

## Trematode Parasites of Equine in and Around Holeta Town, Oromia, Central Ethiopia

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**Abstract:** A cross sectional study was conducted from November 2016 to May 2017 in and around Holeta town, Oromia, Central Ethiopia, to determine the prevalence of trematode parasites in equines and to identify the associated risk factors. Faecal samples collected from 384 equines were examined by fecal sedimentation technique. The overall prevalence of trematode parasites was 34.9% (134/384); with prevalence of 33.5% (60/79) and 36.1% (74/205) in horses and donkeys, respectively. Coprological examination of equine fecal samples revealed the existence of three trematode parasites namely *Fasciola*, *Gastrodiscus aegyptiacus* and *Dicrocoelium dendriticum* with 24.7%, 12.2%, 3.4% prevalence, respectively. There were statistically significant differences between age, body condition and management system of equines in relation to prevalence of trematode parasites ( $p < 0.05$ ). However, there was no statistical significant difference in prevalence of trematode parasites between species and sex of equines ( $P > 0.05$ ). Equines of old age were found 10.9 times at higher risk of acquiring trematode parasites than young aged. Equines with poor body condition and managed extensively were 3.47 and 1.72 times at increased risk of trematode parasite infection.

**Keywords:** Equines • Holeta • Prevalence • Trematode Parasites

### INTRODUCTION

In the developing world, there are estimated 110 millions of equines [1]. Ethiopia has about 9.85 million equines, the biggest population in Africa [2]. Equines have great economic and social contribution in developing countries like Ethiopia in both urban and rural areas. They are kept and often used for transport, packing, land tillage and threshing purposes, as well as for providing of manure for both energy and soil fertility [3, 4]. In Ethiopia context especially in the marginal land of the country where the road construction network is insufficiently developed, make the donkeys and the horses the most valuable, appropriate and affordable pack animals the main means of transport under the small holder farming system [5].

Although equines have great contributions to national economy parasitic diseases of nematode, trematode and cestode become major constraint with having high prevalence as it is indicated in different studies done in different part of the country [6-11].

Trematode parasites which affect equines include *Fasciola*, *Gastrodiscus aegyptiacus*, *Dicrocoelium dendriticum* and *Schistosoma* were an important livestock disease worldwide because of the substantial production and economic losses it causes, particularly in sheep and cattle [12-14]. Studies indicate that donkeys are efficient reservoirs of the trematode parasite like *Fasciola* [15].

Although traditionally regarded as a disease of livestock, trematode parasite species like fasciolosis is now recognized as an important emerging zoonotic disease of humans. Prior to 1992, the total number of reported human cases of fasciolosis was estimated to be less than 3000. More recent figures suggest that between 2.4 and 17 million people are currently infected with a further 91.1 million living at risk of infection in more than 51 countries including Ethiopia [15-18]. Yet the epidemiology of trematode parasitism in equines and the roles that equids may play in transmitting the infection to other susceptible animals and humans, pathogenicity and immunology in equines have not been well studied in the country as whole and specifically no study were done in and around Holeta town.

The Objectives of this Study Were:

- To determine the prevalence of trematode parasites in equine in and around Holeta town
- To identify the species of the parasites
- To identify the associated risk factors

## MATERIALS AND METHODS

**Study Area:** The study was conducted from November 2016 to May 2017 on horses and donkeys in and around Holetta town. Holetta is a town in central Ethiopia that is 45 kilometers away from Addis Ababa towards west direction, 9°40' N, 38°30'0" E at an altitude of 2400 meters above sea level in central highlands. The area is characterized by mild subtropical weather with minimum and maximum temperature of ranging from 2-9°C and 22-27°C, respectively. The area receives annual rainfall of 1200mm. The livestock resources of the area consist of cattle, goats, sheep, poultry and equines [2].

**Study Design And Study Animals:** A cross sectional study was conducted on 384 randomly selected horses and donkeys (179 horses and 205 donkeys). Equines used in this study are kept for cart pulling, transport, packing and as means of reserve capital in and around Holetta town. In the rural part of the study area, equines are kept with other species of animal like cattle and sheep.

**Sample Size:** Since there was no previous study on trematode parasites in equines in and around Holetta town, sample size for this study was determined using 50% expected prevalence and 5% absolute precision at 95% confidence level. Therefore, according to Thrusfield [19] the sample size was as follows:

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

where,

P<sub>exp</sub> = expected prevalence; d = absolute precision;

n = sample size.

Using the above formula, 384 equines were sampled during the study.

**Sampling Strategy:** Three peasant associations from Holta town randomly and four peasant associations in four directions around Holetta were purposively selected based on location. Then two villages were selected randomly from each of those and all accessible horses and donkeys in the village were sampled.

**Sample Collection And Examination:** Fecal samples were collected directly from rectum of 384 equines and sometimes from freshly defected faeces by using arm length rubber gloves. Each sample was labeled with necessary information and kept in icebox and transported to Parasitology laboratory of AAU CVMA and Holetta TVET College. Samples were kept in refrigerator at 4°C if immediate processing was not possible, but it had been processed within 48 hours. Fecal sedimentation by centrifugation technique was done to concentrate trematode eggs for microscopic examination [20] and examined microscopically with 10×4 magnification for presence of trematode parasite egg. Identification of the eggs was made on the basis of their morphology by using ova identification keys [21].

**Data Management and Statistical Analysis:** The data collected were entered and saved in Ms-excel worksheet. Before subjected to statistical analysis, the data were thoroughly screened for errors and properly coded. Confidence interval and p-value was employed to assess the presence of association and Odds Ratio was used to see the strength and direction of this association using STATA statistical soft ware version 11 for analysis. Descriptive statistical analysis such as table was used to summarize and present the data collected and Percentage was used to calculate prevalence of trematode parasite. In all cases 95% confidence interval (CI) and p < 0.05 was considered for statistically significant difference where as p-value >0.05 considered non significant.

## RESULTS

Three trematode parasites have been identified in the study area (Table 1). The overall prevalence of trematode parasites of equine in the study area was found 34.9% (134/384) with the prevalence of 36.1% and 33.5% in donkey and horse, respectively (Table 2). Eggs of trematode parasites species identified during the study were *Fasciola*, *Gastrodiscus aegyptiacus* and *Dicrocoelium dendriticum* with prevalence of 24.0%, 10.6%, 3.9% in horse's and 25.4%, 13.7%, 2.9% in donkey's respectively. *Fasciola* eggs were dominant among those trematode species identified during the study is both horses and donkeys (Table 1). There was statistically significant difference between age, Body condition and management system in prevalence of equine trematode parasites (p < 0.05). However, there was no statistical significant difference in prevalence of trematode parasites between equine species and sex (Table 2).

Table 1: Prevalence of trematode parasite species in horses and donkeys from Coprological examination.

Trematodes identified	Horse		Donkey	
	No. of positive	Prevalence (%)	No. of positive	Prevalence (%)
<i>Fasciola</i>	43	24.0	52	25.4
<i>G.aegyptiacus</i>	19	10.6	28	13.7
<i>D.dendriticum</i>	7	3.9	6	2.9

Table 2: The Prevalence of equine trematode parasites with respective categories of the risk factors in the study area

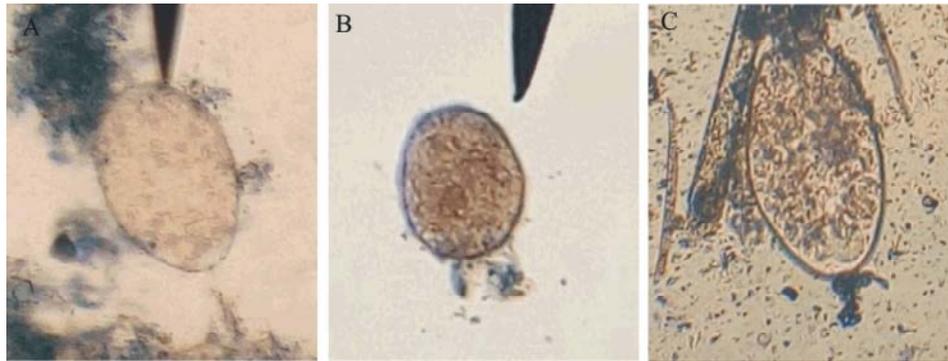
Risk factors	No. of examined equine	No. of positive (%)	$\chi^2$	p-value
Species				
Horse	179	60(33.5)	0.3	0.597
Donkey	205	74(36.1)		
Sex:				
Male	324	110(34.0)	0.8	0.367
Female	60	24(40.0)		
Age category				
Young	13	1(7.7)	9.2	0.010
Adult	306	102(33.3)		
Old	65	31(47.7)		
BCS:				
Good	88	23(26.1)	12.0	0.001
Moderate	247	84(34.0)		
Poor	49	27(55.1)		
Management				
Extensive	229	91(39.7)	5.8	0.016
Semi-intensive (cart horses)	155	43(28.1)		

Table 3: The association between independent logistic variable and trematode parasites infestation of equine

Risk factors	Univariate Analysis		Multivariable Analysis	
	Crude OR (95%)	p-value	Adjusted OR (95%)	p-value
Age category:				
Young	1		1	
Adult	5.9 (0.75-45.42)		5.67 ( 0.71- 45.05)	0.101
Old	10.9 (1.34-89.10)	0.025	9.82 (1.17- 82.17)	0.035
BCS:				
Good	1		1	
Moderate	1.46 (0.81-2.42)		1.76 ( 0.97- 3.19)	0.064
Poor	3.47 (1.66-7.23)	0.001	4.22 (1.83- 9.69)	0.001
Management:				
Extensive	1.71 (1.10-2.66)	0.016	4.84 (1.77-13.24)	0.002
Semi intensive (cart horses)	1		1	

Univariate logistic and multivariate regression analysis was also undertaken to estimate the strength of association of risk factor with trematode parasites infection in the equines. Equines of old age were found to be 10.9 times at risk of harboring trematode parasites than young aged (OR = 10.9, 95% CI = 1.34-89.10). Equines with poor body condition and managed extensively were 3.47

and 1.71 times at increased risk for harboring trematode parasite (OR=3.47, 95% CI=1.66-7.25 and OR=1.71, 95% CI =1.10-2.66) respectively. After adjustment of Odds ratio, old age, poor body condition and extensive management system were found to be significantly associated with trematode parasite infestation in equines (AOR=9.82, 4.22, 5.36) (Table 3).



A = *Fasciola* egg B = *Dicrocoelium dendriticum* egg C = *Gastrodiscus aegypticus* egg

Fig. 1: Eggs of trematode parasite species identified during the survey

## DISCUSSTION

The overall prevalence of trematode parasites in equines has not been documented before. *Fasciola*, *Gastrodiscus* and *Dicrocoelium* species of trematodes were identified from equines in the current study with 34.9% overall prevalence of trematode parasites and 24.7%, 12.2% and 3.4% prevalence for each trematode species respectively. Equines with poor body condition had higher chance of harboring the trematode parasites (55.1%) than good body conditioned age (26.1%). This could be due to the fact that animals with poor body condition might be immuno-compromised probably due to malnourishment and higher workload which predisposes to parasitism. On the other hand, poor body condition score could also be due to the parasitism. More prevalent helminthes parasites were found in animals with poor body condition than good conditioned ones and this is in line with the report done in Dugda Bora District, by Ayele *et al.* [22].

The result indicated that age of equines was significantly related with trematode infection ( $p < 0.05$ ). Old aged equines were 11 fold at higher risk of harboring trematode parasite as compared to young aged (OR=10.9, 95%CI=1.34-89.10) which could be due to the fact that parasitic infection intensity seems to increase with age of the equines [23]. Contrary to this finding, Alcaino *et al.* [24]. Reported a lower prevalence of fasciolosis in horses of above 5 years old.

Extensively managed equines were found 1.7 times at higher risk of harboring trematode parasites than semi intensively managed equines (OR=1.71, 95%CI=1.10-2.66). This may be due to the fact that extensively managed equines have greater chance of grazing in marshy areas where the intermediate host (Snail) is found in abundance

which in turn increases the chance of ingesting metacercaria of trematodes together with grasses.

The prevalence of trematodes parasite species identified in the current study was 24.0%, 10.6% and 3.9% for *Fasciola*, *Gastrodiscus* and *Dicrocoelium* in horses and 25.4% 13.7% 2.9% for *Fasciola*, *Gastrodiscus* and *Dicrocoelium* in donkeys respectively. Detection of 24% prevalence of *Fasciola* eggs in this study in horses was agreed with 23.1% prevalence in Arsi-Bale highlands reported by Yacob and Hagos [8]. But higher than 9.2% prevalence in south Wollo zone reported by Alemayehu and Etaferahu [9] and lower than 37.9% prevalence reported in Dodola district, Arsi-Bale highlands by Yacob and Hagos [8].

The prevalence of *Fasciola* infection in donkeys was found to be 25.4% which was higher than 17.92% prevalence in and around Bahir Dar as reported by Bewketu and Endalkachew [25] but lower than 44.12% which was reported by Getachew *et al.*[7] in central Ethiopia. The variation of the reports may be related to the differences in study areas.

The prevalence of *Gastrodiscus aegypticus* in this study found 10.6% in horses which was lower than 16.7% prevalence reported by Nwosu and Stephen [26] in Borno State. The prevalence of *Gastrodiscus aegypticus* was 13.7% in donkey which was greater than earlier finding of Temesgen and Zerihun *et al.* [6] and Tihune [27] who reported prevalence of 2.5%, 5.7% and 8.1% in and around Mekelle, in Tenta Woreda, Amhara Regional State and Sululta and Gefersa districts of central Oromia respectively, but lower than the reports of Getachew *et al.* [7] who reported 30% in central Ethiopia. This variation observed in this study could be due to the variation in the length of the study period, the season of the study period and ecology of the study area.

## CONCLUSION

The study revealed the importance of equine trematode parasites with the overall prevalence of 34.9%. The prevalence was 36.1% (74/205), 33.5% (60/179) in donkey and horse respectively. Trematode parasites species identified in the current study area were *Fasciola*, *Gastrodiscus aegyptiacus* and *Dicrocoelium dendriticum*. Among the identified trematode parasites, the highest prevalence was recorded for *Fasciola* (24.7%) while lowest prevalence was observed for *Dicrocoelium dendriticum* (3.4%). It was also observed that age, management system and body condition scores were found to be the important risk factors for the occurrence of trematode parasite in equine, which was assessed by their prevalence.

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