Original Research Article

Coprological, abattoir survey and economic significance of bovine fascioliasis at Sylhet region of Bangladesh

ABSTRACT

This study was conducted in the Sylhet division of Bangladesh with the aim of determining the prevalence of fascioliasis in cattle of different age groups, sex and in seasons as well as to assess risk factors and economic loss caused by this parasite. In this study, feces and livers of male and female animals were collected randomly from different farms and slaughter house respectively during a period of one year (September 2016 to August 2017). Coprological examinations were performed by standard sedimentation technique and liver samples were examined by slicing the collected livers. A total of 613 feces and 215 livers were examined of which 119 (19.41%) and 52(24.18%) were found to contain *Fasciola gigantica* respectively. Fasciola in feces and liver samples were observed significantly (P=0.002 and 0.018) higher in older animals of above 5 years estimating 25.64% and 36.36%, respectively. The lowest prevalence of feces samples was found in cattle of >3years of age (10.27%) and the animals aged between 3-5years (20.00%) in case of liver sample. The prevalence was higher in females contributing 19.42% in feces and 26.66% liver samples. Among three seasons, infection was found to be more during rainy season 23.66% and 33.03% in feces and liver sample respectively. The present study indicates that fasciola infection in cattle associated with the 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 disease on livestock production in Bangladesh.

Key words: Fascioliasis, Prevalence, Feces, Abattoir survey, Cattle.

1. INTRODUCTION

Fascioliasis is globally known to be an important helminthic disease of ruminants caused by the genus fasciola and it is one of the most neglected tropical zoonotic diseases. Among the parasitic diseases, fascioliasis is most important in Bangladesh. *F. gigantica* is the most important liver fluke in the tropics and temperate regions frequently reported of causing ruminant's fascioliasis [1]. Usually, animals become infected by the ingestion of infected or contaminated feed, water and pasture [1,4]. Infection to host animals usually takes place with fasciola metacercariae by ingesting contaminated vegetation near to or within wet grazing land [4]. The clinical signs of this disease in cattle, sheep and goat are characterized by weight loss, anemia and development of bottle jaw due to hypoproteinemia; reduce production, poor performance, condemnation of liver and an increased mortality [5]. Others [6] expressed that the total economic losses because of fascioliasis as far as liver condemnations and carcasses weight losses over the 3 years of the study were evaluated 16,800.4 USD. The economic losses consist of costs of anthelmintic, drenches, labor, and liver condemnation at meat inspection: and losses in production due to mortality, reduction in meat, milk and wool production: and reduction in growth rate, fertility and draught power [7]. In Bangladesh, until now there is no available report about the economic losses due to fascioliasis in cattle. The estimated economic losses due to condemnation of liver were 5.59% which amounted to US$ 115.44 per thousand liver of slaughtered goat [8]. The direct economic impact of fascioliasis is increased condemnation of liver meat; the far more harmful effects are reduced animal productivity, under-weight calf birth and mitigate the growth in infected animals [9]. Berando*et al.* [10] also reported that the parasite may cause decline of production in milking cows. Earlier reports suggest around 19-53% prevalence of fascioliasis in cattle in various districts of Bangladesh [11-13]. The prevalence of fasciola infection depends on several risk factors related to the biology of the host and parasite, as

well as the management of flocks and herds. It also relates with the availability of intermediate host snail (*Lymnea auricularia*), temperature, moisture, seasons, health status of animal, improper sanitation, and availability of flooded area or irrigated land which is used as grazing field for animals [14]. Coprological examination is a usual tool to investigate prevalence or diagnosis of fascioliasis. Fascioliasis has raised emerged and reported zoonosis in many countries with estimation of 17 million infected people and up to 180 million at risk [2]. There was an Outbreak of Human *Fascioliasis* in Southwest China [26] where 29 hospitalized patients from 18 families were discovered according to the definition for fascioliasis. It can be transmitted from animal to human by consumption of infected improperly cooked liver. Considering the economic importance and pathological effects of liver fluke infection in cattle in Sylhet region, this study was conducted to determine the prevalence, risk factor assessment and economic analysis of fascioliasis in cattle relation to age, sex, and seasons based on fecal and abattoir survey.

2. MATERIALS AND METHODS

2.1 Study Area and Period

The research was carried out in cattle of Sylhet region in Bangladesh. The area under lies in the Sylhet division is located in north-east part of Bangladesh and between 24°32′ North latitude and 91°52′ East longitudes. The average maximum and minimum temperatures are 38°C and 7°C, respectively. The annual average rainfall is 3.334mm and humidity is 70%. The annual the average maximum and minimum temperature is 10°C and 30°C, respectively.

2.2 Study of Animals

For the purpose of current study, 613 fresh feces were collected from the cattle housed in individual farmers, private and government farms in Sylhet division of Bangladesh.

Information regarding health history, identification, age, sex and breed of cattle were recorded. The farm health problems, number of cattle and the housing were also recorded to gain more information about the predisposing factors for an infection with fascioliasis. The cattle were alienated into three groups: Young: < 3 years, Adult: 3-5 years and Old: > 5 years of age.

2.3 Collection of Fecal Samples

Freshly voided feces or directly from rectum were collected from adult cattle and calves. After collection, the sample were kept on ice and brought to the laboratory. All fecal samples were collected in separate cups. To prevent potential cross contamination between fecal samples, separate disposable gloves were worn for each collected sample. Fecal samples collected in the field were kept refrigerated at 4°C, processed for the determination of parasite within 24 hours of collection.

2.4 Coprological Examination

Each samples of 20-25gm of feces material was collected from each animal. The samples were clearly labeled with universal bottles preserved with 10% formalin and each sample was clearly labeled with animal′s identification (age, sex), date and place of collection. Samples were packed and dispatched in cool box to avoid development of eggs and hatching. Coproscopic examination was performed to detect the presence of fasciola eggs using the standard sedimentation techniques [15]. The egg of fasciola were identified by a drop of methylene blue solution was added to the sediment to differentiate between eggs of paramphistomum species and fasciola species where eggs of fasciola species show yellowish color while eggs of Paramphistomum species stain by methylene blue [15].

2.5 Collection of Liver Samples

During the study year, the affected cattle liver with gall bladders were collected from regional slaughter houses and examined to record the prevalence and economic significance of this disease in a systematic survey.

2.6 Pathological Examination of liver

Necropsies of slaughter animals were conducted and 215 livers were checked for the presence of parasites. Through palpation and incision of dilated or thickened bile ducts, gross pathological lesion of each diseased liver was established and recorded. Records of numbers slaughtered, source of slaughtered stock and the liver lesions were observed and condemned were noted down.

2.7 Statistical Analysis

Among the male and female cattle, variations in the prevalence of fascioliasis on the basis of different age groups, season, sex and their location. MSExcel 2010 and SPSS version 20 were used for data entry, coding, cleaning and analysis. Data was presented using graphs and tables. Prevalence was analyzed with Chi-square, ANOVA and Logistic Regression test by SPSS version 20.

3. RESULTS AND DISCUSSION

Among 613 fecal samples examined, 119 (19.41%) were found infected with *Fasciola spp*. in Sylhet division. Samples were examined microscopically using direct smear and standard sedimentation methods. Liver samples from 215 slaughtered animals were conducted and livers were checked, 52% were found positive with *Fasciola spp*. The prevalence of fascioliasis was found to be associated with age, sex and season as revealed by the

multivariate analysis of risk factors. Among multivariable age statistically significant in both examination which was considered to the calculated P- value was less than 0.05 that was shown in table 1.

Table 1: Animal-level prevalence of fascioliasis in cattle at Sylhet division of Bangladesh

Factors		Variables	No.of Examined Animals	No.of Affected Animals	Prevale-nce(%)	Total Prevale-nce(%)	P-value	Total examined Animals
Coprological examination	Age	less than 3 years	146	15	10.27	19.41	0.002	613
		Between 3-5 years	350	74	21.14			
		More than 5 years	117	30	25.64			
	Sex	Female	484	94	19.42			
		Male	129	25	19.37	19.41	1.00	
Abattoir survey	Age	Between 3-5 years	160	32	20	24.18	0.018	215
		More than 5 years	55	20	36.36			
	Sex	Female	30	8	26.66			
		Male	185	44	23.78	24.18	0.818	

Table 2: Seasonal prevalence of fascioliasis in cattle at Sylhet division of Bangladesh

Samples	Name of Seasons	No. of Animals Examined	No. of Affected Animals	Prevale-nce (%)	Total Prevale-nce (%)	P-value	Total examined Animals
Coprology	Summer	126	18	14.28	19.41	0.114	613
	Rainy	167	40	23.95			
	Winter	320	61	19.06			
Abattoir survey	Summer	113	22	19.46	24.18	0.156	215
	Rainy	87	27	33.03			
	Winter	15	3	20.00			

Table 3: Regional prevalence of fascioliasis in cattle at Sylhet division of Bangladesh

Regions	No. of Animals Examined	No. of Affected Animals	Prevalence (%)	Total Prevalence (%)	Total examined Animals
Sylhet sader	435	73	16.78		
Habiganj	58	17	29.31		
Moulvibazar	78	20	25.64	19.41	613
Sunamganj	42	9	21.42		

Economic losses

The total weight of 215 livers was approximately 752kg and the weight of condemned mass from 52 fascioliasis affected liver was 182 kg this was 179.21 kg of the total weight. The monetary value of 752 kg liver was calculated to be US$ 4574.20 and the monetary value of 182 kg condemned liver was US$ 1134.66 (Table 3). Based on this, the expected monetary loss due to condemnation of liver per slaughtered cattle in the population was US$ 6.23 and the expected monetary losses per 1000 slaughtered cattle in the population would be US$ 2189.78.

Table 4: Economic losses due to condemnation of fascioliasis affected liver of cattle.

Categories	Description
Weight (kg) of 215 livers	752
Weight (kg) of the condemned part from 52 fascioliasis affected livers.	182
Percent of condemned liver tissue due to fascioliasis in the surveyed population	179.21
Market value of 215 liver that is 752 kg liver tissue	US$ 4574.20
Market value of condemned 182 kg mass of liver	US$ 1134.66
Expected average monetary loss due to condemnation of liver per slaughtered cattle	US$ 6.23
Expected average monetary loss due to condemnation of liver per 1000 slaughtered cattle	US$ 2189.78

In this study, coprological prevalence of fascioliasis, its epidemiology and economic significance were measured in cattle in the Sylhet division of Bangladesh. The prevalence found in this study was lower than the earlier findings of Rahman and Mondal [11] who reported a 53% prevalence of bovine fascioliasis in Bangladesh. The rate of infection of fasciola may vary in different agroclimatic conditions as observed in Pakistan by other contributor [17]. Similarly, the prevalence of fascioliasis varied among various districts of Bangladesh. Chowdhury *et al* [12] examined fecal samples of cattle from Savar, Dhaka, Bangladesh and found 19.7% samples positive for fascioliasis. Affroze *et al* [13] recorded a 31.1% coprological prevalence of fascioliasis in Netrokona district, Bangladesh. The climatic condition and geographic position of locality may influence the type and severity of parasitic infestation in grazing animals [18]. Fascioliasis more prevalent in lowland tropical areas as *Lymnea auricularia* (the intermediate host snail of Fasciola) breeds throughout the year in these favorable habitats [19]. The lower infection rate found in Chittagong district was 14.8% in another study [12].

Among the age group, considerably high rate of infection was found in adult cattle. This result was in agreement with the earlier findings [7,18]. The highest level of infection in older group i.e., above 6 years (62.62%) followed by in age groups of 4-6 years (57.28%), 2-4 years (42.56%) and up to 2 years (17.87%) [17]. Affroze *et al* [13] also reported that cattle over 4 years of age had the highest (33.3%) prevalence of fascioliasis in Netrokona district in Bangladesh. High prevalence in the adult in this study could be due to the intake of parasites for longer period and their grazing habit close to water logged areas.

Between the sex groups, considerably high rate of infection was found in female. This result which was in agreement with the result of other workers [8,18], they observed higher

prevalence in females as compared to males. This finding is also inconformity with the previous results [12].

Prevalence of fascioliasis in cattle was found to be high during the rainy season. The fascioliasis in cattle was high in 31.71% in winter, followed by summer (22.45%) and (36.84%) rainy seasons [20]. 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 [21]. The prevalence found in this study was lower than the earlier findings [22] where out of 384 fecal and liver samples tasted, a prevalence of 43.23% and 90.88% was found respectively. The lower infection rate found in goat in Sylhet division was 20.75% in the study [8]. According to other researchers [23], 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.

According to the study of Hassan Khoramian [24], the overall 3.28% of the livers were found to be infected. For total number of sheep, goats and cattle slaughtered annually in region study, it was estimated that 7505 livers were infected and total annual economic losses of fascioliasis of studied animals was 41 784 USD (based on market prices in study period). Of this, 23360 USD, 30240 USD and 15 400 USD were associated with the fascioliasis of sheep, goats and cattle, respectively. The economic importance of fascioliasis has so far been reported by estimating the loss due to condemnation of liver in affected cattle [3,25].

4. CONCLUSION

Prevalence of bovine fascioliasis at Sylhet division of Bangladesh is attributed by multifactorial risk factors which comprise host, parasite and environmental effects. The prevalence was significantly affected by sex, age and seasons of the year. Higher prevalence of bovine fascioliasis was recorded in female cattle than male and older (>5years) than younger ones. As intermediate host is endemic in high rainfall and water logged area, Sylhet region is suitable for surviving the intermediate host. *Fasciola gigantica* infections in cattle are endemic and widespread in Sylhet. The feces collected from animals in farm condition that's why the prevalence was lower compared to free ranged animals. So, the control measures should be taken by destruction of intermediate host (snail population). Avoiding low lying pastures have also significantly important for controlling fluke infections. Periodic anthelmintic treatment should be given to get the maximum benefits from cattle. Liver condemnation due to fascioliasis had caused enormous economic income loss to the meat sellers. The majority of the farmers had heard about fasciolosis but were not aware of its cause and the fact that it can infects human beings proving that it has not been given the attention it requires making it a neglected disease of significant public health importance. Based on the research, selective and periodic use of anthelmintics in cattle against liver fluke infection as treatment will reduce the treatment cost as well as losses from the liver condemnation by the disease in cattle population in Bangladesh.

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CONFLICT OF INTEREST

The authors declare that there is no conflicting interest with regards to the publication of this manuscript.

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