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Coprological Prevalence of Bovine Fasciolosis and Associated Risk Factors in Gewata District of Kaffa Zone, Southern Ethiopia

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Abstract: A cross-sectional study was carried out from November 2014 to March 2015 on cattle selected from five areas in Gewata district of Kaffa zone to determine the prevalence of Fasciola infection and identify the associated risk factors. The study was based on coprological examination using sedimentation technique on fecal samples collected directly from the rectum of the study animals. From the total of 387 cattle examined coprologically, 20.7 % (n = 80) were found to be positive for Fasciola infection. The prevalence of Fasciola infection in the study sites was significantly ($P< 0.05$) affected by study areas. Of the five areas studied, the highest prevalence was recorded in Medabo (31.5%) while the lowest in Melio (7.1%). On sex wise, the prevalence of Fasciola infection was almost equal in female (21%) and male (20%) cattle without significant difference ($P> 0.05$). No significant association ($P > 0.05$) was observed between Fasciola infection and the age of animals; although the prevalence tended to be higher in younger cattle (> 1 yrs) than older ones (> 3 yrs). Similarly, this study didn't show significant association between Fasciola infection and the body condition score of the animals ($P> 0.05$). In conclusion, the presence of the parasite in more than 20% of the cattle population necessitates the need for designing and implementation of control and prevention strategies that are feasible with the ecological conditions of the study area.

Key words: Bovine · Coprology · Gewata · Fasciola · Prevalence

INTRODUCTION

In Ethiopia, ruminant livestock are important sources of income for rural and urban communities and is one of the nation's major sources of foreign currency from export. However, this great population was not properly exploited mainly due to prevailing traditional management, limited genetic potential and rampant diseases. Out of the diseases causing serious problem, parasitism represents a major drawback on livestock production in the tropics [1, 2].

Fasciolosis is an economically important parasitic disease, which caused by trematodes of the genus *Fasciola* [3]. The two most important species in the genus *Fasciola* causing disease in domestic ruminants are *F. hepatica* and *F. gigantica*. *Fasciola hepatica* is found in the temperate areas and cooler highlands in the tropics and subtropics while *F. gigantic* predominates in tropical areas [4].

The life cycle of these trematodes involves snail of *Lymnae truncatula* and *Lymnae natalensis* as an intermediate hosts [5]. Infected cattle can exhibit poor weight gain and dairy cattle have lower milk yield and possibly metabolic diseases [6]. The disease is responsible for considerable economic losses in the cattle industry, mainly through mortality, liver condemnation, reduced production of meat, milk, hide and expenditures for anthelmintics [7]. According to few recent published reports, bovine fasciolosis causes an economic loss of 6300 [8], 4000 [9] and 8312.5 USD [10] per annum due to liver condemnations at slaughter houses alone.

Even though different researchers in the country have investigated the parasite, specific researches are always needed at particular site to update the disease status and generate a complete epidemiological data at national level. Moreover there is paucity of information about the burden and distribution of Fasciola infection in Southern Ethiopia, particularly Kaffa Zone.

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Therefore, the objective of the study:

- To determine the prevalence of bovine Fasciola
- To identify potential risk factors responsible for occurrence of bovine fasciolosis in the area

MATERIALS AND METHODS

Study Area: The study was conducted from November, 2014 to March, 2015 in Gewata district, Kafa zone. Gewata is located 857 km South West of Hawassa and geographically located at 7.38° and 7.70° N latitudes and 35°79' and 36^{0}24' E longitudes. The area has an altitude ranging between 501 and 3000 m.a.s.l. The mean annual rainfall ranges between 1401 and 2200 mm with minimum and maximum mean annual temperature of 15.1°c and 22.5°c respectively [11].

Study Animals: A total of 387 local breeds zebu cattle kept under traditional husbandry system were randomly selected and subjected to qualitative coprological examination. Selected animals were from five different areas with different age and sex groups.

Sampling Design: A cross-sectional study was conducted to determine the prevalence of the disease in the study area. The animals were selected by using simple random sampling method. To determine the sample size, an expected prevalence of 50% was taken into consideration since there was no known research work on bovine fasciolosis in the area. The desired sample size for the study was calculated using the formula given by Thursfield [12] with 95% confidence interval and 5% absolute precision.

$$n = \frac{1.96^2 P_{\exp}(1 - p_{\exp})}{d^2}$$

where P_{exp}= expected prevalence; d= absolute precision; n =sample size. The estimated sample size was 387 animals.

Coprological Examination: Coprological examination was conducted on fecal samples collected directly from the rectum of the animals with gloved hand. The fecal samples were placed into a universal bottle containing 10% formalin, clearly labeled with animal's identification, date and place of collection and transported to Laboratory for examination. Sedimentation technique was used to detect the presence or absence of fluke eggs in the fecal samples collected, as described by Antonia *et al*. [13]. To differentiate between eggs of *Paramphistomum* and Fasciola, a drop of methylene blue solution was added to the sediment where eggs of *Fasciola* species show golden yellowish color while eggs of *Paramphistomum* species do not stain by methylene blue [14]. Data on sex, areas, body condition score and age of individual animals were recorded.

Data Management and Analysis: The raw data generated from the study was entered into Microsoft Excel database and was analyzed by STATA 13.1 version statistical software. The prevalence of Fasciola infection was calculated as the number of infected individuals divided by the number of individuals sampled x 100 [12]. Chi-square (χ^2) test statistic was used to determine the statistical association between Fasciola infection and some study variables like age, sex, Body Condition Score (BCS) and study areas. A statistically significant association between variables was considered to exist if the calculated *p*-value is less than 0.05 with 95% confidence level.

RESULTS

From the total of 387 cattle examined during study period 80 (20.7%) were found to be positive for Fasciola eggs by coproscopic examination. The greatest prevalence (31.5%) was recorded in Medabo area while the smallest prevalence (7.1%) was recorded in Melio area (Table 1).

Table 1: Prevalence of bovine Fasciola in area bases

Study areas	Animals examined	No. of positives	Prevalence (%)	χ^2	P-value
Hinigido	112	20	17.9	11.728	0.019
Konda	105	22	21		
Mashamalo	39	7	17.9		
Medabo	89	28	31.5		
Melio	42	3	7.1		
Total	387	80	20.7		

Table 2: Prevalence of bovine Fasciola in sex bases

Sex of animals	Animals examined	No. of positives	Prevalence (%)	χ^2	*P*-value
Male	120	24	20	0.048	0.827
Female	267	56	21		
Total	387	80	20.7		

Table 3: Prevalence of Fasciola species infection in cattle displayed on age bases

Age of animals	Animals examined	No. of positives	Prevalence (%)	χ^2	*P*-value
<1 year	40	10	25	0.521	0.771
1-3 year	76	15	19.7		
>3 year	271	55	20.3		
Total	387	80	20.7		

Table 4: Prevalence of bovine Fasciola in Body Condition Score (BCS) bases

BCS	Animals examined	No. of positives	Prevalence (%)	χ^2	*P*-Value
Thin	148	36	24.3	1.969	0.374
Moderate	128	24	18.8		
Fat	111	20	18		
Total	387	80	20.7		

The prevalence of Fasciola infection was 20% and 21% in male and female animals respectively without significant statistical difference (P > 0.05) (Table 2).

The prevalence of Fasciola infection was relatively highest in the youngest animals <1 year of age (25%) and showed a tendency to decrease with increasing of age (Table 3).

The prevalence of Fasciola infection was observed to be 24.3%, 18.8% and 18%, respectively in thin, moderate and fat conditioned animals (Table 4).

DISCUSSION

The prevalence of *Fasciola* infection observed in this study was 20.7% which appears to be much lower than the prevalence recorded by previous studies, such as, Tsegaye *et al*. [15] who reported 41.41% in and around Woreta, Mulugeta *et al*. [16] who reported 45.25% in and Around Assela and Aregay *et al*. [17] who reported 36.72% in and around Bahir Dar. In contrast, the prevalence reported in this study was higher than the result recorded by Wondwossen *et al*. [18] who reported 15.67% in Wolaita Soddo town.

There was a significant difference in the prevalence of *Fasciola* infection in relation to kebele of animal sampling (*P*< 0.05). This study indicated that prevalence of bovine fasciola infection was higher in Medabo area (31.5%) than the rest because of the presence of wide margin of marshy and damp areas and the increased tendency of farmers to feed their animals in these marshy, water lodged and damp areas.

This study revealed that sex has no impact on the infection rate (*P*> 0.05) and hence both male and female were equally susceptible and exposed to the disease due to fact that both sexes used to graze on the same pasture land at the same time. This observation is correlated with the work of [19] and contrary to what was reported in Asella Municipal abattoir [16].

There was no statistically significant difference (*P* > 0.05) in the prevalence of *Fasciola* infection in cattle with different age groups in the present study although the prevalence showed a tendency to decrease with increasing of age. Different previous works reported similar findings to the present work and clearly justified that the decrease in infection rate (prevalence) as age increase is the result of acquired immunity which is manifested by humoral response due to previous challenge [20, 21].

The present study also showed lack of statistically significant association (*P*> 0.05) between the prevalence of *Fasciola* infection and body condition score of the animals although a higher prevalence (24.3%) was observed in thin cattle than in moderately conditioned (18.8%) and fat animals (18%). This finding shows that the poor body condition observed in 38.2% (148 out of 387) of the study animals might be the result of poor nutrition rather than *Fasciola* infection as the study was conducted in the dry season where there is extreme shortage of feed for animals relying on free ranging. This finding corresponds with the reports of Hagos A, [22]. The prevalence reported by this worker was 37.7%, 33.1% and 29.1% in poor, medium and good body condition animals, respectively.

CONCLUSION AND RECOMMENDATIONS

The present study conducted for a period of five months in Gewata district indicated that Fasciola species are widespread and prevalent parasites affecting the health and productivity of more than 20% of the cattle population in the area. Study areas were identified as an important potential risk factor for the occurrence of infection in cattle. The observation of such level of infection in dry season in the study area is closely associated with the presence of suitable environmental conditions for the development of snails. Therefore, draining or fencing of marshy areas, utilization of swampy areas for crop production and strategic deworming using trematocidal specific antihelmintics which are effective against both mature and immature flukes are recommended to control the occurrence of Fasciola in the study area. There is also a need to educate farmers about the methods of controlling Fasciola infection in cattle. Further epidemiological study on ecology of the intermediate host and the worm burden in host animals is required so as to develop and implement satisfactory control strategies for the parasite.

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REFERENCES

1. Bekele, T., P. Negategit and G. Tilahun, 1992. Financial losses caused by ovine fasciolosis in the Ethiopian highlands. Trop. Anim. Hlth. Prod., 25: 155-161.
2. Malone, J.B., R. Gommes, J. Hansen, Y. Jobre, J. Slingenbergh, F. Snijders, O.F. Nachet and E. Ataman, 1989. Geographical information system on the potential distribution and abundance of Fasciola hepatica and Fasciola gigantica in East Africa based on food and agriculture organization data bases. Vet. Parasitol., 78: 87-101.
3. Troncy, P.M., 1989. Helminthes of livestock and poultry in Tropical Africa. In: Fischer. Manual of tropical veterinary parasitology. CAB international, UK., pp: 63-73.
4. Urquhart, G.M., J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings, 1996. Veterinary parasitology. 2nd ed. Scientific and technical press, UK., pp: 102-120.
5. Walker, S.M., A.E. Makundi, F.V. Namuba, A.A. Kassuka, J. Keyyu, E.M. Hoey, P. Prodohl, J.R. Stothard and A. Trudgett, 2008. The distribution of Fasciola hepatica and Fasciola gigantica within southern Tanzania-constraints associated with the intermediate host. Vet. Parasitology, 135(4): 495-503.
6. Mason, C., 2004. Fasciolosis associated with metabolic disease in dairy herds and its effects on health and productivity. Cattle Pract., 12: 7-13.
7. Hillyer, G. and W. Apt, 1997. Food-borne trematode infections in the Americas. Parasitol Today., 13: 87-88.
8. Tolossa, T. and W. Tigre, 2007. The prevalence and economic significance of bovine fasciolosis at Jimma abattoir, Ethiopia. Int. Journal of Veter. Med., 3(2).
9. Abunna, F., L. Asfaw, B. Megersa and A. Regassa, 2010. Bovine fasciolosis: coprological, abattoir survey and its economic impact due to liver condemnation at Soddo municipal abattoir, Southern Ethiopia. Trop. Anim. Hlth. Prod., 42: 289-292.
10. Abebe, R., F. Abunna, M. Berhanu, S. Mekuria, B. Megersa and A. Regassa, 2010. Fasciolosis: Prevalence, financial losses due to liver condemnation and evaluation of a simple sedimentation, diagnostic technique in cattle slaughtered at Hawassa Municipal abattoir, Southern Ethiopia. Ethio. Vet. Journal, 14: 39-51.
11. Department of Agricultural Development for Kaffa zone, 2003. Basic data of Kaffa zone Agricultural Department, pp: 11.
12. Thursfield, M., 2005. Veterinary epidemiology. 3rd ed. Black Well Science, pp: 180-188.
13. Antonia, M., P. Conceicao, M. Rute, K. Durao, H. Isabel, J. Costa and C. Correia, 2002. Evaluation of a simple sedimentation method (modified MacMaster) for diagnosis of bovine fasciolosis. Vet. Parasitol., 105: 337-343.
14. Hansen, J. and B. Perry 1994. The epidemiology, diagnosis and control of helmenthes parasite of ruminants. A handbook, Rome: Food and Agricultural Organization of the United Nation, pp: 72.
15. Tsegaye, B., H. Abebaw and S. Girma, 2012. Study on Coprological prevalence of bovine fasciolosis in and around Woreta, North Western Ethiopia. Vet. Med. Anim. Hlth., 4(7): 89-92.
16. Mulugeta, S., F. Begna and E. Isegaye, 2011. Prevalence of bovine fasciolosis and its economic significance in and around Assela, Ethiopia. Glob. Journal. Med. Res., 11(3): 20-25.

17. Aregay, F., J. Bekele, Y. Ferede and M. Hailemelekot, 2013. Study on the prevalence of bovine fasciolosis in and around Bahir Dar, Ethiopia. Ethio.Vet. Journal., 17(1): 1-11.
18. Wondwossen, E., M. Addis and M. Tefera, 2012. An Abattoir Survey on the Prevalence and Monetary Loss of Fasciolosis among Cattle in Wolaita Sodo Town. Microbiology and Veterinary Public Health Team, 6(3): 95-100.
19. Dagne, M., 1994. Survey on prevalence and economic significance of bovine fasciolosis at Debre Berhan region. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University. Debre Zeit, Ethiopia, pp: 9-15.
20. Ogunrinade, A. and G.O. Adegoke, 1982. Bovine fasciolosis in Nigeria Intercurrent Parasitic and bacterial infection. Trop. Anim. Hlth. Prod., 14: 121-125.
21. Dwinger, R.H., P.D. Leriche and G.I. Kuhne, 1982. Fasciolosis in beef cattle in North West Argentina. Trop. Anim. Hlth. Prod., 14(3): 167-171.
22. Hagos, A., 2007. Study on prevalence and economic impact of bovine Hydatidosis and Fasciolosis at Mekelle Municpal Abattoir. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia, pp: 15-23.