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Strongyle Nematode Infections of Donkeys and Mules in and Around Bahirdar, Northwest Ethiopia

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Abstract: A cross-sectional study was carried out from November 2010 to May 2011 to determine the prevalence of strongyles in donkeys and mules in and around Bahir Dar town, west Gojjam administrative zone, northwest Ethiopia. Fresh faecal samples were obtained from 384 randomly selected donkeys (n=203) and mules (n=181). Coprological examination for the detection of strongyle eggs was performed using floatation technique. The over all prevalence of strongyle infection in both species of animals was 83.85% (322/384). In the two separate species; the infection rates were 85.08% (181/154) in mules and 82.75% (168/203) in donkeys. The infection rates of strongyles were 84.77% and 81.05% in adult and young animals, respectively, while in male and female animals the rates were 83.41% and 84.39%, respectively. However, in terms of age and sex, no significant differences were found between infected animals ($P > 0.05$). This study suggested that the high rate of infection with strongyle parasites could contribute to low performance and life expectancy of working equines in the region.

Key words: Bahir Dar · Coprology · Equine · Strongyles

INTRODUCTION

The equine population of the world is 122.4 million (40 million donkeys, 15 million mules' 43.3 million horses and 24.1million Zebras and Camels) [1]. In the distribution pattern, 98% of all donkeys, 97% of all mules and 60% of all horses are found in the developing countries. The number of equines in Africa is in the range of 17.6 million comprising 11.6 million donkeys, 2.3 million mules and 3.7 million horses [1, 2]. The equine population in Ethiopia is estimated to be 7.9 million (2.75 million horses, 5.02 million donkeys and 0.63 million mules) [2, 3].

Equids (donkeys, mules and horses) play an important role as working animals in many parts of the world, employed for packing, riding, carting and ploughing. Equine power is vital for both rural and urban transport system which is cheap and provides the best alternatives in places where the road network is insufficiently developed, the terrain is rugged and mountainous and in the cities where narrow streets prevent easy delivery of merchandise [4, 5].

Equines as a mean of transport for men and materials provides livelihood to a number of rural and semi-urban population of the world. They have a prominent position in the agricultural systems of many developing countries. It is suggested that donkeys can play a great role in the frame works of food security and social equity of high food insecure countries. In areas away from roads, many people use mules and donkeys to transport food and other supplies to villages [6, 7]. Long working hours and difficult conditions are experienced by donkeys and mules. These animals are often engaged in work for long hours and when get free, they are left to browse and feed on garbages. These have the potential to affect negatively their welfare and quality of life [8, 9].

Studies and observations conducted in the last two decades have pinpointed helminth parasites as being a major health hazard, limiting the overall performance of equines [10, 11]. Equids are hosts to a great number of gastrointestinal parasite species, of which nematodes of the family Strongylidae, commonly called strongyle nematodes or strongyles, are the most important. These parasites are ubiquitous and live as adults in the

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large intestine of equids. Strongyle nematodes of equids (horse, donkey and zebra) are classified into the subfamilies Strongylinae and Cyathostominae, sometimes categorized as large and small strongyles, respectively. Among the helminthes, large strongyles are most devastating parasites of equines [12, 13]. These large strongyles are cosmopolitans in distribution. Again, of the three strongylus species, *Strongylus vulgaris* is the most important where, the prevalence of this infection with one or more of these parasites approach 100% in foals [10, 14]. *S. vulgaris* and *S. edentatus* are relatively common and *S. equinus* seems to have more sporadic distribution. These parasites are important because they migrate in the circulation and vital organs and can cause severe damage that is fatal in some instances [15-17].

Although donkeys and mules are very common in Ethiopia, parasite surveys are very scant. The previous investigations were concentrated mainly on few areas of Ethiopia (Debre Zeit, Hawassa and Mekelle) where donkey sanctuary working worldwide is located and they did not consider epidemiological or ecological aspects of equine strongyloides in the rest of the country. Therefore, determination of the prevalence of equine strongylosis and asses the risk factors associated with strongyle infection in and arround Bahir Dar, Western Amhara National Regional State, Ethiopia is conducted in the present study.

MATERIALS AND METHODS

Study Area: The present study was conducted from November 2010 to May 2011 to determine the prevalence of gastrointestinal strongyles in donkeys and mules in and around Bahir Dar town, Western Amhara Region, northwest Ethiopia. Bahir Dar is located at 11°29'N latitude and 37° 29'E longitude. It is found at about 570 km northwest of Addis Ababa. The altitude of the area ranges between 1500-2300 meters above sea level. The area receives a bimodal annual rainfall which ranges between 1200-1600mm. It has the mean annual temperature of 23ºC. The equine population of Bahir Dar and its surrounding area is estimated to be 8000 equines [18].

Study Animals: The study animals were 384 indigenous breeds of mules (n=181) and donkeys (n=203) managed under the traditional husbandry system. Animals were kept mainly for traction power and packing. It comprised of different age groups and both sexes (211 males and 173 females) selected randomly from different localities in and around Bahir Dar town. The ages of animals were determined using owners' information and dentition. Accordingly, animals were categorized as young (< 2 years) and adults (> 2 years).

Study Design: A cross-sectional study design was used to estimate the prevalence of nematode strongyle infection in donkeys and mules in the study area. A simple random sampling technique was used to select study animals. The sample size was determined using the formula given by Thrusfield [19] with a 50% expected prevalence, a 5% desired absolute precision and 95% confidence interval.

Sampling and Coprological Examination: A total of 384 faecal samples were collected directly from the rectum of each animal using disposable glove and put in air and water tight sample vials. The collected samples were properly labeled with the necessary information and soon transported to Bahir Dar Regional Veterinary Laboratory. Samples were examined on the day of collection or stored in a refrigerator at 4°C for processing next day. The floatation technique was employed to concentrate parasite eggs in the faeces and examined microscopically (10x and 40x) for presence of parasite ova following procedures described previously. Identification of the eggs was made on the basis of their morphology [20].

Data Analysis: Data on individual animals and parasitological examination results was inserted into Ms-excel spread sheet program to create a database. The data were analyzed statistically using the Chi-square test (SPSS statistics 17.0). Differences between parameters were tested for significance at probability levels of 0.05 or less.

RESULTS

Of 384 examined samples, 322 were positive for strongyle eggs. The overall prevalence for both mules and donkeys was 83.85 %. The infection rates were 85.08% (181/154) in mules and 82.75% (168/203) in donkeys without any statistical significant difference in prevalence between them ($P > 0.05$).

The overall infection rate of strongyles was 84.77% and 81.05% in adult and young animals respectively. The general prevalence in males and females of both species of animals was 83.41% and 84.39%, respectively. However, in terms of sex, no significant difference was found between infected animals ($P > 0.05$) (Table 1).

Table 1: Prevalence of nematode strongyles according to species, age and sex of animals

Risk factors	No. of examined animals	No. of positive animals	Prevalence in (%)	P-value
Species				
Donkeys	203	168	82.75	0.537
Mules	181	154	85.08	
Age				
Young	95	77	81.05	0.392
Adult	289	245	84.77	
Sex				
Male	211	176	83.41	0.795
Female	173	146	84.39	

DISCUSSION

The results of the present survey clearly demonstrate that strongyle infections are highly prevalent (83.85%) in the study area. This report is less than reports of Getachew *et al.* [21] from Adaa, Akaki and Boset of East Shewa, Getachew *et al.* [3] again from east shewa of 99 and 100% respectively. Naem [22] and Yoseph *et al.* [4] also reported 94.1 and 100% prevalence of strongyle species from Henan Province of China and East and West Shewa zones of Ethiopia respectively. Upjohn *et al*. [23] and Slivinska *et al*. [24] also added 88.2 and 100% strongyle parasite prevalences in equines from Lesotho and Ukraine respectively. This is in line with previous reports from both Ethiopia [25] and other countries of Africa [23] which indicate prevalence rates varying between 100% (Ethiopia) and 89% (Chad). The overall prevalence of strongyle parasites in the present study is higher than the result reported by Pandey [26] with a prevalence of 48%. This may be due to the presence of different geographical and climatic conditions between the study areas. According to the current study the prevalence of strongyles in mules was 85% and in donkeys was 82.7%. Based on this, strongyle infection is slightly higher in mules than in donkeys but the data analysis showed no statistical significant difference in the prevalence of strongyle infections between mules and donkeys. This result is relatively similar to the reports of Feseha *et al*. [28] with a prevalence of100 % in mules and 100% in donkeys in Menagesha. The prevalence of strongyle infection in donkeys is in agreement with results of Ayele *et al*. [29] with a prevalence of 87% in donkeys in Boset, Central Shoa, Ethiopia. But, Zerihun *et al*. [27] in Ethiopia and Hassan *et al.* [30] in Sudan reported a higher prevalence of 99.15% in donkeys and 70.1% in donkeys and 96.15% in mules of strongyle infection, respectively. This difference may be attributed due to the difference in equine management and agro-climatic conditions between the study areas.

Analysis of data for sex related susceptibility to strongyle infections indicates a lack of any difference among the two groups ($P > 0.05$) and gender does not seem to play a role in this regard. This phenomenon is also observed by other workers under different management and climatic conditions [31].

Data on age related prevalence indicates no difference ($P>0.05$) among various age groups. Similarly no effect of age for the strongyle infection could be detected in other studies [32]. This result disagree with works of Chitra *et al.* [33] who reported that the level of strongyles and Ascarids increased when the donkeys became older, but then decreased. It may be due to the development of age immunity to strongyles and Ascarids in adult donkeys.

CONCLUSION

The results of the current study indicated that strongylosis is a prevalent disease in the surveyed area and is an important health problem of the equines which is speculated to cause heavy economic losses through low performance and short life expectancy of working equines. These nematode parasites are and will continue to be the most damaging parasite helminthes in the study area. Equines have crucial importance in the life system of developing countries especially in Africa, particularly for transportation. In spite of the invaluable and unlimited services equines provide man, it is the subject of routine and frequent neglect and maltreatment. Now and for the future, it is within the context of this attitude that the problems associated with equines have to be examined.

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