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The Prevalence of Bovine Fasciollosis and Its Associated Risk Factor in Tullo District, West Hararghe Zone, Oromia Regional State, Eastern Ethiopia

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Abstract: The study conducted for a period five months (From November 2008 to March 2009) in Tullo district, west hararghe zone, eastern Ethiopia. A total of 400 local breed cattle (zebu) coprologicaly examined during the study period, 93 animals were found positive for liver fluke infection (fasciolosis) with an overall prevalence rate of 23.25%. Statistically significant difference in infection rate observed between male and female group of animals ($P \leq 0.05$). Analysis of infection rate on the basis of age of cattle indicate inverse correlation and significant difference between different age groups ($P \leq 0.05$). The species of *Fasciola* involved from 29 fasciola infected livers examined from slaughtered animals in the study district indicated 72.4% (21/29) were *fasciola hepatica* and 27.6% (8/29) *Fasciola gigantica*. The result of the study have been discussed in details in comparison with the finding of other workers and in relation to the climatic and ecological condition of the area that favor the existence of the prevalence of fasciolosis. Based on prevalence rate and local factors, appropriate control strategies pertinent to the local situation have been designed and for warded with other points so as to reduce the disease problem on the livestock production.

Key words: Fasciolosis · Prevalence · Coprological · Bovine · Hararghe

INTRODUCTION

According to CSA [1] report Ethiopia has an estimated of 53.99 million cattle population. Even though, Ethiopia has large cattle population, their production is much lower than that of the fast-growing human population of the country. The livestock resources represent only 19% of the export earning of the country over 30% to the agricultural gross domestic product. This low productivity is attributed to a number of constraints of which feed and nutrition, disease, breeding and marketing are the major one in their list of priority. Among the many livestock disease helminthiasis is considered as one of the major constraints in the livestock improvement program in Ethiopia. One of the helminthes that cause direct and indirect loss especially, in domestic ruminants is fasciolosis. It is a serious hazard to efficient production of cattle particularly in its sub-clinical form Radostits *et al*. [2].

Ethiopia owns huge number of ruminants having high contribution for meat consumption and generates cash income from export of live animals, meat, edible organs and skin. In spite of the presence of huge ruminant population, Ethiopia fails to optimally exploit these resources due to a number of factors such as recurrent drought, infrastructures problem, rampant animal diseases, poor nutrition, poor husbandry practices and shortage of trained man power and lack of government policies for disease prevention and control [3]. Among the animal diseases that hinder the animal health, parasitic infections have a great economic impact, especially in developing countries. Fasciolosis is one of the most common economically important parasitic diseases of domestic livestock, particularly in cattle and sheep [4].

Bovine fasciolosis is economically important parasitic diseases of cattle caused by digenean trematodes of genus *Fasciola* commonly referred to as liver fluke. *Fasciola hepatica* and *Fasciola. gigantica* are the two

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species most commonly implicate as the etiological agents of the fasciolosis. *Fasciola hepatica* has a worldwide distribution while *F. gigantica* is found on most continents primarily in tropical region [5]. Both *F. hepatica* and *F. gigantica* are transmitted by the snails of the family Lymnaesidae. Infestation with fasilolosis is usually associated with grazing wet land and drinking from the snail infesting watering places [6].

The two most important species are *F. hepatica* found in temperate area and cooler area of high altitude in the tropics and sub tropic and *F. gigantica* which pre dominates in tropical area [7]. The snails of the genus *Lymnaea* are mainly involved as intermediate host in the life cycle of fasciolosis. *Lymnaea natalensis* aquatic snail is an important host of *F. gigantica* in Africa. *Lymnaea truncatula* , amphibious snails with a wide distribution through out the world the most common intermediate host *F. hepatica* [8-10].

Both *F. hepatica* (The high land) and *F. gigantica* (low land) type of liver fluke cause severe losses in part of Ethiopia where suitable ecological condition, for the growth and multiplication of the intermediate host snail are found. Areas with seasonally flooded pasture grazing area lake shore, slowly following water ways and bank of river are among the conductive environment for breeding of snail vectors of fasciolosis. In Ethiopia *F. hepatica* is wide spread in area with altitude above 1800—2000 m above sea level, while *F. gigantica* appears to be the most common species in area below 1200 m above sea level. Both species co-exist in area with altitude ranging between 1200 to 1800 m above sea level [11]. Losses from parasitic disease include fasciolosis is expected to be high in tropical country like Ethiopia where strategic and most effective disease control program are lacking.

Control of fasciolosis may be approached in two ways, by reducing population of intermediate host or using on the limentic [10]. Improvement in current from management can reduce the chance of infection by limiting the contact between in intermediate, final host direct action or eliminate intermediate host population. The use of one or more of this measure in an integrated strategy should be based on sound economic assessment of relative merits of control option [12].

The life cycle of *Fasciola* species is typical of digenetic trematode which is characterized by indirect life cycles [13]. The highlands contain pockets of water logged marshy areas. These provide suitable habitats year round for the snail intermediate hosts. More rational prophylactic programs based on local epidemiological information are needed for sound fasciolosis control strategies in Ethiopia [14].

Hence, the objectives of this study were, therefore, to determine the prevalence of bovine fasciollosis and its associated risk factor in Tullo District, West Hararghe zone, Oromia regional state, Eastern Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted in tullo district West Hararghe zone Oromia regional state, Ethiopia. The district located 360 km east of Addis Ababa at an altitude of 1700-2000 m above sea level. The district received an annual mean temperature of 19.5°C minimum and 23.9°C maximum. The district represent by mountain hilly and sloppy geographical land escape where reveries and streams marked.

Generally three geographical zones found in the district like mid high land (Weyna dega) 57% high land (Dega) 40% and lowland (Kola) 3%. The relative humidity of the area varied from 21.9%-65%. The district characterized by main season in a year. The dry season bega which extend from January to the end of April and long rainy season (Keremt) that extends from july to the end of September. The soil is fertile which deep clay soil is. The main crops cultivated in the area include teff, wheat, sorghum and maize.

Study Population: A total of 400 cattle from 7 peasant association (PAs) were subjected to qualitative coprological examination to determine the overall prevalence rate of fasciolosis infection in the study area. All animals examined were local (Indigenous) of mixed age and sex group. In addition 163 cattle among thus slaughtered at Hirna town municipal abattoir were used to identify the fasciola species involved in the area.

Study Design: A cross-sectional study was conducted on cattle fasciolosis from November 2008 to March 2009 in Tullo district of west hararghe zone.

Study Procedure: In the laboratory coproscopic examination were performed to detect the presence of *Fasciola* egg according to standard technique as described by Hansen and Pery [15]. Fresh fecal samples for parasitological examination were collected directly from the rectum of using disposable plastic gloves and

placed in clean screw capped universal bottles. Each sample was labeled with date of submission, age and sex. Samples were preserved with 10% formalin solution to avoid the eggs development and hatching. Age was classified as young (<2 years), adult (2-3) and old (>3 years) as described by De-Lahunta and Habel [16]. Samples that were not processed within 24 h were stored in a refrigerator at 4°C until all are processed and examined. Sedimentation technique was used to detect fluke eggs in the fecal sample.

Sample Size Determination: Since there was no previous study in Tullo district to establish the prevalence of the disease, the sample size was determine by taking the prevalence of 50% fasciolosis using the formula given by Thrusfied [17].

$$n=\frac{1.96^2 Pexp(1-Pexp)}{d^2}$$

where

n = Sample size;
P = Minimum expected prevalence = 50%
1.96 = The value of z at 95% confidence interval
d = Desired accuracy level at 95% interval

Accordingly 384 animal were supposed to be sampled, however to increase the precision 400 animals were sampled.

Sampling Method: The district consist 33 peasant association, from which the 7 peasant association where selected randomly. Sampling unit (Individual animals) where also selected randomly from 7 peasant association.

Data Collection

Coprological Survey: Faecal sample for parasitological examination were collected directly from the rectum of each animals and freshly defecated faces in to plastic bottle with gloved hand. The samples were clearly labeled with clean universal bottle preserved with 5% formalin and each sample was clearly labeled with animal's identification, date and place of collection. Sample were packed and dispatched in cool box to avoid the eggs developing and hatching. In the laboratory, coprospic examination was performed to detect the presence of fasciola eggs using the standard sedimentation techniques [15].

Abattoir Survey: Post mortem examination was conducted at Hirna town municipal abattoir, where the liver of slaughtered animal was examined through inspection, palpation and systemic incision to recover *Fasciola* species.

Data Management and Analysis: Data was stored in Microsoft (MS) excel spread sheet program and were analyzed using intercooled stata 7.0 for windows (2001) to determine prevalence and analyze the association with risk factors. The statistical method used descriptive statistics. Sex and age were considered as potential risk factors for group prevalence of the disease.

RESULTS

Coprological Finding: From a total of 400 feacal sample examined from cattle during the study period, 93 samples were found positive for fascilosis with an overall prevalence rate 23.25% (Table 1). Prevalence rate between male and female animals were compared and the result revealed 31.08% and 18.65% prevalence respectively showed a significant difference ($P \leq 0.05$) (Table 2).

Analysis of the prevalence rate between age group showed an inverse correlation i.e., the infection decrease as age increase. Similarly, these were also statistically significant difference ($P \leq 0.5$) among cattle of different age group (Table 3).

Table 1: Overall prevalence of fasciolosis in Tullo woreda

No of animal examined	No of positive	No of negative	Prevalence (%)
400	93	307	23.25

Table 2: Prevalence of bovine fasciolosis on sex basis

Sex	No of sample examined	No of sample positive	No sample negative	Prevalence (%)
Male	148	46	102	31.08
Female	252	47	105	18.65

χ^2 =8.0735 P =0.004

Table 3: Prevalence of bovine fasciolosis on age basis (Different age group)

Age (year)	No of sample examined	No of sample positive	No of sample negative	Prevalence %
≤ 2	60	11	49	18.33
2-3	192	74	118	38.54
≥ 3	148	8	140	5.41

χ^2l= 50.4591 P< 0.001

Table 4: Species of fasciola identification

Species of *Fasciola*	No of liver condemned	Percentage %
Fasciola hepatica	21	72.413
Fasciola gigantica	8	27.586
Total	29	100

Fasciola Species Identification: Among the 163 slaughtered animals and whose liver was inspected in the abattoir 29 livers found positive for liver fluke infection where 21 livers (72.4%) harbored with *F. hepatica* and 8 livers (27.6%) harbored with *F. gigantica* (Table 4).

DISCUSSION

Bovine fasciolosis exist in almost all region of Ethiopia. However, the prevalence rate, epidemiology and fasciola species involved vary with locality. This is mainly attributed to the variation in the climate and ecological condition such as altitude, rainfall, temperature and management system of livestock [11, 18].

The result of present study indicated that bovine fasciolosis relatively spread with low prevalence rate of 23.25% in the study area which is relatively similar with Yidnekachew [19] (21.35%). In Ethiopia, compared with high prevalence rate of bovine fasciolosis have been reported by other workers such as 86% Keffa [18] 80% in and around Dabre Berhan [20] (88.57%) and (82.5%), in western shoa zone [21]. Country to the present finding [18, 22, 23] have reported prevalence rate of 61%, 52% and 62.2% in Gonder, around Tana and around Bahir dar respectively . The occurrence of fasciolosis in an area is influenced by a multi-factorial system, which comprises host, parasite and environmental effects. In the natural foci of fasciolosis, the fasciola and their intermediate and final hosts form an association posing a potential epidemiological threat [24].

During the dry period, the majority of eggs do not have the opportunity to hatch and develop because they are trapped with the faces mass not separated and there is no sufficient moisture for the development and hatching. The survival of metecercaria on the herbage and the availability of the moisture. Because of the drying of temporary water habitats during the dry period, snail are forced to undergo aestivation deep in the mud and only those snail in permanent water source have the opportunity to shed cercaria [25]. Therefore, only minimum metacercaria on herbage, which account for low infection rate during the dry period [26].

Prevalence rate of 31.08% and 18.65% were recorded in male and female animals respectively show difference between two sex groups which is statically significant. The justification is related to management system with longer exposure of male out door when females are kept in door at the beginning lactation [27]. However, in some workers there is no statistically difference between the two sexes (P≥0.05). This was implies that sex has no impact on the infection rate and both male and female are equally susceptible and exposed to the disease [20, 28].

Statistical analysis of infection rate on the basis of age indicated an inverse correlation. There was significant difference infection rate (P≤0.05) among different age groups. The decrease in infection rate (Prevalence rate as age increase is the result of acquired immunity which is manifested by humeral respond and tissue reaction in bovine liver due to previous challenge [29]. Dwinger *et al*. [30] also reported the increase resistance (Low prevalence) as age increase is most likely related to the high level of tissue reaction seen in bovine liver, severe fibrosis which impedes the passage of immature fluke, acquired resistance , thickening, stenosis and calcification of bile duct, assumed unfavorable site for adult parasites and consequently fasten there expulsion.

Experimentally, higher infection rate occurs in young animal [9, 25] relatively lower infection rate observed in the cattle of age group ≤ 2 years 18.33% compared 2-3 of age groups 38.54% might attributed to the fact that calves are not often driven with older age groups to grazing and watering points. Result indicating inverse co-relation of the prevalence rate and age of cattle were reported by Dagene [20], Fekadu [23], Rameto [28] and Bayazn [31]. The species of fasciola involved in causing the disease in the study area was identified from

29 *Fasciola* infected liver during postmortem examination of slaughtered animals indicated *F. hepatica* 72.413% (21/29) and *F. gigantica* 27.586% (8/29). Different workers so far conducted in Ethiopia reported variable prevalence rates of bovine fasciolosis in different localities of the country [32-35]. The predominant species involved in causing bovine fasciolosis in the study area is *F. hepatica* and is associated to the existence of favorable ecological condition for *L. truncatula* (Intermediate host) of *F. hepatica* in the study area such as swampy and marshy area around Hirna Town and low lying plain and shallow pond provide favorable habitats for *L. truncatula* and allow the existence of *F. hepatica* in the area. The lower prevalence of *F. gigantica* was due to unfavorable condition to the existence and multiplication of the snail *L. natalensis* in the study area. The favorable condition for *L. natalensis* was border of lakes, flood-prone area and low lying marshy and drainage ditches are favorable habitats [36].

CONCLUSION AND RECOMMENDATION

The present study conducted the bovine fasciolosis for a period of five months in tullo werada west hararghe zone indicates that fasciolosis has been and still one of the major constraints to the livestock development in Ethiopia by inflicting remarkable direct and indirect losses in various part of the country, where suitable biotops for the development and breeding of snail intermediate host prevail.

Therefore based on the above remarks the following points are recommended:

- Further study should be conducted in the epidemiology of the disease, biology and ecology of intermediate host snail (*Lymnea*) to help avoid difficulties in planning and programming control strategy
- Since the effect of fasciolosis on the ruminant host is aggravated by poly parasitism, attention should be given to the control of other internal helminth parasite too and for this purpose broad spectrum anti helmenthic, active against both trematode and nematodes infection are recommended.
- The swampy (Marshy area) should be used for irrigation (Crop production), to destruct the favorable habitat for the intermediate host.
- Strategic anti helmenthic treatment with appropriate flucidal drugs should be practiced two times a year i.e. after the end of dry season and the end of rainy season so as to eliminate the fluke burden of the host intermediate and minimize pasture contamination by reducing faecal eggs output and thus interrupting the life cycle of the

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