

Prevalence of Gastrointestinal Parasites of Horses and Donkeys in and around Gondar Town, Ethiopia

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ABSTRACT

A cross sectional study was conducted from October 2010 to June 2011 in and around Gondar town to identify the species and determine prevalence of gastrointestinal parasites in donkeys and horses. Gross examination, direct fecal smear, sedimentation and floatation techniques were utilized to identify the eggs and larvae of parasites in feces. A total of 384 horses and donkeys were examined for gastrointestinal parasites. The overall prevalence of gastrointestinal parasites was 92.71% (356 from 384) with 80.95% (85 from 105) and 97.13% (271 from 279) in horses and donkeys, respectively. Prevalence of *Strongyle*, *Parascaris equorum*, *Oxyuris equi*, *Gastrodiscus aegyptiacus* and *Gastrophilus intestinalis* was 66.67%, 43.8%, 0.95%, 2.86%, and 0.95%, respectively in horses. Prevalence of gastrointestinal parasites was 87.81%, 42.29%, 4.30%, 5.73%, 1.43%, 3.58% and 0.72% for *Strongyles*, *Parascaris equorum*, *Oxyuris equi*, *Fasciola*, *Tricuris*, *Gastrodiscus aegyptiacus* and *Gastrophilus intestinalis* in donkeys, respectively. There was a statistically significant difference between species, housing and among feed types in prevalence of equine gastrointestinal parasites ($p < 0.05$). However, there was no statistically significant difference in prevalence of gastrointestinal parasites between age, sex and among body condition. Donkeys were at higher risk of acquiring parasites than horses (OR = 7.97, CI = 3.39 - 18.75) and animals that fed only pasture and lived in poor house were at increased risk of acquiring infection (OR = 9.59, CI = 3.25 - 28.25). In conclusion, the present study revealed higher prevalence of gastrointestinal parasites in horses and donkeys. Therefore, continuous deworming, improvement of housing and feeding management were recommended.

Keywords: Donkeys; Gondar; Gastrointestinal Parasites; Horse; Prevalence

1. Introduction

In the developing world, there are estimated 110 millions of equines [1]. Ethiopia has about 7.9 million equines [2] and possesses approximately half of the Africa's equine population with 37% donkeys, 58% horses and 46% mules [3]. There is one equine for every four people in the agricultural sector and for every five persons of the total population [4]. Equines have a prominent position in the agricultural systems of many developing countries [5]. In Ethiopia, the low level of development of the road transport network and the rough terrain of the country make the donkeys and the horses the most valuable, appropriate and affordable pack animals under the small holder farming system [6]. They can be

used for such applications as riding, driving, flock protection, companion, breeding, training calves [5] and provide urban dwellers with opportunity of income generation [7].

Parasitic helminthes are one of the most common factors that constrain the health and working performance of donkeys and horses worldwide. They cause various degrees of damage depending on the species and number at present, nutritional and the immune status of equids [8]. They decrease the performance, production and productivity in the animals mainly in the reduction of body weight or failure to gain weight or even increase the mortality in acute case [9]. A number of studies conducted to detect association between poverty and animal diseases identified gastrointestinal parasitism as one of the most important problems for equids in developing

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countries [10-12].

The prevalence and type of internal parasites affecting equids, in general, are ubiquitous with equines being continually exposed throughout their lives. Although they are often heavily parasitized by helminthes [13], the prevalence and type of internal parasites affecting equids have not been determined to a great extent in Ethiopia, particularly in and around Gondar town. Available information however, indicates that gastrointestinal parasites are the major cause of early demises of working donkeys and horses in Ethiopia [5,14-17]. Therefore, the current study was conducted to identify the species and determine prevalence of gastrointestinal parasites of donkeys and horses in the study area.

2. Materials and Methods

2.1. Study Area

The study was conducted from October 2010 to June 2011 on horses and donkeys in and around Gondar town, Ethiopia. Gondar is administrative center of North Gondar zone found at 748 km away from Addis Ababa, capital of Ethiopia. North Gondar zone is located at 550 - 4620 m above sea level. The rain fall varies from 880 mm to 1772 mm with monomodal distribution. The annual temperature ranges from 10°C to 44.5°C. The zone is divided into three main agro-climatic zones: high land, mid land and low land region. The farming system of the study area is characterized by a mixed (crop-livestock production) farming system. There are 31,456 horses, 272,655 donkeys and 13,612 mules in the zone [18].

2.2. Study Design and Animals

A cross sectional study was conducted on 384 randomly selected horses and donkeys (105 cart horses and 279 donkeys). Information about species, sex, age, body condition and management system of the study animals were gathered from the owners. The ages of animals were determined using owners' information and dentition [19]. Accordingly, animals were categorized as young (<2 years) and adults (>2 years). Body condition score (BCS) was subjectively estimated based on the guides published by Svendsen [14] as 1 (emaciated), 2 (thin), 3 (good), 4 (fat) and 5 (obese). These were categorized into three groups as ≤ 2 , 3 and ≥ 4 to represent BCS 1 and 2, 3, 4 and 5, respectively.

2.3. Study Methodology

Fecal samples were collected directly from the rectum into universal bottle using sterile disposable gloves. Each sample was labeled with necessary information and immediately transported to Veterinary Parasitology Laboratory, University of Gondar. Samples were kept in re-

frigerator at 4°C if immediate processing was not possible, but it had been processed within 48 hours. Gross examination was performed immediately after sample collection for larvae recovery and the recovered larvae of *Gastrophilus* species was identified using stereomicroscope. Direct fecal smear, sedimentation and floatation techniques were the utilized parasitological techniques to identify the eggs in feces and examined microscopically (10× and 40×) for presence of parasite ova following their procedures. Identification of the eggs was made on the basis of their morphology [20].

2.4. Data Analysis

The collected data were coded and entered into Microsoft Excel spread sheet. Statistical analyses were performed using SPSS, version 17 software packages. Percentage was used to calculate prevalence. Data were statistically analyzed using chi-square. Univariate logistic and multivariate regressions were used to calculate degree of association between risk factors and prevalence of gastrointestinal parasites. In all cases 95% confidence interval (CI) and $p < 0.05$ was considered for statistically significant difference.

3. Results

An overall of 92.71% (356/384) equine gastrointestinal parasites prevalence was obtained in the current study with 80.95% (85/105) and 97.13% (271/279) prevalence in horses and donkeys, respectively. There was statistically significant difference between species, housing and among feed type in prevalence of equine gastrointestinal parasites ($p < 0.05$). However, there was no statistical significant difference in prevalence of gastrointestinal parasites between age, sex and among body condition ($p > 0.05$) (Table 1).

Eggs/larvae of different parasites were observed in both equine species under the study. Five and seven different types of eggs/larvae were observed during coprological examination in horses and donkeys, respectively. Strongyle-type eggs were the highly prevalent eggs with 66.67% in horses and 87.81% in donkeys while *Gastrophilus intestinalis* larvae and *Oxyuris equi* egg (0.95%) in horses, and *Gastrophilus intestinalis* larvae (0.72%) in donkeys were the least prevalent parasites (Table 2).

Univariate logistic and multivariate regression analysis was also undertaken estimate the strength of association of risk factor with gastrointestinal parasites infection in the study animals. Donkeys were found to be 7.97 times at risk of developing gastrointestinal parasite than horse (OR = 7.97, 95% CI = 3.39 - 18.75). Animals fed only pasture and live in poor housing system were found to be

Table 1. Prevalence of equine gastrointestinal parasites between/among risk factors.

Variables	No. of examined equine (%)	No. of positive (%)	χ^2	p-value
Species				
Horse	105	85 (80.95)	29.5	0.001
Donkey	279	271 (97.13)		
Sex				
Male	226	210 (92.92)	0.037	0.848
Female	158	146 (92.4)		
Age				
Adult	368	340 (92.39)	1.32	0.252
Young	16	16 (100)		
BCS				
≥ 4	23	23 (100)	2.56	0.277
3	72	68 (94.44)		
≤ 2	289	265 (91.69)		
Feed				
Pasture	280	272 (97.14)	30.2	0.001
Mixed	92	74 (80.43)		
Grain	12	10 (83.33)		
Housing				
Good	161	137 (85.09)	23.78	0.001
Poor	223	219 (98.2)		

Table 2. Prevalence of helminth parasite of horses and donkeys from coprological examination.

Egg/larvae of parasite	Horse			Donkey		
	No. of examined	Positive	Prevalence (%)	No. of examined	Positive	Prevalence
<i>Strongyle</i>	105	70	66.67	279	245	87.81
<i>Parascaris</i>	105	46	43.81	279	118	42.29
<i>Oxyuris equi</i>	105	1	0.95	279	12	4.3
<i>Fasciola</i>	105	0	0	279	16	5.73
<i>Tricuris</i>	105	0	0	279	4	1.43
<i>G. aegyptiacus</i>	105	3	2.86	279	10	3.58
<i>G. intestinalis</i>	105	1	0.95	279	2	0.72

6.8 and 9.59 times at increased risk for gastrointestinal parasite (OR = 6.8, CI = 1.27 - 36.23 and 9.59, 95% CI = 3.25 - 28.25), respectively. After adjustment of odds ratio, poor housing was found to be significantly associated with gastrointestinal parasite infection in the study animals (AOR = 5.79) (**Table 3**).

4. Discussion

In the present study, an overall of 92.71% prevalence of gastrointestinal parasites with 80.95% in horses and 97.13% in donkeys were obtained. The higher gastrointestinal parasites prevalence (97.13%) observed in donkeys in the current study is in line of agreement with

Table 3. The association between independent logistic variable and helminth parasites infestation of equine.

Risk factors	Group data	No. examined	Positive sample	OR	Adjusted OR	CI	χ^2	p-value
Species	Donkey	279	97.1%	7.97	2.23	3.39 - 18.75	29.54	0.001
	Horse	105	81%	1	1			
	Pasture	280	97.1%	6.8	2.48	1.27 - 36.23	26.11	0.001
Feed	Mixed	92	80.4%	0.822	0.75			
	Grain	12	83.3%	1	1			
House	Poor	223	98.2%	9.59	5.79	3.25 - 28.25	4.85	0.001
	good	161	85.1%	1	1			

works of Yoseph *et al.* [21], Mulate [22], Fikru *et al.* [11], Ayele *et al.* [23], Ibrahim *et al.* [16] and Wannas *et al.* [24], who reported 100%, 100%, 92.8% 100%, 96.9% and 100% in Wonchi Awraja, highlands of Wollo province, Western highlands of Oromia, in Dugda Bora District, in and around Hawassa town, Ethiopia and Al Diwaniyah Governorate, respectively. The prevalence in horse (80.95%) observed in the current study is lower than 100% prevalence report of Wannas *et al.* [24] and higher than 65.51% (133 from 200) positive fecal samples for various helminthes [25]. When prevalence between the species is compared, the lower prevalence in horses might be due feeding practices in the study area. All most all of the horses under this study were cart horses that fed grain byproducts and are less exposed to pasture grazing. The difference among these findings from different areas might be due to variation in management system, sample size and sampling method differences [16].

Detection of highest prevalence of *Strongyle*-type eggs in both species agrees with work of Wannas *et al.* [24] who reported predominance of *Strongyle*-type eggs with a prevalence of 50% in horse and 57.14% in donkeys. Saeed *et al.* [25] also reported 58.50% (117 from 200) *Strongyle*-type eggs in horses as predominant one. *Strongyles* have large numbers of genera and species so their percents usually represented (75% - 100%) of whole nematodes infections [26].

The prevalence of *Strongyle*-type eggs in horses was 66.67% in the current study which is in close agreement with 58.50% report of Saeed *et al.* [25]. The current result is lower than work of Fikru *et al.* [11] who reported 91%. The lower prevalence in the present study could be due to all horses of this study were cart horses that are less exposed and in some cases totally restricted from pasture. The prevalence of *Strongyles* infestation was 87.81% in donkeys. Similar studies conducted in different parts Ethiopia indicated higher prevalence than the current study with an overall prevalence of 99%, 100%, 100%, 98.2% and 100% in Ada, Akaki Boset [27],

Dugda Bora distinct [23], highlands of Wollo province [22], Western highlands of Oromia [11] and Wonchi [21], respectively.

Oxyuris equi (0.95%) was one of the least prevalent eggs of parasite detected in horses and with 4.30% in donkeys in the current study. This is in agreement with the work of Ayele *et al.* [23], who reported 3% and Getachew *et al.* [27] who reported 2% in donkeys. Study conducted in Western highlands of Oromia, Ethiopia indicated 2.1% prevalence of *Oxyuris equi* in horses [11]. Similar study in Lesotho showed slight higher prevalence (6.2%) in horses [28]. The lowest prevalence might be due to the effect of relative higher temperature in the present study area which desiccates the highly susceptible *Oxyuris equi* egg.

The prevalence of *Parascaris equorum* was 43.8% in horses. This result is higher than the prevalence reported in Ethiopia by Yoseph *et al.* [29], Fikru *et al.* [11], Getachew *et al.* [30] who reported 15.7%, 7.3%, and 16.2%, respectively and in Lesotho by Melissa *et al.* [28] who reported 21.6% in horses. The prevalence of *Parascaris equorum* was 42.29% in donkeys in the present study is higher than 15.7% and 17.3% reported by Yoseph *et al.* [21] and Fikru *et al.* [11] in donkeys. The reported prevalence in donkeys from four sites in Ethiopia, 43.5% [31], 50% [23], 51% [32] and 51% [27], slightly agrees with the present study. The difference in prevalence of *Parascaris equorum* from different reports in developing countries is somewhat conflicting and this could be due to compromised immune responses relating to concurrent disease, but is worthy of further investigation [28].

The prevalence of *Gastrodiscus aegyptiacus* and *Gastrophilus intestinalis* in the present study were 2.86% and 3.58%, 0.95% and 0.72% in horses and donkeys, respectively. The finding of the current study is lower than report of Getachew *et al.* [27] (30%) in donkeys. Ayele *et al.* [11] also reported 6% prevalence in donkeys of Dugda Bora district. The lower prevalence in the present study may be due to the difference in geographical

location of the area from other study areas. The prevalence of *Fasciola* was 5.7% in donkeys in the current study is lower than work of Getachew *et al.* [27] who reported 80% in donkeys. Slight lower prevalence (1.5%) of fasciolosis in donkeys was reported from Dugda Bora distinct of Ethiopia [23]. The lower prevalence of *Fasciola* eggs in the current study compared to the reports of Getachew *et al.* [27] is due to the geographical location of the area which is not comfortable for the snail population, the intermediate host of *Fasciola*. Only very few areas, where summer tributaries are dried off are found to be swampy. The work of Getachew *et al.* [27] was in fasciolosis endemic area and is not representative for the whole country [28].

This study confirmed presence of statistical significant difference between species, housing and among feed type in prevalence of equine gastrointestinal parasites and absence of statistical significant difference in prevalence of gastrointestinal parasites between age, sex and among body condition. In agreement with this, studies in other parts of Ethiopia indicated absence of statistical significance difference between age groups. However, there is presence of statistical significant difference in the prevalence of the parasites among the different body condition scores and more prevalence of helminth parasites in animals with poor body condition than well-conditioned animals [16,23]. This might be due to increased land of cultivation which restricts animals on small communal grazing land which allows animals for continuous exposure [16].

In this study, donkeys were seen to be 7.97 times at risk of acquiring gastrointestinal parasites than horses. According to Svendsen and Elisabeth [33], the donkey and the horse are closely related, and many of the conditions that affect them are similar; however, detecting illness in the donkey can be made more difficult by its stoical nature. This means that donkeys may be in the advanced stages of a disease before it is noticed or a diagnosis is reached and horses may get dewormed than donkeys before severity of the disease, which might be related to less risk of acquiring gastrointestinal parasite diseases. Also it might be related with the feeding practices as all donkeys under the study were at free grazing that they have high chance of ingesting large amount of gastrointestinal parasites eggs and larvae. Horses and donkeys that feed pasture and live in poor housing were at higher risk of acquiring gastrointestinal parasites than those at mixed feed, grain feed and in good house, respectively. It is assumed that there are different risk factors that contribute to acquiring gastrointestinal parasites in equines. Among this poor housing was found to be the major contributing factors in equine which increases the risk of infestation times than any of the associated risk factor in the study animals.

5. Conclusions and Recommendations

In conclusion, the study revealed high gastrointestinal parasites occurrence in and around Gondar in donkeys and horses. The identified eggs/larvae types include *Strongyle*, *Parascaris equorum*, *Oxyuris equi*, *Gastrodiscus aegyptiacus*, *Tricuris*, *Gastrophilus intestinalis* and *Fasciola*. *Strongyle* and *Parascaris equorum* eggs were common with high prevalence in the area of study. Donkeys were at higher risk of infestation than horses. Species (horses and donkeys), type of feed and housing were the important risk factors for occurrence of gastrointestinal parasites in the equine species. Based on the above conclusion, the following recommendations were forwarded.

1) Improvement of housing and feeding management system for equines.

2) Regular deworming and promotion of equine husbandry practices by concerned organs.

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