

Full Length Research Paper

Gastrointestinal nematodes of small ruminants in Guto Gida District, East Wolloega, Ethiopia

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A study by qualitative fecal examination of 384 fecal samples (201 sheep and 183 goats) was conducted from November 2011 to April 2012 with the objective to determine the major gastrointestinal (GIT) nematodes of small ruminants and their prevalence in sheep and goats in Guto Gida District. The study showed that 186 (92.5%) sheep and 150 (81.97%) goats were found to harbor eggs of GIT nematodes. Both sheep and goats were infected with identical parasites species, but with different level of infection. The six genera of nematodes were identified with prevalence of 21.87, 14.87, 12.5, 10.67, 11.19 and 7.29% for *Haemonchus*, *Trichostrongylus*, *Trichuris*, *Oesophagostomum*, *Bunostomum* and *Strongloides*, respectively. There was a significant difference ($p < 0.05$) in the prevalence of GIT nematodes between sex and species of animals but not for different age group. The study showed that GIT nematodes are major problems of small ruminants in the study area. Therefore, comprehensive study on GIT nematodes, cost effective control strategy and awareness creation to the farmers should be instituted in the area.

Key words: Sheep, goats gastrointestinal nematodes, Guto Gida District, Nekemte.

INTRODUCTION

In Ethiopia, helminth infections in ruminants are characteristically chronic and insidious in nature. The parasites attract very little attention, including research funds, when compared with viral, bacterial and some protozoan diseases. This is despite of the fact that they undoubtedly exert a heavy toll on the health and productivity of a vitally important livestock resource with obvious implications for the rural and national economy of the country. Gastro intestinal parasites are a worldwide problem for small and large scale farmers, and their impact is major for sub-Saharan Africa in general and Ethiopia in particular. This is due to the range of agro-

ecological factors suitable for diversified host and parasite species (Regassa et al., 2006). Endoparasites are responsible for the deaths of one third of calves, lambs and goat kids, and considerable production losses due to parts of carcasses, being condemned during meat inspection. It is well recognized that in a resource poor country, helminth infections of sheep and goats are factor responsible for economic losses through reductions in productivity (Abunna et al., 2009, Abouzeid et al., 2010). Although helminth parasites of small ruminants are ubiquitous in the climatic zones of Ethiopia where prevailing weather provides favorable conditions for their

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survival and development, their presence does not mean that they necessarily cause overt disease (Abunna et al., 2009).

Among the diseases that constrain the survival and productivity of sheep and goats, gastrointestinal nematode infection rank highest on the global scales, with *Haemonchus contortus* recognized as a major parasite for both small and large scale small ruminant production (Abunna et al., 2009). These disease have major impact on morbidity and mortality rates with annual losses as high as 30 to 50% of the total value of livestock production of Ethiopia (Abunna et al., 2009). With little inputs, sheep and goats play an important role in rural economy through the provision of meat, milk, blood and cash, accumulating capital, fulfilling cultural obligations, manure and contribution to the national economy through export of live animals meat and skins (Abunna et al., 2009).

The prevalence of gastro intestinal parasite, the genera of helminthes parasites involved species and the severity of infection also vary considerably depending on local environmental and managements practices (Singla 1995; Taylor et al., 2007). Therefore, the distribution and prevalence of the disease should be represented by geographical areas that could roughly correspond to climatic conditions (Regassa et al., 2006). These, information are important in the formulation of parasites control strategies since the degree of infection varies according to the parasites involved and other factors (Urquhart et al., 1996; Wadhawa et al., 2011). Thus, the study was designed to determine the prevalence the major GIT nematodes of sheep and goat in Guto Gida Woreda to recommend the most effective control strategies.

MATERIALS AND METHODS

The study was conducted from November 2011 to April 2012 in Guto Gida District, East Wollega zone, Oromia regional state. It is located in western part of Oromia at latitude of 09° 04'; 957°N, longitude of 36°, 32', 928" E and altitude of 2124 m above sea level. It is located at 331 km far from our capital city Addis Ababa. It is annual rainfall range from 1800 to 2200 mm. The maximum temperature is 25°C and the minimum temperature of the area is about 20°C. The area receives long rainy season from June to September and short rainy season from March to May. The area is rich in natural vegetation that comprised of tropical rain forest trees, all grasses and brushes (data obtained from agricultural office).

Study animals and design

A cross-sectional study was conducted on small ruminants of all age and sex category to determine the prevalence of nematodes parasites by collecting fecal samples from individual grazing animals.

Sample size determination

Simple random sampling strategy was followed to collect feces from

individual animals. The sample size was decided based on the formula described by Thrusfield (2005) with 95% confidence interval at 5% desired absolute precision and by assuming the expected prevalence of 50%. The estimated sample size was calculated by the formula:

$$N = \frac{1.96^2 P_{exp} (1-p_{exp})}{d^2} = 384$$

Where N = required sample size; p_{exp} = expected prevalence; d = desired absolute precision.

Parasitological examination

Laboratory diagnosis using flotation, fecal culture and Baermann technique conducted for the identification of the parasite.

Collection of eggs

Faecal pellets collected from the rectum of sheep and goats were placed in small vial. Warm water was slowly added to the faeces and the pellets stirred until a relatively uniform homogenate was obtained and liquid suspension was obtained. The suspension was filtered through sieve with 3 mm aperture. The resulting suspension was again made to pass through a sieve of 150 µm pore size. The suspension was then poured into 15 ml test tubes and centrifuged for 2 min at 377 g and the supernatant was decanted. The tube was agitated by vortex mixer to loosen the sediment. Saturated sodium chloride was then added to the test tube until the meniscus forms above the test tube on which the cover slip was placed. After 3 to 5 min, the cover slip was carefully taken off the tube and put into microscope slide for observation (Bowman, 1999).

Fecal culturing

The method of incubating fecal samples at room temperature to hatch egg to larvae and development to L3 was followed, so that the larvae hatched can be identified according to the criteria listed as follows: Taking certain amount of feces in a tray; incubating it under suitable moisture content for 14 to 21 days with continuous moistening at an interval of 3 days. The recovery larvae (L3) were studied and identified and the criteria used for identification were based on shape of larvae, head, number and shapes of gut cells, presence or absence of retractile bodies, larvae sheath coverage and length of sheath tail. Then L3 were harvested using Baerman apparatus after 14 days of incubation and were identified (Annon, 2005).

Data management and analysis

The collected sample was entered into Microsoft excel and analyzed using statistical software packages for social science (SPSS). Descriptive statistics like percentage can be used to determine prevalence of GIT nematode and Chi-square (χ^2) used to check the association between prevalence of GIT nematodes and risk factors. In the analysis, confidence level was held at 95% and $p < 0.05$ was set for significance.

RESULTS

The overall prevalence of gastro intestinal nematodes

Table 1. Overall prevalence of gastro intestinal nematodes of sheep and goats.

Species	No. of examined animals	No. of positives	Prevalence (%)
Sheep	201	186	92.5
Caprine	183	150	81.79
Total	384	336	87.5

Chi(χ^2) =9.789; Pr = 0.02.

Table 2. Prevalence of gastro intestinal nematodes in sex.

Sex	No. of examined animals	Sex		No. of positive male and female sheep and goats	
		Male	Female	Male	Female
Sheep	201	103	98		
Caprine	183	89	94	161 (83.86%)	175 (91.14)
Total	384	192	192		

Pearson Chi²(χ^2) = 4.6667; Pr = 0.031.

infection was 87.5% and the species wise is 92.5 and 81.97% in sheep and goats, respectively, which was a significant difference in infection rate between the two animal species (Table 1). Prevalence of gastro intestinal nematodes of infection of sheep and goats on the basis of sex is shown in Table 2. There is statistical significant difference ($P < 0.05$) in prevalence of gastro intestinal nematodes which was 175 (91.15%) and 161 (83.85%) in female and male, respectively. In this study species, sex and age were considered as a risk factors and revealed significant difference ($p < 0.05$) with variation in species, and sex of animals while in the case of age, there is no significant difference ($p > 0.05$) in sheep and goats but there is higher number of young sheep and goats infected than old age group.

In this study, 6 types of gastro intestinal nematodes were identified during the study period based on their morphology described (Urquart et al., 1996). During the study period, fecal samples were cultured to determine genera prevalent as shown in Table 4. *Haemonchus* (21.87%) were the most frequently identified helminthes followed by *Trichostrongylus*, *Trichuris* with *Strongyloides* been the least (7.29%) identified in the study.

DISCUSSION

In the present study, the prevalence of gastro intestinal nematodes was 87.5% (Table 1) in sheep and goats. This result coincides with the result of Gebreyesus (1986) (96.38%) at Ogaden range lands; Esayas (1988) (90.41 and 82.13%) in sheep and goats in and around Wolayita sodd; Tesfalem (1989) (88.1 and 84.32%) in sheep and goats in and around Mekelle; Melkamu (1991) (91.435%) in sheep in and around kombolcha; Bayou (1992) (90.94 and 94.855%) in sheep and goats of Gonder; Yoseph

(1993) (92.23 and 94.1%) in sheep and goats in Mendayo district of Bale; Genene (1994) (93.22 and 92.24%) in sheep and goats of four Awarajas of Eastern shoa; Getachew (1998) (90.23 and 88.3%) in sheep and goats of Buno province of Iluababor; Tefera et al. (2009) (91.32 and 93.295%) in sheep and goats in and around Bedelle, respectively.

Statistically significant difference ($p < 0.05$) (Table 1) was recorded between sheep and goats with relative lower number of goats infected than sheep which may be due to different habits of grazing by these two species of animals. This study also indicates significant different was observed between sex of animals and females are more infected than male (Table 2). Thus, pregnant or lactating ewes/does become the major source of infection for the new born. In some manner, other studies in Africa have shown that the age and immune status of the host animals have significant influences on the GIT eggs pus (Magona and Mosis, 2002). On the contrary, there was no statistical significant difference ($p > 0.05$) recorded in this study between young and adult but relatively higher number of young animals are infected than older once (Table 3). This could be due to equal exposure of both age groups of animals and they are from similar agro-ecological area.

The prevalence of *Haemonchus* species was 21. 87% (Table 4) in sheep and goats in the study area which disagreed with the work of different scholars: Ahmed (1988) (88.23% prevalence in East Wollega zone); Kumsa and Wossene (2006) (95.1% in ogaden region); Naod et al. (2006) (81.18% in Awassa in Hawassa in sheep and goats). The prevalence of *Trichostrongylus* species was 14.8% in sheep and goats. This result is disagreed with Abunna et al. (2009) who reported prevalence of 90.45% in sheep and goats; Tefera et al. (2009) (43.5 and 55% in sheep and goats in and around

Table 3. Prevalence of gastro intestinal nematodes in different age groups.

Age	Results	
	Positive (%)	Negative (%)
Adult	157 (86.74)	24 (13.26)
Young	179 (88.18)	24 (11.82)

Pearson $\chi^2(\chi^2) = 0.1807$; Pr = 0.671.

Table 4. Relative percentage of parasite identified in sheep and goats.

Species of parasites	Frequency	Percentage
<i>Haemonchus</i> species	84	21.87
<i>Trichuris</i> species	48	12.5
<i>Trichostrongylus</i> species	57	14.8
<i>Oesophagostomum</i> species	41	10.67
<i>Bunostomum</i> species	32	8.33
<i>Strongloides</i> species	28	7.29

Bedelle). But, this study is consistent with the finding reported by Sissay et al. (2007), where *Haemonchus contortus* was the most prevalent parasites of GIN; this could be associated partly with breed susceptibility, biological plasticity and high environmental adaptability.

The prevalence of *Strongloides* species was detected to be 7.49% in sheep and goats in the study area and this is in line with the work of Tefera et al. (2009) (13.04%) in sheep and 20% in goats in Bedelle and the prevalence of *Bunostomum* species was detected to be 8.33% in sheep and goats in the study area and this was in disagreement Tefera et al. (2009) (26.1 and 35% in sheep and goats in and around Bedelle). This difference in the prevalence of parasite in different area might be attributed to the difference in breed of sheep and goats and different agro-ecological zones where the animals are kept.

Conclusion and recommendation

The result of present study showed the high prevalence rate of gastro intestinal nematodes infection in small ruminants in Guto Gida District, East Wolloega. There was highly significant difference in infection level on the basis of sex and species. This shows that the general scientific facts on those bases can be recognized in the study area and the traditional husbandry and animal management have also valuable contribution in the detection of gastro intestinal nematodes. The existence of these parasites has an impact on the productivity and can hamper the sustainability of the revenue generated from small ruminant production by small holder society of East Wolloega zone. Therefore, based on the result

obtained the following recommendation are forwarded:

1. To get clear epidemiological picture of GIN parasites, comprehensive study should be launched in the area.
2. Effective utilization of available of feed resource such as agricultural by products, natural pasture and appropriate nutritional supplements program for young and lactating animals.
3. Detail study should be conducted to identify the parasite using more sensitive and specific methods such as postmortem examination.
4. Strategic nematode control practice should be implemented.
5. Field veterinarian should be aware of the importance and burden of GIN in sheep and goats.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

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