Advances in Biological Research 6 (5): 191-195, 2012
ISSN 1992-0067

DOI: 10.5829/idosi.abr.2012.6.5.6645

Gastrointestinal Helminthes Parasites in Sheep: Prevalence and Associated Risk Factors, in and Around Gondar Town, Northwest Ethiopia

[1]*Meaza Mulatu,* [2]*Tewodros Fentahun and* [1]*Basaznew Bogale*

[1]University of Gondar, Faculty of Veterinary Medicine,
Unit of Veterinary Para-Clinical Studies, Gondar, Ethiopia
[2]University of Gondar, Faculty of Veterinary Medicine,
Unit of Basic Veterinary Sciences, Gondar, Ethiopia

Abstract: A cross-sectional study was conducted to determine the prevalence and risk factors associated with Ovine gastrointestinal (GI) helminthes parasitism in and around Gondar town, northwestern Ethiopia commencing September 2011 to January 2012. A total of 406 sheep faecal samples were collected and examined using standard floatation and sedimentation techniques for the detection of GI helminthes eggs/larvae. Of these, 240 (59.11%) were positive for gastrointestinal helminth infections. Nematodes were the predominant 153(37.68%) helminthes followed by cestodes 17(4.18%) and trematodes 6(1.47%). Strongyles, *Moniezia* spp., *Trichuris* spp. and *Dictyocaulus filarial* (*D. filaria*) were the most abundant helminthes. Cases of single and multiple infection prevalence were observed. Most of the samples were found with single infection 176(43.35%) than multiple 64(15.76%) infection prevalence. The infection rate of helminthes parasites among age groups was not statistically significant ($\chi^2 = 0.424$; $P > 0.05$). Similarly, statistically significant variation in helminthes prevalence ($\chi^2 = 2.079$; $P > 0.05$) was not observed between male and female sheep. Keeping in view of the current study results, control measures for gastrointestinal parasites should be undertaken to reduce the intensity of the parasitic infection.

Key words: Coprology · GI-Helminthes · Prevalence · Gondar Town · Ethiopia

INTRODUCTION

Ethiopia has the largest livestock inventories in Africa, including more than 38,749,320 cattle, 18,075,580 sheep, 14, 858,650 goats, 456,910 camels, 5,765,170 equines and 30,868,540 chickens with livestock ownership currently contributing to the livelihoods of an estimated 80% of the rural population [1]. However, the full exploitation of these huge resources was hindered due to a combination of factors such as poor genetic potential of animals, traditional system of husbandry and management as well as the presence of numerous diseases [2].

Small ruminants under intensive and extensive production systems are extremely susceptible to the effects of wide range of helminth endo-parasites. Gastrointestinal parasite infections are a world-wide problem for both small- and large-scale farmers, but their impact is greater in sub-Saharan Africa in general and Ethiopia in particular due to the availability of a wide range of agro-ecological factors suitable for diversified hosts and parasite species. Economic losses are caused by gastrointestinal parasites in a variety of ways; they cause losses through lowered fertility, reduced work capacity, involuntary culling, a reduction in food intake and lower weight gains, lower milk production, treatment costs and mortality in heavily parasitized animals [3]. Urban and Peri-urban livestock keeping has been hailed as a source of livelihood by some households in cities around the world [4].

Different works have been conducted in the prevalence of gastro-intestinal helminthes (GI helminthes) in sheep in different parts of the country [5-7]. However, there is limited information or report about the prevalence of GI-helminthes parasites of sheep in the study area. Therefore, the objectives of the current study were to determine the prevalence of GI helminthes in sheep and to evaluate the influence of the associated risk factors on the prevalence GI helminthes in sheep in Gondar town.

Corresponding Author: Tewodros Fentahun, University of Gondar, Faculty of Veterinary Medicine, Unit of Basic Veterinary Sciences, P.O. Box: 196, Gondar, Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted in and around Gondar town; North Gondar Zone; Amhara, region, northwest Ethiopia from September to December 2011. Gondar town is located on 35°7' N and 13°8' E and lies at an altitude of 2,200 meter above sea level. It is found 750 km north of Addis Ababa. The area receives mean annual rain fall of 1,172 mm mainly in rainy season with average temperature of 19.7°C [8].

Study Animals: The sheep of local indigenous breeds which were presented to Gondar town Veterinary Clinic and Gondar University Veterinary Clinic for clinical purposes and from various small holders in Gondar town. The sampled sheep were stratified by sex and age. Animals aged up to one year was classified as young stock (lamb) whiles those above two years were categorized adults based on owners' response and observations during sampling.

Study Design and Sample Size Determination: A cross sectional study design was used to determine the prevalence of ovine GI helminthes parasites during the study period. Simple random sampling method was used to select each study animal. The sample size was determined based on the expected prevalence of 50% and absolute desired precision of 5% at confidence level of 95% according to the methods provided by Thrusfield [9].

$$n = \frac{1.96^2 p^{exp} (1-p^{exp})}{d^2}$$

where

n = Require sampling size
pexp = Expected prevalence
d = Desired absolute precision

Since there was no similar study done previously on the study area, the expected prevalence was taken as 50%. Therefore, using 50% expected prevalence and 5% absolute precision at 95% confidence interval, the number of animals needed in this study were calculated to be 384. But to increase the precision 406 sheep were examined.

Sample Collection and Examination Procedures: A total of 406 fecal samples were collected per-rectum using plastic gloves, put into sample vials, labeled and soon brought to University of Gondar, Faculty of Veterinary Medicine, Parasitology laboratory. The samples were examined on the day of collection or stored in a refrigerator at 4°C until processing. The floatation in saturated NaCl solution and sedimentation methods was employed to concentrate the helminthes eggs/larvae in the faeces [10]. Identification of helminthes eggs/larvae was made on the basis of their morphological characteristics using keys given by Soulsby [11] under x10 microscope objective. The morphological and color differences were used to distinguish *Fasciola* and *Paramphistomum* species eggs.

Data Analysis: Data was entered into Ms Excel® 2003 and analysis was conducted using SPSS 17.0. Descriptive statistics were calculated and presented as tables. The association between the independent factors (age and sex) and the prevalence of the various parasites were evaluated using Chi-square (χ^2). In all the analysis, confidence level was held at 95% and $p<0.05$ was set for significance.

RESULT

A total of 406 sheep were examined, of which 240(59.11%) were diagnosed as harboring nematodes, cestodes and trematodes according to the egg structure at varying levels and as single and mixed infections. Nematodes were the predominantly occurring (n=153) helminthes followed by cestodes (n=17) and trematodes (n=6). When they are compared among the different genera, the prevalence of strongyles were recorded to be the highest (41.62%) followed by *Moniezia* spp. (11.82%). Infections with *Nematodirus* spp and *Ascaris* spp. were rarely seen. Cases of single and multiple infections (infection with endoparasites of different genus) were observed. Most of the samples were found with single infection (43.34%) prevalence than multiple (15.76%) infections. Of these, concurrent infections by Strongyles + *Moniezia* had the highest prevalence (34.37%) while the lowest was formed among many others (1.56%).

No significant difference (P>0.05) was observed in GI helminth prevalence between male (62.75%) and female (55.71%) animals. Likewise, the prevalence did not show significant association (P>0.05) among different age groups (Table 2).

Table 1: Prevalence of GI helminthes and mixed infections in sheep

Parasite Spp	No. of positives	Prevalence (%)
Strongyles	112	27.58
Trichuris	12	2.95
Strongyloides	13	3.20
Nematodirus	2	0.49
Neoascaris vitulorum	3	0.74
D. filaria	11	2.70
Moniezia spp	17	4.18
Fasciola spp	6	1.47
Mixed infections	64	15.76

Table 2: Prevalence of GI helminthes parasites based on sex and age in sheep

Risk factors	No. of animals examined	No. of positives	Prevalence (%)	χ^2	P-value
Sex					
Male	196	123	62.75	2.079	0.149
Female	210	117	55.71		
Total	406	240	59.11		
Age					
Young	206	125	60.67	0.424	0.515
Adult	200	115	57.5		
Total	406	240	59.11		

DISCUSSION

The result of the present study clearly demonstrates that helminth infections are highly prevalent in sheep of the study area. The higher prevalence of parasites of this study (59.11%) could be due to the fact that sheep could have frequent exposure to the same communal grazing land that causes contamination of pasture. This finding agrees with the results of other researchers [5, 6, 12] in eastern part of Ethiopia (95.6%), southwestern Kenya (80.0%) and Awi Zone of Ethiopia (58.18%) respectively. Furthermore, comparatively lower prevalence was reported by Shimelis *et al*. [7] and Regassa *et al*. [13] in North Gondar of Ethiopia (46.07%) and Western Oromia (50.2%) respectively.

The species of helminthes recovered during this study were also reported by Abebe and Esayas [5], Nigatu [6], Shimelis *et al*. [7], Maichomo *et al*. [12] and Waruiru *et al*. [14]. Mixed infections with more than one parasite are common (15.76%) in the current study. This report is agreed with the report of Ayalew [15] who showed 71% of sheep in Kembebit district, North-West Shoa, harbor one or more species of helminths, strongylids or strongyloids being the predominant group. According to Biffa *et al.* [16], 57.3% of cases were due to two helminth species, 33.8% due to three species and 8.9% due to four or more species. In another study in Kelala district of northern Ethiopia, 28.6% of the sheep population studied was reported to be infected with two or more species [17]. In some areas, the prevalence of mixed infection is exceptionally high; 90.0% [18].

Nematodes were the predominant (37.68%) helminthes followed by cestodes (4.18%) and trematodes (1.47%). Strongyles, *Moniezia* spp., *Trichuris* spp. and *D. filaria* were the most abundant helminthes. The high level of multiple infections may be due to the inefficient methods of control including low attention given to the subclinical forms, coupled with the prevailing chronic nutritional stress and suitability of the climate for survival and proliferation of the parasites [16].

The present study revealed that sex and age of the sheep did not show significant association with the prevalence of the parasites. The absence of association between sex and prevalence agrees with that of Nigatu [6]. This indicates that male and female sheep have equal chance of infection if they are exposed to the same contaminated communal grazing pasture. However, the findings of Kuchai *et al*. [19] showed that females were more infected than their counterparts. This difference may be due to the physiological peculiarities of the female animals, which usually constitute stress factors during the study period thus, reducing their immunity to infections.

The study showed that the prevalence of gastrointestinal helminthes between different age groups is not statistically significant. This result disagrees with reports of Nigatu [6] and Nganga *et al*. [20] where there was a higher prevalence of infection in younger animals as compared to adult ones. It may be due to the fact that adult animals were stressed due to different reasons such as malnutrition and draught which lead to reduced immunity during the study period.

CONCLUSION AND RECOMMENDATIONS

The present study indicates the importance of gastrointestinal helminth parasites in sheep in all age groups and both sexes and the poly-parasitism nature of the disease. The high prevalence of GI helminth parasites of sheep recorded is indicative of the abundance and importance of the disease in the study area and its potential contribution to limiting the productivity of sheep. Keeping in view the above results, some control measure for gastrointestinal parasites can be undertaken to reduce the intensity of the parasitic infection.

Based on the above conclusions, the following recommendations are forwarded:

- The subject of helminth parasites in the study area should be paid more attention by professionals.
- Further studies on epidemiological, seasonal dynamics and economic significance of helminthiasis of sheep should be conducted to design feasible strategic control.

REFERENCES

1. CSA (Central Statistical Authority), 2009. Federal Democratic Republic of Ethiopia, Central Statistical Authority (CSA), Agricultural Sample Survey 2008/2009 [2001E.C.], Report on Livestock and Livestock Characteristics (Privet Peasant Holdings), Addis Ababa, pp: 120-121.
2. Mtenga, L.A., G.C. Kifaro and B. Berhanu, 1994. Studies on factors affecting reproductive performance and mortality rates of small East African goats and their crosses. Small Ruminants Research and Development in Africa. Proceedings of the second Biennial Conference of African Small Ruminants Research Network. AICC, Arusha Tanzania, 7-11 December 1992. ILCA/TCTA, September 1994. Addis Ababa, Ethiopia, Network Workshop, pp: 69-73.
3. Lebbie, S.H.B., B. Rey and E.K. Irungu, 1994. Small ruminant research and development in Africa. Proceedings of the second biennial conference of the African small ruminant research network. ILCA, pp: 1-5.
4. Mireri, C., P. Atekyereza, A. Kyessi and N. Mushi, 2007. Environmental risks of urban agriculture in the Lake Victoria drainage basin: A case of Kisumu municipality, Kenya. Habitat International, 31: 375-386.
5. Abebe, W. and G. Esayas, 2001. Survey on Ovine and Caprine Gastro-intestinal Helminthosis in eastern part of Ethiopia during the dry season of the year. Global Veterinaria, 12: 379-384.
6. Nigatu, K., 2008. Gastrointestinal Helminthosis of Sheep in Awi Zone, northestern Ethiopia. Global Veterinaria., 12: 121-129.
7. Shimelis D., A. Asmare and T. Wudu, 2011. Epidemiology of gastrointestinal helminthiasis of small ruminants in selected sites of north Gondar zone, northwest Ethiopia. Ethiop. Vet. J., 15(2): 57-68.
8. GARDO, 2010. Gondar Agriculture and Rural Development Office; Annual Report of 2009.
9. Thrusfiled, M., 2005. Veterinary epidemiology. 3rd ed., London: Philadelphia, pp: 27-28.
10. Hanson, J. and D. Perry, 1994. The Epidemiology, Diagnosis and control of helmenth parasites. International Laboratory for Research on Animal Disease, Nairobi, Kenya, pp: 24-73.
11. Soulsby, E.J.L., 1982. Helminths, arthropods and protozoa of domesticated animals. 7th edn. Tindall, London, pp: 13-16.
12. Maichomo, M.W., J.M. Kigira and J. Walker, 2004. Point prevalence of gastrointestinal parasites in calves, sheep and Gaots in Magadi division, Southwestern Kenya. Onderstepool J. Vet. Res., 71(4): 257-261.
13. Regassa, F., S. Teshale, D. Reata and K. Yosef, 2006. Epidemiology of Gastrointestinal parasites of Ruminants in western Oromia, Ethiopia. Intl. J. Appl. Res. Global Veterinaria, 4: 51-57.
14. Waruiru, R.M., M.N. Mutune and R.O. Otieno, 2005. Gastrointestinal parasite infections of sheep and goats in a semi-arid area of Machakos District, Kenya. Bull Anim Health Prod. Afr., 53(1): 25-34.
15. Ayalew, T., 1995. A preliminary survey of sheep helminthosis in Kembebit district, North-West Shoa. Proceedings of the 9th Annual Conference. Ethiopian Veterinary Association, Addis Ababa, Ethiopia.

16. Biffa, D., Y. Jobre and H. Chakka, 2007. Ovine helminthosis: a major health constraint to productivity of sheep in Ethiopia. Animal Health Research Reviews, 7(1/2): 107-118.
17. Tesfaye, H., 1998. Ovine and Bovine helminthosis in Kelala, South Wello. Proceedings of Ethiopian Veterinary Association (EVA) 12th Annual Conference. Addis Ababa, Ethiopia.
18. Dessalegn, L., 1999. The Epidemiology of Strongyle infections in small ruminants under warm tropical climate. Proceedings of the 13th Annual Conference of Ethiopian Veterinary Association. Addis Ababa, Ethiopia.
19. Kuchai.
20. Chishti, J.A., M.Z. Manal, A. Javid, R. Muzaffar, S.A. Dar and T. Hidayatullah, 2011. Prevalence of nematode parasites in Sheep of Ladakh - India. Journal of Agricultural Extension and Rural Development, 3(13): 229-231.
21. Nganga, C.J., N. Maingi, W.K. Munyua and P.W. Kanyari, 2004. Epidemiology of Gastrointestinal Helminths infection in Dorper sheep in semi-arid area of Kenya. Ondestepool J. Vet. Res., 71(3): 219-226.