Prevalence and Risk Factors of Gastrointestinal Nematode Parasites of Horse and Donkeys in Hawassa Town, Ethiopia

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Abstract

A cross-sectional study was conducted on 384 horse and donkey in Hawassa town to determine the prevalence of gastrointestinal Nematode parasite and to identify infection association with species, sex, age and body condition of horse and donkey. Horse and donkey were examined for the presence of Nematode parasite. Floatation and McMaster Techniques were employed on feces to identify parasite eggs. Overall prevalence of horse and donkey was 72.7% (279/384) for gastro intestinal nematode parasite with the prevalence of 63.7% and 78.5 % in horses and donkeys respectively. The prevalence recorded for Strongyle parasite was 76% and 64.9% and for Parasascaris equorum 26.2% and 4.6% in donkeys and horses respectively. Nematode parasite prevalence was influenced by species and age risk factors (p< 0.05) whereas sex and body condition score were not (p>0.05). The mean egg count indicated the existence of significant difference in the mean of egg count with different risk factors; detected high in donkeys, females, less than four years age group and poor body condition score (p< 0.05). In conclusion, this study revealed that the occurrence of gastro intestinal nematode parasite in horse and donkey in Hawassa town is a common phenomenon. As a result, awareness to animal owners and proper deworming and prevention mechanisms should be implemented to reduce the economic burden of the disease in the country.

Keywords: Hawassa; Floatation; McMaster; Nematode; Prevalence

Introduction

Despite their invaluable contributions, equines in Ethiopia are not the most neglected animals, accorded low social status. Studies to elucidate the magnitude of equines health problem are lacking. Such information would be useful for designing strategies that would help improve equine health and welfare [1]. 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 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 [2]. This study was conducted to know the current prevalence of gastrointestinal nematode infection of horse and donkey in Hawassa town and its associated risk factors.

Material and Methods

Study area

The study was conducted in Southern Nation’s Nationalities and People’s Regional state (SNNPRs) in Sidama zone, Hawassa town. The town is located in the Great Rift Valley, 270Km south of Addis Ababa. The population of donkey (Equus asinus), mule (Equus hemonious) and horse (Equus cabalis) in Hawassa town is 13961, 369 and 5161 respectively [3].

Study type and study animal

A cross-sectional study was conducted on 233 donkeys and 151 horses. The study animals included systematically selected donkeys and horses of all age group which owned by the individual farmers for the purpose of cart pulling to generate income. The study animals were kept under extensive management system and they were not treated with anthelmintic during the study period.

Sampling strategy

The sampling method employed to select the study animals was systematic random sampling where a sample of randomly selected donkeys and horses were sampled from market places, cart stations and construction sites. Sample size was determined by taking the expected prevalence of 50% and absolute precision of 5% with 95% confidence level were used and the total sample size was estimated at 384 [4].

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Data management and analysis

The data collected from the study area were entered in to Microsoft Excel spread sheet and the data were coded appropriately and analyzed using SPSS version 16 statistical software. Chi-square tests were applied to test the statistical association exists among the risk factor such as species, sex, age and body condition scoring with the presence of the infection.

Results

The overall prevalence of GIT nematode of donkey and horses

During the study period 384 fecal samples taken from 151 horses and 233 donkeys were thoroughly examined for the presence of different gastrointestinal nematode. From the examined animals, 96 horses and 183 donkeys were positive for different GIT nematode. 89(58.9%) of horses and 126 (54.1%) donkeys were infected with a single parasite, on the other hand 7(4.6%) horses and 57(24.5) donkeys were harbored two types of parasites. The overall prevalence of GIT nematode in horses and donkey in the study area was found to be 72.7% (Table 1) (Figure 1).

Relative proportion of parasite

The highest relative percentage was recorded for Strongyles (75.26%, 210/279), followed by Parascaris equorum and Strongyle (22.58%, 63/279) and Parascaris equorum (2.15%, 6/279) (Table 2).

The proportion of parasite with risk factors

The parasites encountered in the study area both in donkeys and horses were Strongyle and Parascaris equorum with overall prevalence of (76%, 64.9%) and (26.2%, 4.6%) in donkeys and horses respectively. The highest prevalence of Strongyle and Parascaris equorum was observed in donkeys, females, young and poor body condition score (Table 3).

Analysis of risk Factors

Chi-square analysis of different risk factors showed that sex and body condition score was not significantly associated with the risk of infection with GIT nematodes (p>0.05) whereas Species (X²=10.33, P=0.001) and age (X²=6.88, P=0.043) of the animal was associated with GIT nematode infection (Table 4).

Result of quantitative fecal examination

The McMaster technique applied to determine the number of GIT nematode parasites egg per gram of feces (EPG) revealed minimum and maximum EPG value of 100-8100 and 100-3200 in donkeys and horses respectively. There was a high significant association between species, sex, age and body condition score with EPG of GIT nematodes in that highest EPG count was detected in donkeys, females, in age group less than four years and in poor body condition score (Table 5).

Intensity of infection in donkey and horse: Based on the result of EPG counts in the study area 53.6% donkeys were severely infected, 15.88% moderately, and 8.58% mildly whereas 11.2% horses were infected severely, 19.2% moderately and 32.4% mildly (Figure 2).

Discussion

The coprological examination done for this study using floatation method revealed an overall gastrointestinal nematode parasite prevalence of 72.7% (78.5% in donkeys and 63.7% in horses). This finding is higher than work [9] reported with prevalence of 29.79%; 15.7% of horse and 37.48% of donkeys in South Darfur state. The current prevalence of gastrointestinal nematode infection of donkeys (78.54%) is higher than the work [10] reported with overall prevalence of 33% of Parascaris and Strongyle in donkeys in Central Shewa, Ethiopia and this is in agreement with previous study done [11] in Sudan. Horse harbor 63.6% of gastrointestinal nematode this is higher than the study reported [12] with overall prevalence of 52% of gastrointestinal nematode in horses in Kombolcha. This difference might be due to the difference in the study area or due to nutritional status of the animal in the respective study area which can influence the level of immunity to be infected by the parasite. Additionally it could be affected by deworming strategy equines and accessibility to veterinary clinic.

High level of prevalence (78.5%) was observed in donkeys compared to horses (63.6%). This is in agreement with previous reports [13-15]. This could be due to the relatively less attention given to these animals. Different prevalence was observed between female (78.6%) and male (71.9%), but there was no statistically significant difference (X²=0.83, P>0.05). Age was also considered as a risk factor and higher prevalence (82.3%) observed in animals of below four years old while the lowest prevalence (66.9%) observed in greater than ten years old and the difference between the prevalence among the different age groups was statistically significant (X²=6.8, P<0.05) this is in harmony with Regassa and Yimer [14], Sheferaw and Alemu [15]. Statistically there is no significance association with body condition and infection of GIT nematodes this is in agreement with Mezgebu et al. [13].

Strongyle type egg is highly prevalent in both species (76% in donkeys and 64.9% in horses) compared to Parascaris this agrees with study reported [16] predomination of Strongyle-type eggs with a prevalence of 50% in horse and 57.14% in donkey. 58.5% Strongyle type egg as predominant one also reported [17]. 66.67% of Strongyle type egg also reported [13].

<table>
<thead>
<tr>
<th>Species of animal</th>
<th>Number of animal examined</th>
<th>Number of positive animal (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horse</td>
<td>151</td>
<td>96 (63.7)</td>
</tr>
<tr>
<td>Donkey</td>
<td>233</td>
<td>183 (78.54)</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>279 (72.7)</td>
</tr>
</tbody>
</table>

Table 1: The prevalence of gastrointestinal nematode parasites in donkeys and horses.

Figure 1: Prevalence of single and mixed infection with nematode parasites of donkey and horse.
The percentage prevalence of Strongyle species was higher in donkeys, females, in young age and poor body condition whereas the occurrence of *Parascaris equorum* was statistically associated with species, age and body condition score. The prevalence of *Parascaris* was 4.6% in horses. This result is lower than the prevalence reported in Ethiopia [18] with prevalence of 11.7% and it is in close agreement with reported prevalence of 6.5% [12].

Statistically significant variations in mean eggs per gram of feces were observed in all the considered risk factors (P < 0.05), in the current study higher level of mean egg count was observed in female animals compared to male. The result agrees with previous work [19]. This difference in the mean egg count between female and male animals could be due to the fact that resistance to infection is decreased at the time of parturition and during early lactation. This periparturient relaxation of resistance results in the females [2].

With regard to age, generally the highest egg count was observed in animals of less than four years of age followed by the egg count observed in animals of four to ten years of age, while the lowest egg count observed in animals of greater than ten years. As age increases egg per gram feces decreases this is in agreement with previous work [14,15]. This might be associated with apparent inability of the host to develop acquired immunity so that young animals have severe infection with gastrointestinal nematode parasite. Higher infection rates and more severe infections indicate a lack of immunity in younger population [2].

Concerning severity of infection in donkeys reported in this study, (53.6%) for severe infection both moderate and mild infection had the lower incidence with 15.9% and 8.6%, respectively.

It is lower than the values obtained with previous work [14] in donkeys 86.31%, 46.82%, and 46.82% for severe, mild and moderate infection respectively. In Sudan there is a contradictory report with 58.6%, 21.9%, and 19.5% for mild, moderate and severe infections respectively [11]. This may be attributed to management system and deworming strategy of donkeys.

### Table 2: The relative proportion of gastrointestinal nematode parasite of donkey and horse.

<table>
<thead>
<tr>
<th>Parrot encountered</th>
<th>Number of positive</th>
<th>Relative percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongyle</td>
<td>210</td>
<td>75.26%</td>
</tr>
<tr>
<td><em>Parascaris equorum</em></td>
<td>6</td>
<td>2.15%</td>
</tr>
<tr>
<td>Strongyle and <em>Parascaris equorum</em></td>
<td>63</td>
<td>22.58%</td>
</tr>
<tr>
<td>Total</td>
<td>279</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3: The prevalence of GIT nematode parasite with respective categories of the risk factors in the study area.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>No. of animal Examined</th>
<th>No. of animals Positive</th>
<th>Prevalence (%)</th>
<th>X^2(P-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horse</td>
<td>151</td>
<td>96</td>
<td>63.7</td>
<td>10.33(0.001)</td>
</tr>
<tr>
<td>Donkey</td>
<td>233</td>
<td>183</td>
<td>78.54</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>33</td>
<td>78.6</td>
<td>0.83(0.362)</td>
</tr>
<tr>
<td>Male</td>
<td>342</td>
<td>246</td>
<td>71.9</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;4 years</td>
<td>79</td>
<td>65</td>
<td>82.3</td>
<td>6.88(0.043)</td>
</tr>
<tr>
<td>4-10 years</td>
<td>172</td>
<td>125</td>
<td>72.7</td>
<td></td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>133</td>
<td>89</td>
<td>66.9</td>
<td></td>
</tr>
<tr>
<td><strong>BCS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>80</td>
<td>58</td>
<td>72.5</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>222</td>
<td>162</td>
<td>73</td>
<td>0.64(0.726)</td>
</tr>
<tr>
<td>Good</td>
<td>82</td>
<td>57</td>
<td>69.5</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>384</td>
<td>279</td>
<td>72.7</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4: Chi-square analysis of different risk factors for GIT nematode infection.

### Table 5: Analysis of mean EPG of GIT nematodes in donkeys and horse with different risk factors using one-way ANOVA.

The percentage prevalence of Strongyle species was higher in donkeys, females, in young age and poor body condition but statistical significance was observed only on the species of animal whereas the occurrence of *Parascaris equorum* was statistically associated with species, age and body condition score. The prevalence of *Parascaris* was 4.6% in horses. This result is lower than the prevalence reported in Ethiopia [18] with prevalence of 11.7% and it is in close agreement with reported prevalence of 6.5% [12].

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Conclusion and Recommendation

GIT nematode infection was highly prevalent in donkeys and young age group where as sex and body condition was not significantly associated with prevalence of GIT nematode. Strongyle and Parascaris equorum was the nematode parasites affecting donkeys and horses in Hawassa town and Strongyle had the highest relative prevalence, than Parascaris in the study area. All donkeys in the study area working for long duration and provided with small amount of crop residue at the morning and in the evening they are allowed to graze around Tikur Wuha and these may suppress their immunity and expose them to parasitic infection.

Public awareness creation to equine owners on proper deworming, sufficient feed supply and minimizing extensive open grazing of donkeys and horses is important. Balancing of the work load and duration should be managed.

Acknowledgements

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References

2. Urquhart GM, Armour J, Duncan JL, Dunn AM, Jennings FW (1996) Veterinary parasitology, 2nd ed. The Faculty of Veterinary Medicine, University of Glasgow 4-57.