

HEMATOLOGICAL STUDIES ON CATTLE EXPOSED TO *Fasciola gigantica* INFESTATION

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Summary

Hematological values were determined from 140 *Fasciola gigantica* infested and 138 non-infested apparently healthy (control) zebu cattle from eight different sites of Bangladesh. The *F. gigantica* infested cattle have experienced of normocytic normochromic anemia indicated by the significant ($p < 0.01$) decline of total erythrocyte count, hemoglobin level, packed cell volume and mean corpuscular hemoglobin concentration and significant ($p < 0.01$) increase of erythrocyte sedimentation rate, as compared with non-infested control animals. Values of mean corpuscular volume and mean corpuscular hemoglobin content were not differed significantly between the infested and control animals. There observed significantly ($p < 0.01$) higher eosinophil and neutrophil counts and significantly ($p < 0.01$) lower lymphocyte counts in fasciola infested cattle in comparison with the control animals.

(Key Words: Hematology, Cattle, *Fasciola gigantica* Infestation)

Introduction

Fascioliasis caused by *Fasciola gigantica* is a common disease in Bangladesh affecting mainly cattle, sheep, goat and buffaloes (Bhuyan, 1970). The disease causes enormous economic losses through reduced production (Bhuyan, 1970; Fahiya and Adeleye, 1982) and mortality (Davtyan, 1953; Hammond, 1965). Numerous hematological and biochemical changes are associated with liver damage caused by liver flukes (Sinclair, 1964). Information on hematological changes induced by *F. gigantica* is scanty (Hammond and Sewell, 1974; Ogunrinade and Bomgboxe, 1980) and is not available on local zebu cattle in Bangladesh. The present paper describes hematological changes on such cattle exposed to *F. gigantica* infestation.

Materials and Methods

The study was conducted at eight different

sites of Bangladesh. Fecal samples were collected from a large number of zebu cattle at each site and these were examined by Stoll's dilution technique. A total of 140 cattle from 8 sites with fecal egg count above than 300 epg (eggs per gram of feces) were selected as infested group and a total of 138 apparently healthy cattle of same age, sex, breed were selected as non-infested control group. All the control animals were treated with Triclabendazole (Fasinex[®], Ciba-Geigy) and Thiophanate (Nemafax[®], Rhone Poulenc) for liver flukes and gastro-intestinal nematodes respectively with a gap of 21 days. The feces of all treated animals were examined at 7 days interval for a period of 42 days and the absence of parasitic ova for three subsequent fecal examinations were considered as gastro-intestinal parasite free animals.

The blood samples from all infested and control animals were collected from jugular veins in anticoagulant vials (EDTA as anticoagulant). Total erythrocytes count (TEC), erythrocytes sedimentation rate (ESR), packed cell volume (PCV) and differential leukocytic count (DLC) with wright's stain were performed as per methods described by Schalm (1967). Acid hematin procedure was used for hemoglobin (Hb) estimation following the technique described by Coffin (1955). Mean corpuscular volume (MCV),

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Received November 30, 1992

Accepted March 12, 1993

mean corpuscular hemoglobin (MCH) content and mean corpuscular hemoglobin concentration (MCHC) were determined following the method of Schalm (1967). Statistical analysis was performed using Fisher's 't' test (Shil and Debnath, 1985).

Results

The erythrocytic indices of *F. gigantica* infested and non-infested control animals are presented in table 1. Total erythrocyte count (TEC), hemoglobin (Hb) level, packed cell volume (PCV) and mean corpuscular hemoglobin concentration (MCHC) were significantly ($p < 0.01$) lowered in fasciola infested cattle in comparison to control animals. Erythrocyte sedimentation rate (ESR)

was significantly ($p < 0.01$) increased in infested cattle than the control animals. No significant difference was observed in respect of mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) content among the infested and control animals.

The differential leukocytic counts (DLC) of fasciola infested and control cattle are presented in table 2. Eosinophil and Neutrophil counts were observed significantly ($p < 0.01$) higher in fasciola infested cattle than the control animals. A significantly ($p < 0.01$) lower lymphocyte counts were found in infested animals in comparison with the control cattle. Monocyte and basophil counts between the infested and control animals did not differ significantly.

TABLE 1. ERYTHROCYTE INDICES (MEAN \pm SD) OF FASCIOLA INFESTED AND CONTROL CATTLE

Indices	Infested No. of animals : 140	Control No. of animals : 138
ESR ^a (mm/hr.)	2.23 \pm 0.48**	0.73 \pm 0.26
PCV ^b (%)	24.68 \pm 1.20**	32.01 \pm 1.30
TEC ^c ($10^6/\text{mm}^3$)	4.92 \pm 0.59**	6.75 \pm 0.65
Hb ^d (g %)	6.87 \pm 0.67**	9.38 \pm 0.46
MCV ^e (μm^3)	50.56 \pm 0.67	50.98 \pm 2.80
MCH ^f (ng)	14.72 \pm 0.80	14.79 \pm 0.76
MCHC ^g (% Hb/Cell)	28.22 \pm 1.80**	29.46 \pm 1.20

^a Erythrocyte sedimentation rate.

^b Packed cell volume.

^c Total erythrocyte count

^d Hemoglobin.

^e Mean corpuscular volume.

^f Mean corpuscular hemoglobin.

^g Mean corpuscular hemoglobin concentration.

** Values differ significantly ($p < 0.01$).

TABLE 2. LEUKOCYTE COUNTS (MEAN \pm SD) OF FASCIOLA INFESTED AND CONTROL CATTLE

Leukocytes	Infested No. of animals : 140	Control No. of animals : 138
Eosinophils (%)	12.50 \pm 1.20**	6.03 \pm 1.50
Neutrophils (%)	31.80 \pm 1.10**	30.40 \pm 0.78
Lymphocytes (%)	54.18 \pm 2.40**	57.80 \pm 2.51
Monocytes (%)	2.71 \pm 10.71	3.90 \pm 1.20
Basophils (%)	0.31 \pm 0.20	0.33 \pm 0.23

** Values differ significantly ($p < 0.01$).

Discussion

Animals with *Fasciola gigantica* infestation suffered from normocytic normochromic anemia which had been indicated by significant decline of total erythrocyte count (TEC), hemoglobin

(Hb) level, packed cell volume (PCV) and mean corpuscular hemoglobin concentration (MCHC), significant increase of erythrocyte sedimentation rate (ESR) and insignificant alterations in the values of mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) content.

These observations are almost in agreement with the findings of Ogunrinade and Bomgboxe (1980), Haroun et al. (1986), Swarup et al. (1987) and Chaudri et al. (1988). The lower values of TEC in infested animals might be attributed to (i) loss of blood resulting from severe hemorrhage caused by extensive migration of the young flukes through the hepatic parenchyma and from blood sucking activity of the adult flukes, (ii) secretion of an unknown toxic substance that depress the hematopoietic activity resulting in decreased production of erythrocytes (Blood et al., 1983). The continuous drainage of iron stores and reduction in the total number of erythrocytes were thought to be responsible for reduction in hemoglobin level. Decrease of PCV values in the infested animals could be attributed to hemodilution demonstrated by the increase in plasma and blood volumes (Berry and Dargie, 1978) as well as to lower level of total erythrocytes. Higher ESR values in the infested cattle were probably due to a combined effect of anemia and chronic morbid process undergoing in the liver owing to infestation.

The study revealed significantly higher eosinophil counts in fasciola infested cattle than the control animals. This result confirms the earlier reports (Moroshkin et al., 1964; Ross et al., 1966; Haroun et al., 1986; Swarup et al., 1987). Neutrophil counts were also found significantly higher in infested animals and this might be a result of secondary bacterial infections caused by migration of young flukes through the biliary parenchyma. This finding is in agreement with the result of Furmaga et al. (1974). The significant fall in lymphocyte counts in infested animals of the present study substantiate the observation of Furmaga et al. (1974).

Acknowledgements

The authors express their grateful thanks to Director, Bangladesh Livestock Research Institute, Savar, Dhaka, for his financial support and inspiration during the study.

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