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Cross sectional study on the prevalence of equine Strongyle infection Inmecha Woreda, Ethiopia

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Abstract

A cross-sectional study was carried out from November 2015 to April 2016on 219 mules and on 165 donkeys in mecha,worda Amhara Region to determine the prevalence of GIT strongylosis in equine species and to determine the association of different risk factors with the disease in the study area. Simple random sampling technique was used. In order to achieve these objectives, simple flotation technique was applied. Fresh fecal samples were obtained from 384 randomly selected mule (=219) and donkeys (n=165). Coprological examination for the detection of strongyle eggs was performed using floatation technique. The overall prevalence of strongyle infection in the study area was 63% (n=263). The prevalence of strongyle infection in mules and donkeys were 64.8%, 60.6 %, respectively (χ^2 =0.724, P = 0.395). The infection rates of strongyle were 74.4%, 62.3% and 62.1% in young, adult and old animals, respectively, while in female and male animals the rates were 64.6% and 61.7%, respectively. There was statistical significant difference in prevalence of strongyle infection among body condition, and work pattern (P <0.05). However, there was no statistical significant difference in prevalence of strongyle infection between age, species and sex (P > 0.05). In conclusion, strongyle infection is widely distributed in the study area. Therefore, further epidemiological study of strongyle infection with aims of designing and implementing appropriate prevention and control strategies are strongly recommended.

Keywords: GIT strongylosis, Coprological examination, floatation technique, strongyle eggs.

Introduction

The equine population of the world is 122.4 million (40 million donkeys, 15 million mules' 43.3 million horses and (Abayneh, *et al*., 2002). 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 of17.6 million comprising 11.6 million donkeys, 2.3 million mules and 3.7 million horses (Belay, 2006).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 thebest alternatives in places where the road network is insufficiently developed (Getachew *et al*., 2008). Equines asa 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 mule's donkey as well as

horses to transport food and other supplies to villages (Yosephet *al*., 2008 and Woodford, 2009).

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 (FAO, 1999; Wilson, 1991). The country has the highest equine population probably with the highest density per square kilometer in the world(Alemayehu, 2004)and it has a total of 6.9% and 42.4% in the world and Africaequine respectively(Wilson, 1991).Ethiopia possess about 5.02 million donkeys, 2.75 million horses and 0.63 million mules (ERAO, 1999), equine play an important role in the transportation of products, fodder, fuel, wood, agricultural inputs and construction and waits materials (Feseha, 1997).

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 groupare 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, wherecurrent methods of control rely almost entirely on the use of anthlementics (Chapman *et al*, 2002).

Infections caused by strongyles constitute a severe impediment to successful equine management due to debilityand death of animals, particularly when heavy burdens are involved. Even light infections can affect the development and the performance of equines. The adult worms produce lesions in the gut wall as they feed and larvae make destructive migrations in various tissues of the animal body.*Strongylus vulgaris (S.vulgaris)*stands out as being particularly dangerous because the larvae develop inthe mesenteric arterial system causing arthritis and thrombosis with serious consequences (Ogburne*et al.*, 1985). Patterns of transmission vary greatly with climate and management, therefore no worming program is universally applied (Dunsmore*et al*., 1985).

Strongylosis is the most common and economically devastatingdisease of equine clinicallyinfected equine exhibitsigns of unthriftiness, anemia,colic and diarrhea (Urquhart *et al*., 1996).In Ethiopia, previous investigations about this parasite were concentrated mainly on few area such asFeseha *etal.* (1999) and Basznew*et al.* (2011) around Bahirdar were reported that with a prevalence of 100 % and 83.85% overall, , Yoseph *et al.* (2005),belay (2006) and Ayele *et al*. (2006) and Fikru *et al*. (2005) and Tolla*et al*. (2013) in which they reported, 100%, 100%, 100% and 98.2%, 87.7% in donkeys of, Wonchi, highland of Wollo province, Dugda Bora and western high land of Oromia, Gondar respectively.But the previous investigator was excluding mecha woredaduring investigationprevalence of equine strongyle so that I was interested to conduct my research on mecha woredas.Mecha is situated at an altitude ranging from 1800-2500 meters above sea level sea level topographically, the likely hood of strongyleinfestation in the area is not known because no previous works of an appreciable degree were under taken to determine the magnitude of the problem in the study area.Therefore,the objectives of this study were:

- To estimate the prevalence of strongyle infection in merawi and around merawitowns
- To identify the risk factors associated with GIT strongyle infection status in equines

Materials and Methods

Study Area

Mecha district is one of the 105 districts of Amhara Regional State which is found in west Gojjam Zone, northwestern parts of Ethiopia. The town Merawi is the center of the district administrative unit of the kebeles. It is located at about 535 km North West of Addis Ababa and 30 km south west of Bahir Dar. The altitudinal variation of the district ranges from 1800-2800 m a.s.l. and it covers total surface area of 159,027 hactares. It is bordered by 'YilmanaDensa' Wereda in the east, 'Bahir Dar Zuria' Wereda in the north and north east, 'SemienAchefer' in the north, DebubAchefer', 'Dangila' and 'FagtaLekoma' district in the west, 'Sekela' district in the south. Currently, the district consists of 43 kebeles of which 3 kebeles are found in Merawi town and the rest in the rural kebeles (MWAO, 2010). The district lies between the coordinates of 110 05' to 110 38' N and 370 00' E to 370 23' E with an estimated area of 149.2 km2.The total population of the district is 248,127 of whom 126, 136 are males and 121, 991 are females. Of the total population, 244, 219 are urban dwellers while 3,908 were in town dweller(EPCC, 2007).

The equine population mecha district was ranges upto 20,106 equines and190000 cattle, 148971 ovine and 204181 poultry (MWARDO, 2011).

The agroecology of the district is classified as WeinaD ega (80%) and'Dega' (20%). The altitudinal ranges cover between 1800 - 2500 m is considered 'WeinaDega' and between 2500 -2800 m is 'Dega' (MARDO, 2010). The study area has uni-modal rainfall distribution with the highest rain falling from May to October based on the data rec orded by the Ethiopian National Meteorological Service Agency for 5 years (January 2005 to December 2009). The annualrainfall is 1703 mm and the minimum, maximum and mean annual temperature is 5.70C, 30.60C and 18.80C respectively. The total number of cattle population in Western Gojjam Zone was 1,800,

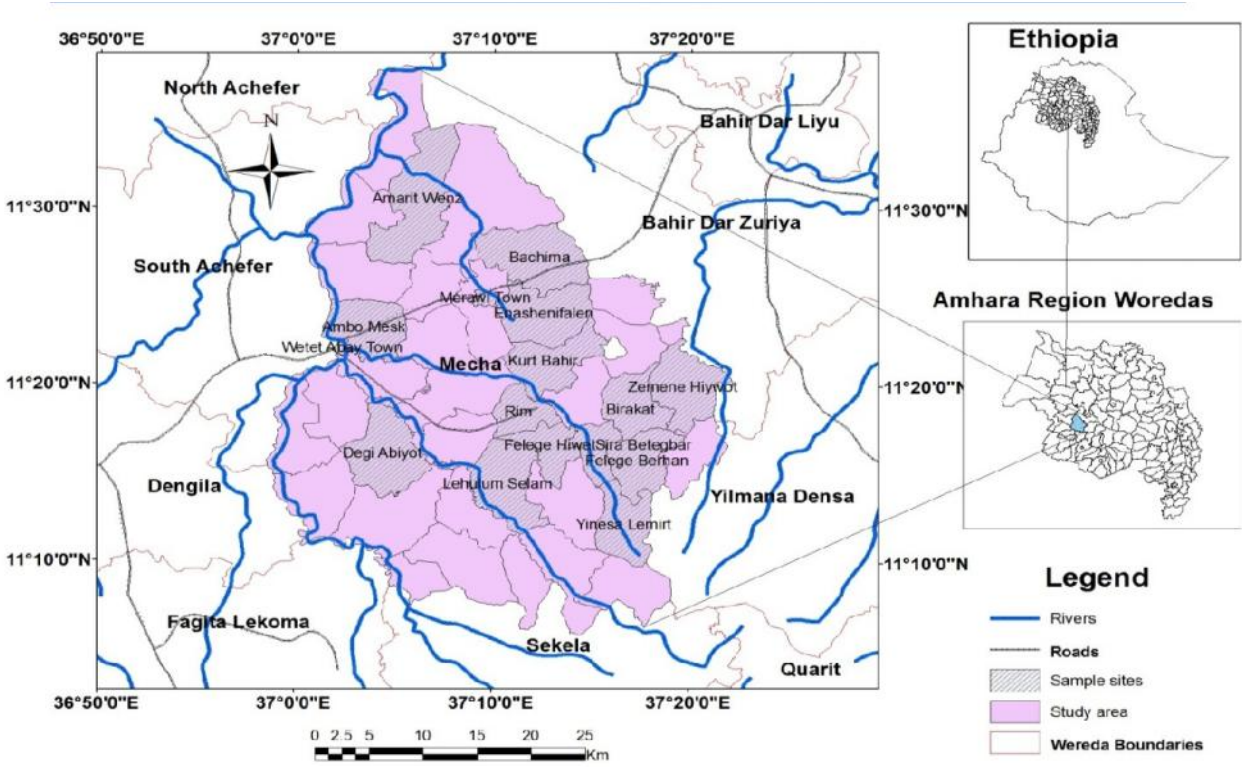

Figure 1: map of study area, source (CSA, 2007)

Study Population

The study animals were 384 indigenous breeds of Mule (n=219) and donkeys (n=165) managed under the traditional husbandry system and animals kept mainly for traction power, packing, transport and cart pulling and concerning all age groups (young, adult and old aged)(Annex1). The age of the selected equines was determined by dentition. Donkeys less than 3 years ages were classed as young, those in range of 3 to ten years were classed as adult and those greater than ten years were classed as old(Patrica, 2007). Body condition scores (poor, medium and good)were subjectively estimated based on the guides published by (Pearson and Ouassat, 2000) (Annex2).Both sexes and its economic activities of equineswere included in the study.

Sample Size Determination

The sample size was decided by formula of Thrusfield (2005), by assuming 50% expected prevalence, as there were no previous study in the study area and 95 % confidence interval.

$$n = \frac{Z^2.p\ (1\text{-}p)}{d^2}$$

Where n= sample size, p= prevalence (50%), z= taken from the level for 95% CL (1.96) and d= the level of absolute precision (5%). Accordingly the calculated sample size was 384.

Sampling Techniques

A total of 384 equines (219 Mule and 165donkeys) were selected by simple random sampling procedurein Mecha and subjected to qualitative coprological examinations to identify the major GIT strongyle parasites involved and to determine their prevalence rates.

Study Design

A cross- sectional study design was conducted from November, 2015 to April, 2016 to estimate the prevalence of stongylosis in equine species.

Data Collection Methods

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. Each sample was labeled with code referring to the animal number, species, date, and place of collection and would soon transport to Bahidar Regional Veterinary Laboratory. Samples were examined on the day of collection or stored in a refrigerator at 4°C and 10% formalin 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 and identification of the eggs was made on the basis of their morphology (Souls, 1986).

Data analysis

To test the hypotheses the raw data stored in excel spread sheet was analyzed by SPSS stastical software, version 20. The possible association of infection with comparable categorical variables (hypothesized risk factors) was assessed using chi-squared analysis. The prevalence was computed and analyzed at different levels such as sex, age, species, body condition score and work pattern as a percentage value. For all statistical analysis $\alpha = 0.05$ was considered a significant level (Steel and Torrie, 1982).

Results

Overall Prevalence and Prevalence in Different Species of Equines

The overall prevalence was found to be 63% and the species specific prevalence was 64.8% and 60.6% in mule and donkey respectively.There was nostatistically significant difference ($\chi^2$0.724, P= 0.395) on the prevalence of strongyle infection in different species of equines in the study areas (Table 1)

Prevalence in Different Sexes of Equines

Sex based prevalence was 64.6%, 61.7% in female and male species respectively. There was no statistically significance difference (χ^2= 0.358, P = 0.550) in the prevalence of strongyle infection in different sexes of equine species in the study areas (Table 1).

Prevalence in Different Age groups of Equines

The study animals were categorized in to three age groups, young <3years, adult, 3-10years and old beyond 10 years. The prevalence on age bases was 72.4%, 62.3%, 62.1% in young, Adult, and old respectively. There was statistically insignificant difference (χ^2= 1.189, P = 0.552) in the occurrence of strongyle infection with the three age's groups (Table 1).

Table 1: Association of hypothesized risk factors (species, sex and age) with the occurrence of equine strongylosis.

Risk factors	Tot no of animals examined	no of positive	prevalence %	χ^2	p-value
Species					
Mule	219	142	64.8	0.724	0.395
Donkey	165	100	60.6		
Total	384	242	63		
Sex					
Female	178	115	64.6		
Male	206	127	61.7	0.358	0.550
Total	384	242	63		
Age					
Young	29	21	72.4		
Adult	260	162	62.3	1.189	0.552
Old	95	59	62.1		
Total	384	242	63		

Prevalence in Different Body Condition Score of Equines

Body condition scores of equines were categorized as poor, medium, and good. The prevalence in different body conditions scores of equines were found to be 75.4%, 80%, and 23% in poor, medium, and good in respectively. The prevalence of GI strongyle infection among the different body condition score groups were statistically highly significant (χ^2= 93.523,P = 0.000). The highest and lowest prevalence of GI strongyle infection 80% and 23 % were recorded in medium and good body condition score respectively in the study area (table 2).

Prevalence in Different Work Pattern of Equines

The equines based on their purposes were categorized as those animals used for packing, transport, cartpulling, pack&transport and non-purposes and their prevalence rate in both species were 56.5%, 83.9%, 54.5% ,67.3%, and 71.6% in packing , transport , pack and transport, cartpulling and have no purposes respectively. There was statistically highly significant difference (χ^2 = 13.13, P = 0.011) among infected equines used in different purposes. The highest and lowest prevalence of GI strongyle infection 83.9 % and 54.5% were recorded in equines used for transport purpose and both for transport and packing purposes respectively in the study area (table 2).

Table 2: Association of hypothesized risk factors (body condition and work pattern) with the occurrence of equine strongylosis

Risk factors	Tot no of animals examined	no of positive	prevalence %	χ^2	p-value
Body condition					
Poor	179	135	75.4		
medium	105	84	80	93.52	0.000
Good	100	23	23		
Total	384	242	63		
Work pattern					
packing	191	108	56.5		
transport	31	26	83.9		
cart pulling	55	37	67.3	13.13	0.011
packing and transport	33	18	54.5		
non purpose	74	53	71.6		
Total	384	242	63		

Discussion

Over all higher prevalence of GIT equine strongylosis among equine species in the current study from the total sample 384 examined, 242 equine species were positive for GIT equine strongylosis which count 63% prevalence. This survey was a first attempt to provide base line information on the occurrence of equine strongylosis in the study area.This prevalence rate obtained from the present study is less than to the work reported by(Getachew *et al*, 2008) and (Alemayehu, 2004)from East Shewa and Adaa, Akaki and Bost of East Shewa that revealed 100% and 99% prevalence respectively and (Fesheha*et al*, 1999) and (Basznew*et al.*, 2011) in and around Bahirdar alsoreported that with a prevalence rate of 100 % and 83.85% overall prevalence in mules anddonkesrespectively.The current study also revealed that there is lower prevalence of stronglosis when compared with the study reported by (Ayele and Dinka, 2008). They reported that 93% in Bereh, 87% in Boset and 95% in Adaa respectively.This difference mightbe due to the difference in environmental conditions, sample size, sampling time, management practice favoring the survival of the larvae of the parasite and availability of antihelementics in the study area.

There was no statistically significance difference (P < 0.05) between mule and donkeys in susceptibly in the study area. The prevalence of GI strongyle infection in the current study was 64.8% and 60.6% in mule and donkey respectively, which is lower than that of (Asefa*et al.*, 2010) who reported 88.21 % in donkeys and 77.91 % in mules in and around Bahir dar western, Ethiopia. The prevalence recorded for Strongyle parasite reported by (Feseha *et al.*, 1999) and (Basznew*et al*, 2011) around Bahirdar were reported that with a prevalence of 100 % and 83.85%

prevalence in mules and donkes respectively this report is not in agreement with the findings of the present study as there was a prevalence of strongylosis 64.8% and 60.6% in mule and donkey respectively.The prevalence of the current study was also lower than as compared with the results of,(Yoseph *et al.*, 2005; belay, 2006); Ayele *et al*., (2006); Fikru *et al*., 2005) and Tolla*et al*., 2013) in which they reported, 100%, 100%, 100% and 98.2%, 87.7% in donkeys of,Wonchi, highland of Wollo province, Dugda Bora and western high land of Oromia, Gonderrespectively. But also the finding of the current study of prevalence of 60.6 % in donkeys is lower than that of (Asefa*et al.*, 2011) who reported a prevalence of 99.5 % in Sululta and Gefersa district of centeral Ethiopia. This variation might be due to difference in agro-ecology and density of equine population in the area and the practice of use ofantihelementics therapy for equines in the study area.

Data on age related prevalence in the present work also indicated no significant difference (P>0.05) among various age groups. Similarly no effect of age for the occurrence of strongyle infection reported in other studies (Saeed *et al*. 2011 and Basesenew *et al.*(2011). This finding is not in agreement to (Desalegn, 2005) who reported statistically significance difference among age groups. Who reported that higher prevalence in adult and lower in young. This might be due to the fact that management in young equine is good as compared to adult equine, whereas in the present study age groups reared extensively and thus the likelihood exposure is almost similar to different age groups. Butalso the present finding is not in agreement with (Sousby1983) who reported there is higher prevalence in young animals when compared to adult and old equines.This could be due to the difference in management, feeding and practice of deworming difference among the three age groups of equines in the study areas because young mule and donkeys in the study area feed both grazing and getssupplementary feeds when the mothers goes to market and for other packing activities.

In the present study there was no statistically significant difference (P >0.00) sex related susceptibility to stongylosis. This finding is in agreement to the findings of (Fikru et al 2005) and (Yoseph, 1999) both reported there was no statistically significant difference in between sex.The present finding is not in agreement with the work done by (Saeed *et al.*2011and basaznew *et al.* (2011). They reported a significance difference (P< 0.05) between males and females, higher prevalence rate reported in females. This could be associated with the more workload in males than females, which could create most of males get less chance for grazing the pasture but mostly get non pasture feeds when compared to females and, females usually have not more cares because females are mostly used as breeding purpose.

The finding on body condition scores has highly significance difference (P < 0.05) among the three BCS groups in the current study which is in agreement with the study of(Alemayehu and Etaferaw, 2013and Ayele *et al*. (2006).Likewise, equine with poor body condition have higher chance of harboring the parasites. 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 stongylosis.

There was statistically significance difference (P < 0.05) among equines used for different purposes. Concerning the purposes for which the animals were kept, equine that was used for transport andnon-purposewas found to be with higher prevalence of stongylosis than animals used for cart pulling and packing and this might be confounded by the difference in the management given to these groups of animals. There was no a habit of giving especial care for the equines used for transport andnon-purpose such as deworming and supplementary feed rather than the chance ofextensive grazing for these animals on work,as the result getting chance of infection ascompare to use for the purpose of cart pulling, packing and packing &transport in the study area. But equineswhich were used for the purpose of cart pulling ,packing and packing&transport were habit of giving especial care such as deworming and supplementary feed so that reduce the chance of getting infection. However there is no previous data reported regarding this issue at all.

Conclusion and Recommendations

The present study indicated that equine strongyle to be the major problem with equal susceptibility between mules and donkeys in the area. In the investigation of potential risk factors for the occurrence of strongyle infection, work pattern and body condition were found to be significantly associated with the occurrence of the disease. However; sex, species and age of animals were not significantly associated with the occurrence of strongyle infection. Generally in the present study

the disease affect all age groups and both sexes approximately equally. Higher prevalence rate were recorded in animals having poor and medium body condition. Concerning the purposes for which the animals were kept, equine that used for transport and non-purpose was found to be with higher prevalence of stongylosis. The climatic condition of Mecha in the Amhara Region where rainfall is frequent and temperature is mild also favors the development and survival of infective larvae for most part of the years. Owing to the huge equines population in the study area considerable contamination to the communal pasture grazing system could be the other factor which favors the survival of the parasite. Animals of deferent age and sex group usually graze on communal pasture facilitated easy transmission of this parasitism. However, the problem due to strongyle of equines in the study area was given less attention. Hence based on the above conclusion the following recommendations are forwarded:

- The high prevalence of strongyle infection highlights the need further epidemiological and investigation of this disease that would result in designing and implementing cost-effective and appropriate prevention and control strategies.
- Appropriate management and sanitary standard through strategic deworming has to be followed in combating the impacts of strongyle infection in equines.
- Strategic treatment of equines should be undertaken on the basis of sound and complete understanding on the epidemiology of strongyle of equines in the study district.

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