



RESEARCH ARTICLE

Prevalence and Economic Significance of Caprine Fascioliasis at Sylhet District of Bangladesh

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ABSTRACT

Caprine fascioliasis plays an important role of major constraints to small ruminant production in Bangladesh. This study was conducted in Sylhet district of Bangladesh to determine the prevalence of fascioliasis in Black Bengal goats of different age groups, sex and in seasons. In this study, livers of male and female goats were collected randomly from slaughter house during a period of 1 (one) year (October, 2007 to September, 2008). A total of 318 livers examined of which 66 were found to contain *Fasciola gigantica*. The overall prevalence rate was 20.75%. Fascioliasis was observed significantly higher in older (58.33%), female goats (36.79%) and during the rainy season (26.16%). The estimated economic losses due to condemnation of liver were 5.59% which amounted to US\$ 115.44 per thousand liver of slaughtered goat. The prevalence was significantly different ($P \leq 0.05$) in different age groups and sex of the animals. The present study indicates that *Fasciola* infection in Black Bengal goats associated with age and sex of the animals; and seasons of the year. To control the disease in this area, appropriate preventive control strategies have to be designed to reduce the impact of the disease on goat production in Bangladesh.

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INTRODUCTION

There are about 38.1 million small ruminants (goat and sheep) in Bangladesh (FAO, 2005) which plays an important role in the rural economy and earn substantial amount of foreign currency by exporting skins and other by-products (Kamaruddin, 2003). Helminthiasis, especially parasitic gastro-enteritis (PGE) constitutes a serious health problem and limitation to the productivity of small ruminants throughout the world due to the associated morbidity, mortality and cost of treatment and control measures (Silvestre *et al.*, 2000). In Bangladesh, parasitism has been considered as one of the major constraints of livestock production. Among the parasitic diseases, fascioliasis is an economically important of livestock particularly in cattle, sheep and goats. The prevalence of fascioliasis among small ruminants in Bangladesh is rampant and the economic loss from this disease is considerably high. It is reported that *F. gigantica* is the most prevalent and economically

important liver fluke in Bangladesh. Infection with *F. gigantica* is regarded as one of the most common single helminth infection of ruminants in Asia and Africa (Hamond and Sewell, 1990). This disease causes enormous economic losses all over the world and these losses are due to reduction in milk and meat production, condemnation of liver, loss of draught power, reproductive failure and mortality (Rahman *et al.*, 1972; Fabiyi, 1986; Diaw *et al.*, 1998). Selim *et al.* (1997) estimated the economic losses due to condemnation of liver 7.54% which amounted to US\$ 28.86 per thousand liver of slaughtered goat. Despite the wide prevalence of the malady and huge loss sustained from it, no epidemiological study on the disease in goats have so far been undertaken in Sylhet district of this country. Therefore, in this study, an attempt was made to record the prevalence of fascioliasis in Black Bengal goats associated with the influence of age and sex on the prevalence and to correlate between worm and seasonal changes.

MATERIALS AND METHODS

Study area and experimental animals

This study was conducted in Sylhet district of Bangladesh. Sylhet district is located in north-east part of Bangladesh and between 24°32' North latitude and 91°52' East longitude. The average maximum and minimum temperatures are 23 and 7°C, respectively. The annual average rainfall is 3.334 mm and humidity is 70%. In this study, livers of male and female goats of different age groups slaughtered at Sylhet slaughter house were collected randomly during a period from October, 2007 to September, 2008.

All animals of this study were belonged to Black Bengal goats which were purchased by the butchers from different areas of Sylhet district where they were maintained under the rural husbandry practices. The age of the animals was determined by dentition. The sex of the animals was recorded by examining the presence of penis or uterus.

Sample collection and processing

A total of 318 livers were collected and examined in the laboratory of the Department of Medicine and Surgery, Sylhet Agricultural University, Bangladesh. The livers were subjected to postmortem examinations. At first the lesions were examined for gross examinations specific for liver fluke (fascioliasis) infestations. The ligaments of the livers were removed and weighed with its gall bladder. The gross lesions of the liver like cyst, abscesses, necrosis, white spots, hemorrhages etc. were investigated and recorded by bringing immediately to the laboratory. The livers and gall bladders in the laboratory were subjected to thorough investigation for the collections of parasites as well as for gross pathological studies.

Parasitological examinations

At first, the bile ducts were opened for exploring fascioliasis. For generalized liver fluke infections (fascioliasis) incisions were given in different parts of the bile duct to detect fluke in the liver. The liver was placed on a tray and cut into slices of 4-5 mm thickness with a sharp knife. Slight pressure was exerted to the sliced pieces with the thumb and fingers to squeeze out immature flukes from its tissue and smaller bile ducts, if there be any. The sliced pieces of livers were placed in saline water for 30-60 minutes. Then each piece was removed from the saline and the sediment was examined for collection of flukes, *F. gigantica*. A magnifying lens was also used according to necessity. Number of flukes (immature and adults) removed from each liver were counted.

Statistical analysis

Microsoft Excel 2003 was used to calculate the descriptive statistics. Data collected were transferred to STATA version 8.0 (Stata Corporation, Texas, USA, 2007) for analysis by chi-square test. Variation in the prevalence of fascioliasis among sex, age and season were analyzed. Year was divided into three seasons, i.e. rainy (June to October), summer (March to May) and winter (November to February). A value of $P \leq 0.05$ or less was considered significant at 95% confidence interval.

RESULTS AND DISCUSSION

Out of 318 slaughtered goats, 66 (20.75%) livers were found to contain immature and mature Fasciola. Selim *et al.* (1997) and Islam and Taimur (2008) reported a relatively low prevalence rate of *F. gigantica* in goat which was 8.70 and 14.28%, respectively. The heavy rainfall in the region might be one of the causes of higher prevalence of the disease in the area where this study was carried out.

Age wise prevalence

Fascioliasis was observed significantly ($\chi^2=16.917$, $df=4$, $P<0.002$) higher in older animals over two years of age (Table 1), which is in agreement with the result of other workers (Tasawar *et al.*, 2007). The higher infection rate in older animals could be due to long time exposure to disease entity and their grazing habit close to submerge areas. Similarly, Keyyu *et al.* (2005) reported that the high infection rates in older animals associated with age and consequently longer exposure time. The prevalence of fascioliasis started to decrease with the increase of age (>2.5 years) in the present study. Similar observation reported by Tasawar *et al.* (2007) where the prevalence was high (35.71%) in 2 years age group and low (18.18%) in greater than 3 years age group. The probable explanation for the lower prevalence in higher age group compared to younger age group could be due to the so called self-cure phenomenon (Fryod, 1975; Assanji, 1988) and/or high acquired immunity which increase with age. It has been reported that host may recover from parasitic infection with increasing age and hence become resistant (Winkler, 1982).

Table 1: Age wise prevalence rates of fascioliasis in goats in Sylhet district, Bangladesh

Ages of animals (Years)	Number of liver examined	Positive cases (%)
Up to 1	35	01 (2.85)
1- 1.5	86	14 (16.27)
1.6- 2	168	35 (20.83)
2.1- 2.5	24	14 (58.33)
2.6 -3	05	02 (40.00)

Figures in the parenthesis indicate percentage. A significant difference between various age groups was recorded ($\chi^2=16.917$, $df=4$, $P<0.002$).

Sex and season wise prevalence

Female goats (36.79%) were affected more ($\chi^2=15.384$, $df=1$, $P<0.001$) with fascioliasis than the males (12.73%) which could probably due to the fact that the female goats in this country are slaughtered at older age. The change of physiologic condition during lactation (productive activity) and/or lack of proper nutrition for production and due to long time exposure of the animals to disease entity and their heavy grazing in submerged areas might be the cause of greater prevalence rate in females. In adult female goats fascioliasis was recorded higher (44.20%) and this was probably for their higher survival rate of this age group of animals to this disease (Selim *et al.*, 1997).

Prevalence of fascioliasis in slaughtered goats was found to be high (26.16%) during the rainy season (Table 2), however, difference with other season found non

significant ($\chi^2=2.450$; $P=0.294$). This observation appeared in agreement with the earlier reports (Lemma *et al.*, 1985; Selim *et al.*, 1997). Climate conditions, particularly rainfall, were frequently associated with differences in the prevalence of fasciola infection because this was suitable for intermediate hosts like snails to reproduce and to survive longer under moist conditions (Ahmed *et al.*, 2007). Moreover, Bangladesh has a rainy season for five months, which facilitates parasitic survival in such an environment. From this and previous studies (Schillorn van Veen *et al.*, 1980; Mzembe and Chaudhry, 1981; Jithendran and Bhat, 1999), the prevalence of *F. gigantica* was found to be significantly higher during the wet season than that of dry season. Reports on the duration and period during which animals are exposed to infection with *F. gigantica* vary between habitats and the rate of infection is not constant throughout the year but concentrated over a relatively few months (Spithill *et al.*, 1999). The proportion of animals passing fluke eggs increased gradually from the early dry season and peaked at the end of the dry season and the early part of the rainy season (Keyyu *et al.*, 2005).

Table 2: Season wise prevalence of fascioliasis in goats in Sylhet district, Bangladesh

Seasons involved	Number of liver examined	Positive (%) cases
Rainy (June to October)	107	28 (26.16)
Summer (March to May)	106	19 (18.86)
Winter (November to February)	105	17 (17.14)

Figures in the parenthesis indicate the percentage. A non significant difference between various seasons was observed ($\chi^2=2.450$, $df=2$, $P=0.294$).

Economic losses

The total weight of 318 livers was approximately 143kg and the weight of condemned mass from 66 fascioliasis affected liver was 8 kg this was 5.59% of the total weight. The monetary value of 143kg liver (318 livers) was calculated to be US\$ 619.04 (US\$@ 300 per kg) and the monetary value of 8kg condemned liver was US\$ 34.63 (Table 3). Based on this, the expected monetary loss due to condemnation of liver per slaughtered goat in the population was US\$ 0.16 and the expected monetary losses per 1000 slaughtered goat in the population would be US\$ 115.44. According to statistical reports in Bangladesh in the year 1983, total number of goats slaughtered in Bangladesh was 4.75×10^6 . The number of slaughtered goats in the fiscal year 2007-2008 i.e. during the period of this study was possibly more than that of 1983. However, if we consider that the number was same then the economic loss for the fiscal year 2007-2008 stands for US\$ 548.86 (approx.). Similarly, Selim *et al.* (1997) estimated 7.54% which amounted to US\$ 28.86 per thousand liver of slaughtered goat. According to Ahmadi and Meshkehkar (2010), the prevalence of liver condemnations due to fascioliasis decreased from 7.37, 1.80 and 4.41% in 1999-2000 to 4.64, 1.12 and 2.80% in 2007-2008 for cattle, sheep and goats, respectively. The 5.59% loss of liver tissue alone due to condemnation for fascioliasis should not be under estimated in the contest of a developing country like Bangladesh.

Conclusion

Fasciola gigantica infections in goats are endemic and widespread in Sylhet. So, the control measures should be taken by destruction of intermediate host (snail population). Avoiding low lying pastures have also significantly importance for controlling fluke infections. Periodic anthelmintic treatment should be given to get the maximum benefits from goats. However, this is an initial study; further study should be required to estimate the accurate prevalence of the disease and to prevent the infections of animals and maximizing the goat production in Bangladesh.

Table 3: Economic losses due to condemnation of fascioliasis affected liver of goats

Categories	Description
Weight (kg) of 318 livers	142.80
Weight (kg) of the condemned part from 66 fascioliasis affected livers.	8.38
Percent of condemned liver tissue due to fascioliasis in the surveyed population	5.59
Market value of 318 liver that is 143 kg liver tissue	US\$ 619.04 (US\$ @ 4.32/kg)
Market value of condemned 8 kg mass of liver	US\$ 34.63 (5.59%)
Expected average monetary loss due to condemnation of liver per slaughtered goat	US\$ 0.16
Expected average monetary loss due to condemnation of liver per 1000 slaughtered goat	US\$ 115.44
Calculated economic loss due to condemnation of goat liver in Bangladesh in the year 2007-2008, for 4750000 heads of slaughtered goats	US\$ 584.34

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