



ISSN 2347-2677

IJFBS 2018; 5(3): 164-168

Received: 22-03-2018

Accepted: 23-04-2018

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Equine fasciolosis a growing problem in Arsi-Bale highlands of Oromia region, Southeastern Ethiopia

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Abstract

A coproscopic survey on equine fasciolosis was conducted in Asela and Goba districts within the Arsi-Bale highlands of Oromia region, Southeastern Ethiopia. The study design was a cross sectional type employed between September 2015 to June 2016 on a total of 1184 faecal samples representing 682 horses, 401 donkeys and 101 mules. Coprological examination revealed the existence of equine fasciolosis with an overall prevalence of 18.92%. Out of which, the prevalence of fasciolosis in horses, donkeys and mules was 83 (7.02%), 93 (7.85%) and 48 (4.05%), respectively. There was no statistically significant variations ($P>0.05$) in the prevalence of equine fasciolosis among districts, age, species and sexes of equines. Necropsy was performed on a total of 14 horses euthanized due to severe infections of epizootic lymphangitis and tetanus cases and examined for adult parasites. Accordingly, *Trichostrongylus axei* (100%), *Parascaris equorum* (50%), *Gastrophilus species* (50%), *Fasciola hepatica* (35.7%) and *Fasciola gigantica* (28.7%) were found. The presence of more than one helminthes parasites in equines of Arsi-Bale highlands of Oromia region may be related with lack of regular deworming and poor management practices. The result of the present study disclosed that fasciolosis is one of the growing parasitic problems of equines in the Arsi-Bale highlands affecting the well-being of horses, mules and donkeys. Therefore due emphasis should be given particularly in prevention and control of this parasites.

Keywords: Arsi-Bale highlands, Equines, Ethiopia fasciolosis, prevalence

Introduction

Equines have a prominent position in the agricultural and transport system less developed modern transport and communication service, the natural choice rests on the use of human and pack animals made of transport as it has been the care in some part of the world. The mountains nature of Ethiopian landscape has also made travel time consuming and difficult which has resulted the back of pack animals to remain as the only suitable means of transport in the country terrain for centuries^[1].

The most common entities leading to ill-health, suffering and early demise and finally death are infectious diseases and parasitism, which resulted in considerably reduced animals work output, reproductive performance and most of all their longevity^[1]. *Strongylus vulgaris* and *Strongylus edentatus* are among the most common problems in Ethiopia and more rarely *Strongylus equinus*^[2]. On the other hand, *Fasciola hepatica* is also common in many countries as an occasional parasite of equines and man. Horses and donkeys may get heavy infestation where such case usually discovered at routine postmortem examination^[3]. Fasciolosis is a parasitic infection caused by liver flukes, *Fasciola hepatica* and *Fasciola gigantica* belonging to the genus fasciola in the family fasciolidae. It affects mainly ruminants but also other animal species, such as horses and pigs. In tropical countries, fasciolosis is considered the most important helminth infection with reported prevalence of 30–90%^[4, 5]. The disease is one of the most important parasitic diseases in grazing animals with over 700 million production animals being at risk of infection^[6, 7].

Endo parasitic diseases dominated by gastro intestinal helminthes are the serious health problem contributing to poor body condition, reduced work out, poor reproductive performance and short life span. The deleterious effects of helminthes parasites on their equine hosts are well recognized globally and documented^[8, 9]. Large number of internal parasites has been identified in study done in some African countries including Ethiopia, Kenya, Zimbabwe, Burkina Faso and Morocco^[1]. In Ethiopia various studies disclosed that Strongyles, *Parascaris equorum*, Bot stomach worms, lung worms, tape worms and liver flukes to be the

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most prevalent gastro intestinal parasites of equines [10]. In Ethiopia equines are mainly found in highlands and middle altitudes where the altitudes are known by presence of fasciolosis in livestock [1].

According to temperature and rainfall, the year in Ethiopia is divided into four seasons, namely long rainy (July–September), post-rainy (October–December), short rainy season (January–March) and dries (April–June). Studies carried out on fasciolosis around the world have determined that there exists a relationship between transmission and climatic factors [11]. Microclimate can vary considerably from one region to another, from one farm to another or between neighboring open grasslands [12]. In addition, transmission of *Fasciola gigantica* is known to depend on several factors related to the biology of the parasite, the vector and stock management [11].

Despite the huge numbers and the increasing importance of equines in the Ethiopian economy, knowledge about the health problems affecting their welfare is limited for most parts of the country. Thus, the present study on equine fasciolosis in Arsi-Bale highlands of Oromia region was necessary. Even though fasciolosis was reported as major livestock problem in different parts of Ethiopia, in Arsi-Bale highlands of Oromia region particularly in Asela and Goba districts studies were not so far conducted. Therefore, the objectives of the present study include determining the prevalence of assessing the magnitude of infection in different equine species, sex and age groups in Asela and Goba districts of Arsi-Bale highlands of Oromiya region, Southeastern Ethiopia.

Materials and Methods

Description of study area

Arsi-Bale highlands are found in the Oromia Regional State southeast of Ethiopia where Asela and Robe the capitals of Arsi and Bale zones are located 175 Kms and 430 Kms away from Addis Ababa. Topographically, the altitude ranges from 2000-4250 meters above sea level where a central plateau predominates with a narrow lowland area. Three climatic zones, including an arid, tropical highland and tropical forms are known to exist. The area experiences a bimodal rainfall occurring from July to October and April to May. An average annual temperature of 20- 25 °C and rainfall of 200 mm in the lowlands whereas 10- 15 °C with a rainfall of 400 mm in the highlands are recorded. Livestock plays an integral role for agricultural activity, which also provides meat, milk, cash income and transportation purposes. The livestock species reared are cattle, sheep, goat, horses, donkeys, mules, camels and poultry. Equine population is the highest in the Oromiya Region mainly of the Arsi-Bale highlands [13]. From the total area 43% is used for grazing, 35% for cultivation, 8.6% for forestland, 2.7% unproductive and 10.7% productive but unutilised land. The major land cover is thus used for grazing which support on average 27 livestock per hectare. There are mixed farming of crop production and livestock production [14].

Study animals

Equines considered in this study were local breeds in origin belonging to different age and sex groups. The study was conducted on a total of 1184 equines of local breed 682 horses (344 males and 338 females), 401 donkeys (205 males and 196 females) and 101 mules (53 males and 48 females) in

two selected districts namely Asela and Goba within the Arsi-Bale highlands of Oromia region, Southeastern Ethiopia. Young and adult groups were estimated using an age determination chart developed based on dentition [15]. Accordingly, equines less than two years of age were considered as young while those above two years as adults. Equines were kept under typical traditional farmer's management conditions. All animals were allowed to graze without or poor supplementation (crop residues) and did not receive antihelminthic treatment both before the start and during the study.

Study design and sampling methods

A cross sectional study design was employed to determine the prevalence of equine fasciolosis in Arsi-Bale highlands of Oromia region, Southeastern Ethiopia. The sample size was determined using standard procedures for an infinite population, 50% estimated prevalence, 95% confidence interval and 5% allowable error for the estimate [16]. A two stage cluster sampling technique was used to calculate the minimum sample size. Two districts Asela and Goba were selected purposively based on equine population and accessibility to the main road. Three peasant associations (PA) from each district were selected randomly using a lottery system. One village from each PA was selected randomly and all accessible horses in the village were sampled until the required number was attained.

Examination Protocols

A total of 1184 faecal samples of equines (682 horses, 401 donkeys and 101 mules) were collected to examine for the presence of *Fasciola* eggs. Faecal samples were collected directly from the rectum using arm length rubber gloves and placed in 28 ml glass, screw-corked universal bottles half filled with 10% formaldehyde (samples for coproculture were collected without preservative). Sedimentation technique was used to concentrate the *Fasciola* eggs and microscopic examination of faeces for helminth ova using procedures as described by Hendrix [17].

Post mortem examinations were conducted on 14 horses to investigate and identify adult parasites from the GIT. At post mortem worm recoveries were accomplished by the following method. Each organ of the GIT was ligated at its junction with the others and left out of the abdomen and the contents of each organ was separately opened and irrigated with water. The supernatant was passed through a sieve, so that not to miss the small strongyles. A thorough parasitological examination (collection and identification) was made. The collected parasites were preserved for identification. Identification of the collected worms was done by using lactophenol and differentiated by their morphologies and predilection sites [3].

Data analysis

The differences in the prevalence equine fasciolosis among species, age and sex groups were analyzed by chi-square (χ^2) test. The p-value for statistically analyzed data was considered significantly different at 5% probability level [16].

Results

The overall prevalence for equine fasciolosis in Asela and Goba districts within the Arsi-Bale highlands of Oromia region, Southeastern Ethiopia was found to be 224 (18.92%).

Out of which, the prevalence of fasciolosis in horses, donkeys and mules was 83 (7.02%), 93 (7.85%) and 48 (4.05%), respectively (Table 1).

Table 1: Prevalence of fasciolosis in different equine species in Asella and Goba districts

Species	No. examined	No. positive and Prevalence
Horses	682	83 (7.02%)
Donkeys	401	93 (7.85%)
Mules	101	48 (4.05%)
Total	1184	224 (18.92%)

There were no statistically significant differences ($P>0.05$) in the prevalence of equine fasciolosis between sex groups (male Vs female), age groups (young Vs adult) and species of equines (Table 2 and 3).

Table 2: Prevalence of fasciolosis by age in different equine species in Asella and Goba districts:

Equine species	Age group	No. examined	No. positive and Prevalence
Horses	Young	280	24 (8.57%)
	Adult	402	59 (14.68%)
Donkeys	Young	120	23 (19.17%)
	Adult	281	70 (24.91%)
Mules	Young	20	9 (45%)
	Adult	81	39 (48.15%)
Total		1184	224 (18.92%)

Table 3: Prevalence of fasciolosis by sex in different equine species in Asella and Goba districts:

Equine species	Sex group	No. examined	No. positive and Prevalence
Horses	Males	344	30 (8.72%)
	Females	338	53 (15.68%)
Donkeys	Males	205	40 (19.5%)
	Females	196	53 (27.04%)
Mules	Males	53	27 (50.94%)
	Females	48	21 (43.75%)
Total		1184	224 (18.92%)

Necropsy was done on fourteen horses euthanized due to severe infections of Epizootic lymphangitis and Tetanus cases. Apart from *Fasciola hepatica* and *Fasciola gigantica*, adult parasites of *Trichostrongylus axei*, *Parascaris equorum* and larvae of *Gasterophilus* species were found attached to the lumen and gut contents. In these fourteen animals *Trichostrongylus axei* found in all cases (100%), *Parascaris equorum* and *Gasterophilus species* in seven of them (50%) each (50%) (Table 4).

Table 4: Necropsy findings of major parasites on 14 euthanized horses

Specific parasite identified	No. of positive cases	Percentage (%)
<i>Trichostrongylus axei</i>	14	100
<i>Parascaris equorum</i>	7	50
<i>Gasterophilus species</i>	7	50
<i>Fasciola hepatica</i>	5	35.7
<i>Fasciola gigantica</i>	3	28.6

Discussion

The present study revealed that fasciolosis is one of the main

parasitic problems of equines in Asela and Goba districts within the Arsi-Bale highlands with an overall prevalence of 18.92% affecting the well-being of horses, mules and donkeys. This result is comparable to previous reports in different parts of the country. For instance, equine fasciolosis was reported with a prevalence of 12.2% from South Wollo province [18]; 9% from Menagesha district central highlands of Ethiopia [19] and 1.5% from Dugda Bora district within the main rift valley South Ethiopia [20].

The present study clearly indicated that there were no statistically significant differences ($P>0.05$) in the prevalence of equine fasciolosis between sex groups (male Vs female), age groups (young Vs adult) and species of equines (horses Vs donkeys Vs mules). This insignificance might be due to the fact that all equines were equally exposed to infection and susceptible.

The prevalence for equine fasciolosis in Asela and Goba districts within the Arsi-Bale highlands of Oromiya region, Southeastern Ethiopia was 83 (7.02%), 93 (7.85%) and 48 (4.05%) in horses, donkeys and mules, respectively. This result is somewhat similar with Seid [18] who reported 13.1% donkeys, 12.8% horses and 6.5% mules in South Wollo zone of Amara Regional State. On the other hand Yilma [19] who reported 9% prevalence in donkeys from Menagesha district central highlands of Ethiopia. However, the overall prevalence of equine fasciolosis in the present study 18.92% was much higher than other reports in the central highlands of Ethiopia [10, 20, 21]. The climatic condition of Arsi-Bale highlands favors the development and survival of infective larvae for most part of the years where rainfall is frequent and temperature is mild. Owing to the huge equine population in the area considerable contamination to the communal pasture grazing system could be the other factor which favors fasciolosis. Furthermore, lack of control measures and poor management practices specifically the lack of regular deworming tends to attribute to the incidence of fasciolosis and other GI parasites. This higher prevalence of equine fasciolosis from the present study might be due to the differences in ecological conditions for the development of intermediate snails and the parasite. This might also be attributed to the presence of wide marshy communal grazing areas, which are used throughout the year in Arsi-Bale highlands of Oromia region, especially in Asela and Goba districts. This can be justified by the biology of intermediate vector (snails) of the liver fluke, which is favored by the existence of marshy grazing areas than other districts and abundance of floods and stagnant water bodies during the rainy wet season for both the snail and intermediate larval stages of flukes (radiae-cercariae). It was reported that permanent dampness, suitable luminosity, basic pH of soil and water, and temperature contribute to the multiplicity of snails [22]. The infections were recorded in April (from snail infection of November to December) and July (from snail infection of March-April). A study conducted in Egypt indicated that donkeys are the potential reservoir of fasciolosis and they recommended that donkeys should be considered within the preventive and control measures of zoonotic fasciolosis [23].

In Arsi-Bale highlands, the growing problem of fasciolosis in equines may be related with mixed grazing field of animals with domestic ruminants which are considered to be the prominent primary hosts of liver fluke and the favorable environmental condition which allow multiplication and

spread of intermediate host snails and presence of parasite in study area. Thus, the incidence of fasciolosis has increased in recent years due to climatic changes and to greater stock movements [24]. For instance, the occurrence and timing of some disease outbreaks, such as fasciolosis, highlighting changes in the epidemiology of infection related directly to climate change [25]. Some agricultural activities have also been related with high prevalences of *F. hepatica*, by enhancing external suitable conditions for the life cycle to proceed, such as rural politics on irrigation areas [26]. Despite of ruminants are the target species, others, as equines are considered secondary hosts, even wild mammals, such as hares, have recently been included as part of the refugia of this fluke [27]. This re-emergence could be due to many factors such as modifications in developing conditions for exogenous phases due to climatic changes, longer parasite–host exposition as it happens in organic farms where animals graze all year round or the massive use of drugs that increases the presence of anthelmintic-resistant populations which will be of great concern if it spreads [28].

Conclusion and Recommendations

In conclusion, equine species were found to harbor fasciolosis, one of the commonest ill-causing factors and indeed the main cause of early demise of animals. Specifically the lack of regular deworming tends to attribute to relatively higher prevalence of fasciolosis. Arsi- Bale highlands of Oromia region have temperate type of climate being cool for most parts of year with above 1200 mm rainfall per annum. Therefore, the climatic conditions prevailing in the sites of study are favorable for the development propagation of parasites. Furthermore the equine biomass in Arsi- Bale highlands of Oromiya region is the highest for the country. Equines are important domestic animals playing a vital role in the lively hood of peoples in the study area. Hence, the optimum utilization of equine was hindered by a variety of diseases among which parasitic diseases are the major ones. In light with above concluding remarks, strategic treatment with appropriate, effective and broad spectrum anthelmintics is recommended. Above all, an integrated and cost effective control strategy for fasciolosis and its vectors should be practiced in the area.

Conflicts of interest

The authors have no conflicts of interest.

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