

Study on Nematode Infections in Horses and Donkeys in and Around Bishoftu, Ethiopia

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DOI: 10.31080/ASVS.2022.03.0257

Received: October 19, 2021

Published: November 12, 2021

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Abstract

The study was conducted in and around Bishoftu town from November 2018 to May 2019 in order to estimate the prevalence of Gastrointestinal tract nematode infections and to identify the associated risk factors with the occurrence of nematode parasite infections. A fecal sample was taken from 272 horses and 112 donkeys and examined. During the examination, floatation technique, McMaster technique and berman technique were employed to identify the egg, burden of infection and the larvae of lung worm respectively. The parasites encountered were strongyle, *Parascaris equorum* and *Dictyocaulus arnfieldi* with respective prevalence of 38.54%, 0.89% and 0.74 respectively. The overall prevalence GIT nematode infections were 26.84% and 71.43% in horses and donkeys respectively. Species, body conditions and origins of the animal having respective p-values of 0.0001, 0.000 and 0.000, were significant effect. The study indicates a mean faecal egg counts (1661) egg per gram in donkeys. Body condition was a significant difference ($P < 0.05$) in mean EPG. Poor body condition harbors highest EPG than good body condition. Favorable climatic conditions for parasitic egg development, poor animal management, lack of awareness, mixed pasture grazing, and inadequate health services are contributors for highest infestation. Therefore, further study on the impact of the disease on equine, pasture management, use of rotation grazing and regular deworming is recommended.

Keywords: McMaster Technique; Parasite; Encountered; Infections

Introduction

From Africa the highest population of livestock is found in Ethiopia, previous study shows that 35 million tropical livestock unit. Horse and donkey covers 2.03 and 7.43 million respectively [1]. Among the total Africa equine population 50% are found in Ethiopia [2,3]. Horse and donkeys have several importance as working animals, for packing, riding, carting and ploughing. Equine are very important for transport system in the place where modern transportation is insufficient and road accessibility is poor. Farmer use equine to transport the agricultural products. Relative to cost horses and mules are taken high cost for buying than donkey but they are faster and more powerful animals for work [4].

Due to the presence of high prevalence of endoparasite, malnutrition and other constraints equine remains marginal relative to its population number. In the livestock farming system

parasite are the major challenge, which is characterized by high morbidity and mortality rates and leads to poor development of the country [5]. Internal parasite leads to poor weighing gain, reduced power output, low productivity and short life span [6].

Equines are among the most important animal in human and they are intimate relationship. Equines have different contribution for man through their social, cultural and economic aspect. In Ethiopia equine give different services especially in areas where inaccessibility of modern means of transportation and in the absence of road [7]. Equine play an important role in rural communities such as providing power, riding, to transport agricultural product and means of gifts for different cultural ceremony [8].

Among different internal parasite nematodes are the most economically important parasites in equines [9]. The degree of tissue

damage due to nematode infection is depending on the species, infestation rate of the parasite and, nutritional and the immune status of equine. Nematode infection cause to reduction the performance of animal, poor productivity, poor weight gain, high morbidity and mortality and cause to high treatment cost for the owner [10]. In developing country gastrointestinal parasite are the most important disease in equine and it cause one of the source of poverty [11].

All over the world, horses and donkeys are exposed to helminthes parasites from many orders and genera resulting in significant morbidity and mortality [12]. Equines are exposed to different types of intestinal parasites. Such as Dictyocaulus, large and small Strongyle, Ascaris, fluke and trimatodes are the common problems encountered in equine. Mixed infections are most commonly found in horses [13]. GIT parasites share with the equine digestive nutrients and cause to retarded growth, reduce power cause to discomfort and pains and it also lead to mortality [14].

A heavy infection of strongyle causes' severe loss of body condition/emaciation leads to death of animals. Light infections can also affect the growth performance and work output. The adult worms of large strongyle cause gut wall lesion and migratory nature of the larva damage different tissues of the body. Larvas of Strongyle vulgaris are develop in the mesenteric artery causing inflammation of the artery and develop thrombosis or arterial obstruction [15].

In Ethiopia equine are huge number of economic importance, but there is inadequate knowledge about the welfare and different health problems that affecting equines. Equine management and health care are very poor especially attention given to donkeys has neglected relative to horse [16]. Many researchers indicate equine harbor GIT parasite in Ethiopia. The purpose of this study was aimed:

- To estimate the prevalence of gastro intestinal nematodes in donkey and horse
- To assess the risk factors with the occurrence of nematode parasite infections
- To identify the common GIT helminthes parasites of equines in and around Bishoftu town.

Methods and Materials

Study area

Study was conducted from November,2018 to May 2019 on horses and donkeys in and around Bishoftu town which is located

in the East Shewa zone of Oromia regional state at 47 km South of Addis Ababa on the main road to Adama. The exact location of Bishoftu is 8°45'N latitude and 38°59'E longitude and at an altitude of about 1920 meters above sea level. The temperature falls within a range of 16°C and 24°C. Bishoftu town is the largest urban center in its population size, the population threshold is above 100,000 [17].

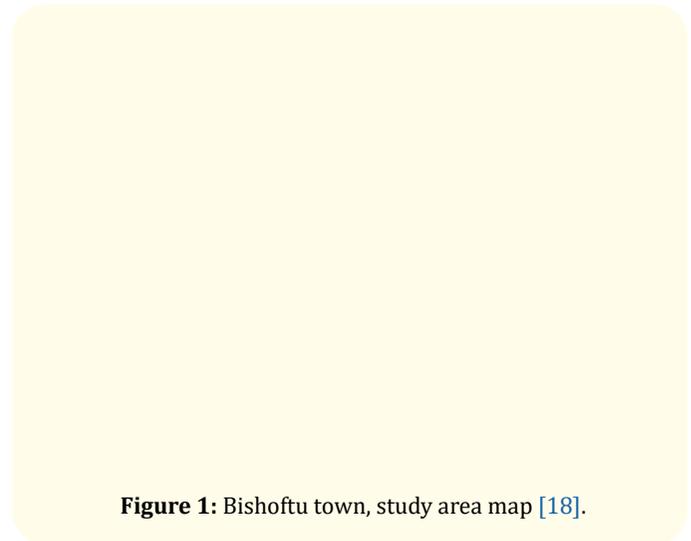


Figure 1: Bishoftu town, study area map [18].

Study animals

Study animals were horses and donkeys in and around Bishoftu town and were randomly selected (272 cart horses and 112 donkeys). In this study Working and adult equines are considered. Equines found from different areas of Bishoftu town and its surroundings were used in this study. The body conditions of the animal was grouped or classified as poor, moderate and good according to [19].

Study design and sampling strategy

In order to estimate the prevalence of gastro intestinal Nematode a cross sectional study was conducted. Horse and equines was selected by simple random method. Fresh fecal samples were taken from each selected donkeys and horses directly from the rectum using disposable plastic glove. Different risk factors such as sex, species, age, study Site, management system and body condition scores were recorded on each sample.

Sample size determination

The sample size for this study is calculated by using [20] formula. The sample size determined by taking 82% expected prevalence from the previous study done by [21] in the study area. Therefore

by using this 82% expected prevalence at confidence level of 95% and required absolute precision of 5% the minimum sample size was 227. However in order to increase precision of the study total of 384 animals were examined.

Sample processing and egg identification

Fresh fecal samples were collected from the rectum of the equines and taken to parasitology laboratory of Addis Ababa University College of veterinary medicine for examination. Fecal examination was carried out by direct sedimentation, floatation technique, McMaster technique (to see the level of infection) and larvae were recorded using Bearman apparatus technique to identify *D. arnifildae*.

Level of infection

The McMaster technique is used for demonstrating and counting helminthes eggs in faecal samples. It is very important technique to estimate worm burden in the animal based on nematode eggs per gram of faces. During Macmaster technique faeces weight must be proportional because it is affecting the reliability of the method. In order to minimize extrapolation in estimating EPG large amount of faeces per host must be analyze [22,23]. In this study the minimum egg counted was 150 EPG and maximum was 1661 egg was recorded. The total EPG was calculated the given formula. $Epg = side\ 1 + side\ 2) \times 50$.

Data analysis

Recorded data were entered in excel spread sheet as database and used to analyze different attributable factors and the data transferred to SPSS 20 version for windows package 2007 for further statistical analysis. Chi square test is used to analyzing species, site of sample collection, and body condition risk factors. The confidence level was held at 95% confidence interval and from the result p values less than 0.05 considered a significant level.

Results

From 272 horses and 112 donkeys examined 73 horses and 80 donkeys were found infected by nematode parasite with the prevalence of 26.84% and 71.43% respectively. Generally the over prevalence was 39.84%.

The study indicates there was significant difference between species of animals, body conditions and study site ($p < 0.05$).

Species	Animals	x ²		P value
Horse	272	25.74%	64.5689	0.000
Donkey	112	69.64%		

Table 1: GIT parasite prevalence species as a risk factor.

The prevalence of GIT nematode infection was found to be higher in donkeys than horses with 26.84% and 71.43% respectively.

%	x ²	p value
Body condition	53.0835	<.0001
Poor	90 (%61.22)	
Moderate	32 (28.32%)	
Good	26 (20.97%)	

Table 2: The prevalence of strongyle infection based on body conditions of the species.

There was statistically difference in the prevalence of the parasites between the body conditions of the animals with high prevalence in poor conditioned animals compared to good body condition (Table 2).

		%	X ²	P value
Body condition	Poor	61.22%	53.0835	<.0001
	moderate	28.32%		
	Good	20.97%		
Study Site	Bishoftu	26.19%	54.8316	0001
	Dire	34.90%		
	Godino	77.61%		
Animal species	horses	25.74%	64.5689	0001
	donkeys	69.64%		

Table 3: Prevalence of strongyle infection by risk factor.

The prevalence between strongly and the animal species were found highly significant with p value of <.0001. The donkeys were much more affected by strongly infestation than horse with prevalence of 69.64% and 25.74% respectively. Thus, because donkeys are the most neglected animals and poorly managed. There was strong association between the body condition and the parasitic infestation with p value of 0.0001. Animals having poor body conditions were more affected followed by moderate and good respectively. There was also variation between the site and parasitic infestation was found significant as shown in the table 4. The prevalence was higher in Godino followed by Dire and Bishoftu with respective prevalence of 77.61%, 34.90% and 26.197% respectively.

		Overall parasitic infection	X ²	P value
Body condition	Poor	63.27%	55.3240	0.000
	Moderate	28.32%		
	Good	22.58%		
Site	Bishoftu	27.98%	50.5520	0.000
	Dire	36.24%		
	Godino	77.61%		
Species of animal	Horses	26.84%	65.8107	0.000
	Donkeys	71.43%		

Table 4: Overall prevalence of GIT nematode parasite infections among species, origin of the animal and body conditions.

This study shows that there was high prevalence of parasitic infestation in equines having poor body conditions followed by moderate and good 63.27%, 28.32% and 22.58% respectively.

The species body condition and the overall parasitic infestation found to be highly significant with the p value of 0.000. Donkeys found to be the most infected equids with prevalence of 71.43% in this study.

Parasite	Horses	Donkeys	X ²	P values
Parascaris equorum	1.10%	0%	1.2450	0.2645
Lung worm	0.74%	0.89	0.0254	0.8734
Strongyle	25.74%	69.64	64.5689	<.0001

Table 5: GIT nematode parasites identified during the study period.

The prevalence of both lung worm and *Parascaris equorum* was not found significant. Equines having good body conditions were found free of both lung worm and *Parascaris equorum* in this study area.

Mgt system	No. animals examined	No positive animals	Prevalence
Intensive	272	73	26.84%
Semi intensive	42	16	38.1%
Extensive	70	43	61.42%

Table 6: Prevalence of equine GIT parasite depend on different management systems.

$$P = .000, x^2 = 39.82$$

The prevalence of GIT helminthes parasites was found higher under extensive management followed by semi extensive and intensive respectively. The difference between in different management system was statically highly significant (P < 0.05).

Discussion

In this study the overall prevalence of gastro intestinal helminthes parasites in the study area was 39.84%. This was relatively lower than some of earlier reports 98.2% [16], 96.9% [24] and 92.71% [25], at Dugna Borana district, Hawassa town and at Gonder zone respectively. The variation between different reports can be done by free from gastro intestinal helminthes parasites or level of infection, grazing lands and management system such as feeding can affect the occurrence these diseases. The major helminthes parasites were found in Bishoftu. Compression was made regarding prevalence with respect of origin, species and body condition scores. The level of infection is different between equines.

It is higher in donkeys than horses and the statically significance between them is (p < 0.05) because of the difference in feeding, deworming by anti-helminthes and management system in general. In the present study, the level of GIT nematode parasites was relatively higher in donkeys (71.43%) than horses (26.84%) which is not disagree with the study of [26-28] in Sudan having a findings of 78.54%, 70.8% and 37.48%.

This result is much higher than the study of [29] with the prevalence of 29.79% of horses and 37.48% of donkeys in south Darfur state. However, the present finding is lower than the result of [16,24,25] with findings 98.2%, 96.9% and 92.71% for prevalence of GIT parasites in equines at around Dugda Bora, around Hawassa town and around Gondar district respectively.

The difference in prevalence and its occurrence of parasites can be because of difference in management system, the presence and absence of veterinary clinic, season, deworming strategy and difference in agro-ecological zone in the study areas. The prevalence of GIT nematode parasites is significantly associated with risk factors such as origin of animals, body condition, and species of animal with p-value of (0.0001, 0.0001 and 0.000) respectively in line with report of [26,30] they reported (p = 0.001 and p = 0.000) for species and body condition respectively.

In this study strongyle was have higher percentage rate (38.54%) than other GIT nematode parasite. The study agrees with

the study in Kombolcha town [30] but the current finding is lower than the result (75.26%) in Hawasa town.

In this study management system was statically significant difference ($p < 0.05$) the prevalence of (61.42%, 38.1% and 26.84%) in extensive, semi intensive and intensive management system respectively. Generally the study indicates that equine kept in extensive management system are more exposed and highly infected than equines managed semi intensive and intensive system which is agree the reported of [31].

Conclusion and Recommendations

Strongyle parasite is the most occurring parasite in and around Bishoftu town. *Parascaris equorum* followed by *D. arnifildae*. In this study donkey was most susceptible and infested severely than horse. Similar to several previous studies, this study also confirmed that poor body condition equines are more infected than good body condition equine. Based on the finding species and body condition are the most important risk factors for infection of nematode.

In this study gastro intestinal nematode is found the most health problem of donkey and horse in and around Bishoftu town. But still now the care given to the animal is not good enough especially donkey management is very poor than horse management. In the study area horse are used for cart purpose which gives high attention for horse proper management.

The study shows Strongyle species, *Parascaris equorum* and *D. arnifildae* found the major nematode infections. To use horses and donkey more efficiently proper parasitic prevention and control must be implemented regularly. Generally GIT helminthes infection has great economic importance in equines and poor management system was identified the most exposing risk factor for infection of equines. Based on the above conclusion and the finding of this study the following recommendations were forwarded:

- To minimize the effect of GIT parasite, control and prevention method such as rotational grazing, zero grazing and strategic deworming programmes should be carried out.
- Especial attention must be given for donkey management and owner awareness creation and good veterinary clinic service must be expanding in the study area.
- Newly introduced animals into the herd must be dewormed before contaminating the grazing pasture.

- Public awareness creation to equine owners on proper regular deworming, sufficient feed supply and minimizing extensive open grazing are also important.

Bibliography

1. CSA (Central Statistics Agency). Agricultural Sample Survey 2014/15. Volume II Report on Livestock and Livestock Characteristics (Private Peasant Holdings), Central Statistical Agency (CSA), Addis Ababa, Ethiopia (2015): 188.
2. Technical Center for Agricultural and Rural cooperation (CTA). Livestock development policies in Eastern and Southern Africa proceeding of seminar by CTA, OAU/IBAR and the Ministry of Agriculture and cooperatives. Swaziland (1997): 216-220.
3. Tegegne T., *et al.* "Cross border livestock Trade and Food Security in the Southern and Southeastern Ethiopia Border lands". OSSREA. Developmental Report series. No.1 Commercial printing Enterprise. Addis Ababa, Ethiopia (1999): 1-6.
4. Pearson RA., *et al.* "Harnessing and hitching donkeys, horses and mules for work". Center for tropical veterinary medicine. University Of Edinburgh, UK and department of agriculture and rural engineering. University of Venda for science and technology. South Africa (2003): 1.
5. Jobre Y., *et al.* "Health Problems of Working Donkeys in Debre Zeit and Menagesha of Ethiopia in Field". D and Pearson, R.A., (Eds), Donkey, Mules and Horses in tropical agricultural development. Proceedings of colloquium held 3-6 September (1991): 151-161.
6. Pandey VS., *et al.* "Parasites of donkeys in Africa". Proceedings of the second colloquium on working equines. (EDS. Bakkoury, M and Pretis, R.A.). Institutes of Agronomies et veterinary Hassan II. Rabat. Morocco (1994): 35-44.
7. Abayneh T., *et al.* "The potential role of donkeys in land tillage in central Ethiopia". *Bulletin of Animal Health and Production in Africa* 50 (2002): 172-178.
8. Anteneh W and Getachew S. "Gastrointestinal nematodes of donkeys and horses in Gondar town northwest, Ethiopia". College of Veterinary Medicine, Haramaya University (2016).
9. Yanzhen B., *et al.* "Strongyloid nematodes in the caeca of donkeys in Henan Province, China". *Acta Parasitology* 54 (2009): 263-268.
10. Asefa Z., *et al.* "Endoparasites of donkeys in Sululta and Gersa Districts of Central Oromia, Ethiopia". *Journal of Animal and Veterinary Advances* 10.14 (2011): 1850-1854.

11. Perry BD, *et al.* "Investing in Animal Research to Alleviate Poverty". International Livestock Research Institute, Nairobi (2002).
12. Hodgkinson J. "Molecular diagnosis and equine parasitology". *Veterinary Parasitology* 136 (2006): 109-116.
13. Boxell A, *et al.* "Occurrence of gastrointestinal parasites in horses in metropolitan Perth, Western Australia". *Australian Veterinary Journal* 82 (2004): 91-95.
14. Elisabeth D and MBE Sevendesen. "Professional donkey hand book". Anley road, London W14 OBY, (1997): 61.
15. Haimanot D., *et al.* "Prevalence of Strongyle Infection in Horses and Donkeys in and Around Dangila Town, Northwest Ethiopia" (2015).
16. Ayele G., *et al.* "Prevalence of gastro-intestinal parasites of donkeys in Dugda Bora District, Addis Ababa University, Faculty of veterinary medicine, donkey sanctuary". *Livestock Research for Rural Development* 18.10 (2006).
17. Oromia Urban Planning Institute (OUPI): Structural Plan of Bishoftu Town, Demographic Profile, Utilities, and Social Services Final Report, Addis Ababa, Ethiopia (2009).
18. Dejene T. "Analyzing spatial distribution and accessibility of primary schools in Bishoftu Town, Ethiopia". *Spatial Information Research* 27 (2018): 227-236.
19. Svendsen E. "The profession hand book of the donkeys". 4th ed. England, sidmouth Devon: whittet books, (2008): 401.
20. Thrusfield M. "Veterinary epidemiology". 3rd edn. Blackwell Science Ltd, UK. (2005): 232-245.
21. Seyoum Z., *et al.* "Prevalence, intensity and risk factors of infestation with major gastrointestinal nematodes in equines in and around Shashemene, Southern Ethiopia". *Tropical Animal Health and Production* 47.8 (2015).
22. Cringoli G., *et al.* "The influence of flotation solution, sample dilution and the choice of McMaster slide area (volume) on the reliability of the McMaste technique in estimating the faecal egg counts of gastrointestinal strongyles and *Dicrocoelium dendriticum* in sheep". *Veterinary Parasitology* 23 (2014): 121-131.
23. Mes THM., *et al.* "A novel method for the isolation of gastrointestinal nematode eggs that allows automated analysis of digital images of egg preparation and high throughput screening". *Parasitology* 123 (2001): 309-314.
24. Ibrahim N., *et al.* "Survey of Prevalence of Helminthes Parasites of Donkeys in and Around Hawassa Town, Southern Ethiopia". *Global Veterinaria* 6 (2011): 223-227.
25. Mezgebu T., *et al.* "Prevalence of Gastrointestinal Parasites of Horses and Donkeys in and around Gondar town, Ethiopia". *Open Journal of Veterinary Medicine* 3 (2013): 267-272.
26. Tesfu N., *et al.* "Prevalence and Risk Factors of Gastrointestinal Nematode Parasites of Horse and Donkeys in Hawassa Town". *School of Veterinary Medicine, Hawassa University* (2014).
27. Regassa A and E Yimer. "Gastro-intestinal Parasites of Equine in South Wollo Zone, North Eastern Ethiopia". *Global Veterinaria* 11 (2013): 824-830.
28. Seri HI., *et al.* "A survey of gastro-intestinal nematodes of donkeys in Khartoum State". *Journal of Animal Production and Veterinary* 3 (2004): 736-739.
29. Sawsan T., *et al.* "Field investigation of gastro-intestinal nematodes in horses and donkeys in South Darfur State, Sudan". 13th Scientific Congress (2008): 723-729.
30. Worku S and Afera. "Prevalence of equine nematodes in and around Kombolcha, South Wollo. Ethiopia". *Veterinary* 13 (2012): 1-13.
31. Alemayehu B., *et al.* "Bovine trypanosomosis: A threat to cattle production in Chena district, southwest Ethiopia". *Open Journal of Animal Sciences* 2 (2012): 287-291.