of high infection rates of GIT helminthes in ovine and caprine in the study areas was associated with the presence of favorable environmental conditions for the existence and development of the parasitic GIT helminthes larvae.

The prevalence of *Heamonchus* species was (38.5%) and (24.7%) in sheep and goats respectively. The other finding by Hailelul [15] who reported 61.63% and 54.76% in sheep and goats respectively in and around Wollaita Soddo, Ahmed [16] who reported 88.23% prevalence in goats of East wollega zone at Mechara settlement area and Mulugeta, Geremew and Molalegn [17] who reported 69.5% and 65% in sheep and goats respectively in and around Bedelle. These results are relatively higher than the present finding. The difference between the findings of these studies might be due to the difference in the age, sex and body condition of examined animals and the climatic condition of the area.

The prevalence of *Trichostrongylus* species during the qualitative fecal examination was (16.1%) and (16.3%) in sheep and goats respectively. this result agreed with Hailelul [15] who reported prevalence of 22.09% in sheep in and around Wolaita Sodo and Esayas [13] who reported prevalence 16.59 in goats of Ogaden.

The prevalence of *Trichuris* species was (12.8%) and (13.9%) in sheep and goats respectively. This result is inconsistency with Hailelul [15] and Esayas [13] who have reported 36.04% in sheep and 28.57% in goats and 36.04% prevalence *of Trichuris* species in sheep and goats in and around Wolaita sodo and in goats of Ogaden respectively. The results reported by the above authors' relatively higher prevalence than the present finding. The difference might be due to the difference in age group, the immune status and environmental condition for parasite stage of larvae growth.

Bunostomum species with prevalence of (10.6%) and (12.7%) recovered during qualitative fecal examination in sheep and goats respectively in the present study. This was in agreement with Mulugeta, Geremew and Molalegn [17] who reported 26.1% and 35% in sheep amnd goats respectively in and around Bedelle. This result also in line with Esayas [13] who reported 59.38% in goats of Ogaden, Hailelul [15] who reported 41.86% in sheep in and around Wolaita sodo and Yoseph [18] who reported a prevalence of 40.48% in sheep of Asella. The above authors reported relatively higher prevalence than the present findings. This difference might be attributed to the difference in animal sex, age and environmental conditions for the parasitic stage of larvae growth.

Oesophagostomum species was detected on (9.2%) and (9.0%) of the sheep and goats in the study area respectively. Other authors reported as, Hailelul [15] who reported prevalence of 74.42% in sheep in and around Wolaita sodo, Esayas [13] who reported prevalence of 61.13% in Ogaden goats and Mulugeta, Geremew and Molalegn [17] who reported 52.2% and 45% in sheep and goats in and around Bedelle. These resalts are relatively higher than the present finding and the difference between the findings of these studies might be due to the age and sex of animals examined and the environmental condition of study areas.

The prevalence of (10.1%) and (10.2) of *Chabertia* species recorded during the present study in sheep and goats respectively. This was agree with Yoseph [18] who reported a prevalence of 2.88% in sheep in and around Asella and Mulugeta, Geremew and Molalegn [17] who reported 17.4 % and 25% in sheep and goat respectively inand around Bedelle.

The prevalence of *Ostertagia* species found in this study was (6.4%) and (10.2%) in sheep and goats respectively. This result relatively agrees with the work of (19) who reported a prevalence of 15.6% in sheep and goats of three different agro ecological zone of southern Ethiopia and Mulugeta, Geremew and Molalegn [17] who reported 26.1% and 25% in sheep and goats respectively in and around Bedelle.

The prevalence of Cestode parasites, *Monezia* species in this study was (11.0%) and (10.8%) in sheep and goats respectively. This result is in line with Hailelul [15] who reported 26.04% in sheep and 23.81% in goats in and around Wolaita sodo and Esayas [13] who reported 16.13% prevalence of *Monezia* species in goats of Ogaden. The results by the above authors are relatively higher than the present finding. The difference might be due to the difference in age.

The prevalence of *Avetellina* species was (10.6%) and (13.3%) in sheep and goats respectively. This result is in agreement with Hailelul [15] who reported 13.45% and 11.90% in sheep and goats in and around Wolaita sodo and Esayas [13] who reported 7.86% prevalence of *Avetellina* species in goats in Ogaden.

The prevalence of Trematod parasite, *Paramphystomum* species in this study was (18.8%) and (16.3%) in sheep and goat respectively.

CONCLUSIONS

This study was conducted on small ruminant GIT helminthes in and around Kombolcha area shows that GIT helminthosis of sheep and goats are the most widespread disease in the area affecting the welfare of the animals. During this study an overall prevalence of was detected by observing egg morphology and characterizing the larvae by fecal culture particularly for Strongyle species. The study indicates that massively infected animals found poor and lightly infected animals found good in body condition. From the study finding it can be concluded the body condition has significant role in burden of parasite infection. The presence study also indicates that GIT parasite particularly Haemonchus species is causing a major health problems and loss of body condition. Therefore, based on the above remarks, the following points are recommended:

- A comprehensive study on GIT helminthes should be launched in area where sheep and goats plenty to get more information about the GIT helminthosis and their epidemiology.
- Awareness creation about the high prevalence and burden of GIT parasites of sheep and got should be instituted for the people particularly for farmers and field veterinarians.
- A study on drug resistance of GIT helminthes should be conducted to check the effectiveness of anthelmentics given in the study area.
- Repeated, strategic and effective deworming of sheep and goats before and after rainy season should be practiced.

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