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Prevalence off Fasciolosis in Small Ruminants and its Associated Risk Factors in and Around Adisge Kebelle, North Shewa Zone, Basona Werena District, Central Ethiopia

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Abstract: Fasciola is serious problem in animal production in different areas of the world especially in Ethiopia. It is a wide spread trematodal disease affecting ruminants (cattle, sheep and goats) and also other species of animals. A cross sectional study was conducted from November 2017 to April 2017 to detect the prevalence of fasciolosis and associated risk factors in sheep and goats in and around Adisge. A total of 430 small ruminants; 320 sheep and 110 goats were randomly selected and fecal samples were collected to detect Fasciola eggs by sedimentation techniques. Out of 430 fresh fecal samples; 200 (182 sheep and 18 goats) were found positive for fasciolosis with an over all prevalence of 46.5%. Regarding the species, the prevalence of fasciolosis was higher in ovine than caprine with (56.9% and 16.4%), respectively. Hence, there was significant difference ($P<0.05$) between the species. The occurrence of parasite was highest in animals with poor condition (71.4%) followed by medium (45.2%) and good (28.7%) body condition and there was statistically significant difference ($P<0.05$). However, there was no statistically significant variations ($P>0.05$) by sex, age and origin of sheep and goats. This study indicated that fasciolosis is the most wide spread and prevalent parasitic disease affecting the health and productivity of sheep and goat of the study area. Therefore, further research should be done on the epidemiology of the disease, biology and ecology of intermediate host snails to overcome difficulties in planning and programming control strategies is highly recommended.

Key words: Adisge · Fasciolosis · Goat · Sheep

INTRODUCTION

Ethiopia has the largest livestock population in Africa, with 70 million cattle, 42 million sheep, 52 million goats, 8 million camels and 56 million chickens [1]. The productivity per animal and the contribution of this sub sectors to the national economy is relatively low due to multiple constraining factors including malnutrition, disease improper health care and other management problems [2].

The small ruminants (sheep and goat) in Ethiopia are the dominant livestock, providing up to 63% of cash income and 23% of the food subsistence value obtained from livestock production. Small ruminants play a significant role in maintaining household stability by providing meat, milk, skin and wool, generate cash income and play traditional social and religious roles [3]. The productivity per animal and the contribution of this sub-sector to the national economy is relatively low due to multiple constraining factors including malnutrition, diseases, improper health care and other management problems [4]. A disease due to parasitic infection has a great impact on global economy by hindering the productivity and the health of animals especially in developing countries [5]. Fasciolosis is one of the important parasitic diseases in tropical and subtropical countries which limit productivity of ruminants. The disease is caused by digeneantrematodes of the genus Fasciola commonly referred to as liver flukes [6].

Fasciola is serious problem in animal production in dif-ferent areas of the world especially in Ethiopia. It is a wide spread trematodal disease affecting ruminants (cattle, sheep and goats) and also other species of animals. F. hepatica and F. gigantica are the parasitic species belonging to Genus Fasciola under the phylum platyhelminths. The fasciola disease has three phases of

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clinical sign acute, sub-acute and chronic forms. Fasciolosis is more apparent in young ruminant and is usually chronic in nature [7]. The transmission of fasciola is depends on intermediate host, the lymnae snail. Animals ingest metacercaria, up on grazing of pasture in the marsh area and the worm migrates to the liver where it causes extensive damage and the mature worm inhabits the bile duct. Adult flukes in the bile ducts cause inflammation, biliary obstruction, distraction of liver tissue and anemia. the infection of animal is acquired through grazing on swampy pasture [8].

Small ruminant fasciolosis due to *F. hepatica* and *F. gigantica* is endemic in many parts of Ethiopia with prevalence ranging from 11.5% to 87% [9]. However, the prevalence of fasciolosis in small ruminants in and around Adisge was not investigated before. Therefore, the objective of this Study was to determine the prevalence of fasciolosis and to assess its associated risk factors in and around_Adisge.

MATERIALS AND METHODS

Description of Study Area: The study was conducted from November, 2016 to june 2016 in and around Adisge. Which located in Basonsa werena district around 40 killometrs north of Debrebrhan city. Debra-Berhan is a city and woreda in central Ethiopia. Located in the Semien Shewa Zone of the Amhara Region, about 120 kilometers north east of Addis Ababa on the paved highway to Dessie, the town has a latitude and longitude of 9°41'N 39°32'E and an elevation of 2,840 meters above sea level [10] the climate of the study area conforms to that of the highland. Its average yearly temperature of 31°C. Throughout the year, the average monthly temperature can drop to 28°C and rise to 36°C and Annually, about 678 mm of rain falls [11].

Study Animals and Sample Size: The study animals were the local breeds sheep and goats which originated from Asegdmegn, Adisgeafaf, Geda and Btrge areas. The sample size for the study was determined using the Thrusfield [12] with a 95% confidence interval (CI) and 5% absolute level of precision as follows:

$$N = (1.962\ P_{exp})\ (1\text{-}P_{exp})/d^2$$

where,

n = required sample size
d = desired absolute precision 0.05,
P_{exp} = expected prevalence (50%).

Since there was no study conducted in the current study area on fasciolosis of sheep and goats, 50% expected prevalence was taken and the sample size was calculated to be 384 local breed sheep and goats. However, due to limited accuracy of fasciola, in the study area the sample size is increased to 430 for the study in and around Adisge.

Study Design: A cross-sectional study was conducted on randomly selected local breeds of sheep and goats of the study area. The data was collected based on their sex, age, body condition and origin information of sheep and goat and simple random sampling method was conducted to collect the fresh fecal samples of study animal's population in the study area.

Study Methodology: Fecal samples were collected from the rectum of sheep and goat by using disposable plastic gloves and placed in clean screw cape bottle. Each sample was clearly labeled with an animal identification number, place of collection, body condition score, sex and origin of animal. The samples were presented with 10% formalin solution to avoid the eggs developing and hatching and then collected sample transported to Adisge animal health clinical laboratory for examination of Fasciola egg. In the laboratory, coprological examinations were performed to detect the presence of Fasciola eggs using standard sedimentation techniques [13].

Sedimentation Technique: From collected faecal samples for each case 3 gm of faeces was measured and placed in to a mortar. Then 42 ml of water were added and crushed thoroughly with the pestle. The suspension was then filtered through a mesh sieve in to a beaker. After gentle shaking, the suspension was filled in to a test tube and centrifuged at 1500 revolution per minute for 5 min. After removing the supernatant carefully the sediment was agitated till homogenous fluid was obtained at the bottom of the test tube. The sediment was re-suspended with equal amount of water to the previous level and allowed to sediment for 5 min. The supernatant was removed and the content of the tube was mixed thoroughly with the thumb over the open end of the tube. Then, using a pasture pipette, one drop of methylene blue was added to the sediment for staining. A single drop of sediment was. Taken and transferred to microscopic slide. Then after,Covered with cover slip and examined under microscope check the presence of fasciola eggs.

Eggs of fasciola species show yellowish brown with an indistinct operculum and embryonic cells, while eggs of *Paramphistomum* species is large and show transparent egg shell with distinct operculum and clear embryonic cells [14].

Statistical Analysis: The collected data were entered in Microsoft Excel 2007 spreadsheet and analyzed using SPSS statistical software package version 20. All raw data coded by numerical values were subjected to chai squre value (χ^2) and p-value tests to determine statically significance variations in the prevalence of of fasciolosis between origins, sex, species and body condition score of sheep and goats. A 95% confidence interval was used to determine whether there is a significant difference between measured parameters or not.

RESULTS

Table 1: Prevalence of fasciolosis based on sex

Sex	No of examined	No of affected	Prevalence (%)
Female	271	124	45.8
Male	159	76	48.7
Total	430	200	46.5

χ^2=0.18 which is insignificant p=0.66

Table 2: Prevalence of fasciolosis based on animal species

Species	No of examined	No of affected	Prevalence %
Ovine	320	182	56.9
Caprine	110	18	16.4
Total	430	200	46.5

χ^2=20.577 which is significant p=0.001

Table 3: Prevalence of fasciolosis based on animal origin

Origin	No of examined	No of affected	Prevelance %
Asegdmegn	103	48	46.6
Adisge afaf	92	42	45.7
Geda	130	62	47.7
Btrge	105	48	45.7
Total	430	200	46.5

χ^2=0.433,which is insignificant p=0.72

Table 4: Prevalence of fasciolosis based on body condition score

Body condition score	No of examined	No of affected	Prevalence %
Good	122	35	28.7
Medium	210	95	45.2
Poor	98	70	71.4
Total	430	200	46.5

χ^2=40.32 which is significant p=0.001

Table 5: Prevalence of fasciolosis based on age

Age	No of examined	No of affected	Prevalence %
Young	166	76	45.8
Adult	264	124	46.9
Total	430	200	46.5

χ^2 = 0.03 which is insignificant p=0.98

From a total of 430 fresh fecal samples 200 (46.5%) were positive for fasciola eggs. Of 200 positive animals 76 were male and 124 were female. Therefore, the prevalence with respect to sex the occurrence of fasciolosis is slightly higher in male animals than females (48.7% and 45.8%) respectively.

Regarding the species, the prevalence of fasciolosis was higher in ovine than caprine with (56.9% and 16.4%), respectively. Hence, there was significant difference (P<0.05) between the species.

Prevalence of fasciolosis on the bases of animal's origin in Geda, Asegdmegn, Btrge and Adisge afaf areas were 47.7%, 46.6%, 45.7% and 45.7% respectively. The sheep and goats from all areas included in the study were affected by almost with similar infection rate. Furthermore, the sheep from Geda showed slightly higher infection rate than Asegdmegn Adisge afaf and btrge. The difference was not statistically significant (p>0.05) (Table 3).

The prevalence of fasciolosis was different with different body condition. The occurrence of parasite was highest in animals with poor (71.4%) followed by medium (45.2%) and good (28.7%) body condition and there was statistically significant difference (P<0.05) (Table 4). When prevalence rate among age groups is considered analysis of data indicates that 46.9% and 45.8 % in Adult and young respectively. The occurrence of fasciolosis was slightly higher in adult animal as compared to young animal .It has statistically insignificant when get analyzed statistically between age group (P < 0.05) (Tables 1).

DISCUSSION

The overall prevalence of fasciolosis in this study area was 46.5 %. This result was lowers than other reports, such as 70.2% in debrebrhan agricultural research center [15], 51.2% in and around Debre Berhan districts [16] and 62.2% in and around basona werena district [17], 70.2% around menz lalo district[18] .In other way the study result was higher than reports of 16.3% in mekelle [19]. 11.6 % at hernia weredas [20], 39.3% in and around ambo [21]. The difference in the prevalence of fasciolosis may be due to variation in the climatic and ecological conditions such as altitude, rainfall, temperature and

management systems of livestock. Climatic conditions, particularly rainfall, were frequently associated with difference in the prevalence of fasciola species infection because this was suitable for intermediate hosts like snails to reproduce and to survive longer period under moist conditions [22] .

The present study showed significantly fasciolosis was detected at higher proportion in sheep as compared to goats. This result agrees with finding of Abel *et al.* [23] who reported 25.9% and 10.6% in sheep and goats, respectively and Abebe *et al.* [19] who described 22.8% and 5.2% in sheep and goats goats, respectively in and around mekelle , northern Ethiopia.

The variation in the prevalence of fasciolosis is due to The difference in the grazing behavior of the two species could be responsible for the higher prevalence of fasciolosis in sheep than in goats. Sheep are grazers while goats are browsers, hence goats do not normally graze marshy areas where there is a great possibility of acquiring the metacercaria together with the grass [24, 25].

There was also considerable significant variation regarding body conditions. The disease was higher in poor body conditions followed by medium and good body conditions. The result was in agreement with Zeleke *et al.* [17] and Mathewos *et al.* [26], Abayneh and Seifu [27]. The association of fasciolosis with poor body conditioned animals could be related to Fasciola species are known to suck blood and tissue fluid with serious damage to the liver parenchyma, especially during the migratory phase of the juvenile worm and this may lead to poor body conditions [28]. it can also justified that susceptibility of such animals to parasitic infections as described by Devendra and Marca [29].

It can also be Analysis of the fecal egg detection result didn't show statistically significant difference between two sexes as risk factor (P>0.05). the result was in agreement with tsegaye and gebeyeyhu [19] at debrebrhan municipal abattoir.This indicates that there is no difference in acquiring Fasciola infection between male and female animals This might be due to common exposure to a similar Fasciola contaminated pasture land by both sex groups and traditionally animals are driven to pasture regardless of sex [31].

This study also revealed that there is no significant difference (P>0.05) among the origin of animal with respect to the prevalence of Fasciola eggs. But Infection rate of fasciolosis in Gedas was Slightly higher than other 3 study sites; this may be attributed to in geda the existence of more favorable environment for both the snail intermediate host and the parasite.

Based on the result obtained from the study, the occurrence of fasciolosis was slightly higher in adult as compared to young animals. This result was in agreement with the reports of Abebe *et al.* [20]. Even though there was difference between the two age groups there was no statically significance difference between them (p>0.05).

CONCLUSION

The present study concluded that fasciolosis is the most wide spread and prevalent parasitic disease affecting the health and productivity of sheep and goat and it is important disease in different parts of the study areas with an overall prevalence of 46.5%. This result also indicates that the prevalence of fasciolosis ls facilitated by the presence of favorable ecological, climatic and edaphic factors for the development of the intermediate host Lymnaea species in adisge kebelle. The prevalence of small ruminant fasciolosis was not associated with sex , age and origin of animals While,it was highly associated with body condition scores and species.

Based on the above conclusion the following recommendations are forwarded.

- Strategic anthelminthics treatment with appropriate flukicidal drugs should be practiced to control the load of the parasite.
- Appropriate control measures should be done like animals should not be allowed to graze in water reservoir areas and avoid intermediate host snail.
- Moreover, further research or studies should be done on the epidemiology of the disease, biology and ecology Of intermediate host snails (lymnaea) to overcome difficulties in planning and programming control strategies is highly recommended.
- Animals with poor body conditions should be kept in good nutritional management in order to develop immunity against fasciola.

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