



Prevalence of Gastrointestinal Nematode Parasites of Horse in Nole Kaba District, West Wallaga Zone, Oromia Region, Ethiopia

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Abstract: Horses that have parasitic infections may experience a range of respiratory, digestive, and other disorders in addition to certain performance impairments. A cross sectional study was conducted from November 2021 to June 2022 in Nole Kaba district of West Wallaga Zone of Western Oromia, with the objective of determining the prevalence of gastrointestinal tract nematode parasites of horse and its associated risk factors. A simple random sampling technique was used to select the study samples. A total of 384 horses were randomly sampled in the study area and examined coprologically for the presence of gastrointestinal tract nematode parasite eggs using flotation techniques. An overall prevalence of gastrointestinal nematode of examined animal through coprological in the study area was 66.7% (256/384). The three genera of parasite commonly encountered during the study period were strongyles (54.69%), *Parascaris equorum* (14.45%) and *Oxyuris equi* (6.64%). Mixed infections of (*Strongyle* + *P. equorum*, *Strongyle* + *P. equorum* + *O. equi* and *Strongyle* + *O. equi*) were detected with prevalence of 13.67%, 5.47%, 5.09% respectively. The highest prevalence of parasites was observed in females, young and poor body condition score. There was significant ($P < 0.05$) difference in prevalence of GIT nematodes between body conditions. Because of their importance and impact of disease on the use of horses a comprehensive study for strategic parasitic control measures should be implemented.

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1. Introduction

Ethiopia is one of the developing countries of Africa, which is predominantly an agricultural country with more than 85% of its population engaged in farming activities (Ayele *et al.*, 2006). The country has numerous agro-ecological zones that have contributed to the growth of different systems of agricultural production (Tegegne and Crawford, 2000). The total world equines population is estimated at approximately 112.5 million (58.5 million horses, 43.3 million donkeys, and 10.5 million mules) (Abdela *et al.*, 2017). Ethiopia owns approximately 1.91 million horses, 6.75 million donkeys, and 0.35 million mules, according to the central statistical agency (Mangassa and Tafese, 2016).

Equines play an important role in the livelihoods of millions of people worldwide, as well as being used in agricultural and tourism activities for the loading, traveling, carting, plowing, and transport of goods, people, and building materials (Pritchard 2010; Wubishet, 2017). While equines are often characterized as hardy and resistant, they suffer from many health problems (Takele and Nibret, 2013). Despite its huge

population size, due to the high prevalence of malnutrition, management limitations, and disease like a parasite, the equines remain marginal. Parasitism is a major barrier to the growth of the livestock farming system in the country (Wondimu and Sharew, 2017) and is characterized by high morbidity and mortality rates. Severe health threats are gastrointestinal nematodes, which lead to poor body condition, reduced power production, poor productive performance, and short life span (Wondimu and Sharew, 2017; Tedla and Abichu, 2018).

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 countries (Perry *et al.*, 2002; Fikru *et al.*, 2005; Valdez-Cruz *et al.*, 2006). 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 (Graber, 1975), 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 (Feseha *et al.*, 1998; Svendsen, 1997; Getachew, 1999; Ibrahim, *et al.*, 2011; Bogale, *et al.*, 2012). Regarding gastrointestinal tract nematodes parasite of horses in West Wallaga, Oromia generally in and around Nole Kaba district specifically, information is scant. Therefore, the objectives of this study were: To determine the prevalence and its associated risk factors of gastrointestinal nematodes of horse in Nole Kaba district of West Wallaga Zone of western Oromia.

2. Materials and methods

2.1. Study Area

The study was conducted in and around Nole Kaba which is located in West Wallaga Zone at western Oromia regional states and it is about 491 km from Addis Ababa. Geographically, Bube town falls between 8° to 26° 8' N latitudes and 36° to 20° 9' E longitudes. The total land area covers 1140.57 square kilometres with altitudes of 1400 to 2010 meter above sea level. The annual mean temperature ranges from 12.5°C to 27.5°C and receives annual rain fall greater than 1400mm. The livestock populations of the district were estimated to be 149,352 cattle, 45,571 sheep, 41,852 goats, 159,488 poultry, 9702 horses, 1,154 mules, and 6,367 donkeys and the livestock are free grazing. The farming system of the area is mixed farming where 87% of the total population is engaged in agriculture. Livestock population occupies a significant place in the farm ecology. The most important crops that grow in the area are teff, maize, wheat, sorghum etc. Crop and livestock sales are important source of income for all wealth groups; the poorer groups also do agricultural labour such as weeding and harvesting and sell firewood. The main hazards in the area include crop pests & livestock disease (CSA, 2018).

2.2. Study Population

The study was conducted on 384 randomly selected local breed horses, selected from 4 peasant associations (PAs). Of these animals, 93 from Haro Tumsa, 95 from Arbu Aba Gada, 97 from Ula Babu, and 99 from Siba Koche.

2.3. Study Design

A cross-sectional (observational) study was conducted from November 2021 to June 2022 to determine the prevalence of gastrointestinal Nematode parasites of horses in the study animals. 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 (Crane, 1997). Accordingly, animals were categorized as young (< 4 years), adult (4-9 years), Old (> 9 years) (Martin *et al.*, 1999). The body conditions were classified according to (Svendsen, 2008) as poor, medium and good. The animals was selected randomly and restrained by farmers for sampling.

2.4. Sampling Method

2.4.1. Sample size determination

The number of animals required for the study was determined using the formula given by Thrusfield (2018) for simple random sampling.

$$N = \frac{1.962 P_{exp} (1 - P_{exp})}{d^2}$$

Where N = required sample size

P_{exp} = expected prevalence

d = desired absolute precision (usually 0.05)

The size of the sample is determined using 95% level of confidence, 50% expected prevalence and 0.05-desired absolute precision. Therefore, 384 Horses were needed for the study.

2.5. Study Methodology

Fecal samples was collected directly from the rectum into universal bottle using sterile disposable gloves. Each sample was labeled with necessary information and immediately transported to Bube Veterinary Clinic (type C) Laboratory. Samples were kept in refrigerator at 4°C if immediate processing is not possible, but it has to process within 48 hours. Direct fecal smear and floatation techniques was 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 (Soulsby, 1982).

2.6. Data Analysis

The data collected from the study area was entered in to Microsoft Excel data base system and coded appropriately and statistical analysis using SPSS software was done. Data were statistically analyzed and chi-square tests 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. Result

3.1. The Overall Prevalence of Gastrointestinal Tract (GIT) Nematode of Horses

During the study period 384 fecal samples taken from horses of four different peasant associations (PAs) of Nole Kaba district and were thoroughly examined for

the presence of different gastrointestinal nematodes. From the examined animals, 256 horses were positive for different GIT nematodes. Of this, 194 (50.5%) of horses were infected with a single parasite, on the other hand 62(16.1%) horses were harbored mixed types of parasites. The overall prevalence of GIT nematodes in horses in the study area was found to be 66.7% (Table 1).

Table 1. Prevalence of parasite infestation in different PAs of Nole Kaba District

PAs	Numbers of examined animal	Number of animals	positive	Prevalence (%)
HaroTumsa	93	60		64.5%
Arbu Aba Gada	95	61		64.2%
Ula Babu	97	69		71.1%
SibaKoche	99	66		66.7%
Total	384	256		66.7%

3.2. Relative Proportion of Parasites

The highest relative percentage was recorded for Strongyles (54.69%, 140/256), followed by *Parascarisequorum* (14.45%, 37/256), mixed parasites of *Strongyle +Parascarisequorum* (13.67%, 35/256), *Oxyurisequi* (6.64%, 17/256), *Strongyle +Parascarisequorum +Oxyurisequi*(5.47%, 14/256) and *Strongyle +Oxyurisequi* (5.09%, 13/256) (Table 2). The highest prevalence of parasites was observed in females, young and poor body condition score (Table 3).

Table 2. The relative proportion of gastrointestinal nematode parasite of horse

Parasite encountered	Number of positive	Relative percentage
Strongyle	140	54.69%
<i>P. equorum</i>	37	14.45%
<i>O. equi</i>	17	6.64%
<i>Strongyle + P. equorum</i>	35	13.67%
<i>Strongyle + O. equi</i>	13	5.09%
<i>Strongyle + P. equorum + O. equi</i>	14	5.47%
Total	256	

Table 3. Infestation of different parasite species in different risk factors

Risk factors	Category	None	Strongyle	P.equorum	O.equi	Strongyle+P.equorum	Strongyle+O.equi	All mixed	X²	P-value
Bcs	Poor	11(9.8%)	42(37.5%)	16(14.3%)	9(8.0%)	17(15.2%)	6(5.4%)	11(9.8%)	65.07	0.00
	Good	86(41.3%)	79(38.0%)	13(6.2%)	5(2.4%)	16(7.7%)	6(2.9%)	3(1.4%)		
	Medium	31(48.4%)	19(29.7%)	8(12.5%)	3(4.7%)	2(3.1%)	1(.6%)	0(0.0%)		
Sex	Male	65(34.9%)	69(37.1%)	16(8.6%)	9(4.8%)	14(7.5%)	5(2.7%)	8(4.3%)	2.80	0.833
	Female	63(31.8%)	71(35.9%)	21(10.6%)	8(4.0%)	21(10.6%)	8(4.0%)	6(3.0%)		
Age	Young	11(20.4%)	23(42.6%)	4(7.4%)	4(7.4%)	4(7.4%)	5(9.3%)	3(5.6%)	5.51	0.064
	Adult	70(37.4%)	61(32.6%)	18(9.6%)	8(4.3%)	18(9.6%)	6(3.2%)	6(3.2%)		
	Old	47(32.9%)	56(39.2%)	15(10.5%)	5(3.5%)	13(9.1%)	2(1.4%)	5(3.5%)		

3.3. Analysis of Different Risk Factors

Chi-square analysis of different risk factors showed that body condition score was significantly associated with the risk of infection with GIT nematodes ($p < 0.05$) whereas sex and age of the animal was not associated with GIT nematode infection (Table 4).

Table 4. Chi-square analysis output of parasite infestation in Nole Kaba district

Risk Factors	Category	Number Tested	Positive	Prevalence	X ²	P-Value
PAs	SibaKoche	99	66	66.7	1.323	0.742
	HaroTumsa	93	60	64.5		
	Arbu Aba Gada	95	61	64.2		
	Ula Babu	97	69	71.1		
Sex	Male	186	121	65.1	0.422	0.588
	Female	198	135	68.2		
	Young	187	117	62.6		
Age	Adult	143	96	67.1	5.512	0.064
	Old	54	43	79.63		
BCs	Poor	208	122	58.7	40.44	0.00
	Medium	64	33	51.6		
	Good	112	101	90.2		
Total		384	256	66.7		

4. Discussions

The results of this study showed that gastrointestinal nematode parasites are highly prevalent in horses in Nole Kaba district. A greater proportion of sampled horses were found positive for different GIT nematode parasites. An overall prevalence of 66.7% of nematode parasites in horses were recorded in the study area which was in line agreement with reports of 64.61% by Molla *et al.*, 2015, 65.51% by Saeed *et al.*, 2010, and 63.7% by Tesfu *et al.*, 2014.

However, it was lower than some of the earlier reports of Yoseph *et al.*, 2001, Mulate 2005, by Fikru *et al.*, 2005, Birhanu *et al.*, 2014, Chemedu *et al.*, 2016, Ayele *et al.*, 2006 and Tolossa and Ashenafi, 2013 who reported 100%, 100%, 92.8%, 96.9%, 94.0%, 98.2%, 92.71% in Wonchi Awraja, highlands of Wollo province, Western highlands of Oromia, Hawassa, Ambo, Dugda Bora district and Gonder towns, respectively. This difference might be due to the differences in the study areas, deworming strategy and accessibility to veterinary clinic, nutritional status of the animal in the respective study area. It may also be due to the variation in sampling time, as seasonality affects the occurrence of the parasites.

When prevalence between the peasant associations is compared, relatively the higher prevalence is encountered in horses of Ula Babu and Siba Koche. The difference among these findings from different areas might be due to difference in geographical locations, deworming strategy and accessibility to veterinary clinic in the study area. Almost all of the horses under this study were free grazing horses and the owners used them for transportation.

The relative percentage of GIT Nematode parasites reported in this current study indicated that *strongyle* was observed to have higher occurrence rate than other GIT Nematode parasites. The prevalence of *Strongyles* in horses was 54.69% in the current study which is in close agreement with 50% and 58.50% report of Wannas *et al.*, 2012 and Saeed *et al.*, 2010 respectively. Similar studies conducted in different parts of Ethiopia indicated higher prevalence than the current study with an overall prevalence of 100% in highlands of Wollo province by Mulate 2005, 98.2% in Western highlands of Oromia by Fikru *et al.*, 2005 and 100% in Wonchi by Yoseph *et al.*, 2001 respectively. The lower

prevalence in the present study could be due to variation in management system, feeding practices.

The prevalence of *Parascaris equorum* was 14.45%. This result is in close agreement with the prevalence reported in Ethiopia by Yoseph *et al.*, 2005 and Getachew *et al.*, 2008 who reported 15.7%, and 16.2%, respectively and higher than prevalence reported 7.3%, by Fikru *et al.*, 2005. Similar study also conducted in Lesotho by Melissa *et al.*, 2010 who reported 21.6% in horses. The prevalence of *Oxyuris equi* was 6.64%. This result is higher than prevalence reported 3.1% by Samuel, (2015) in Gondar.

This study confirmed presence of statistical significant difference between in prevalence of horse gastrointestinal parasites and among body conditions. Moreover, absence of statistical significant difference in prevalence of gastrointestinal parasites between age and sex is recognized. 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 and among the different body condition scores and more prevalence of helminth parasites in animals with poor body condition than well-conditioned animals (Ibrahim *et al.*, 2011; Ayele *et al.*, 2006). This might be due to increased land of cultivation which restricts animals on small communal grazing land which allows animals for continuous exposure (Ayele *et al.*, 2006).

5. Conclusion and Recommendations

Horses GIT nematode infection was highly prevalent in the Nole Kaba district. Strongyle, *Parascaris equorum* and *Oxyuris equi* was the nematode parasites affecting horses in study area and Strongyle had the highest relative prevalence, than other parasites in the study area. Body condition was significantly associated with prevalence of GIT nematodes. All horses in the study area graze on marshy areas and these may suppress their immunity and expose them to parasitic infection. Besides the management problems from the owners there is also lack of knowledge on periodic deworming and treatment of horses by taking to veterinary clinics when they get sick. Therefore, based on the above conclusion, the following recommendations were forwarded. Improvement of housing and feeding management system for horses, public awareness creation to owners on proper deworming, sufficient feed supply and minimizing extensive open grazing of horses is important.

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