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Research Article

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Gastrointestinal Nematodes in Ruminants: The Parasite Burden, Associated Risk Factors and Anthelmintic Utilization Practices in Selected Districts of East and Western Hararghe, Ethiopia

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Abstract

A cross-sectional study aimed to assess major GI nematode, parasite burden and associated risk factors as well as the current practices of anthelmintics utilization was conducted from September 2015 to August 2016 in selected districts of east and western Hararghe zones. In the study faecal samples were collected from randomly selected 768 ruminants' (cattle, sheep and goats) and coprological examinations and EPG techniques were employed. The study result indicated occurrence of GI nematode has statistically differences (p<0.05) in all considered risk factors: age, sex, species, body condition and origin of animals and overall prevalence was 51.3% (394/7680). The infection rate was higher in ovine (63.33%) species than in bovine (36.84%) and caprine (52.67%). The current study also revealed the major GI nematodes at the study areas were *Strongyle* type (16.15%), Haemonchus (13.67%), Oesophagostomum (11.07%), *Strongyloides* (3.91%) and *Trichuris* (1.05%), whereas 5.47% (42/768) was recorded as mixed nematode infection. Questionnaire survey in this study indicated majority of the respondents had poor to no information on economic importance GI nematode (71.67%) and anthelmintic drugs utilization (83.61%). Albendazole, Tetramisole and Ivermectin are the commonly available anthelmintics for GI nematode infection treatment at our study area. On the other hand, about 35.83% of animal owners had free access to drugs from general shop (nonprofessional traders) and 24.17% (87/360) had used traditional medicinal plants of unknown doses. The study revealed that high prevalence of nematode infection in ruminates and majority of the people in the study area lack awareness on economic importance of GI nematode though they had free access to anthelmintics with no understanding of drug resistance. Therefore, there should be detail awareness creation and the need of further investigation to develop control and prevention strategies.

Keywords: Anthelmintics practices; Coprology; EPG; Nematode; Hararghe-Ethiopia

Introduction

The gastrointestinal (GI) nematodes are the important parasites of ruminants in all regions across the tropics and sub-tropic countries like Ethiopia. Helminthes infections in ruminants are currently triggering serious problems in the developing world, particularly where nutrition and sanitation are poor [1]. They cause low productivity due to stunted growth, poor weight gain, feed utilization, feeding and water intake, lower meat, wool and milk production, cost of treatment and mortality in young animals [2]. The nematode infections in other parts of the world also affect the health of millions of animals, causing huge economic loss in livestock farming [3].

Adult female nematodes produce eggs that are passed out of the host with the faeces. Under optimal condition in external environment first-stage larvae (L1) can develop and hatch egg within 24 hours. L1 grow and develop to the second stage larvae (L2) which in turn grow and develop in to third-stage larvae (L3), which is the infective stage. After ingestion L3 develop into fourth-stage larvae (L4), which then develop in to immature adults (L5). Sexually mature adult nematodes develop within 2 to 4 weeks after ingestion of the L3 unless arrested larvae development occurs [4].

There are many associated risk factors such as age, sex, weather condition and husbandry, anthelmintic application and etc. that influence the prevalence and burden of GI nematodes in ruminants [5]. The prevalence of GI helminthic parasites is quite different in different species and the severity of the infection also vary considerably depending on local environmental condition such as humidity, temperature, rainfall, vegetation and management practice [6].

The diagnosis of nematode infections in livestock has been based on the clinical signs and detection of nematode eggs or larvae in the faeces by direct microscopic examination. Quantifying number of egg per gram (EPG) of faeces is the best way of estimating parasite loads [7]. To take the control measures epidemiological surveillance of nematode parasite by different diagnostic methods like faecal examination, determination and identification of specific nematode species is important [8] and way of administering anthelmintic drugs is also advised in countries like Ethiopia. The eggs of the nematodes are most often diagnosed by floatation technique and the commonly used floatation solution for nematode and cestode eggs are sodium chloride or sometimes magnesium sulphate [9]. On the other hand, many parasitic helminths of veterinary importance have genetic features that favour development of anthelmintic resistance, this becoming a major worldwide constrain in livestock production. The development of anthelmintic resistance poses a large threat to future production and welfare of grazing animals [10]. The risk of under dosing and a continued use of one class of anthelmintics, irrespective of efficacy status are frequently encountered

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factors enhancing development of anthelmintic resistances [11]. Reduced efficacy, that may reflect the development of resistance, can be detected by using the Faecal Egg Count Reduction Test (FECRT) though lack of sensitivity is its main limitation. Another disadvantage of FECRT is that it is not species-specific since eggs of different nematode species cannot be differentiated. Moreover, the interpretation of the test depends upon various factors including the detection limit of the method, the number of animals per group, the host species, and the level of egg excretion by the helminths [12].

In Ethiopia, the use of anthelmintics has been practiced for a long time, and constitutes a considerable share of the costs spent by the country in the control of helminthosis. Also, smuggling and misuse of veterinary drugs involving anthelmintics is a wide spread practice in the country [13]. Some of these drugs, particularly albendazole and tetramisole, have been continuously imported and distributed to every corner of the country under different trade names and by different manufacturers [14]. There was a complaint by the Regional Animal Health Officers and some animal owners with regard to the effectiveness of available anthelmintics, especially albendazole.

Considerable work has been done on prevalence of GI nematode of ruminants in many parts of Ethiopia. But, there was no previous study carried out on prevalence with parasite load of major GI nematodes and associated risk factors in ruminants at the present study area. On the other hand, knowing the current situation of the GI nematode in the area could be basis for the possible control and prevention of GI nematode. Therefore, the current study was designed to determine the load and associated risk factors of the GI nematode in ruminants and to assess the current anthelmintic utilization practices in selected districts of east and western Hararghe.

Materials and Methods

Study area description

The study was conducted in four selected districts of east (Haramaya and Meta districts) and western (Tullo and Chiro woredas) Hararghe zones. East Hararghe zone is one of the 18 zones of Oromia National Regional State and boarderd by Somali Regional State from the east direction. Haramaya one of the east Hararghe district is located at 14 km north of Harari regional state capital city at 9°24′N 42°01′E and 9°24′N 42°01′E in the altitudinal range of 1400 to 2340 m a.s.l. with the mean annual temperature and relative humidity of 18°C and 65%, respectively. Its average temperature is 9.5-24°C with low temperature fluctuation. Climatically the district has two ecological zones of which 66.5% is midland and 33.3% is low land. According to Haramaya district agricultural statistics information, the district has about 63,723 cattle, 13,612 sheep, 20,350 goats, 15,978 donkeys, 530 camels and 42,035 chickens. Meta Woreda is also another districts of east Hararghe zone and situated in southwest of Harar along the road to Addis Ababa. Meta woreda covers three agro-ecological floors (dega 17 kebele, weina dega 15 kebele, kola 15 kebele) [15,16].

West Hararghe zone is bordered with Bale in the south, Arsi in the south west, East Hararghe in the east and Afar in the north West. Tullo one of the woredas in the west Hararghe zone is bordered by Mesela, Chiro, Doba and east Hararghe zone in south, west, north and in east, respectively. The district has 33 rural PAs, and Debeso and Hirna towns. The daily mean temperature of the district ranges from 18°C-26°C and mean annual rainfall 550 mm-800 mm. The agro-ecological zones of the district are highland (dega) 40%, medium high land (weynedega) 57%, kola 3% at elevation of 1500 m-2500 m a.s.l. The livestock populations of the district are 125,915 cattle, 37,973 goats, 13,177 sheep, 171,499 poultry, 5,905 donkeys, 338 horses and 274 mules. Chiro district/Zuria is of west harargeh is also another study site of the current investigation. it is bordered by tullo district in northeast It is part of former Chiro woreda what was divided for Chiro Zuria and Gemechis woredas and Chiro Town. The highest peak in Chiro is 3574 m. a.s.l. [17,18] (Figure 1).

Study design

A cross-sectional study was conducted from September 2015 to

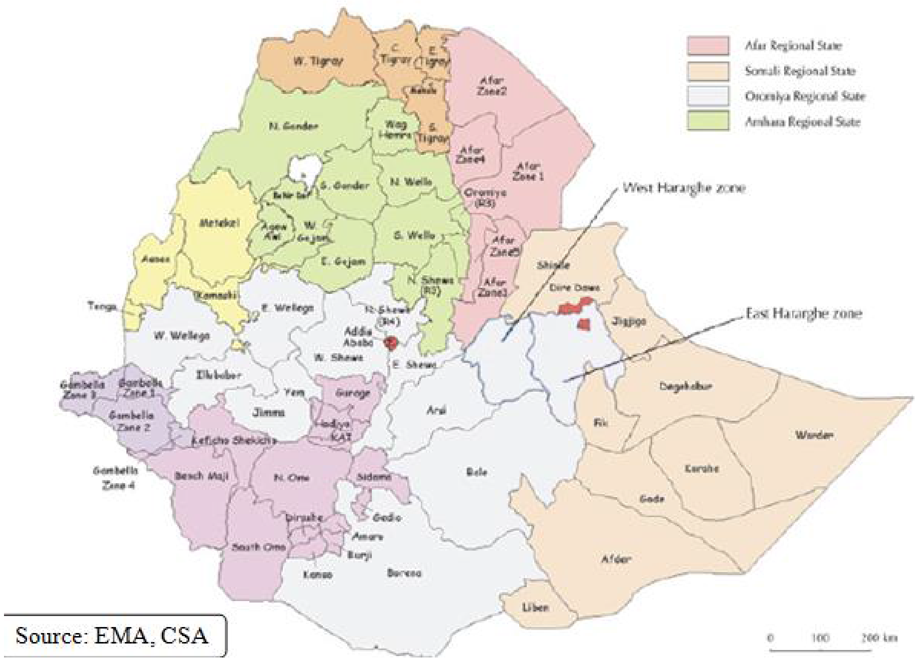


Figure 1: Map of Ethiopia showing the study area.

August 2016, on randomly selected cattle, sheep and goats from four purposely selected districts of both east and western Hararghe zones.

Study population

The study animals were local breeds of cattle, sheep and goats kept under mixed crop-livestock production system. The animals recruited to the study were also further categorized based on body condition score, locality, sex and age groups.

Concerning the current utilization practices of anthelmintics at our study areas questionnaires were distributed for representative respondents chosen from the four districts and retrospective data were also collected from animal health agency offices, veterinary clinics and drug shops in the areas.

Sample size determination and sampling method

The sample size was determined by the formula described by Thrusfield, at 95% confidence level and 5% precision, and considering 50% estimated prevalence as there was no previous such combined study at the current study area. However, to increase the precision of the study sample size was increase by two folds and a total of 768 animals (312 from east and 456 from western Hararghe zone) were included in to the study [19].

The 12 peasant associations (PAs) were purposively selected considering their distance from main road and equal proportions of samples were collected from each PAs. In line with this, 228 cattle, 240 sheep and 300 goats were included in to the study by simple random sampling technique within the species. Among animal species proportional sampling were applied based on estimated total number of each animal species in each PA, as taken from the respective agricultural offices the districts.

Study methodologies

Sample/data collection: Fresh faecal samples were collected directly from the rectum of 768 ruminant animals using gloved hand and placed in into universal bottles. In some cases when immediate faecal sample processing was impossible because distance from the laboratory, 10% formalin was added to the sample to preserve parasite eggs. Data on animal characteristics, management practices, Anthelmintic utilization practices and farmer status and knowledge on GI nematode infection impact in animal production were collected through survey questionnaires at the time of sampling. The faecal samples were transported to Hirna regional veterinary laboratory (HRVL) but samples from Haramaya areas were taken to Haramaya University CVM laboratory.

Parasitological examination: In the laboratory, faecal samples were examined for the detection of nematode eggs employing standard procedures of flotation as described by Charles M using sodium chloride (NaCl) as floatation fluid. This qualitative technique is followed by the quantitative technique McMaster egg counting. In which the positive samples further subjected to EPG counting to determine the number of eggs per gram of faeces and then the degree of infection was categorized as light, moderate and severe (massive) [20]. According to Soulsby egg counts from 50-799, 800-1200 and over 1200 per gram of faeces are considered as light, moderate and massive infection, respectively [21].

Questionnaire survey and or interviews and retrospective study: Evaluation of farmers and professionals awareness about GI nematodes impact and Anthelmintic drug utilization habits were done through designed questionnaires and interviews. In this a total of 360 participants i.e., 30 individuals from each PA (farmers of different ages and education levels, veterinarians, slaughter house personals, agricultural and rural development staffs) were contacted to collect data on: effect of GI nematode infection on animal production, clinical manifestation, control method and use of anthelmintic drugs (accessibility, source of drug, dose, professional administering the drug) and etc. Field observation and direct assessment was also conducted to support questionnaires and or Interviews data. During this period, common grazing sites, small scale farms, veterinary drug shops and clinics of the study areas were visited and the existing activities were investigated.

Data analysis: The data collected from field, laboratory tests and questionnaires and or interviews were analyzed using SPSS version 20.0. The study variables were analyzed by chi- square and descriptive statistics were also used to calculate the data prevalence or percentages by dividing positive samples for total examined. The confidence level was held at 95% and it was considered as significant when P-value is less than 0.05.

Results

In the present study out of 768 ruminant animals examined 394 (51.30%) were found to be positive for the gastrointestinal nematode eggs. In this age, sex, species, body condition and origin of animals were considered as risk factors and the result showed all risk factors were statistically significant ($p<0.05$). The infection rate was higher in ovine species (63.33%) than in bovine (36.84%) and caprine (52.67%) species. The result also indicated the GI nematode infection is more prevalent in adult, female animals with poor body condition than in young, male ruminants of good body condition. In relation to geographical origin of animals, significantly higher prevalence was found in ruminants from Genda Abdi of Chiro district (72.50%) than in other PAs (Table 1).

In the current study variation had been observed in the occurrence of different types of GI nematode parasites. The major GI nematodes observed in ruminants at the study area were Strongyle type, Haemonchus, Oesophagostomum, Strongyloides and Trichuris with the prevalence of 16.15%, 13.67%, 11.07%, 3.91% and 1.05%, respectively. In this mixed nematode eggs were also examined with prevalence of 5.47% (42/768) (Table 2).

To determine intensity of GI nematode infection among positive samples, the EPG count had employed using MC-master egg counting technique. The EPG counting result indicated majority of the study animals (18.86% bovine, 26.67% ovine and 33.67% caprine) were slightly infected. The study result also revealed ovine species had higher exposure to massive/severe infection (15%) than bovine and caprine species (Graph 1).

Based on questionnaire survey to assess community's current knowledge in the study area, majority of the respondents had poor to no information on economic importance of GI nematode (71.67%) and anthelmintic drugs utilization practices (83.61%). The result showed only 17.78% had deworming schedule and 68.33% of the respondents had no habit of even talking sick animals to veterinary clinics and also did not deworm their animals. Albendazole, Tetramisole and Ivermectin are the commonly accessible anthelmintics for GI nematode infection treatment at our study area. However, about 35.83% of animal owners got access (bought) the drugs from general shop (nonprofessional traders sold the drugs as any form goods) and 24.17% (87/360) had used traditional medicine (parts of plants and vegetables and seeds (Tables 3 and 4).

Risk factors			No. examined	No. positive (%)	X^2 (P-value)
Species	Bovine		228	84 (36.84)	33.21(0.00)
	Ovine		240	152 (63.33)	
	Caprine		300	158 (52.67)	
Sex	Male		350	162 (46.27)	6.47(0.01)
	Female		418	232 (55.50)	
Age	Young		264	120 (45.45)	5.51(0.02)
	Adult		504	274 (54.37)	
Body condition	Poor		292	218 (74.66)	109.39(0.00)
	Medium		260	110 (42.31)	
	Good		216	66 (30.56)	
Districts and PAs	Chiro	Chiro twon	43	12 (27.91)	17.21(0.00)
		Genda abdi	80	58 (72.50)	
	Tullo	Oda balina	84	48 (57.14)	
		Midhagdu	79	39 (49.37)	
		Kira-kufis	55	29 (52.73)	
		Rakata-fura	68	41 (60.29)	
		Hirna town	47	17 (36.17)	
	Meta	Chelenko main	95	64 (67.37)	
	Haramaya	Finkle	56	35 (62.50)	
		Gende tare	49	12 (24.49)	
		Damota	62	25 (40.32)	
		Adelle	50	14 (28.00)	
Total			**768**	**394 (51.30)**	

Table 1: Prevalence and associated risk factors of GI nematodes in ruminants.

Nematode egg type	No. examined	No. positive (%)
Styrongyloides	768	30(3.91)
Trichuris	768	8(1.04)
Oesophagostomum	768	85(11.07)
Haemonchus	768	105(13.67)
Other *Strongyle* type	768	124(16.15)
Mixed type/infection	768	42(5.47)
Total	**768**	**394(51.3)**

Table 2: Prevalence of GI nematode species in ruminants at the study areas.

Knowledge of respondents	No. interviewed	No. of respondents (%)
Knowledge on GI nematode		
Know about GI nematode	360	102 (28.33)
Don't Know	360	258 (71.67)
Level of individual's knowledge		
Well	360	27 (7.50)
Moderate	360	75 (20.83)
Poor/don't know	360	258 (71.67)
Level of knowledge on their clinical manifestation/signs		
Well	360	37 (10.28)
Moderate	360	62 (17.22)
Poor/don't know	360	261 (72.5)
Deworming schedule for the animals		
Yes	360	64 (17.78)
No	360	296 (82.22)

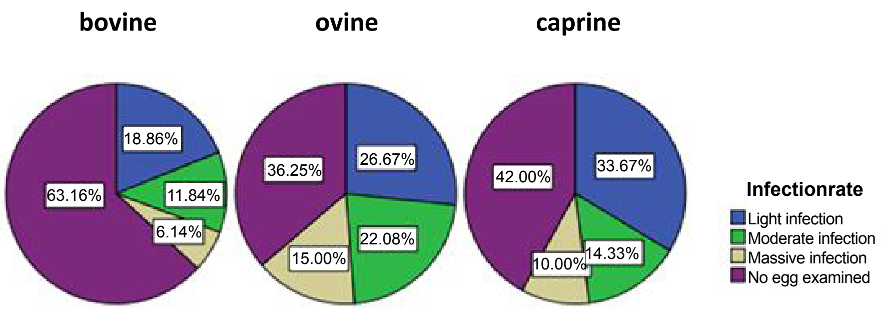
Table 3: Community Knowledge on GI nematode economic impact as animal disease at the study areas.

Discussion

The study showed of 768 ruminant animals examined 394 (51.30%) were found to be positive for the GI nematode eggs. This finding is higher than the findings of Muluneh et al. [22] who found 43.2% in small ruminants and Muktar et al. 41.5% in cattle from dire dawa [23]. In eastern Ethiopia, animals are managed under extensive pastoralism in which large numbers of the animals are kept together. This could increase the degree of pasture contamination leading to higher prevalence rate [24]. However, the current prevalence was lower than report of Mideksa et al. who found 88.8% GI nematode prevalence in small ruminants. The result also showed there was statistical difference in prevalence of GI nematode infections among animal species, age, sex, body condition score and geographical origins of the animals [25]. This deference could be due to varied knowledge in anthelmintic utilization practices by the farmers, difference in agro-climatic conditions that could support prolonged survival and development of infective larval stage of most nematodes [26]. Furthermore, sample size variation and management system of animals could also contribute in the differences of the prevalence. Supporting the current study [27] also reported highly varied GI nematode infections rate that had been reported by different authors from Ethiopia.

The species specific prevalence calculation in our study indicated highly significant infection in ovine 63.33%) than in bovine (36.84%) and in caprine (52.67%) which was in agreement with the report of Dagnachew et al. [28] from Gondar area, and Waruiru et al. [29] from Kenya. This higher prevalence in ovine than caprine and bovine could be due to the grazing habit of the sheep where they might be grazing on contaminated pasture while goats are usually natural browsers. The higher prevalence in sheep than in cattle in this study might be due to small sample size (cattle) included to the current study; stress due to overcrowdings might also influence the immune status in sheep than in cattle. Contrary to this result reported that there is no significant difference in between sheep and goat in exposure to the GI nematode parasites [30].

Unlike the finding of Mideksa et al. statistical analysis of the current study showed there is difference in prevalence of GI nematode infections among animals with poor, medium and good body condition scores where the infection rate is significantly higher (p=0.00) in animals with poor body condition [25]. Muluneh J and



Graph 1: Proportion of GI Nematode infection intensity by species.

Knowledge and habit of respondents	No. interviewed	No. of respondent (%)
Knowledge on Anthelmintic drugs		
Know about anthelmintic	360	59 (16.39)
Don't know/poor	360	301 (83.61)
Level of individual's knowledge		
Well	360	23 (6.39)
Moderate	360	36 (10.00)
Poor/don't know	360	301 (83.61)
Source of anthelmintics drugs		
Licensed vet drug shop	360	72 (20.00)
Veterinary clinic	360	61 (16.94)
General shop/ nonprofessional trader	360	129 (35.83)
Awareness on talking animals to vet clinic and deworming		
Very good	360	36 (10.00)
Good	360	78 (21.67)
Poor/don't like	360	246 (68.33)
Mainly accessed anthelmintics		
Albendazole	360	90 (25.00)
Tetramisole	360	147 (40.83)
Ivermectin	360	123 (34.17)
Medicinal plants	360	87 (24.17)
Know about drug resistance		
Yes	360	76 (21.11)
No	360	284 (78.89)
Know about drug withdrawal period		
Yes	360	83 (23.06)
No	360	277 (76.94)

Table 4: Community Knowledge and status of anthelmintics utilization at the study areas.

Mohammed et al. also reported GI nematode infections is higher in animals with poor and medium body condition score than in animals with good body condition. This could be explained by the fact that loss of body condition in the study animals could be due to other factors, like parasitic infection and malnutrition or other concurrent disease which lead to lower immunological response against infective stage of the parasites [22,26].

Attributing to the Nana our study indicated higher prevalence of GI nematode infection in adult animals. This might also be because of the young animals are not exposed for grazing as adult and more time [31]. Chaparro also explained though most animals will stimulate a protective immunity against many species of nematodes after several months of exposure on pasture, there are certain parasites such as Ostertagia, for which an immune response is not so evident until at or after 2 years of age [32]. However, it contradicts with the report of Regassa and Mohammed et al. who found higher prevalence in young animals and justified their findings as that could be due to the fact that younger animals are more susceptible than adult counter parts. Adult animals may acquire immunity to the parasites through frequent challenge and expel the ingested parasite before they establish infection. This variation may be due to all animals of age group in the present study were kept under outdoor grazing system [24,26].

Attributing our study Ibrahim also reported a significant difference of some GIT parasites infection among sex group of animals. The differences may be related with sample size variation and some female animals included in the current study being lactating, some others in pregnancy stages during the study period [33].

The coprological investigation in the present study revealed Strongyle type nematode infection was the predominant with 16.15% infection rate. Haemonchus, Oesophagostomum, Strongyloides and Trichuris were also examined as important nematodes accounting 13.67%, 11.07%, 3.91% and 1.05% prevalences, respectively. Attributing to our study Mohammed also reported Strongyle nematode as the most prevalent one in eastern Ethiopia [26]. This high prevalence of Strongyle type nematode may be related with the direct life cycle nature of this parasite as explained by Nana [31]. However, Mideksa found Haemonchus as the most and Trichuris as the second least significant nematodes with 55% and 10% prevalence rates in small ruminants [25]. The variation in the nematode prevalence might be due to differences among pasture contamination, because FECs usually used to predict pasture contamination.

In this study there was significant nematode variation among PAs (p>0.05) of the four districts of the two zones west Hararghe (Chiro and Tullo districts) east Hararghe (Meta and Haramaya districts). The highest prevalence was observed in Genda abdi PA (72.50%) followed by Rakata-fura (60.29%) in west Hararghe whereas the prevalence of 67.37% in Chelenko main and 62.50% from Finkle was recorded as the first and second most prevalences in eastern Hararghe zone. Supporting our study Bacha also reported GI nematode infection rate varies among localities, species and age of the animals, body condition and other risk factors [34]. Our study also revealed there were also important differences, not only in prevalence of infections among considered risk factors, but also in egg counts. The nematode infection severity/burden (massive and medium) was higher in sheep and followed by goats and cattle. Out 63.33% positive sheep 15% and 22.08% were severely and moderately infected. This study supports the assumption of earlier works in other part of Ethiopia [35] and Kenya [29] that higher parasite prevalence is more common in sheep than in goats due to the grazing habit of sheep. According to Regassa the higher prevalence rate observed in sheep and goats of eastern Ethiopia could be due to difference in management system of the animals and breeds of these animals [24]. In eastern Ethiopia, animals are managed under extensive pastoralism in which large numbers of the animals are kept together.

According to the result of the current questionnaire survey, 71.67% (258/360) of the interviewed respondents did not know the economic impact of GI Nematode on animal production as a disease; they even did not care about control and treatment of infected animals. On the other hand, about 7.5% of the participants had good information about the negative impact of GI Nematode on animal production and productivity. The study result indicated only 17.78% animal owners had deworming schedule for the animals. This implies that majority of respondents had poor understanding on GI Nematode infection which is inconsistent with the report of Aga, Kumsa and Melaku et al. [11,36,37]. These authors reported that frequency of treatments with anthelmintics varied among animal owners but most of the farmers treated their animals twice a year mainly at the beginning and end of the long rainy season. Even though they had bought anthelmintic drugs from licensed professionals and also from nonprofessional traders to treat GI Nematode infection, our study result revealed only 10.28% of participants were familiar with the clinical manifestation and signs the disease whereas 17.22% of the participants had moderate understanding on it. Educational backgrounds, lack of logistic, and inadequate veterinary infrastructure had its own impact to poor understanding on economic importance of animal diseases including GI Nematode in developing countries particularly rural areas.

The results of the current study disclosed that mainly available anthelmintic drugs at our study areas are albendazole, tetramisole and ivermectin. The data obtained from visited veterinary drug shops and clinics; and interviewed professionals also mentioned these three drugs accounts almost about 90% anthelmintics available and had been used to treat GI nematode infection at the investigated districts. Beside this about 24.17% of animal owners had used mmedicinal plants (that had been believed to heal internal parasites) recommended by individuals whom locally experienced with ethno veterinary medicine to treat the nematode infection and other diseases. In line with this and free access in getting anthelmintics about 68.33% respondents had poor awareness of taking sick animals to clinics. Supporting this study, Wakayo explained even though Safe and effective use of anthelmintics requires professional regulation and supervision as also stipulated in Veterinary Drug and Feed Administration and Control (DACA) Proclamation No. 728/2011", widespread infringements such as: marketing of unknown formulation drugs, professionally unsupervised prescription and use of drugs, inappropriate calculation of drug doses and exhaustive use of few drugs is common in Ethiopia [38].

The current result indicated animal owners had free access in getting anthelmintic drugs from both licensed professionals and nonprofessional traders and sometimes treats their animals by themselves which enhance the development of anthelmintics resistance. Kumsa also found animal owners do not have information about anthelmintic rotation and the farmers treat their animals only by visual estimation of animals' body weight to determine the required doses [36]. Scientific information on GI parasites anthelmintics resistance problems prevailing under small holder farm settings is limited in Ethiopia [38]. The current study showed about 78.89% of interviewed respondents did not know the issue of anthelmintics resistance and its future impact. Waller Also reported anthelmintic resistance has become a global problem in the small ruminant industry during the last three decades [39]. According to Aga in western Oromia, the existing method to control endo-parasites has increased its dependence on the treatment with anthelmintics [11]. Meanwhile, the risk of under dosing and a continued use of one class of anthelmintics, irrespective of efficacy status are frequently encountered on many farms. Even though majority of the people at our study area depends on animal products (milk, meat etc.) as source food, 64.72% (233/360) participants had no understanding about residual effect of drugs (meat and milk drug withdrawal period). They prefer to slaughter sick animals when animals are unable to recover (poor response to treatment) from the disease they had been suffering with. This habit not only implies people poor understanding on drug residual effects but also lack of public health awareness including zoonosis.

In conclusion the study indicated Strongyle type nematode infection is more prevalent than Haemonchus, Oesophagostomum, Strongyloides and Trichuris at the study area though some animals suffer mixed nematode infection. On the other hand 51.3% overall prevalence of GI nematode parasites in ruminants at the study area indicated, the significance of these parasites in hampering animal production and productivity. However, the EPG counting result also indicated majority of the study animals (18.86% bovine, 26.67% ovine and 33.67% caprine) were slightly infected. The questionnaire survey analysis showed majority of the people had poor to no information on economic importance GI nematode (71.67%) and anthelmintic drugs utilization/practices (83.61%) to manage drug resistance. The result showed only 17.78% participants had deworming schedule and 68.33% of the respondents had no habit of even talking sick animals to veterinary clinics and also did not deworm their animals.

On the other hand, the role of ruminant animals in the realizing of the economy of the country and individual owners were very high. Hence there should be a need of more management practices in order to be benefit from these animals. At field level involving both veterinarians and animal owners, it is mandatory to increase awareness among them about rotational and minimum use of anthelmintics through enhancing the interaction among them by regular training programme. Further study should also be conducted to identify parasites species using the faecal culture and post mortem examination in study area.

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