Corresponding Author: Basaznew Bogale, Department of Veterinary Paraclinical Studies, Faculty of Veterinary Medicine, University of Gondar, Gondar, Ethiopia.
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 assess the risk factors associated with strongyle infection in and around 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 23°C. 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

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>No. of examined animals</th>
<th>No. 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>Donkeys</td>
<td>203</td>
<td>168</td>
<td>82.75</td>
<td>0.537</td>
</tr>
<tr>
<td>Mules</td>
<td>181</td>
<td>154</td>
<td>85.08</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>95</td>
<td>77</td>
<td>81.05</td>
<td>0.392</td>
</tr>
<tr>
<td>Adult</td>
<td>289</td>
<td>245</td>
<td>84.77</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>211</td>
<td>176</td>
<td>83.41</td>
<td>0.795</td>
</tr>
<tr>
<td>Female</td>
<td>173</td>
<td>146</td>
<td>84.39</td>
<td></td>
</tr>
</tbody>
</table>

**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 Ada, 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 Feshea et al. [28] with a prevalence of 100% 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.

**REFERENCES**


