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Prevalence of ovine fasciolosis in selected Kebeles of Wogera District, North Gondar zone, Ethiopia

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Abstract

A cross-sectional study was conducted from November, 2016 to April, 2017 to determine the Prevalence and risk factors associated with ovine fasciolosis in eight randomly selected kebele's inWogera woreda, North Gondar Zone of Amhara Region. A total of 384 fecal samples were collected from randomly selected sheep and examined coprologically to detect Fasciola eggs. Out of which, 139 (36.2 %) were positive for fasciolosis.statistical analysis showed that there was not statistically significant association between sex (P>0.05).with prevalence of (35.9%) and (37.2%) in female andmale sheep, respectively. A statistical insignificant variation (P> 0.05) in prevalence was also observed among age groups where higher prevalence was recorded in adults (37.8%) than young animals (32.8%).unlike, there was statistically significant difference (P<0.0;5) in infection rate among different body condition scores was observed in which higher prevalence was recorded in poor (54.3%) than in good(26.2%) and medium (31.4 %) body conditioned animals.Different prevalence of ovine fasciolosis were recorded in eight kebele's withDebraso(42.0%),Sankatikem(43.6%),Dengordeba(36.7%),Ambageorgis(40.0%),Birra(35.0%)and Sankdeber(45.0%)andwas found statistically significant(P<0.05) in study area where higher prevalence was recorded insankdeber(45.0%) and Sankatikem(43.6%) than others.In conclusion the finding reported here showed that the prevalence of fasciolosis in sheep was high, which could be attributed to the presence of favorable environment for the abundance of intermediate host and the parasite. Considering the huge negative effect of the parasite on health and productivity of the livestock sector, strategic parasite control method with an integrated approach should be implemented to improve the health and productivity of sheep in the area.

Keywords: *Cross-sectional study, Coprology, Ovine Fasciolosis, Prevalence, Risk Factor, Wogera woreda*

Introduction

Ethiopia has the largest livestock inventories in Africa, including more than 38,749,320 cattle, 18,075,580 sheep, 14, 858,650 goats, 456,910 camels, 5,765,170 equines and 30,868,540chickens with livestock ownership currently contributing to the livelihoods of an estimated 80% of the rural population (CSA, 2009).In Ethiopia, sheep are the dominant livestock providing up to 63% of cash income and 23% of food substance value obtained from livestock production.

Production of sheep for meat, milk, wool, hair, skin and the manure are attractive agricultural enterprises for Ethiopian farmers because the relative low cost of breeding stock, the high productive rate of sheep and source of cash income (Gatenby, 1991).

The widely prevalent livestock diseases are major constraints to Ethiopian livestock development. The vulnerable of livestock production and trade to disease

epidemics is undermining investment in a potentially valuable economic activity which would increase employment in rural areas, raise rural incomes and assist in alleviating poverty (Shitaye*et al.,* 2007).Parasitic infection,malnutritionand management problems are known to be the main factors that affect productivity of livestock production. From the internal parasitic infectionthe various species of gastrointestinal and pulmonary nematodes, trematodes and cestodes are known to be prevalent in Ethiopia (Ahmed *et al*., 2007).Among the many parasitic problems of the domestic animals fasciolosis is a major disease in tropical and subtropical countries which imposes directly or indirectly economic impact on livestock production in ruminants in particular sheep which are the natural hosts for *Fasciola*(Urquhart *et al.,* 1996**).**

Fasciolosis is an economically important disease of domestic livestock especiallycattle, sheep and goat as well as occasionally man. The disease is caused by digenean trematodes of the genus *Fasciola,* commonly referred to as liver flukes. The two species most commonly implicated, as the etiological agents fasciolosis are *Fasciola hepatica* and *Fasciolagigantica*.(Keyyu*et al.,* 2005).The risk of hepatic Fasciolosis is determined by the number of infected *Lymnae*snails in thegrazing area.The disease has a predictable seasonal pattern in regions where snails are active for only part of the year. Some *Lymnae*snails have more aquatic habit than others but most are restricted to damp. (Maqbool *et al* .,2002).The distribution of the disease is predominantly rural being associated with cattle and sheep breeding.The degree of pathogencity of *F.hepatica*to man depends on many factors; particularly the number of snails present and the origin infected mechanical and toxic damage are characteristics (Assefa, 2005).

Pathogenesis of Fasciolosis varies according to the parasitic development phases, parenchymal and bilary phases.The parenchymal phase occurs during migration of flukes through the liver parenchyma and is associated with liver damage and hemorrhage.The biliary phase coincides with parasite residence in the bile ducts and results from the haematophagic activity of the adult flukes and from the damage to the bile duct mucosa by their cuticular spines (Urquhar*et al*.,1989).

The egg passed out in feces hatch after about 9 days at optimal temperature (22-26 °C) releasing motile stage which must locate and penetrate a lymnaeid snail within few hours. Further development in the snail is complex but lead to eventual release of many motile forms which attach to firm surface such as blades of grasses where they encyst to infective form which is called metacercariae it ingested by susceptible host. The metacercariae release immature fluke in the small intestine which migrate through the liver to the bile duct and sometimes the gall bladder, when mature, the fluke shed eggs which are passed out in the feces so continuing the life cycle.At temperature less than 10°C eggs passed out in the feces remains dormant until ambient temperature are higher before hatching. Breeding of snails and development of flukes in infected snails are also arrested at similar temperature. In dry conditions the survival of metacercatriae on herbage is poor (Taylor *et al.,* 2007).

Several clinical syndromes are acute Fasciolosis in sheep most often occurs as sudden death without other apparent clinical abnormality. It is usually seen in the summer and autumn but may occur at any time when sheep have the opportunity to graze heavily contaminated herbage. If the disease is observed clinically in sheep it is manifested by dullness, weakness, lack of appetite, pallor and edema of mucosa and conjunctiva and pain when pressure is exerted over the area of the liver. It is rarely occurs in cattle (Radostits*et al* .,2007).Diagnosis of Fasciolosis is based on clinical sign, grazing history,and seasonal occurrence, examination of feces by laboratory tests and post mortem examination (Marquard*et al*.,2000).There is no vaccine against the disease and hence chemotherapy is the only viable control method available today. Triclabendazole being the drug mostcommonl. The study was carried out due to its effectiveness against both mature and immature forms of the parasite (Brennan*et al*., 2007**).**Water, land and blocked drainage are hazardous for grazing stock (Radostits*et al*.,2007).Evidence suggests that sheep and cattle are the main reservoir host species (Smith,1996).Human acquire infection through ingestion of metacercariae that are attached to certain aquatic plant and vegetable. In addition experimental studies suggested that human consuming raw liver dish from liver infected with juvenile flukes could become infected.(Scottand Goll,1997).

In Ethiopia, despite the huge economic losses in cured and wide distribution of fasciolosis in the country, significant control measures have not yet been developed at the national and regional level. Routine treatment of clinical illness is the norm rather than prevention of infection. More rational prophylactic

programs based on local epidemiological information are needed for round fasciolosis control strategies in Ethiopia (Yilmaand Melon, 1998).

In general fasciola prefer non acidic low lying swampy area with slowly moving water. But land with small streams, spring blocked drainage or spillage. The influence of watering particles on the transmission of fasciola among sheep in the Ethiopian high lands snails burrow into the soil to survive the dry period and release cercaria when free water is presented .the later expands and contract depending on water availability construction works, such as road building may alter drainage patterns and disease risk improvement of peaty pasture by time application may increase risk by reducing soil acidity and allowing snail colonization (Radostitis*et al.,* 2005).Despite the significance of this parasite infection, there is no documented and quntifed report on the occurrence of the ovine *faciolosis* and other trematode infectionof sheep in District Wogera, North Gondar. Theobjective of the study were:

- To determine the prevalence of ovine fasciolosis in Wogera District,North Gondar Ethiopia
- To assess associated risk factors to the occurrence of ovine fasciolosis

Materials and Methods

Study Area

A cross sectional study was conducted from November 2016 to April 2017 in District Wogera in Amhara regional state, North Gondar administrative zone between 37.36 ºE and 12.460 ºN longitude and at an altitude ranges from 1600 to 3000 meter above sea level with the average of 2900 m. a. s. l in the northern highlands of Ethiopia. It is located at 778 km north of capital of the country, Addis Ababa and 40 km from its zonal capital city of Gondar (BSA, 2009). The rainfall pattern is bimodal, with a short rainy season from March to May, followed by a long rainy season from June to September. It has an average annual rainfall of 700 mm and the temperature varies from 10 °C to 28 °C with the mean annual temperature 12.7 ºCthe livestock population of Wogera district is estimated to be 209,117 cattle, 214,150 sheep, 113,100 goats, 33,431 equine and 213,721 poultry. Its human population is 249,297 (National Metrology Agency (NMA, 2008); Wogera woreda agricultural and development planning office (WWADO, 2013).

Study Animals

Study animals were384 sheep which are randomly selected from Wogera woreda of different kebele's at bothsex and agecategory found under the extensive grazing system.

Study Design

A cross sectional study was carried out from November 2016 to April 2017 to determine the current prevalence of ovine fasciolosis in Wogera woreda. From 39 kebeles found in the district 8 kebeles were selected based on vehicle access, security and distance with concerning cost near to laboratory .

Sample Size Determinationand Sampling Method

The sampling method applied in this study was simple random sampling. Totally, 384 sheep were sampled for estimation of Ovine fasciolosis. The sample size was calculated according to the following formula (Thrusfield, 2005). Since there was no documentedinformation about the prevalence of ovine fasciolosis in wogera woreda before, sample size was calculated using 50% prevalence with 5% desired level of precision and95% of confidence interval. Accordingly, the calculated the sample size was 384 sheep.

$$n=1.96^2 x Pexp\ (1-Pexp) / d^2$$

Where:
n = required sample size
Pexp = expected prevalence
d= desired absolute precision

Sample collection Method

Fresh fecal sample was collected directly from the rectum of each animal.using disposable plastic gloves and placed in clean screw capped universal bottle and each sample was clearly labeled with animal identification, place of collection, body condition score, sex and age of sheep. The collected fecal samples was placed in screw cap bottles containing 10% formalin and transported to the Parasitology Laboratory in University of Gondar for examination.In laboratory the samples were processed by sedimentation technique and the eggs of *Fasciola*species was identified under compound microscope after staining the sample with 1% methyl

blue (Hansen and Perry 1994).To differentiate eggs of *Paramphistomum* and *Fasciola*, Adrop of 1% methylene blue solution will be added to the Sediment.Eggs of *Fasciola*species showed yellowish Color while eggs of *Paramphistomum*species stain by Methylene blue (Hansen and Perry 1994).

Data Management and Analysis

All raw data generated from this study was coded and entered in MS Excel database system. datawas analyzedusing SPSS version 20. Overall prevalence was calculated by dividing the number of positive animals by the total number of animals examined and times 100. Chi-square (X^2) test was used to examine the effects of risk factors on animal prevalence. *P*< 0.05 wasconsidered to be significant significant.

Results

From the total of 384examined sheep for fasciolosis throughcoprological examination139 (36.2%) were positive for *Fasciola*eggs. *Fasciola*infection was more prevalent in female110 (35.9%) than male29 (37.2%) sheep. However, there was no significance difference (p=0.840) in the prevalence of *Fasciola*infection in different sexes (Table.1). In age wise prevalence40 (32.8%)in young, and 99(37.8%) inadult sheep was recorded .The difference in prevalence between the age groups was not statically significant(p=0.343)(P>0.05)(Table 1).The Body condition of sheep was tested as a risk factor for fasciolosis.andresults indicated that there was a statistical significant difference between animals having good,medium and poor body condition (P<0.05)where higher prevalence of ovine fasciolosis was observed in poor body condition (54.3%) than medium(31.4%) and good body condition (26.2%)(Table 1).Also there was stastically significant variation between different study sites i.ebetween kebeles of Wogera woreda.(p<0.05) among the kebeles Sakedaber(45%),Sankatikem(43.6%)andDeberaso(42. 0%)was show the highest prevalence than Enkash and Balderga was the lowest prevalence (0%) for ovine faciolosis(Table-2).

Table 1: Prevalence of ovine fasciolosis based on different risk factorson coprological examinationin wogera woreda

Risk factor		№. Of (N=384) Examined	№.of Positives	χ 2	P-value
Sex	Male	78	29(37.2%)	0.41	0.840
	Female	306	110(35.9)		
	Total	384	139(36.2%		
Age	Young	122	40(32.8%)	0.901	0.343
	Adult	262	99(37.8%)		
	Total	384	139(36.2)		
Body condition					
	Poor	105	57(54.3%)	21.253	0.00
	Medium	172	54(31.4%)		
	Good	107	28(26.2%)		
	Total	384	139(36.2)		

Table 2: Prevalence of ovine fasciolosis by origionbased on coprological examination of study animals in wogera woreda

Risk factor Study site	№. of (N=384) Examined	№.of Positives	χ 2	P- Vlue
Debraso	50	21(42.0%)		
Sankatikem	39	17(43.6%)		
Dengordeba	30	11(36.7%)		
Ambageorgisbirra	95	38(40.0%)	33.983	0.000
enkash	20	7(35.0%)		
baldarga	25	0(0%)		
sakdeber	25	0(0%)		
Total	100	45(45.0%)		
	384	139(36.2%)		

Discussion

Fasciolosis is a prevailing ruminant health predicament and causes substantial economic losses to the livestock commerce in Ethiopia. The overall prevalence of ovine fasciolosis by fecal examination in the present study was 36.2%. The present finding was relatively higher than that of 28.39% reported by (Birhanu*et al*., 2016)in selected three woredas(Gondar, Azezo and Tseda town) of north gondar. Thisemight be due to the fact that the present study area is relatively high land with extensive swampy area and also these differences might be comes from the techniques used for sample collection, storage and processing of fecal materials.When compared with others reports this study is higher than 24.2% from Alamata, Ethiopia(Mathewos*et al* .,2014) 13.2% fromMiddle Awash River Basin(Ahmed *et al*.,2007) ,15.8% around Bahir Dar (Musa ,2009) and 14.6% prevalence in around Hirna town, Ethiopia (Henok and Mekonnen, 2011).

However,it is lower than the finding from different places in Ethiopia like (50.8%) in around Debre Birhan (Asrede and Shifaw,2015), 49% in Dawa Cheffa, Kemissie (Molalegn *et al*.,2010) and 42.44% inYilmanaDensa District, West Gojjam Zone, (Basaznew *et al*.,2012)a possible reason for the variation of prevalence of fasciolosis in different geographical location might be due to variation of agro-ecological zones of the study area, management system of animals, increased awareness of the society about the effect of the disease, seasonal deworming. Additionally the availability of suitable snail habitats, temperature and moisture are the main factors influencing the production of the large numbers of metacercariae necessary for epidemiology of fasciolosis.Climatic factors are of supreme importance influencing epidemiology of Fasciolosis (Ansari-lari.andMoazzeni, 2006).

This finding relatively agreed with the earlier works reported (35.94%) Hidebu AboteWoreda, North Shoaw,(Eyob*et al*.,2014) and 35.68% Ambasel Woreda South Wollo Zone,Amhara Regional State, Ethiopia (Melkamuand Mulat,2015). This may be attributed to the presence of similar favorable ecological factor for the development of snail intermediate hosts and the parasites. One of the most important factors that influence the occurrence of fasciolosis in an area is availability of suitable snail. Water logged and poorly drained areas with acidic soils in the highlands are often endemic areas for fasciolosis (Heinonen *et al*.,1995).

The prevalence of fasciolosis in female and male animals was recorded as 35.9% and 37.2% respectively.The result showed that coprological prevalence of ovine fascioliosis was comparatively higher in male than female animals in study area.However there was no statistical significe ($p>0.05$) between the two sex groups.similar observations have been made in several studies including in dawa-chafie, kemissie(Molalegn *et al*.,2010)in Adigrat, North East Ethiopia (Eyerusalem *et al*., 2012) and In woreda of south Gondar administrative zone bordering Lake Tana(Mulualem,1998).

Study was also conducted in age wise to observe prevalence of ovine fasciolosis and the result indicated that the difference in prevalence among the two age groups were relatively high prevalence in Adult (37.8%) than Young groups (32.8%),however, the variation was not statistically significant ($P>0.05$). The present finding is in line with (Ahmed*et al*., 2007; Henok and Mekonnen,2011). This may beadult sheep were frequently allowed to graze and covers large areaof grazing land than youngs that allows more chance of exposure to infestation.This study also observed among various body conditioned sheep higher prevalence was observed inpoor body conditioned (54.3.%) animals compared to good(26.2%) and of medium (31.4%) body conditioned animalsand there wasstatistically significant association ($P<0.05$) between different body condition scores.This finding agrees with the result of (Basaznew *et al*.,2012; Mathewos*et al*.,2014) and (Eyerusalem*et al*.,2012) in different study areas. The probable reason could be due to the fact that animal with poor body condition are usually less resistant and are consequently susceptible to various disease including fasciolosis and may be created by luck of essential nutrients and poor management (Lughano *et al*.,1996).

Accordingly geographical location was concerned in this study and was found statically significant ($p<0.05$). This finding was in contrary with (Birhanu*et al*.,2016) in and around northgondar (Gondar, Azezo and Tseda) townsimilar altitude, marshyness of the land, temperature and management system of sheep. But these findigis higher prevalence in sakedeber, sanakatekemdeberasoand amabageorgisezuria (45.0%,43.6%,42.0% and 40.0%) respectively than enkash and balderga(0%) this due to in ecology that in, sankatikem ,deberasoand amabageorgise there was flaunty of snail due to marshy and water lodged

environment so that,it ideal habitat for fasciolosis as compared toenkash and balderga dray and well driand environment.

Conclusion and Recommendations

Fasciolosis is a major obstacle for sheep production and productivity by inflicting remarkable direct and indirect losses atdifferent parts of the country.The result of the present study indicated that fasciolosis is ahighly prevalent sheep disease in the study area. However, it is increasingly evident that aproper evaluation of the epidemiology is lacking.The relatively high prevalence reported in this study has clearly indicated lack of strategic controlmeasures against the disease as well as poor veterinary services.This high prevalence found in the study area could be also due to the water lodgment which is marshy at grazing areas of animals and the tendency of farmers to graze their animals in these areas because of feed scarcity.

Based on the given conclusion the following recommendations are foreword:

- Since fasciola causes great economic losses the government should pay attention the problem to control the distribution of disease by financial support and distribution of anthelmintics to the farmers where the disease is endemic.
- Improving of basic animal management system i.e, watering as well as grazing management must be practiced
- Awareness creations need to be organized to livestock owners in relation to economicalSignificance and control methods of the disease in the study area.
- Further studies on the epidemiological conditionsand seasonal dynamics of parasites in the study areashould be conducted to implement integrated controlstrategies.

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