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Prevalence of Gastrointestinal Nematodes of Small Ruminants in and Around Arsi Negele Town, Ethiopia

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Abstract: A cross-sectional study was conducted on 384 small ruminants kept in and around Arsi Negele from December 2013 to May 2014 to determine the prevalence of gastrointestinal nematode and to see the association with age, sex and species of small ruminants. For the purpose of this study, 384 fecal samples were collected from (285 sheep and 99 goats). Coprological methods including floatation technique and McMaster egg counting techniques was used for screening and counting the eggs of observed gastrointestinal (GIT) nematodes. The fecal samples examined revealed an overall prevalence of 265 (69.01%) in the small ruminants with 195 (68.4%) in sheep and 70 (70.7%) in goats harbor one or more genera of nematodes. The study revealed significantly higher ($p<0.05$) prevalence of nematodes in younger animals than in adults. The prevalence of nematodes has no association with other risk factors (sex, body condition and species of study animals). Based on the EPG result, the study animals were classified as mild (48.65%), moderate (29.81%) and severe (21.51%) infection. The majority of examined animal had the EPG count in average of less than 800. In conclusion, the study revealed that GIT nematodes are major parasitic infections of small ruminants in the study area. Therefore, effective strategic treatment and public awareness creation should be instituted in the study area.

Key words: Prevalence · Gastrointestinal · Nematodes · Sheep · Goats · Arsi Negele

INTRODUCTION

Gastrointestinal parasite infections have greater impact in Ethiopia due to the availability of a wide range of agro-ecological factors suitable for diversified hosts and parasite species [1]. Ethiopia possesses the highest number of livestock population in Africa. Small ruminants (Sheep and Goats) are among the major economically important livestock in Ethiopia; in which there are 23.62 million sheep and 23.33 million Goats, playing an important role in the livelihood of resource poor farmers and provide a vast range of products and services such as meat, milk, skin, hair, horns, bones, manure and urine, security, gifts, religious rituals and medicine [2]. Sheep and goats are particularly important resources for their owners, because they require smaller investments, have shorter production cycles, faster growth rates and greater environmental adaptability than cattle. Therefore, they form an important economic and ecological niche in all agricultural systems throughout the country [3]. However, diseases often prevent them from attaining optimum productivity [4].

The most prevalent animal diseases include Trypanosomiasis, Foot and mouth disease, Bovine pneumonia, Pest des Petitis Ruminants, Contagious caprine pleuropneumonia, Lumpy skin diseases and helminth parasitism. These diseases have a major impact on morbidity and mortality rates, with annual losses as high as 30–50% of the total value of livestock products of Ethiopia. It is also estimated that approximately 2 million cattle and 5 to 7 million sheep and goats die from these diseases and malnutrition each year in Ethiopia, accounting for an annual financial loss in excess of 90 million USD [3].

The direct victims caused by these helminth parasites are attributed to keen illness and death, early butcher and elimination of some parts at meat scrutiny. Indirect losses include the reduction of productive potential such as decreased growth rate, weight loss in young growing animals and late development of slaughter stock [5]. The prevalence of GIT parasites, the genera of helminth parasites involved, species and the severity of infection also vary considerably depending on local environmental conditions, such as humidity, temperature, rainfall,

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vegetation and management practices [6]. Therefore the objective of this study was to estimate the prevalence of major GIT nematode helminth parasites and associated risk factors in sheep and goats.

MATERIALS AND METHODS

Study Area: Arsi Negele is located in the central rift valley of Ethiopia in West Arsi Zone, Oromia Region State about 225 Kilometers from capital Addis Ababa. Arsi Negele is located at 7° 09' to 7° 41'N and 38° 25' to 38° 54'E [7].

Study Animal: A total of 384 sheep and goats (285 Sheep and 99 Goats) were randomly selected and examined for GIT nematodes considering different age groups (less than 2, 3 to 4 and greater than 4 year), sex groups (male and female) and body condition groups (poor, medium and good) as described by Gatenby [8].

Sampling Method and Sample Size: Random sampling strategy was followed to collect faces from the individual animals. The sample size was decided based on formula described by [9]. Sample size was calculated using 50% expected prevalence, 5% absolute precision and 95% confidence interval and the calculated total sample size was 384.

Study Design: Cross-sectional study was undertaken to determine the prevalence of sheep and goat GIT nematodes by qualitative and quantitative corprological examination. Individual animals were carefully identified and sex, age, species and body condition score were recorded. These risk factors were assessed for the presence of possible association with presence of GIT nematodes.

Study Methodology: Faecal samples were collected directly from the rectum of each animal and placed in air and water tight vials (universal bottles) and then transported to the laboratory. In the laboratory, the samples were subjected to floatation techniques for screening of study animals for nematodes presence and McMaster techniques to identify and counting of GIT nematodes following the standard procedures [10]. The animals were then categorized as lightly, moderately and severely (massively) infected according to their egg per gram of faeces (EPG) counts. Egg counts from 50-799, 800-1200 and over 1200 eggs per gram of faeces were considered as light, moderate and massive infection respectively [11, 12].

Data Management and Analysis: Data collected from the study were entered to MS Excel sheet and analyzed by using SPSS version 20 software. Descriptive statistics was used to determine the prevalence of the GIT nematodes and Pearson Chi-square (÷2) test was used to assess the degree of association between each risk factor and GIT nematodes. In all analyses, confidence level was held at 95% and P-value less than 0.05 was considered as significant.

RESULTS

The overall prevalence of gastrointestinal nematodes in sheep and goats during the study period was 69.01% and among these sheep and goat account for 195(68.4%) and 70(70.7%), respectively (Table 2). From the positive samples, 258(67.19%) were positive for *strongyle* egg, 7(1.82%) were positive for *strongyloide* egg and 14(3.64%) were positive for *strongyle* type egg and s*trongyloide* egg (Table 1).

Higher prevalence rates were shown in small ruminants with age group of less than 2 year (77.1%) followed by the age group within 3 to 4 years (67.2%) and age groups greater than 4 years (36.3%). A statistically significant difference ($p<0.05$) was observed in age group of less than 2 year. The prevalence of gastrointestinal nematodes was higher in male (71.3%) as compared to female (68%). Medium body condition score small ruminants have higher prevalence record (73.5%) followed by poor body condition score (72.2%) whereas the lowest prevalence was recorded in good (61.1%) body condition score. Higher prevalence of gastrointestinal parasites was observed in goats (70.7%) than in the sheep (68.4%). However, there is no statistically significance difference ($p>0.05$) in GIT nematode prevalence among small ruminant of different sex, body condition score and species (Table 2).

Results of Quantitative Fecal Egg Counts: Fecal samples positive for GIT nematodes in this study were subjected to McMaster egg counting chamber for EPG count to determine the degree of severity of parasitic severity. The majority of positive study animal had the EPG count in average of less than 800.

The majority of positive study animal had the EPG count in average of less than 800. The animals positive for nematodes by floatation technique was subjected to McMaster technique and are classified as lightly (48.65%), moderately (29.81%) and severely (21.51%) infected with GIT nematodes (Table 3).

Table 1: Nematodes eggs identified

Species of parasites	No examined	No positive	Prevalence
Strongyle	384	258	67.19%
Strongyloide	384	7	1.82%
Strongyle and strongyloide	384	14	3.64%
Total	384	265	69.01%

Table 2: Prevalence of gastrointestinal nematodes in small ruminants by considering different risk factors

Risk factors	No examined	No positive	Prevalence	p-value
Species				
Ovine	285	195	68.4%	0.672
Caprine	99	70	70.7%	
Age				
<2year	105	81	77.1%	0.010
3-4 year	268	180	67.16%	
>4 year	11	4	36.3%	
Sex				
Male	109	77	71.3%	0.656
Female	275	187	68.0%	
Body condition				
Poor	72	52	72.2%	0.052
Medium	181	133	73.5%	
good	131	80	61.1%	

Table 3: Level of infestation of positive small ruminant animal for GIT nematodes

level of infestation	no examined	frequency	prevalence
light	265	129	48.68%
moderate	265	79	29.81%
severe	265	57	21.51%
Total	265	265	100.00

DISCUSSION

The coprological examination performed for this study revealed the existence of nematodiasis in small ruminants with an overall prevalence of 69.01%.The study showed that 68.4% and 70.7% of sheep and goats respectively harbor one or more nematodes. This finding is lower than the results of other surveys in small ruminants in Western [13, 13], Central [15], Northern [16, 17] and Southern [18, 19] Ethiopia. The decrease in the GIT nematodiasis prevalence in the present study compared with the other studies in the country could be due to the existence of unfavorable climatic or environmental factors that could support prolonged survival and development of infective larval stage of most nematodes [20, 21].

A significantly higher prevalence rate of nematodiasis was found in younger small ruminants ($P<0.05$) than adult animals. This is in agreement with reports of higher prevalence in young animals in Ethiopia [13, 28] and elsewhere [29-33]. Age was considered as an important risk factor in GIT helminthiasis [24]. Several authors have documented that adult and old animals develop acquired immunity against helminth infections as they get mature due to repeated exposure [12, 28] and this will help expel the parasite before it establish itself in the GIT [32].

The study further revealed that sex, body condition and species of study animals did not show significant association ($P>0.05$) with the prevalence of the GIT nematodes. Male and female animals were found to be equally susceptible to infection with GIT helminth parasites. The absence of association between sex is consistent with previous reports [13, 34]. Nevertheless, it is in disagreement with a higher prevalence of helminth infection in female animals [28]. It is assumed that females are more prone to parasitism during pregnancy and per-parturient period due to stress and decreased immune status [12].

Higher prevalence of GIT parasites was observed in goats than in the sheep which is consistent with previous reports from Western [12] and Eastern [22] Ethiopia and elsewhere [24]. These could be due to the fact that most of the goats were from lowland and mid altitude areas, which are thought to be suitable for survival of the larval stage of the parasites [6]. The other reason assumed to be that sheep do have a considerably higher immunological response to GIT parasites compared with that of goats [12]. However, it is in contrary with other reports in Ethiopia [25] and elsewhere in the world [26, 27]. In this regard, this could be due to the fact that sheep have frequent exposure to communal grazing lands that have been contaminated by feces of infected animals. Goats are browsers in behavior but sheep are grazers from the ground where the GIT parasites egg hatches and reaches the infective stage [22, 26].

The study further revealed that small ruminants with medium and poor body condition score have higher prevalence rate of nematodiasis infection which is consistent with previous reports [23, 34]. This might be due to either well-fed animals have good immunity or parasitic infection leads to poor immunological response to the fecundity of the parasites.

CONCLUSION

Small ruminant GIT nematode was found to be an important problem in the study areas. Therefore during the control and treatment of small ruminant nematodiasis; age should be considered as potential risk factors for the occurrence of the disease. Further studies on the economic importance of helminthiasis and drug resistance patterns of anthelmintics should be conducted for the holistic implementation of nematodes control.

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REFERENCES

1. Fikru, R., S. Teshale, D. Reta and K. Yosef, 2006. Epidemiology of Gastro intestinal parasite of ruminant in Western Oromia, Faculty of Veterinary Medicine, Addis Ababa Univ. Debre - Zeit, Ethiopia.
2. Welemehret, N., B. Basaznew and C. Mersha, 2012. Helminthes Parasites in Small Ruminants: Prevalence, Species Composition and Associated Risk Factors in and Around Mekelle Town, Northern Ethiopia. European Journal of Biological Sciences, 4(3): 91-95.
3. Sissay, M.M., 2007. Helminth Parasites of Sheep and Goats in Eastern Ethiopia. Epidemiology and Anthelmintic Resistance and its Management.
4. 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.
5. Naseer, U., S.K. Mian and S. Muzafar, 2013. Infestation of helminthes parasite in sheep, Ovisaries (L.) in district Peshawar, Pakistan. International Journal of Biosciences. 3(2): 28-34.
6. Fikru, R., S. Teshale, D. Reta and K. Yosef, 2006. Epidemiology of Gastrointestinal Parasites of Ruminants in Western Oromia, Ethiopia. Intern J. Appl Res Vet Med., 4: 1.
7. ORS, 2004. The Oromia Regional State government: Socio Economic Profile of East Shoa Zone.
8. Gatenby, M.R., 1991. Sheep. R. Coste and J.A. Smith, (eds.), the Tropical Agriculturalist, Macmillan (London) and CTA (Wageningen), [32]. pp: 6-11.
9. Thrusfiled, M., 2005. Sampling in veterinary Epidemiology.2nded. Blackwell Science Ltd. London, pp: 182-189.
10. Gordon, H.M. and H.V. Whitlock, 1939. A new technique for counting nematode eggs in sheep faeces. J. Counc. Sci. Ind. Res., 12: 50-52.
11. Soulsby, E.J.W., 1982. Helminths, Arthropods and Protozoa of Domesticated Animals, Seventh Edition. BaillereTindall, London: Lea and Febiger, Philadelphia, pp: 212-258.
12. Urquhart, G.M., J. Aremour, J.L. Dunchan, A.M. Dunn and F.W. Jeninis, 1996. Veterinary parasitology 2nd edition. The University of Glasgow, Blackwell Sciences, Scotland, pp: 3-137.
13. Regassa, F., S. Teshale, D. Reta and K. Yosef, 2006. Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia. Int. J. Appl. Res. Vet. Med., 4(1): 51-57.
14. Tefera, M., G. Batu and M. Bitew, 2011. Prevalence Of Gastrointestinal Parasites of Sheep And Goats In And Around Bedelle, South-Western Ethiopia. Internet J. Vet. Med., 8: 2.
15. Kumsa, B., T. Tadesse, T. Sori, R. Dugum and B. Hussen, 2011. Helminths of sheep and goats in Central Oromia (Ethiopia) during the dry season. J. Anim. Vet. Adv., 10(14): 1845-1849.

16. Genene, R., 1994. A study of prevalence of ovine GIT helminthes in and around kombolcha. DVM Thesis, faculty of veterinary medicine, Addis Ababa University, DebreZeit. Ethiopia, pp: 24-25.
17. Tesfaye, H., 1998. Ovine and bovine helminthiasis in Kelala (S. Wollo).Ethiopian Veterinary Association Proceedings of the 12th Conference. Addis Ababa, Ethiopia, June, pp: 30-34.
18. Hailelul, N., 2002. Study on prevalence of GIT helminthes of small ruminants in and around Wolayta Soddo, southern Ethiopia. DVM Thesis, Faculty of veterinary medicine, Addis Ababa university, Debre-Zeit. Ethiopia, pp: 353.
19. Amenu, A., 2005. Epidemiology of gastrointestinal tract nematodes of small ruminants in three different Agro Ecological zones of Southern Ethiopia. MSC Thesis. Faculty of Veterinary Medicine, Addis Ababa University, Debre-Zeit. Ethiopia, pp: 99.
20. Rossanigo, C.E. and L. Grunder, 1995. Moisture and temperature requirements in feces for the development of free living stages of gastrointestinal nematodes of sheep and cattle and deer. J. Helminthol., 67: 357-362.
21. Andrews, S.J., 1999. The life cycle of *Fasciola hepatica*. In: J.P. Dalton (ed) Fasciolosis.
22. 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. Revue Vet. Med., 152(5): 379-384.
23. Nigatu, K., 2008. Gastrointestinal Helminthosis of Sheep in Awi Zone, northwestern Ethiopia Global Veterinaria, 12: 121-129.
24. Raza, M.A., Z. Iqbal, A. Jabbar and M. Yaseen, 2007. Point prevalence of gastrointestinal helminthiasis in ruminants in southern Punjab. Pakistan. J. Helminthol., 81: 323-328.
25. Teklye, B., 1991. Epidemiology of endoparasites of small ruminants in sub-saharan Africa.Proceedings of Fourth National Livestock Improvement Conference. Addis Ababa, Ethiopia, pp. 13-15. November 7-11.
26. 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.
27. Asif, M., S. Azeem, S. Asif and S. Nazir, 2008. Prevalence of Gastrointestinal Parasites of Sheep and Goats in and around Rawalpindi and Islamabad, Pakistan. J. Vet. Anim. Sci., 1: 14-17.
28. Dagnachew, S., A. Amamute and W. Temegen, 2011. Epidemiology of gastrointestinal helminthiasis of small ruminants in selected sites of North Gondar zone, Northwest Ethiopia.Ethiop. Vet. J., 15(2): 57-68.
29. Fritsche, T., J. Kaufmann and K. Pfister, 1993. Parasite spectrum and seasonal epidemiology of gastro-intestinal nematodes of small ruminants in the Gambia. Vet. Parasitol., 49(2-4): 271-283.
30. Ng'ang'a, 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.
31. Githigia, S.M., S.M. Thamsborg, N. Maingi and W.K. Munyua, 2005. The epidemiology of gastrointestinal nematodes in Goats in the low potential areas of Thika District, Kenya. Bull. Anim. Health Prod. Afr., 53(1): 5-12.
32. Shah-Fischer, M. and R. Say, 1989. Manual of Tropical Veterinary Parasitology. CAB International; The Technical Center for Agricultural and Rural Cooperation (CTA).
33. Keyyu, J.D., A.A. Kassuku, N.C. Kyvsgaard and A.L. Willingham, 2003. Gastrointestinal nematodes in indigenous zebu cattle under pastoral and nomadic management systems in the lower plain of Southern highlands of Tanzania. Vet. Res. Commun., 3(5): 371-380.
34. Nigatu, K., 2008. Gastrointestinal Helminthosis of Sheep in Awi Zone, northwestern Ethiopia. Global Veterinaria, 12: 121-129.