

Prevalence and therapeutic effect of drugs available in market against fascioliasis of cattle in certain area of Bangladesh

Bepari Mohammad Jafar Ahammed ¹, Md. Matiur Rahman ¹, Nasrin Sultana Lucky ², Mohammed Kawser Hossain ², Jamal Uddin Bhuiyan ³ and Md. Rafiqul Islam*¹

¹Department of Medicine, Sylhet Agricultural University, ²Department of Surgery and Theriogenology, Sylhet Agricultural University, ³Department of Parasitology, Sylhet Agricultural University, Bangladesh

Abstract

Context: Minimize the effect of Fascioliasis is needed for efficacy evaluation.

Objectives: The objective of present study was to investigate the prevalence and therapeutic effect of drugs against fascioliasis in certain of Bangladesh.

Materials and Methods: Fecal sample of 900 cattle were taken from different area of Barisal district. The result was analyzed under mean values and standard error of mean and Chi-square test.

Results: The overall prevalence of Fascioliasis in Barisal district was 21.55%. The highest prevalence 60.00% was noted in winter followed by 50.00% in rainy, 15.00% in summer. The prevalence in animals between 3 months to 1 year age group, 1 to 3 year age group and in age group above 3 year was 10.33%, 28.66% and 27.00% respectively. The prevalence rate in age group 1-3 year and above 3 year were almost similar (28.66% and 27.00%). These rates were significantly ($p < 0.05$) higher than the age group of 3 months to 1 year. Among male and female animals, the prevalence rate in male was 17.55% and in female 26.44%. The prevalence rate of female were significantly ($p < 0.05$) higher. The egg per gram of feces varied from 100-200 in summer and rainy season. During winter season the egg count varied from 100-300. The anthelmintic efficacy of Fasinex® (12 mg/kg body weight orally) and Nitrox A® (1.5 ml/50 kg body weight subcutaneously) against Fascioliasis were evaluated on the basis of faecal egg counts. The efficacy of Fasinex was higher than Nitrox A and both showed good efficacy (above 66.19%) against Fascioliasis.

Conclusions: Anthelmintic therapy is a good strategy against parasitic diseases in animals. Further investigations and molecular research should be recommended to reduce fasciola infection for sustainability of the small scale dairy farms.

Keywords: Prevalence, therapeutic effect, drugs, fascioliasis and cattle

Introduction

Parasitism is one of the main constraints in cattle rearing in Bangladesh (Jabber & Green, 1983). The hot and humid climate in Bangladesh is ideally suited for the survival and reproduction of parasites. Parasitic diseases are considered important in causing enormous economic losses through morbidity and mortality in livestock. Among the parasitic diseases, liver fluke (*Fasciola* sp.) is the most common in Bangladesh (Qadir, 1981; Rahman & Mondal, 1983). This group of liver fluke (*Fasciola* sp.) is also associated with anaemia (Soulsby, 1982) resulting loss of body weight, stunted growth, diarrhoea etc. that greatly hamper the normal growth and production of cattle.

Among the various parasitic infections, Fascioliasis is considered to be a major disease of ruminants in this country. In developed countries the principle of controlling parasitic diseases are based on pasture and barn management (Roditis *et al.*, 2000) and protective treatment but in Bangladesh where animals are mainly maintained in mixed farming system with virtually no pasture land for grazing, these methods have limitation to control parasites. Moreover, the chemicals used against parasites are hazardous for animals, human as well as environment. Control of parasitic diseases is mainly based on regular anthelmintic treatment in Bangladesh. Because of high treatment cost and unavailability of anthelmintics, our economically insolvent farmers cannot afford to buy allopathic medicine. Furthermore, indiscriminate use of these anthelmintics by the field veterinarians and the quacks contribute a lot to increase the resistant population of liver fluke (*Fasciola gigantica*).

To minimize the effects of parasites on animal, different types

of anthelmintics are being used all over the world. But due to their indiscriminate use, some researchers have expressed their opinion on the development of resistance to anthelmintics in some nematodes (Waller & Prichard, 1985; Waller, 1987). For that efforts have been made for the development of new effective anthelmintics. Since then, various groups of anthelmintics with narrow and broad spectrum activities have been discovered.

Triclabendazole and Nitroxynil are the latest broad spectrum anthelmintics. Therefore, Triclabendazole (Fasinex) and Nitroxynil (Nitrox-A) were selected and the present research work was designed. The study was undertaken with a view to investigate the prevalence of *Fasciola* infestation among cattle population by fecal sample examination and by examination of liver and gall bladder of slaughtered cattle and therapeutic effect of drugs available in markets against Fascioliasis for a period of one year, in different area of Barisal district. The year was divided into three seasons namely (Sarder *et al.* 2006) winter (November-February), summer (March– May), rainy (July -October).

Materials and Methods

Selection of animal

A total of 240 animals, out of which 80 animals in each season were selected randomly from different villages of Barisal district. The ages of the animals were determined from the history of the owner and by examining the teeth. Equal number of male and female animals was selected. Also in each season equal number of animals in each age group was brought under this study.

Fecal sample collection and examination

* Corresponding author: dr.rafiq.dvm@sau.ac.bd

Fecal sample from each animal were collected from the rectum in small polythene bag which were identified properly as per age and sex of the animal. The sample were transferred to the diagnostic laboratory of Veterinary Hospital of Gourmodi at Barisal district and examined within 1-3 hours.

Technique of the examination

Direct smear method:

A loop of fecal sample was taken on a glass slide, thoroughly diluted with few drops of water, covered with a cover slip and examined under microscope using both low and high power magnification for the presence and identification of *Fasciola* egg.

Sedimentation method:

Five gm of fecal sample (Soulsby, 1982) was diluted with 20 ml of tap water in a cylinder after which the cylinder was kept standing for one hour. After this supernatant fluid was decanted off and one drop of the sediment was taken on a glass slide covered with a coverslip and examined under microscope for the presence of *Fasciola* egg. The total number of eggs found in the slide was multiplied by 100 to get the EPG (egg per gram feces). The *Fasciola* eggs were identified on the basis of their characteristic morphological features as described by Soulsby (1982) and then counted.

Examination of liver and gall bladder

Examination of the liver and gall bladder of slaughtered cattle were carried out for the presence of *Fasciola*. A total of 120 livers with gall bladder were purchased randomly from slaughtered cattle of different rural markets of Barisal district and were examined for liver fluke. The examination was carried out on spot on a tray. The large and small bile duct were opened with a pair of scissors and viewed with naked eye or by using magnifying glass for the presence of fluke. The liver was cut into small pieces and kept in water for 1 hour in the tray and then cut pieces were squeezed to expel the fluke if any. The fluid was decanted off and the sediment was viewed with naked eye and by using magnifying glass. The gall bladders were separated from the liver, the bile was taken on a petri-dish and was examined for detection of fluke.

Study on therapeutic efficacy of commonly used anthelmintics

Out of 900 selected cattle, fifty (50) were treated with Fasinex^(R) bolus (Triclabendazole) Novartis, 12 mg/kg body weight orally as (recommended by the manufacture) in recommended dose and the faecal samples were reexamined 2 months later (Islam & Samad 1992). Similarly fifty (50) cattle were treated with Nitrox-A^(R) injection (Nitroxynil 34% Soln., The Acme Laboratories LTD.) 1.5 ml/50 kg body weight subcutaneously and faecal sample were reexamined 2 months later to find out the effect of the anthelmintics used.

Statistical analysis

Results were processed using Microsoft Excel 2007 and mean values and standard error were determined. Results were analysed by using Chi-square test.

Results and Discussion

Fascioliasis in ruminants is a common hepatic fluke infection of ruminants in Bangladesh. The parasite needs intermediate host for completion of the life cycle. In Bangladesh prevalence of

Fascioliasis varies from place to place depending upon the presence of the intermediate host, number of susceptible animals and some other epidemiological factors. In Barisal area no attempt has been made previously to investigate the disease among cattle population. Many localities in this area come under lower land areas of Bangladesh which are highly suitable for survival of the snail population.

Prevalence of Fascioliasis in cattle by fecal examination

A total of 900 fecal samples were collected randomly from the equal number of cattle of different age and sex groups.

Table 1. Seasonal prevalence of *Fasciola* infestations in village cattle of Barisal district

Seasons/Months	No. of animal/sample	No. of positive cases	Percentage %
Winter (November-February)	300	86	28.66
Summer (March-May)	300	34	11.33
Rainy (June-October)	300	74	24.66
Overall	900	194	21.55

In this study fecal sample examination revealed that the overall prevalence was 21.55 % (Table 1) which was similar to the result of Carrels (1975) who found the prevalence of 22.4% but higher than that of Chowdhury (1990) 19.72%. The result was slightly higher than the reports of Rahman and Razzak (1973) 16.30% but lower than the findings of Tasawar *et al.* (2007). These variations may be due to hosts and other epidemiological factors.

Seasonal prevalence

The seasonal prevalence of *Fasciola* infestations was shown in Table 1. In winter (November to February); summer (March to May); rainy (June to October) reason the prevalence were 28.66%; 11.33%; 24.66%; respectively. The highest prevalence was found in winter season and lowest in summer season.

Table 2. Age and sex wise prevalence of Fascioliasis in village cattle of Barisal district

Factors	Factor Level	No. sample examined	No. of positive cases	Percentage %
Age group	3 months-1 year	300	31	10.33
	1 to 3 year	300	86	28.66*
	Above 3 year	300	81	27.00
Sex group	Male	450	79	17.55
	Female	450	119	26.44*

In similar studies Rahman and Razzak (1973) recorded increased infection only in monsoon. Chiriboga *et al.* (1980) found maximum infection during winter (November – February). Swarup and Pachari (1987) observed higher *Fasciola* infection rate in January and throughout June to September. Morel and Mahalo (1987) and Hossain *et al.* (2011) found highest prevalence during summer to monsoon and January to February. The moderate variation in the period of higher prevalence with different findings were probably due to variation in temperature, rainfall, humidity, other agro-climatic condition, ecology of the vector and hosts.

Age wise prevalence

The age wise prevalence of Fascioliasis was summarized in Table 2. The prevalence of Fascioliasis in age group of 3 months to 1 year was 10.33%, 1 year to 3 years was 28.64% and above 3 year was 27.00%. The prevalence of Fascioliasis in age group of 1-3 year were significantly ($p < 0.05$) higher. The finding was in close agreement with those of Al-Barwari (1978)

and Pachauri *et al.* (1988) but differed with findings of Affroze *et al.* (2013) where they reported that cattle over 4 years of age had the highest (33.3%) prevalence. The results were varied due to less grazing of young animals in watery areas and the probability of infection was very less.

Sex wise prevalence

The sex wise prevalence of Fascioliasis was shown in Table 2. The prevalence of Fascioliasis in female animal was 26.44% and in male animal 17.55%. The prevalence of Fascioliasis was significantly higher ($p < 0.05$) in female animals. The results of the present study are in agreement with the findings of Molina *et al.* (2005) and Bhutto *et al.* (2012) who observed higher prevalence in females as compared to male. The higher prevalence in female was probably due to change of physiological condition during lactation period causing low resistance of animal.

Table 3. Seasonal prevalence of *Fasciola* infestations in slaughtered cattle of Barisal district

Seasons/Month	No. of Liver Examined	No. of Liver Infested	Percentage (%)
Winter (November-February)	40	24	60.00
Summer (March-May)	40	06	15.00
Rainy (June-October)	40	20	50.00
Cumulative	120	50	41.66

Prevalence of Fascioliasis among slaughtered cattle

A total 120 livers of slaughtered cattle were examined during this study. The findings of liver examination of slaughtered cattle (Table 3) revealed the prevalence of 41.66% infection rate. In similar studies Ikeme & Obioha (1973) reported 39% infection rate, Froyd (1959) reported 35.4% and Babalola & Schillom Van Veen (1976) observed 31.7% and Ozung *et al.* (2011) reported between 22.3% to 50.5% of fascioliasis. These variations may be due to variation in the various epidemiological factors of the different countries and localities.

Totally 20 livers and gall bladder of animals were examined in each season i.e. in winter (November to February), summer (March to May) and rainy season (June to October) and the prevalence of liver fluke infection was found 65.00%; 15.00% and 50.00% respectively. The Cumulative prevalence of Fascioliasis among slaughtered cattle was 41.66%. Seasonal variation in this study revealed higher infection rate in winter season (November-February) which fairly coincided with the finding of coprological examination of this study as well as of the findings of Al-Bawari (1978).

Table 4. Seasonal egg counts of *Fasciola* per gram of feces (epg) in infested village cattle of Barisal district.

Seasons/months	No. of animal infested	Mean±SE (EPG)	Range of EPG
Winter (November- February)	80	145.40±1.40	100 - 300
Summer (March- May)	80	120.45±1.28	100 - 200
Rainy (June-October)	80	125.60.±1.40	100 - 200

SE= Standard error of means

Seasonal findings of *Fasciola* egg per gram of the faeces in infested cattle

The Table 4 showed that egg per gram of feces is counted in each season from a total of 240 positive cases. In each season fecal sample of 80 animals were brought under the

study. In winter season (November- February) it ranged between 100-300 with a mean value of 145.40 ± 1.40 (SE), in summer (March-May) the count varied from 100-200 with a mean value of 120.45 ± 1.28 (SE), in rainy (June-October) the range value was between 100-200 with a value of 125.60 ± 1.40 (SE). The range of EPG in this study varied from 100-300. This range and the mean values were lower than those reported by Contreras *et al.* (1979) and Howlader (1983). Contreras *et al.* (1979) reported 200-2800 EPG and Howlader (1983) reported 100-900 EPG. These variations might be probably due to mature parasite load in the liver of infected animals.

Table 5. Percentage of worm free population after using different specific anthelmintics.

Name of anthelmintic	Total number of treated animals	Number of treated animals without Fasciola	Efficacy percentage (%)
Fasinex Bolus	50	46	92.00
Nitrox-A	50	47	94.00

Anthelmintic trials on Fascioliasis

The effect of Fasinex (Triclabendazole), Nitrox-A (Nitroxynil) was shown in table 5. Out of 900 selected cattle, fifty (50) heads of cattle were treated with Fasinex bolus in recommended dose and after two months later faecal samples were examined of which 46 faecal samples were found to be free of fasciola and the efficacy was 92.00%. Similarly fifty (50) heads of cattle were treated with Nitroxynil (Nitrox-A) and two months later after treatment faecal samples were examined of which 47 faecal samples were found to be free of Fasciola and the efficacy of Nitrox-A was 94.00%.

Boray *et al.* (1983) and Turner *et al.* (1984) studied the percentage efficacy of Fasinex(R) (Triclabendazole) against Fascioliasis in cattle and the result were 93.94% and 100% respectively. However, Qadir (1984) reported 88.5% overall efficacy rate of Fasinex(R) against *Fasciola gigantica* infection in Black Bengal goats of Bangladesh. In the present study the efficacy was 92%. Gupta *et al.* (1989) examined the efficacy of Fasinex(R) (Triclabendazole) against experimental *Fasciola gigantica* infection in sheep, goat, buffalo and rabbit. They found that Fasinex(R) was highly effective in sheep and goat. The efficacy of Nitrox-A was 94.00%. The efficacy rate with Nitrox A injection (Nitroxynil) supported by the earlier report of the Dutta *et al.* (1972) who reported 80-100% efficacy rate in cattle against *F. hepatica*. Similar observation had also been reported by Josher *et al.* (1970) and Chowdhury *et al.* (2014) who found about 80%-90% efficacy of Trodax[®] against naturally infection of Fascioliasis in adult cattle. However, Roy and Reddy (1969) observed comparatively higher rate up to 100%. Anaya *et al.* (1984), Amin and Samad (1988) studied the percentage efficacy of Nitrox A injection against Fascioliasis in cattle and the results were 100% and 86.23% respectively.

Conclusions

Anthelmintic therapy is a good strategy against parasitic diseases in animals. Further investigations and molecular research should be recommended to reduce Fasciola infection for sustainability of the small scale dairy farms.

Author's contribution

The first author has contribution on study design, analyzing the data and writing the manuscript and the other authors have contribution on editing the manuscript and analyzing the data.

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