Prevalence of Strongyle Infection in Horses and Donkeys in and Around Dangila Town, Northwest Ethiopia

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Abstract: Strongyle infection is the most common and economically devastating disease of equine in Ethiopia. The aim of this study was to estimate the prevalence of strongyle infection and associated risk factors in horses and donkeys in and around Dangila town in Amhara Region. A cross-sectional study was conducted from November 2013 to April 2014 to determine the prevalence of strongyles infection in horses and donkeys in the study area. A total of 384 horses and donkeys were examined for strongyle parasites. Fresh fecal samples were obtained from 384 randomly selected horses (n=24) and donkeys (n=360). Coprological examination for the detection of strongyle eggs was performed using simple test tube floatation technique. Results revealed that the overall prevalence of strongyle infection in both species of animals was found to be 5.73%. In each species it was found to be 4.92% and 5.83% in horses and donkeys respectively. The infection rates of strongyles were 4.92% and 10.17% in adult and young animals, respectively, while in male and female animals the rates were 6.12% and 5.32%, respectively. However, there was no statistical significant difference in prevalence of strongyle infection between age, sex and among body condition (P > 0.05). In conclusion, even though strongyle infection seems endemic in horses and donkeys in the study area, the present report is very low. This may be due to be the fact that the deworming program by Bahirdar donkey sunchery at the beginning and end of rainy season, in collaboration with veterinary clinics worked well and effectively in managing the infection.

Key words: Dangila Town • Donkeys • Horses • Prevalence • Strongyles

INTRODUCTION

The equine population of the world is estimated to be 122.4 (40 million donkeys, 15 million mules’ 43.3 million horses and 24.1million zebras and camel) [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 [2]. 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 [3]. Equines as a means of transport for men and materials provide livelihood to a number of rural and semi urban population of the world. They have a prominent position in agricultural systems of many developing countries. It is suggested that donkey can play a great role in the frame works of food security and social equity of high food in secure countries. In areas away from roads, many people use mules and donkeys to transport food and other supplies to villages [4, 5].

Ethiopia is one of the developing countries in Africa, which is predominantly an agricultural country with over 85% of its population engaged in agricultural activity [6, 7]. The country has the highest equine population probably with the highest density per square kilometer in the world and Alemayehu [8] and it has a total of 6.9% and 42.4% in the world and Africa equine population
respectively [9]. Ethiopia possess about 5.02 million donkeys, 2.75 million horses and 0.63 million mules [6], equine play an important role in the transportation of products, fodder, fuel, wood, agricultural in puts and construction and waits materials equine power is both a rural and urban transport system which is cheap and viable if provides the best alternative in palace where good network is insufficiently developed, other terrains eagged and mountains and cites where narrow streets prevent easy delivery of Merchandise [10].

Equine endoparasites may be divided into three categories: nematodes, or roundworms; cestodes, or tapeworms; trematodes, or flukes. Parasites are assigned to these categories according to their morphology, or structure. Growth and life cycles of parasites within each group are generally distinct from those of the other groups. The roundworms are by far the most economically important internal parasites of equines. Internal parasites continue to be a significant threat to the health of equines. Even under proper management equines will become infested with internal parasites. Internal parasites of equines are of veterinary importance in many countries, where current methods of control rely almost entirely on the use of antihelmentics [11].

Infections caused by strongyles constitute a severe impediment to successful equine management due to debility and death of animals, particularly when heavy burdens are involved. Even light infections can affect the development and the performance of equines. The damage caused by large strongyles (Subfamily: Strongylinae) is well known. The adult worms produce lesions in the gut wall as they feed and larvae make destructive migrations in various tissues of the animal body. Strongyulus vulgaris (S. vulgaris) stands out as being particularly dangerous because the larvae develop in the mesenteric arterial system causing arthritis and thrombosis with serious consequences [12]. Patterns of transmission vary greatly with climate and management, therefore no worming program is universally applied [13].

Strongylosis is the most common and economically devastating disease of equine. Clinically infected equine exhibit signs of unthriftiness, anemia, colic and diarrhea [14]. The national census by the Central Statistical agency of Ethiopia yields that Dangila town has total population of 158, 688 (80, 235 men and 78, 453 women). Dangila town is populated of 27, 001(13, 387 men and 13, 614 female). Livestock disease; tryponosomosis (cattle), fasciolosis (cattle), anthrax (cattle), lump skin disease, pasteurellosis, black leg, internal and external parasites, Contagious bovine pleuropneumonia and African horse sickness. In Dangila town at least one person that has one donkey or horse to transport the crop from different rural area to the market, however health management is poor compared from other livestock [15]. Therefore, this study was aimed to estimate the prevalence of strongyle infection and determine the associated risk factors in horses and donkeys in and around Dangila town in Amhara Region.

MATERIALS AND METHODS

Study Setting: The study was conducted in and around Dangila town from November, 2013 through April, 2014 in Amhara region. Dangila town is under the administration of Awi zone in Amhara region, Ethiopia. Geographically; it is located on elevation of 2200m a.s.l and it is 485Km from the capital city, Addis Ababa and 95 km from Bihardar. It covers 526 km² between latitude with annual average rainfall and temperature amount being 1576 mm and 17°C, respectively [16]. The topography of this area is plane with some hills. This region has fertile red soil with high potential for production. The rainy season lasts from May to October which is relatively long. Around the rural part of Dangila town, with heavy accent on crops production (such as maize, teff, millet, mug seed and other cash crops), the farmers practice mixed farming with livestock production (such as goat, cow’s milk, chicken and egg sales) of 11° 20’ North and at the longitude of 37° 0 east [17].

Study Design: A cross-sectional study design was used to estimate the prevalence of strongyle infection in horses and donkeys in the study area. All horses and donkeys presented to the clinic with suggestive of clinical manifestation of strongyle infection were considered.

Study Animals: All horses and donkeys regardless of sex, age and breed found in and around Dangila town that were presented to Dangila Veterinary clinic and showing clinical signs of unthriftiness, anemia, colic and diarrhea were the study animals.

Sample Size Determination: The sample size was determined using the formula given by Thrusfield [18] with a 50% expected prevalence, a 5% desired absolute precision and 95% confidence interval were used hence, according to the formula given below and the total sample size was estimated as 384.
Where:
\[
n = \frac{(1.96)^2 \left( P_{\text{expe}} (1-P_{\text{expe}}) \right)}{d^2}
\]

- \( n \): required sample size
- \( P_{\text{expe}} \): expected prevalence of nematode parasites
- \( d \): desired absolute precision
- 1.96: the value of “Z” at 95% level of confidence

**Data Quality Control:** Fecal samples were collected aseptically and coprological examination was conducted. For quality control each slide was examined twice. The second round confirmatory microscopic examination were done by experienced laboratory technologists who were working at Dangila clinical laboratory.

**Materials and Chemicals:** The materials and chemicals used in this study include: two beakers, microscope, slide, cover slip, disposal glove, pipette, pistle and mortal, bottles, chemicals (formalin10%) and tea strainer. The flotation solution used in this study was salt solution.

**Method of Data Collection:** Fecal samples were collected directly from the rectum of 384 suspected animals (donkeys and horses) presented to Dangila veterinary clinic from Dangila town and the surrounding 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 Dangila clinical Laboratory. Samples were processed and examined on the day of collection and samples not processed on collection day were preserved in formalin for the next day to be processed. The samples were processed by simple test tube floatation technique and diagnosis was based on the observation of strongyle eggs in microscopic examination of fecal samples using 10x and sometimes 40x magnification power [18].

**Data Analysis:** After collection of all the necessary data, it was coded on pre arranged coding sheet. Data was entered into excel 2007 and analyzed through STATA version 11 soft ware. Tables were used to present results of pertinent findings. Association of host risk factors with strongyle parasite positives was calculated. A statistically significant association between variables is considered to exist if the computed p-value is less than 0.05.

**RESULTS**

Out of 384 both species (24 horses and 360 donkeys) examined 22 were found to be infected with strongyle parasites. The overall prevalence of strongyle infection for both species in the present study was 5.73% as indicated in table 1. The infection rate with strongyles in Dangila town was 4.17 % in horses and 5.83% in donkeys. The infection rates of strongyles were 4.92% and 10.17% in adult and young animals, respectively, while in male and female animals the rates were 6.12% and 5.32%, respectively. The body condition of both species was also classified as poor, medium and good body condition scores respectively. The prevalence according to body condition grade was found to be 5.64%, 4.35% and 8.33% in poor, medium and good body condition in both respectively. However, in terms of age and sex, species, body condition no significant differences were found between infected animals (P > 0.05) as indicated in table 2.

**Table 1:** General characteristics of study participants

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>188</td>
<td>48.96</td>
</tr>
<tr>
<td>Male</td>
<td>196</td>
<td>51.04</td>
</tr>
<tr>
<td>Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donkey</td>
<td>360</td>
<td>93.75</td>
</tr>
<tr>
<td>Horse</td>
<td>24</td>
<td>6.25</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>59</td>
<td>15.36</td>
</tr>
<tr>
<td>Adult</td>
<td>325</td>
<td>84.64</td>
</tr>
<tr>
<td>Body condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>24</td>
<td>6.25</td>
</tr>
<tr>
<td>Medium</td>
<td>23</td>
<td>5.99</td>
</tr>
<tr>
<td>Poor</td>
<td>337</td>
<td>87.76</td>
</tr>
<tr>
<td>Result</td>
<td></td>
<td></td>
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<tr>
<td>Positive</td>
<td>22</td>
<td>5.73</td>
</tr>
<tr>
<td>Negative</td>
<td>362</td>
<td>94.27</td>
</tr>
</tbody>
</table>

**Table 2:** Prevalence of Strongyle infection according to species, age and sex and body condition of animals

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Number of examined animals</th>
<th>Number of positive animals</th>
<th>Prevalence in%</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donkey</td>
<td>360</td>
<td>21</td>
<td>5.83%</td>
<td>0.735</td>
</tr>
<tr>
<td>Horse</td>
<td>24</td>
<td>1</td>
<td>4.17%</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>325</td>
<td>16</td>
<td>4.92%</td>
<td>0.119</td>
</tr>
<tr>
<td>Young</td>
<td>59</td>
<td>6</td>
<td>10.17%</td>
<td></td>
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<tr>
<td>Sex</td>
<td></td>
<td></td>
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<td>12</td>
<td>6.12%</td>
<td>0.735</td>
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<tr>
<td>Female</td>
<td>188</td>
<td>10</td>
<td>5.32%</td>
<td></td>
</tr>
<tr>
<td>Body condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>24</td>
<td>2</td>
<td>8.33%</td>
<td>0.583</td>
</tr>
<tr>
<td>Medium</td>
<td>23</td>
<td>1</td>
<td>4.35%</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>337</td>
<td>19</td>
<td>5.64%</td>
<td></td>
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</tbody>
</table>
DISCUSSION

In the current study the overall prevalence of strongyle infection in the study area was found to be 5.73%. This result clearly demonstrates that strongyle infections are with very low prevalence in the area. This report is less than the reports of Getachew et al. [8, 20] from east shewa and Adaa, Akaki and Bost of East Shewa that revealed 100% and 99% prevalence respectively and the reports of Feseha et al. [21] with a prevalence of 100 % in mules and 100% in donkeys. This may be due to the presence of different geographical and climatic conditions between the study area and availability of anthelmintics.

It was indicated that, the prevalence of strongyle infection was 93% in Bereh, 87% in Boset and 95% in Adaa as reported by Ayele and Dink [22]. The prevalence of the current study was also lower as compared with the results of Yoseph et al. [23], Mulate [24] and Ayele et al.[25] and Fikru et al. [26] in which they reported 100%, 100%, 100% and 98.2% in donkeys of Wonchi, highland of Wollo province, Dugda Bora and western high land of Oromia, respectively. According to the study of Samuel and Berihun [27] the overall prevalence of strongyle infection in horses was 32.6% in and around Wollo Combolcha. Upjohn et al. [28] and Slivinska et al. [29] also added 88.2 and 100% strongyle parasite prevalences in equines from Lesotho and Ukraine respectively. According to the study of Basaznew et al. [30], the prevalence of strongyles in mules was 85% and in donkeys was 82.7% in and around Bahirdar. In our study, strongyle infection is slightly higher in donkeys than in horses, but no statistical significant difference was observed within two species.

Data on age related prevalence also indicated no significant difference (P>0.05) among various age groups. Similarly no effect of age for the strongyle infection could be detected in other studies [31]. Strongyle-type eggs were reported with a prevalence of 58.50% according to the report of Chitra et al. [32], this finding was also higher than the current study. Even though helminth infections are most common and significant health concern due to morbidity and mortality, lower infection rates have been recorded in other studies where regular deworming practices with effective drugs are routinely undertaken as indicated by Capewll et al. [33]. Many studies have reported wide spread occurrence of helminthes species in horse population across the world and grown under varied management and climatic conditions as it was stated by Chapman et al. [11] and Boxell et al. [34].

The current prevalence of 10.17% and 4.92 in young and adult animals respectively is lower than that of Alemayehu [35] who reported prevalence of 80% and 51.4% in young and adult in and around Arsi and bale region respectively. The current study also revealed that the prevalence was 5.64%, 4.35% and 8.33% in poor, medium and good body condition horses respectively.

Lower infections of strongyles in the current study may correspond with the biology and epidemiology of these parasites as they require longer period to complete the life cycle and slow or partial development of immunity. Studies over the years have indicated a significant change in worm population and their burden under different anthelmintic pressures over the years as it was reported by Dunsmore and Sue Sue, [13], Herd [36] and Chapman et al. [11].

Generally, even though strongyle infection seems endemic in horses and donkeys in and around Dangila town, the prevalence report of this study is very low. This may due to be the fact that the deworming program by Bahirdar donkey sunchery at the beginning and end of rainy season in the study area.

CONCLUSION

The present study revealed that strongyle infection is less prevalent in the study area. However, this prevalence is enough to cause enormous economic loss through poor weight gain, reduce working ability. The occurrence of strongyle infection was observed in different sex and age of horses and donkeys in this study. In conclusion, even though strongyle infection seems endemic in horses and donkeys in and around Bahirdar town, the prevalence report of this study is very low. This may be due to the deworming program by Bahirdar donkey sunchery at the beginning and end of rainy season in the study area. Therefore, strategic and regular anthelmintic treatment of equine population should be continued and further study should be conducted using well equipped laboratory techniques to document the true prevalence of the study area.

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