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Prevalence of Gastro-Intestinal and Haemoprotozoan Parasite of Sheep and Goat at Veterinary Teaching Hospital, Bishoftu, Ethiopia

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Abstract: A cross-sectional study was conducted from December, 2017 to May, 2018 to assess the prevalence of intestinal and haemoprotozoan parasites of Sheep and Goats in Veterinary Teaching Hospital, Bishoftu, Ethiopia.A total of 120faecal samples (73-sheep, 47-goats) and 50 blood smears (35-sheep, 15-goats)were examined, for the presence of eggs of intestinal and haemoprotozoan parasites, respectively. The samples were collected from the Veterinary teaching hospital and its surrounding in Ada'aBarga district Bishoftu town.Faecal samples wereprocessed by sedimentation technique and examined under low power objective (×10) and blood smears were stained usingGiemsa's technique and examined under oil immersion (×100).The analysis of data showed an overall prevalence of intestinal parasites was foundto be 54.79% and 40.4% in sheep and goats, respectively, whereas 21.6% of sheep and 8.3% of goats had the haemoprotozoanparasitic infection. High significant difference ($p<0.001$) in the prevalence of intestinal ($\chi^2=45$) and hemoprotozoan ($\chi^2=19.6$) parasitism was observed between sheep and goats. Intestinal parasites such as strongyles, Haemonchus, *Moniezia*and coccidia were identified in which the highest prevalence was observed with coccidia, followed bystrongyles, Haemonchus and the least with *Moniezia*in both the sheep and goats. The haemoprotozoan parasitesrecorded were *Babesia*and *Anaplasma*species, of which, *Anaplasma*spp. being the highest and *Babesia*species the leastprevalent in both the sheep and goats. The seasonal prevalence of intestinal parasites showed highest in rainy season and least with summer in both the sheep and goats, whereas the haemoprotozoan parasitesrecorded were the highest in summer followed by winter and least with rainy season.The present study suggests that Ada'aBarga district of Bishoftu town is highly endemic for intestinal parasitessuch as coccidia and strongyles and haemoprotozoans such as *Anaplasma*and *Babesia*species in small ruminants.

Key words: Blood Parasites · GIT Helminths · Goats · Prevalence · Sheep · Ethiopia

INTRODUCTION

Livestock diseases that inflict major socio-economic losses in Ethiopia occur every year. Annual disease losses amount to 14-16% and sheep populations' respective parasitism is of supreme importance in many agro-ecological zones and still a serious threat to the livestock economy worldwide [1]. Ethiopia has about 30.7 million sheep and 30.2 million goats [2]. The relative importance of these resources and their products varies from region to region and are largely determined by ecological and economic factors. Traditionally keeping large number of small ruminants was considered as an expression of status in the rural community. However, with ever-increasing human population and drastically shrinking farmlands, sheep and goat production is becoming a means of survival particularly for the landless youth and female headed households in the rural areas. As a result, the contribution of small ruminants is increasing whereas sustaining large ruminants is facing complexity during season of serious feed shortage [3, 4].

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Worldwide parasite helminthes and protozoan are major cause of losses in productivity and health problem of goat and sheep and usually associated with huge economic losses especially in resource poor region of the world [5]. The annual estimated financial loss in the study reported by [6] need to be cautiously interpreted as it would be affected by factors which are dynamic and change over time due to market price of sheep and goats as condemnation of the brain means condemnation of the animals, prevalence of disease and number of animals slaughtered every year which can change the amount of financial loss from year to year. Littering the environment with plastic bags and other indigestible materials could pose serious health problem for free grazing ruminants [7], which impose animals to foreign bodies and result in economic losses.

The effect of infection with gastrointestinal helminthes varies according to the parasite concerned, the degree of infection and other risk factors such as species, age, season and intensity of worm burden [8]. The problem is much more severe in tropical countries due to very favorable environmental sheep and goats, with their higher reproductive capacity and growth rates, are ideally suited to production by resource-poor smallholders [9, 10]. Helminthes infections remain one of the major constraints to small ruminant production in tropics [11, 12].

Gastrointestinal (GI) parasitism is one of the major health problems affecting productivity of small ruminants worldwide [13]. GI parasitic infection in sheep and goats are of much economic importance because, small ruminants rearing has become a major source of income especially for the poor marginal farmers in rural areas. Sheep and goats in sub-Saharan Africa may be infected with a wide variety of parasites among which the gastrointestinal parasitic infection are the commonest and these include helminthic infections especially *Haemonchuscontortus*, *Strongylus* and *Cooperia* [14, 15] as well as economically important vector-borne prokaryotic and eukaryotic blood parasites such as the *Babesia*, *Anaplasma*and *Ehrlichia*(*Cowdria*) and the protozoan diseases including coccidiosis, protozoan parasites like *Theileria* and *Trypanosoma* [16, 15].

Various risk factors play an important role in the onset of GIT infections, due to host and environment. Environmental factors include agro-ecological conditions, animal husbandry practices such as housing system, deworming intervals and pasture management [17] these largely determine the type, incidence and severity of various parasitic diseases [18]. Other risk factors such as the host species, sex of the animal, age, body condition and breed/genotype [19] parasite species and intensity of the worm population, have an effect on the development of gastrointestinal parasitic infections [20].

The tropical environment is for various reasons eminently suitable for the development of these parasitic diseases [21]. The sheep and goats are important animals used for poor families of sub-Saharan Africa, specifically Ethiopia. However, parasitic burden causes decreases in production and reproduction of these animal species. Therefore, this study was carried out to.

- Determine the prevalence of intestinal and haemoprotozoan parasites of Sheep and Goats.
- Identify important risk factors for the occurrence of parasite in study area.

MATERIALS AND METHODS

Description of the Study Area: Fecal samples and blood smears were collected from the animals coming to Veterinary teaching hospital and its surrounding Bishoftu town.Bishoftu is one of the industrialized town of Oromia region and is a separate district located in the East Shewa zone at 47 kilometers South East of the capital city of Addis Ababa, on the main road to Adama. The absolute location of Bishoftu is 9°N and 40°E with an altitude of 1920 meters above sea level. Topographically the city is located in tepid to cool sub-moist mid highland with moderate weather condition. The temperature of the area falls within a range of 16°C and 24°C. The mean relative humidity is 61.3% [2].

Study Design and Sample Size Determination: Study animal were randomly selected sheep and goat from different origin in different age group and sex brought to Veterinary teaching hospital during September 2017 to April 2018. A cross sectional study was conducted for the prevalence of blood and gastrointestinal parasites from goat and sheep feces and blood. A total samples 120 feces and 50 blood were collected.

Sample collection and Processing: About 20g of faecal materials were collected directly from the rectum of the sheep and goats and placed in clean polythene bags. While 5ml of blood was collected from the severed jugular vein using tubes contain in Ethylene Diamine Tetra Acetate (EDTA) as anticoagulant. The samples were properly labeled and then transported immediately to Addis Ababa University, Parastology laboratory for identification of parasite.

Examination of the Faecal Sample: Faecal samples submitted to Department of Veterinary Parasitology laboratory were processed by sedimentation technique and examined under low power objective (×10). The ova of intestinal parasites were identified based on their morphological features [22].

Floatation Technique: Three gram of the faces were taken in a mortar, ground and mixed thoroughly in a saturated sodium chloride solution. The suspension was poured through a tea sieve into a beaker to remove the large particles. The solution was poured into a small bottle until it was completely filled to make a convex meniscus at the top. Then it was covered with a clean grease-free cover slide. The cover slide was removed after 20 min and placed on a clean slide to be examined at 10x magnifications.

Sedimentation Technique: Three grams of the faces were mixed with water and poured in to tubes. The tubes were centrifuged three times for 5 min; each supernatant fluid was removed and replaced each time. The deposits were taken and placed on slides with covers slip and examined at high power 40× magnifications for detection of parasites ova.

Examination of Blood Smear: On arrival to the laboratory, the blood samples were immediately examined for the presence of parasites using Geimsa stained thin and thick blood smears.

Thin Blood Samples: Thin blood films were prepared on slides, dried and fixed with absolute methanolicalcohol. Then these smears were stained with 5% diluted Giemsa stain 30% solution for 45 min. Films were washed using distilled water, dried and examined microscopically under oil immersion at (100xmagnification for blood parasites detection. The parasites were identified based on theircharacteristic morphology [23]. The smears recorded as negative for Babesia if no parasites were detected in oil-immersion fields.

Thick Blood Smears: One drop of fresh blood was placed on a slide, covered with a cover-slip and examined microscopically for detection of motile parasites at low power objectives (40xmagnifications).

Data Analysis: Data were statistically analyzed using Pearson Chi-squared test at $p<0.01$ regarded as statisticallysignificant [24] and Microsoft Excel and statistical package for social science (SPSS) version 20 was used for presentation of the results.

RESULTS

From the total sample (n=120), fecal samples and haemoprotozoan parasites examined in the present study results was found to be 49% and 30% respectively. The gastrointestinal parasites observed in this study were Strongyles, *Coccidia, Moniezia* and *Hemoncus* (Table 1). The haemoprotozoan parasites isolated were *Babesia* and *Anaplasma* species (Table 2).

Highly significant difference ($p<0.001$) in the prevalence of intestinal ($\chi^2=45$) and haemoprotozoan ($p<0.03$; $\chi^2=19.5$) parasitism was observed between sheep and goats. Intestinal parasites such as strongyles, *Haemoncus, Moniezia* and coccidian were identified in which the highest prevalence was observed with coccidia, followed by strongyles, *Haemonchus*and least with *Monezia* in both the sheep and goats (Table 1 and 2). The haemoprotozoan parasites recorded were *Babesia*and *Anaplasma* species, of which, *Anaplasma*species being the highest (48.4% and 58.5%) and *Babesia*species were the least prevalent (30% and 41%) in both the sheep and goats.

From the risk factors analyzed body condition score and management system have significant difference with the occurrence of intestinal and haemoparasites of sheep and goats. While there were non-significant difference between ages and occurrence of parasites in sheep and goats. The seasonal prevalence of intestinal parasites showed highest in rainy season and least with summer in

Table 1: Overall prevalence of intestinal parasite infections in sheep and goat.

Animals	Number of faecal samples examined	Number of positive	Percentage	χ^2	P-value	Moniezia	Coccidia	Hemoncus	Strongyle
Sheep	73	40	54.79	45	0.001	5(12.5%)	19(47.5%)	6(15%)	10(25%)
Goats	47	19	40.4			2(10.5%)	10(52.6%)	3(15.7%)	4(21%)
Total	120	59	49			7(11.8%)	29(49%)	9(15.2%)	14(23.7%)

Table 2: Overall prevalence of haemoprotozoanparasite infections in sheep and goats.

Animals	Number of blood smear examined	Number of positive	Percentage	χ^2	P-value	Babesia	Anaplasma
Sheep	33	26	21.6	19.5	0.03	10(8.3%)	16(13.4%)
Goat	17	10	8.3			7(5.8%)	10(8.3%)
Total	50	36	30			17(14.1%)	26(21.6%)

Table 3: Prevalence of associated risk factors with the occurrence of internal and haemoprotozoan parasites in sheep and goats

Risk factors	Number of animal examined	Number of positive animals	Prevalence (%)	χ^2	P-value
Body condition				32.3	
Poor	42	30	25		<0.001
Medium	50	17	14.16		0.02
Good	28	12	10		0.70
Ages				0.78	
Adult	84	41	34.16		0.80
Young	36	18	15		0.21
Management				24	
Intensive	44	15	12.5		0.01
Extensive	76	44	36.6		<0.001

both the sheep and goats whereas the haemoprotozoan parasites recorded were highest in summer, followed by winter and least with rainy season. Highly, significant difference ($p<0.001$) in the prevalence of intestinal and haemoprotozoan parasitism was also observed among different seasons in sheep and goats.

DISCUSSION

Among the intestinal parasites observed in the present study, coccidian infections were predominant in both the sheep and goats. This result is in agreement with the findings of Obijiaku and Agbede [25] who also reported a high prevalence of *coccidia*in lambs and kids. Also Namakkal reported the higher incidence of *Eimeria*spp. in 34.61% of sheep [26] and 26.57% of goats in Greater Kamrup district of Assam [27] and similar findings were also reported from Nigeria, the high prevalence of coccidia was observed in both the lambs and kids [28]. The high prevalence of coccidiosis in small ruminants obtained in this study could be as a result of the management system operated by most small ruminants' owners especially during the rainy season when animals are confined to avoid damage to crops. Consequently, such animals are overcrowded in the pens, which are not properly cleaned regularly. These factors with the high marshy areas of the study site predispose them to high parasitic infections. Next to coccidia, strongyle infection was observed high in both the sheep and goats in this study.

The observed high prevalence rate of intestinal nematodes agrees with the findings of earlier investigators [15, 28, 29]. It was reported that the prevailing climatic conditions especially rainfall and temperature favor the development and survival of parasitic nematode eggs of infective stages [30]. The least infection of *Monezia* in sheep and goats may be due to the short rainy season in the study, which limited the accessibility of infection through snails.

An effort that was made to know the influence of seasonal variation on the prevalence of helminthes infection was found to be significantly high during summer and least in winter in both the sheep and goats. The present investigation is in agreement with the report from Maiduguri, Nigeria [31] a high prevalence of *Haemonchus*and *strongylus*species were encountered during rainy season and attained peak counts at the same time in both goats (June) and sheep (July). There was a definite seasonal influence in faecal egg counts of the sheep and goats and this corresponded with the pattern of rainfall. Environmental conditions are usually favorable for the development, survival and translocation of pre-parasitic stages during the rainy season. Therefore, there is a gradual build-up of adult worm populations in grazing animals so that higher prevalence of helminths recorded during the rainy season.

The haemoprotozoan parasites recorded in this study showed highest in summer and least with rainy season. This study is in agreement with the previous studies in cattle [32] reported that prevalence of babesiosis was significantly higher during summerand less in winter season. The species of haemoprotozoan parasites reported in this study were similarly observed by Takeet *et al*. [33] in sheep that *Anaplasmaovis*is the most prevalent haemoprotozoan parasite in both sheep and goats [34]. The health problems, management problems and diseases control measure were general, economically tolerable and can achieve good health problems [35]. The prevalence of babesiosis is directly related to its tick vectors, seasonal animals and pasture treatment before and after rainy season and awareness creation on routine investigations of tick vectors [36]. The main problems for occurrence of haemoparasites, specially, babesiosis and anaplasmosis are ticks prevalence and ages of animals [37]. A relatively high incidence of the haemoprotozoan parasite could be attributed to the favorable environmental conditions for the survival and transmission dynamics of the arthropod

vectors. Considerable seasonal variation with respect to the occurrence of the haemoprotozoan disease may be due to changes in macroclimate that is essential for breeding of ticks.

CONCLUSION

The results from the study indicated that theBishoftu town of Ada'aBarga district is endemic for the prevalence of coccidian, strongyles and *Anaplasma*in sheep and goats. The result of this study clearly shows that most of the small ruminants kept in the area of the study are infected with blood and intestinal parasites. The study identified area, sex, ageand month as the most relevant risk factors for the development ofgastrointestinal parasites across agro-ecological regions. Further-more, the effect of site was explored for impact of different riskfactors on parasitic infections and common parasite species andrisk factors differed with area. Knowledge on these gastrointestinalhelminths species and of the epidemiological parameters is important in the development of appropriate control strategies for thedifferent areas. This has a potential to reduce production losses andimprove rural livelihoods.

The results of the present study would help to anticipate disease outbreak not only in this town but also relevant to other parts of the country where similar type of climatic condition triumphs. Prevention and control programs against these parasites of sheep and goats in endemic areas will improve the production potentials of these animals and the economic well-being of the marginal farmers. There is a need for further investigations using molecular techniques for the accurate identification of the carrier status of haemoprtozoan parasites in small ruminants.

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