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Study on Prevalence of Internal Parasites of Horses in and Around Ambo Town, Central Ethiopia

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Abstract: A cross-sectional study was conducted from November 2014 to June 2015 in and around Ambo town, central Ethiopia to estimate the prevalence of horse internal parasites and assess the associated risk factors. Fecal samples were collected from 384 randomly selected horses of varied sexes for the study and examined using standard parasitological techniques (flotation, sedimentation and modified Baermann). The overall prevalence of egg/larva in the study area was 94.0% (361/384). The types of helminthe parasites (egg/larva) detected were *Triodontophorus* 158 (41.1%), *Parascaris equorum* 126 (32.8%), *Strongyles* 116 (30.2%), *Oxyurise qui* 43 (11.2%), *Dictyocaulus arnfieldi* 18 (4.7%) and *Anoplocephala* 6 (1.6%) in decreasing order. Sex and age of horses had a significant effect only on the prevalence of *P. equorum* ($P<0.05$). Mares (50%) and young (60.3%) horses were severely affected by *P. equorum* than their counterpart stallions (29.5 %) and older age (25.9%), respectively. Hence, the findings of the present study indicated a high prevalence of helminthic parasites compromising the health and welfare of horses in the study area. Thus, proper screening and monitoring of the horses should be carried out regularly; regular and strategic deworming programmes should be carried out.

Key words: Ambo · Floatation · Gastrointestinal parasite · Horses

INTRODUCTION

In the developing world, there are an 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 4.6% mules [3, 8, 9]. There is one equine for every four peoples in the agricultural sector and for every five persons of the total[4]. Equines have a prominent position in the agricultural systems of many developing countries. In Ethiopia, the low level of development of the road transport network and the rough terrain of the country make the donkey and the horses the most valuable, appropriate and affordable pack animals under the small holder farming system [5]. They can be used for such applications as riding, driving, flock protection, companion, breeding, training calves [6] and provide urban dwellers with opportunity of income generation [7].

In comparison with other equines, the horse plays a dominant role due to its physical and physiological characteristics and easily demonstrates drought ability and often shows great willingness to undertake such works [3]. Hence, cart horses are a business of way of life and generate a large amount of revenue in the area as a source of sustainable daily income for many people in the town [10]. Horses involved in pulling carts often work continuously for 6to 7 hours/day [11].

Although equines play a significant role in the economy of the country, the development programmes of the government and those of aids agencies pay more attention to the maintenance of cattle, because it provides meat, milk and wool production while equines have been completely neglected or omitted from the pastoral livestock programmes. This is because of the contribution of equines power in the agricultural system and their role in the productions not yet well recognized and magnified [12].

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Despite the large numbers of horses and the valuable services they provide in Ethiopia, the attention given to their health and welfare is minimal as a result they have still health problems due to presence of malnutrition, management constraints and diseases like parasites. Parasitism represents a major obstacle to development of livestock sectors and hampers the poverty alleviation programs in livestock farming system in Ethiopia [13, 14] and causing serious health hazards contributing to poor body condition, reduced power output and short life span [15]. Horses, among most domestic animals are reported to be more susceptible to a large number of parasites and may harbor different species at any time [16] which act up and damage the intestine depending on the age and natural defense of the individual equine [17]. The most common internal parasite of equines includes *Strongyle, Parascaris equorum, Dictyocaulus arnfieldi, Triodontophorus*, Pin worms *(Oxyuris equi)* and *Anoplocephala* [19, 20].

Different studies have described that the prevalence and type of internal parasites affecting eqiuds, in general, are ubiquitous with equines being continually exposed throughout their lives [20, 21]. A large study looking at the association between poverty and animal disease [22] identified gastrointestinal (GI) parasitism as one of the most important problems for equids in developing countries. Studies conducted in Ethiopia and Mexico estimate the prevalence of endoparasite infections at over 90% in horses [9, 23] and over 80% in donkeys [24].Gastrointestinal parasite burdens also seem to be substantial in donkeys in The Gambia [25] and Republic of South Africa [26]. The existing limited evidence shows that there is high probability for the distribution of helminth parasites in horses of different ages. Even though few studies were reported about internal parasites of horses in the other parts of Ethiopia, there was no comprehensive study conducted on prevalence of internal parasites of horses, in and around Ambo town. Therefore, this study was designed to estimate the prevalence of different genera of helminth parasites and assess the associated risk factors of horses in the study area.

MATERIALS AND METHODS

Study Area Description: The study was conducted in and around Ambo town from November, 2014 to June, 2015. The area is found in western Shoa Zone, Oromia Regional State, central Ethiopia114 km west of Addis Ababa. These areas are at an altitude of 2101 meters above sea level (masl) and geographically located at a Latitude of 8°59'N37°51'E and longitude of 8.983°N 37.85°E. The area receives a mean annual rainfall of 900 mm (800-1000 mm) and annual temperature ranging from 15^0C to 29^0C with average temperature of 22^0C and relative humidity of 58%. Based on figures from the West Shoa Zonal Livestock and Market Development agency in 2014, there are estimated total population of bovine 5347, ovine 3297, donkeys 456, mules 151 and horses 2154 in and around Ambo town. The farming system of the study area was characterized by a mixed (crop-livestock production) farming system.

Study Animals: A study was conducted on 384 randomly selected horses. Information about sex, age and body condition and management system of the study animals was gathered from the owners. The ages of animals were determined using owners' information and dentition. Accordingly, animals were categorized as young (<2 years), adults (3-10 years) and old beyond 10 years. Body condition score (BCS) was subjectively estimated based on the guides published by Matthee *et al*. [27].

Study Design: A Cross-sectional study was conducted on 384 randomly selected horses of local breed found in Ambo town and in the localities around Ambo town to determine the prevalence of helminthes parasites in horses and also to compare the occurrence of the parasites depending on the types of sex, age groups and the body condition. Fecal samples collection and examination was carried out from horses which were dewormed with anthelmintics three months ago.

Sample Size Determination: The study design was cross-sectional and an expected prevalence of 50% for helminthes was taken into consideration for sample size determination as there was no previous report on the prevalence of the parasites in the study area. The number of animals required for the study was determined using the formula given by Svendsen [28] by using simple random sampling methods and 95% confidence interval with required 5% precision. There for a total of 384 horses were taken for the study.

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

Where;
n= required sample size
P_{exp}=expected prevalence
d= required precision

Study Methodology

Sampling Technique: Fecal samples were taken directly from the rectum or from the ground with strict sanitation when the animals were seen defecating and placed in universal bottles. Each sample was labeled with animal identification (sex, age and BCS) and then brought to Ambo University Veterinary Parasitology Laboratory. Samples were kept in refrigerator at 4°C to be examined coprologically. Fecal samples were preserved with 10% formalin, while samples for coproculture were collected without preservative [29].

Coprological Examination: Fecal examination was carried out by using sedimentation and floatation technique as described by Hendrix [13]. For identification of some parasites to species level, fecal samples were cultured and the larvae were recovered using Bearmann apparatus technique. The larvae were then identified under lower power microscope (10X objective), based on the shape and number of gut cells, relative size and shape of larvae's tail. The floatation fluid used in this study was supersaturated solution of sodium chloride (Nacl) salt prepared in the laboratory. The procedure given by Urquhart [21] was followed for the above parasitological methods. The Eggs were identified using ova identification keys [30].

Data Analysis: Data collected from the study animals were coded and entered in a Microsoft Excel sheet. All statistical analyses were performed using SPSS version 20 for windows. The association between prevalence of each studied parasite and the study variables (age, sex and BCS) was analyzed by Chi-square test. In all the analyses, confidence level was held at 95% and P-values <0.05 were considered as statistically significant.

RESULTS

From the examined animals 361(94%) were positive for different helminthic parasites. These included Parascaris *equorum*126 (32.8%), *Strongyle* 116 (30.2%), *Dictyocaulus arnfieldi* 18 (4.7%), *Oxyuris equi* 43 (11.2%) *Triodontophorus* 158 (41.1%) and *Anoplocephala* 6 (1.6%), as shown in Fig. 1.

All studied parasites were not statistically significant ($p>0.05$) between different (poor and good) body condition score in the studied horses (Table 1).

Table 1: Percentage prevalence of gastrointestinal helminthes based on BCS in horse

		Body condition			

Parasites identified	Prevalence (%)	Poor (%)	Good (%)	X^2	P- value
P.equorum	126 (32.8)	35	31.2	0.595	0.44
Strongyle	116 (30.2)	28.8	31.2	0.277	0.599
D. arnfieldi	18 (4.7)	5.6	4.0	0.540	0.463
O.equi	43 (11.2)	10.0	12.1	0.396	0.529
Triodontophorus	158 (41.1)	43.8	39.3	0.768	0.381
Anoplocephala	6 (1.6)	0.6	2.2	1.567	0.211

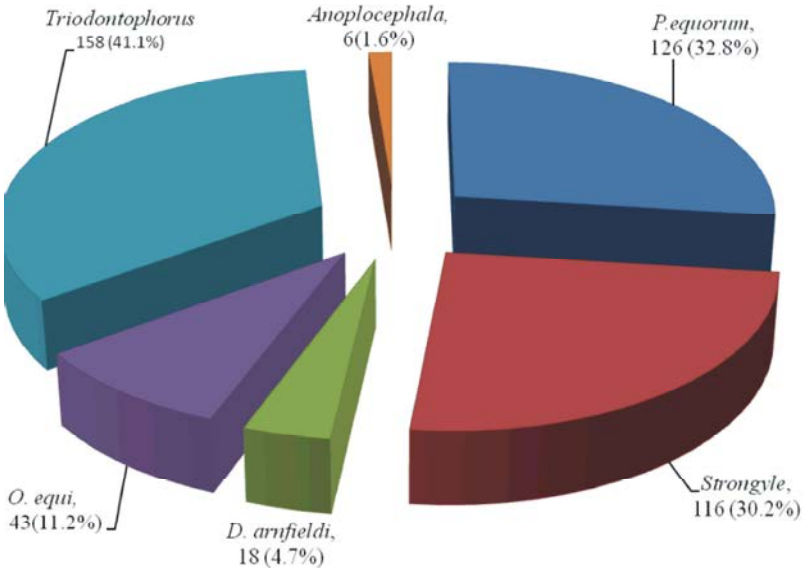

Fig. 1: Types of gastrointestinal helminthes and their prevalence in horses in the study period.

Table 2: Age-wise prevalence of different gastrointestinal helminthes in horse.

	Age groups				
Egg/larva identified	Young (%)	Adult (%)	Old (%)	X^2	P-value
P.equorum	60.3	27.8	25.9	28.445	0.000*
Strongyle	25	32.5	29.9	1.318	0.517
D. arnfieldi	7.4	3.6	4.8	1.572	0.456
O.equi	7.4	11.8	12.2	1.242	0.537
Triodontophorus	36.8	39.6	44.9	1.551	0.461
Anoplocephala	0.0	1.8	2.0	1.348	0.510

* Statistically significant

Table 3: Sex-wise prevalence of different gastrointestinal helminthes in horse.

	Sex			
Egg/larva identified	Female (%)	Male (%)	X^2	P-value
P.equorum	50.0	29.5	9.908	0.002*
Strongyle	29.0	30.4	0.049	0.826
D. arnfieldi	4.8	4.7	0.004	0.951
O.equi	8.1	11.8	0.730	0.393
Triodontophorus	41.9	41.0	0.019	0.890
Anoplocephala	0.0	1.9	1.174	0.279

* Statistically significant

The prevalence of *P. equorum* were statistically significant between the three age groups (P=0.000). In contrast, all studied parasites were not statistically significant (p>0.05) between young, adult and old horse (Table 2).

There was statistically significant difference in the prevalence of *P. equorum* with sex of horses (P=0.002). However, the effect of sex on the prevalence of other identified parasites was statistically not significant (P>0.05) as shown in Table 3.

DISCUSSION

The prevalence of gastrointestinal helminthes might vary temporally and spatially. The results of the present study demonstrated the presence of 6 different types of helminthic parasites in horse in and around Ambo town, Central Ethiopia. The overall prevalence of different types of helminthtic parasites in this study were 94%, which was in line with previous report from Ethiopia by Tolossa and Ashenafi[31] in horses of Arsi-Bale highlands of Oromia Region, Ibrahim[32] in horses of Hawassa town, Southern Ethiopia and Usluand Guclu[33] in Turkey who reported prevalence of 84.4%, 97.9 % and 100%, respectively.

In current study mixed infections were detected in 96 (25%) of horses which was lower than the finding of Tolossa and Ashenafi[31] in horses of Arsi-Bale highlands of Oromia Region and Uslu and Guclu[33] in Turkey who reported 59.1% and 50%, respectively and higher than the finding of Mahfooz*et al*.[34] in Pakistan who reported 5%.

The prevalence of *parascari sequorum* was 32.8%. This finding contradicted with the reports of Tolossa and Ashenafi [31], in horses of Arsi-Bale highlands of Oromia Region, Getachew [24] in Ethiopia, Mahfooz *et al*. [34] in Pakistan, Uslu and Guclu [33] in Turkey, Fikru*et al.* [23] in Ethiopia highlands and Aftab *et al.*[39] in horses of Lahore-Pakistan who reported 11.7%, 16.2%, 12%, 10.81% and 17.1%, respectively. The current findings were relatively higher than the previous findings and might be due to variation in managemental condition and implementation of parasite control options like regular deworming.

This study showed that the level of *parascari sequorum* infection had showed significant variation between the three age groups. The prevalence of *P. equorum* was significantly higher in young horses (60%) than older horses (25.9%). This was expected because *P. equorum* was mostly a problem of young horses and immunity developed following exposure during older age [35, 21]. The prevalence of *P. equorum* was also higher in mares (50%) than their counterpart stallions (29.5 %). This could be justified by the fact that mares had a close relation to their foals, which favored frequent recycling of the parasite between the dam and foal. Heavy infections of *P. equorum* cause impaction and perforation leading to fatal peritonitis [21]

The prevalence of *Strongyle* in the present study was 30.2%, which was different from the work of Tolossa and Ashenafi [31], Morariu *et al* [36], in Romania and Uslu and Guclu [33] in Turkey who reported 0.7 %, 9.6% and 7.2 %, respectively. However, the current study was in agreement with Wannas *et al*. [16] and Ibrahim *et al*.[32] in horses in and around Hawassa Town, Southern Ethiopia who reported prevalence of 22.72% and 28.4% respectively. This study showed that the level of *Strongyle* infection had no significant variation between the age, sex and body condition scores.

Prevalence of *Dictyocaulus arnfieldi 4.7%* was recorded in the present study that was higher than report of Tolossa and Ashenafi [31], with prevalence of 0.5% and in line with Saeed *et al*. [37] in Pakistan with prevalence of 2.5% and Ibrahim *et al*. [32] in horses in and around Hawassa Town, Southern Ethiopia with the

prevalence of 3.7%. Climatic and environmental differences between countries and differences in access to drugs might partly explain the variation in these estimates. The prevalence of *Dictyocaulus arnfieldi* did not show statistically significant variation between the age, sex and body condition scores.

Oxyuris equi with prevalence rate of 11.2% was very low when compared with the work of Ibrahim*et al*. [32] in the horses of in and around Hawassa town, southern Ethiopia and Krecek *et al*. [38] in horses in Republic of South Africa who reported 34.2% and 24%, respectively. This finding was in agreement with the earlier reports of Mahfooz *et al.*[34] 12%in horses of Pakistan and Aftab *et al*.[39] 6.32% in horses of Lahore-Pakistan. The present finding was very high when compared with the work of Tolossa and Ashenafi [31], Uslu and Guclu [33] in Turkey and Fikru *et al.*[23], who reported 1.8%, 1.8%, 2.1%, respectively. The differences in prevalence of infection could be due to variations in the management (care) given to these animals, variations in parasite biology relating to climatic conditions and differences in use of anthelmintics.

The prevalence of *Triodonthophorus* species in this study (41.1 %) was higher than previous findings of Krecek *et al.* [38], Tolossa and Ashenafi [31] and Fesseha [9], Reinmeyer *et al.*[40] who reported 23 %,13.9%, 35% and 3.6 %. respectively. The possible explanation for the observed variation in prevalence could be attributed to differences in agro-ecology, sampling season as well as equine management system.

The prevalence of *Triodonthophorus* species did not show statistically significant variation between the age, sex and body condition scores. Lower prevalence of *Anoplocephala* species 1.6% recorded in this study as compared to reports by Yoseph *et al*. [42], Fikru*et al.*[23] and Getachew *et al*. [24], might reflect the seasonality of oribatid mite intermediate hosts and differences in study period and locations. The low prevalence also could be due to the sporadic discharge of gravid segments in the feces and the difficulty of detecting the eggs of cestodes by routine fecal examination.

CONCLUSION AND RECOMMENDATIONS

Equines are important in the livelihood of developing countries especially in Africa, particularly for transportation. In this study, 6 types of helminthic parasites (*Strongyles, Triodontophorus, P. equorum, D. arnfieldi, O. equi* and *Anoplocephala*) were found in and around Ambo town, with a high overall prevalence of 94.0%.The predominant parasites occurring in the study area was *Triodonthophorus* followed by *Parascari sequorum* and the lowest was *Anoplocephala* with regard to the overall prevelence. The study confirmed that among the different sex and age groups, young and female horses were found to be most susceptible for *parascaris equorum* infection. Therefore proper screening and monitoring of the horses should be carried out regularly and implementing strategic deworming horses should be practiced.

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