Major Gastrointestinal Parasites of Donkey in and Around Jigjiga, Somali Region, Ethiopia

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Abstract: A cross-sectional study was conducted from December 2015 up to May 2016 to estimate the prevalence of gastrointestinal (GIT) helminths of donkeys in and around Jigjiga town, Fafen zone of Somali regional state of Ethiopia. Coprological examination (fecal flotation and sedimentation) techniques were employed for the detection of eggs of gastrointestinal (GIT) helminth parasites. The overall prevalence of GIT helminths infection was 89.8%, including mixed parasitic infections. The GIT helminths recorded were strongyles (79.7%), Parascaris equorum (44.8%), Oxyuris equi (37.5%), Fasciola (1.6%) and mixed infections were (46.9%). The prevalence of gastrointestinal helminthe egg with sex, age and PAs was not significantly associated (P>0.05), but a strong significant association was observed in body condition (P<0.05). The findings of the present study indicated a high prevalence of GIT helminth parasites compromising the health and welfare of donkeys. Sustainable prevention and control methods should be developed to prevent the burden of gastrointestinal helminthes of donkeys in and around Jigjiga town.

Key words: Donkeys • Endoparasites • Ethiopia • Jigjiga

INTRODUCTION

Donkeys (Equus asinus) are among the early domesticated equines that have been around as long as mankind Saul et al. [1]. The domestic donkey belongs to the genus Equus and family equidae. It is believed that all the domestic donkeys in the world are descended from African wild ass [2]. Currently there are about 112.5 million domestic equidae in the world of which 44.3 million donkeys, 58.5 million horses and the remaining are mules [3]. In the developing countries, there are estimated 110 million of equines. Ethiopia has a large numbers of equines. It has a total of 9.83 million equine populations, from those numbers, donkeys accounts 7.04 million while horses and mules are 2.03 and 0.4 million respectively [4].

Equines as a mean of transport for 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 [5, 6]. Donkeys are essential to the livelihoods of many households in rural and urban areas of Ethiopia, relieving families from repetitive and energy-consuming tasks. Equines are the most important animals in the farming and transport systems of Ethiopia [7]. In Ethiopia, 56% of households kept donkeys mainly for pack services (to generate income and homestead use), 26% for cart use (to generate income) and 14% for pack use but exclusively for homestead use and 4% exclusively for renting, breeding or petty trade [8].

Long working hours and difficult conditions are experienced by donkeys. They are often engaged in working for long hours and when they get free, they are left to browse and feed on garbages. These have the potential to affect negatively their welfare and their quality of life [9]. In addition, these animals work under difficult environmental conditions including intense heat, difficult terrain and often-inappropriate equipment, with inadequate food and water, resulting in exhaustion, dehydration, malnutrition, lesions and hoof problems [8].

The donkey is widely distributed throughout Ethiopia. It is most commonly found in the dry and mountainous areas. The low level of development of road transport network and rough terrain of the country make donkeys the most valuable, appropriate and affordable pack animals under the small holder farming system [10]. Donkeys have often been described as sturdy animals, yet they are subjected to a variety of diseases and usually remain asymptomatic carriers GIT parasites [11]. Although
equines are often described as hardy and resistant animals, they do suffer from a number of health problems. They are prone to number of parasitic diseases such as large and small strongyles, Ascarids, pin worms, Gastrophilus, lung worms, fluke and tape worms are the common problems encountered in most veterinary clinics. These parasites share with the equine digestive nutrients and lead to retard growth or reduce work out put, discomfort and pains of various degrees and even mortality of the animals [12]. Some works have been done in different parts of the country on endoparasites of donkeys in Sululta and Gefersa districts [13], Strongyles and Parascaris parasites population in working donkeys of Central Shoa [14], prevalence of gastro-intestinal parasites of donkeys in Dugda Bora district [15] and prevalence of endoparasitic helminthes of donkeys in and around Haramaya district, eastern Ethiopia [16]. The different studies which have been done in some parts of the country suggested that there is high prevalence of donkey GIT helminths. However, there has not been any published study conducted in the study area. Therefore, the objective of the study was to estimate the prevalence of GIT helminthes of donkeys in and around Jigjiga town.

**MATERIALS AND METHODS**

**Study Area:** The study was carried out in and around Jigjiga town of eastern Ethiopia situated 628 km east of Addis Ababa (the capital of Ethiopia) at a latitude of 9° 21’ N and a longitude of 42° 48’ E, with an elevation of 1,609 meters above sea level. The seasonal difference is minor, this is because it is located on plain surrounded by mountains and annual rainfall ranges from 500-1000 mm. The mean minimum and maximum temperature of the area ranges from 14.5°C and 26.5°C, respectively and the mean relative humidity is 57% CDJ [17].

**Study Population:** The total number of donkeys of the study area is 15,645 [18]. The sample population was 384, among these 384 donkeys 254 were male and 130 were female. During sample collection various potential risk factors including sex, age, area and body condition score were recorded. The age of equine was determined by dentition using the given standard [19] and body condition scores were also estimated based on the published guideline [20].

**Study Design:** A cross-sectional study was conducted in three purposively selected peasant associations of the study area from November 2015 to march 2016 to estimate the prevalence of GIT helminthes of donkeys in and around Jigjiga town. A simple random sampling technique was used to select study animals

**Sample Size Determination:** The sample size required for this study was determined according to Thrusfield [21]. Since there was no previous work done in this study area, 50% prevalence was taken as expected prevalence for sample size determination of this study. The other determinants considered in sample size determination were 95% confidence interval and 5% desired absolute precision. Hence the sample size is estimated as:

\[ N = \frac{Z^2 \cdot P_{exp} \cdot (1 - P_{exp})}{d^2} \]

where,
- \( N \) = required sample size
- \( P_{exp} \) = expected prevalence
- \( d \) = absolute precision
- \( Z \) = 1.96 at 95% level of confidence

\[ N = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{(0.5)^2} = 384 \]

**Sampling and Coprological Examination:** A total of 384 fecal samples; 10 g of feaces from each animal were collected directly from the rectum or from the ground with strict sanitation when the animals were seen defecating and placed in universal bottles and 10% formalin was added to preserve from hatching of eggs. The collected samples were properly labeled with the necessary information and soon were taken to Jigjiga Regional Veterinary Laboratory. Samples were examined on the day of collection or stored in a refrigerator at -4°C for processing next day. Fecal examination was carried out by floatation and sedimentation according to the technique described by Urquhart et al. [22] with some modification.

**Data Analysis:** Data collected from the study was entered to MS Excel sheet and analyzed by using SPSS version 20 software. Descriptive statistics was used to determine the prevalence of the GIT helminths and Chi-square (χ²) test was used to assess the degree of association between each risk factor and GIT helminths. In all analyses P-value less than 0.05 was considered as significant.

**RESULTS**

From the total of 384 donkeys, 345 were positive for different types of parasite eggs, with an overall prevalence of 89.8%. The overall infection rate of GIT
Table 1: The relative proportion of the gastrointestinal parasites in the study donkeys

<table>
<thead>
<tr>
<th>Types of parasite</th>
<th>No. examined</th>
<th>No. positive</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongyles</td>
<td>384</td>
<td>306</td>
<td>79.7</td>
</tr>
<tr>
<td><em>Parascaris equorum</em></td>
<td>384</td>
<td>172</td>
<td>44.8</td>
</tr>
<tr>
<td><em>Oxyuris equi</em></td>
<td>384</td>
<td>41</td>
<td>10.7</td>
</tr>
<tr>
<td>Fasciola</td>
<td>384</td>
<td>6</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Table 2: The prevalence of mixed gastrointestinal parasites in donkeys within study area

<table>
<thead>
<tr>
<th>Infection type</th>
<th>No. examined</th>
<th>No. positive (mixed parasite)</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two parasite</td>
<td>384</td>
<td>120 (strongyles + <em>Parascaris equorum</em>, strongyles + <em>Oxyuris equi</em>)</td>
<td>31.3</td>
</tr>
<tr>
<td>Three parasite</td>
<td>384</td>
<td>60 (strongyles + <em>Parascaris equorum</em> + Fasciola)</td>
<td>15.6</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>180</td>
<td>46.9</td>
</tr>
</tbody>
</table>

Table 3: The prevalence of gastrointestinal parasite in donkey with respective to categories of the risk factors in the study area

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>No. examined</th>
<th>No. positive</th>
<th>Prevalence (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>254</td>
<td>223</td>
<td>87.8</td>
<td>0.074</td>
</tr>
<tr>
<td>Female</td>
<td>130</td>
<td>122</td>
<td>93.8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>345</td>
<td>89.8</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>113</td>
<td>103</td>
<td>91.2</td>
<td>0.712</td>
</tr>
<tr>
<td>Adult</td>
<td>271</td>
<td>242</td>
<td>89.3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>345</td>
<td>89.8</td>
<td></td>
</tr>
<tr>
<td>BCS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>113</td>
<td>112</td>
<td>99.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Medium</td>
<td>197</td>
<td>175</td>
<td>88.8</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>74</td>
<td>58</td>
<td>78.4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>345</td>
<td>89.8</td>
<td></td>
</tr>
<tr>
<td>Pas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elbahay</td>
<td>122</td>
<td>111</td>
<td>91</td>
<td>0.735</td>
</tr>
<tr>
<td>Dudahide</td>
<td>136</td>
<td>120</td>
<td>88.2</td>
<td></td>
</tr>
<tr>
<td>Shabeley</td>
<td>126</td>
<td>114</td>
<td>90.5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>345</td>
<td>89.8</td>
<td></td>
</tr>
</tbody>
</table>

parasite was 93.8% in female, 87.8% in male, 91.2% in young, 89.3% in adult, 99.1% in poor, 88.8% in medium and 78.4% in good body condition were recorded (Table 3).

**DISCUSSION**

The prevalence of gastrointestinal helminthes may vary temporally and spatially. In this finding the overall prevalence of different GIT helminth parasites of donkey was found to be 89.8%. The finding of the current study was in line with the previous reports Mattioli *et al.* [23], Fikru *et al.* [24], Ibrahim *et al.* [25] and Bewketu and Endalkachew [26] who have reported 84.4%, 92.8%, 96.9% and 88.21% in Gambia, Western highlands of Oromia, in and around Hawassa town, Ethiopia and in and around Bahir Dar, Ethiopia respectively.

The current finding, however, was lower than other findings reported by other workers in Ethiopia Yoseph *et al.* [27], Fikru *et al.* [24], Mulate [28] and Gizachew *et al.* [10] have reported the prevalence of GIT helminthic parasites to be 100%, 100%, 98.2% and 100% in donkeys of Wonchi, highlands of Wollo province, Western highlands of Oromia and Dugda Bora district, respectively. The relative low occurrence of helminthic parasites in and around Jigjiga might be associated with the agro-ecological differences, veterinary services provided by Jigjiga regional veterinary clinic for donkeys and the diagnostic capacity of the parasitological technique used. The difference among these findings from different areas might be due to variation in management system, sample size and sampling method differences [27].

The results of the present study demonstrated the presence of four different types of GIT helminthic parasites of donkeys in and around Jigjiga town. Among the four different types of helminthic parasites identified in the current study, strongyles 79.7% were found to be dominant in the study area. This was in agreement with the finding of 77.3% Alemayehu and Etaferahu [29] in south Wollo zone, but it was lower as compared with the results of Feseha *et al.* [30] and Zerihun *et al.* [13] in which they reported 100% and 99.15% in donkeys of Menagesha and Sululta and Gefsersa districts respectively. The difference among these findings might be due to geographical location of the areas, variation in management system, sample size and sampling method differences [27].

In this study, the second most prevalent parasite in donkeys next to strongyles was *Parascaris equorum* 44.8% which was in agreement with 50% by Ayele *et al.* [15]. But was higher than 15.7% and 17.3% reported by Yoseph *et al.* [27] and Fikru *et al.* [24] respectively. This variation observed in these studies could be due to the variation in the length of the study period, the season of the study period and ecology of the study area. Mezgebu *et al.* [31] mentioned that the difference in prevalence of *Parascaris equorum* from different reports in developing countries is somewhat conflicting and this could be due to compromised immune responses relating to concurrent disease, but is worthy of further investigation.
In the current study, *Oxyuris equi* with prevalence of 10.7% was in accordance with the work of Shrikhande *et al*. [32], Sinasi [33] and Biniam and Abdisa [16], who have reported 8.53%, 6.4% and 15.36% respectively. The present result disagrees with Ibrahim *et al*. [25] and Yoseph *et al*. [27] who have reported 31.8% and 32.4% respectively. The low prevalence might be due to the effect of relative higher temperature in the present study area which desiccates the highly susceptible *Oxyuris equi* egg.

The prevalence of Fasciola eggs in this study was 1.6% which was in line with 1.5% by Ayele *et al*. [15] in Dugda Bora district, but it was lower than the findings of Biniam and Abdisa [16] and Getachew *et al*. [34] who reported 15.36%, 80% prevalence respectively. The lower prevalence of Fasciola eggs in the current study compared to the reports of Getachew *et al*. [34] and Biniam and Abdisa [16] is due to the geographical location of the area which is not comfortable for the snail population, the intermediate host of Fasciola. Only very few areas, where summer tributaries are dried off are found to be swampy. The work of Getachew *et al*. [34] was in fasciolosis endemic area and is not representative for the whole country.

This study confirmed no statistical significant difference between sex and age in prevalence gastrointestinal helminthes of donkeys which was in agreement with Mezgebu *et al*. [31] and Biniam and Abdisa [16]. However it was disagreed with Bewketu and Endalkachew [26] and Sapkota [35], who suggested that female donkeys were found to have significantly higher infestation of GIT helminthes than their counter part males as they might have lower immunity due to gestation, lactation and stresses occurred during this period as well as compared to the young equines, the immunity of the old equines is low as they are frequently exposed to different parasites, extensive work overload and undernourished conditions. In the study area there were no statistical significant difference among peasant associations PAs (P>0.05). This may be due to the presence of almost similar climatic condition among PAs.

There was a significant difference in GIT helminthes prevalence on the basis of body condition score which was in agreement with previous reports by Matthee *et al*. [36], Getachew *et al*. [37] and Brady and Nichols [38]. This could be due to the fact that animals with poor body condition might be immuno-compromised probably due to malnourishment and higher workload and as a result be exposed to parasitism and similar work was reported by Ayele *et al*. [15] and Alemayehu and Etaferahu [29].

**CONCLUSION**

The study revealed importance of donkeys GIT parasites with an overall prevalence of 89.8%, the common donkeys GIT parasites recorded in the current study area were Strongyles, *Parascaris equorum*, *Oxyuris equi* and Fasciola. Among the identified GIT parasites, the highest relative percentage was recorded for strongyles while less occurrence rate was observed for Fasciola. This study confirmed that there is significant difference in the prevalence of the parasites among the different body condition scores and it is shown that GIT helminthes parasites are more prevalent in animals with poor body condition than well-conditioned animals. Therefore owners should be trained to improve the management system, especially in terms of the level of nutrition so that the animal can have good body condition that confers some level of resistance against helminthes infection together with strategic timed de-worming of donkeys to reduce parasitic contamination of the environments as well as infection of donkeys.

**REFERENCES**


