

Haemato-biochemical profiles in liver fluke and gastrointestinal nematode infected sheep

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ABSTRACT

The study was carried out at the Department of Physiology, BAU, Mymensingh to investigate the hemato-biochemical profiles in liver fluke and gastrointestinal nematode infected sheep. A total of 15 indigenous sheep were used. The sheep reared in a free grazing system and they were divided randomly into three equal groups (n=5) as control, liver fluke infected and gastrointestinal nematode infected group. Body weight, feces examination, hemato-biochemical profiles were performed before anthelmintics treatment (at day 0) and at the end of the experiment (day 30). Total erythrocyte count, hemoglobin (Hb) content and packed cell volume (PVC) was found to be decreased significantly ($p < 0.05$) in infected group compared to control group and significantly ($p < 0.05$) lower in gastrointestinal nematode infected group. ESR value significantly ($p < 0.05$) increased in both gastrointestinal nematode and liver fluke infected group. Packed cell volume (PVC) of gastrointestinal nematode infected group differs significantly ($p < 0.01$) from fasciola infected and control group. Off course fasciola infected group had also significantly ($p < 0.05$) lower ESR than control group. Total leukocyte count (TLC) were increased significantly ($p < 0.01$) in gastrointestinal nematode than fasciola infected and control group. Serum biochemical parameters revealed that sheep affected gastrointestinal nematode had significantly higher ($p < 0.01$) SGOT and SGPT values. The value did not differ significantly ($p < 0.05$) in control and fasciola infected group. It may be concluded that liver fluke and gastrointestinal nematode infection cause marked damage of hemopoietic organs.

INTRODUCTION

Bangladesh is an agricultural country. More than 80 percent people in this country depend on agriculture. Livestock is an important sub-sector of agriculture, playing a significant role in economy of Bangladesh (Anon, 2008). People depend on small domestic animals for various purposes, namely meat, milk, hides, skin, wool and its by-products. Bangladesh earns a considerable amount of foreign currency by exporting hides and skin. Sheep population plays an important role in our economy. The fulfillment of the aforesaid requirement is dependent on the productive reproductive performances of sheep.

Proper scientific method of management, feeding, breeding, prevention and treatment of diseases are necessary to keep the livestock healthy. For the interest of veterinarians it is important to record the normal haemato-biochemical values of indigenous non descriptive sheep.

The hot, humid, damp and rainy weather of this country favours the transmission and dissemination of parasitic infestation. The parasite affects all species of animals. Gastrointestinal nematode and liver fluke are common problem of sheep rearing in the tropical and subtropical region of the world including Bangladesh. The economic losses due to single or mixed nematode infection is reflected in the forms of mortality, lowered health condition, retard growth and decrease in the production of meat (Faiz, 1972).

Liver is a vital detoxifying and metabolic organ. Any change in liver tissue is destructive for health. Liver fluke that harbour in the liver and migration of parasitic larvae damage liver parenchyma and results changes in serum transaminases (Siddiqua et al. 1990; Chakraborty and Lodh, 1994).

Haemato-biochemical values are influenced by age, sex, region, climate, altitude, day length, nutritional status, life habits of the species and such other physiological factors. Haemato-biochemical changes in sheep (Sinclair 1964, Roberts 1968, Malviya et al. 1979) caused by helminthiasis have been reported elsewhere (Symons and Boray, 1967) but there seems to be very limited published report on native ovine helminthiasis in inland literature. Limited work has been done to establish the normal haemato-biochemical values of parasite infested sheep of Bangladesh. Our veterinarians, physiologists and nutritionists have been referring the data given in standard text books and literatures, all of which pertain to foreign breeds animals, which may mislead the diagnosis and treatment of diseases. Considering the facts, the present study was undertaken to investigate the haemato-biochemical profiles in liver fluke and gastrointestinal nematode infected sheep.

MATERIALS AND METHODS

Selection of Animals

A total of 15 indigenous sheep were collected from the Department of Pharmacology, BAU, Mymensingh. The sheep were maintained in mixed flock mostly free grazing system. The sheep were of either sex and aged between 1 and 3 years and body weight ranged 10 kg to 15 kg. The sheep were divided into three equal groups as control (n=5), liver fluke infected (n=5) and gastrointestinal nematode infected (n=5).

Collection and examination of faecal sample

The faeces from the suspected animals were collected directly from the rectum and examined by direct smear and flotation sedimentation techniques. The fascioliasis and the gastrointestinal nematodiasis were diagnosed on the basis of morphological characteristics of parasitic eggs as described by Soulsby (1986) and Samad (1996). The animals which were found negative for fasciola and gastrointestinal parasitic infection on faecal examination served as controls group. Ear tag was used to identify the individual sheep.

Anthelmintic trials

Fasciola infected sheep were treated with triclabendazole (Fasinex®- Novartis Bangladesh Ltd.) @ 12 mg/kg body weight orally. Gastrointestinal nematode sheep were treated with combination of tetramisole and oxclozanide (Levanid®- The ACME Laboratories Ltd.) @ 7.5 mg/kg body weight orally.

Collection of blood

Blood samples of each animal (infected and control) were collected aseptically from the jugular vein (Figure 3) before administration of anthelmintics and on 30th days post-treatment, simultaneously in two separate tubes, one with double oxalate as anticoagulant and the other tube without adding any anticoagulant. The haematological studies were performed within two hours of blood collection.

Preparation of serum

About 5-6 ml of blood was collected in the sterile glass test tubes. The blood containing tubes were placed in a slanting position at room temperature for 6 hours. The tubes were incubated over night in the refrigerator (4°C). The serum samples were separated and centrifuged to get rid of unwanted blood cells. Serum samples were stored at -20°C for biochemical analysis.

Hematological studies

The hematological investigation of Total erythrocyte count (TEC), Hemoglobin (Hb), Estimation, Erythrocyte Sedimentation Rate (ESR), Packed cell volume (PCV), Total leukocyte count (TLC) were performed within 2 hours of blood collection following the procedure described by Lamberg and Rothstein (1977).

Biochemical studies

The biochemical parameters of enzyme system like SGOT (Serum Glutamate Oxaloacetate Transaminase) and SGPT (Serum Glutamate Pyruvate Transaminase) determinations were performed in collaboration with

Safeway Diagnostic Complex, Charpara, Mymensingh. All the tests were performed colorimetrically using Humalyzer 2000 (Human type, Germany) following known techniques (Bergmeyer and Horder, 1980).

Statistical Analysis

A paired t-test was done for exploring the change on the haemato-biochemical parameters of the infected sheep after treating them by triclabendazole for *F.gigantica* and oxclozanide with tetramisole for gastrointestinal nematode (Petrie and Watson, 1999). These parameters of the infected sheep were compared with that of control by two independent sample t-test (Petrie and Watson, 1999).

RESULTS AND DISCUSSION

The experiment was conducted in BAU clinic and Department of Physiology to observe haemato-biochemical profiles in sheep affected with liver fluke and gastrointestinal nematodes.

Haematological parameters

Haematological parameters are presented in table 1 and 2 and Figures 2, 3, 4, 5, 6 and 7. It is evident that control group and higher total erythrocyte, Hb concentration and PCV comparing with infected ones. Gastrointestinal nematode infected group had significantly ($p < 0.05$) lower values compare to control and fasciola infected group. Lowest ESR value was observed in control group and significantly ($p < 0.01$) higher ESR value was observed in fasciola and gastrointestinal nematode infected group. Packed cell volume (PCV) of gastrointestinal nematode infected group significantly ($p < 0.01$) differs from fasciola and control group. *Fasciola* infected group had also significantly ($p < 0.05$) lower value than control.

Referring total leukocyte gastrointestinal nematode infected group had the significantly ($p < 0.01$) highest value compare to both control and fasciola infected group. No difference exists between control and fasciola infected group. From the haematological parameters it is noted that infection causes much damage and severe damage is done by gastrointestinal nematode infection. The probable reason for these might be due to sucking of blood directly by some of the nematodes. A decrease TEC, Hb and PCV is an indication of severe anemia whereas increased total leukocyte is an indication of severe parasitic larva burden in different organs which probably caused marked eosinophilia. Nematode infection and anemia observed on the present experiment are very much similar to the findings of Rowlands and Clampitt (1979). The present normal value for both erythrocyte and leukocyte count are similar to those of Dutta et al. (1994). Symons and Boray (1967) also reported extensive hemorrhages in the liver by flukes. Destruction of RBC results iron deficiency anemia. The present findings are also similar to findings of Nettleton and Beckett (1976) in goats, Chaudhry et al. (1984) in buffaloes and Haroun and Hussein (1975) in bovines.

Table 1. Haemato-biochemical values (mean ± SE) of infected and control (healthy) group of sheep.

Parameters	Control (apparently healthy) group	Infected group	
		<i>F.gigantica</i> infected group	GI nematode infected group
TEC($\times 10^6/\mu\text{l}$)	7.22 ± 0.01	7.02 ± 0.07	** 6.58 ± 0.10
Hb (gm/dl)	7.5 ± 0.03	7.37 ± 0.06	** 7.13 ± 0.04
ESR (ml/in 1st hr)	2.2 ± 0.20	*2.6 ± 0.24	*2.40 ± 0.24
PVC (%)	20.6 ± 0.24	*19.40 ± 0.40	**19.2 ± 0.37
TLC ($\times 10^3/\mu\text{l}$)	8.57 ± 0.06	8.34 ± 0.22	**8.65 ± 0.15
SGOT (U/L)	101.5 ± 2.76	100.38 ± 4.99	**138.78 ± 5.8
SGPT (U/L)	20.16 ± 0.70	19.10 ± 0.59	**28.86 ± 2.07

*Indicates significant at ($p < 0.05$)**Indicates significant at ($p < 0.01$)Table 2. Haemato-biochemical values (mean ± SE) of sheep infected with *F.gigantica* (treated with triclabendazole) and gastrointestinal nematode (treated with oxclozanide and tetramisole).

Parameters	<i>Fasciola</i> infected sheep		Gastrointestinal nematode infected sheep	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
TEC ($\times 10^6/\mu\text{l}$)	7.02 ± 0.07	7.86 ± 0.39	6.58 ± 0.10	**8.84 ± 0.10
Hb (gm/dl)	7.37 ± 0.06	**8.94 ± 0.17	7.13 ± 0.04	**8.85 ± 0.08
ESR (ml/in 1st hr)	2.6 ± 0.24	1.6 ± 0.24	2.40 ± 0.24	*1.4 ± 0.24
PVC (%)	19.40 ± 0.40	**22 ± 0.55	19.2 ± 0.37	**21 ± 0.45
TLC ($\times 10^3/\mu\text{l}$)	8.34 ± 0.22	**9.76 ± 0.22	8.65 ± 0.15	**10.04 ± 0.19
SGOT (U/L)	100.38 ± 0.99	**56.2 ± 3.18	138.78 ± 5.85	**85.5 ± 2.0
SGPT (U/L)	19.10 ± 0.59	**11.98 ± 1.64	28.86 ± 2.07	**8.64 ± 0.41

*Indicates significant at ($p < 0.05$); **Indicates significant at ($p < 0.01$)

Serum transaminases values of present finding are very much similar to Siddiqua et al. (1990) who reported an increased in SGOT and SGPT in gastrointestinal nematode infected goats. Chaudrury et al. (1984) also observed an increase SGPT in buffaloes. Haroun et al. (1986) showed that bovine fascioliasis caused increase SGPT level.

The present findings of serum transaminases activity of infected group clearly indicates that gastrointestinal nematode larva and fasciola that harbour in the liver causes marked damage to liver parenchyma result in an increased serum transaminases.

REFERENCES

- Anon. 2008. Dairy. Pp. 71-79 in High-Value Agriculture in Bangladesh: An Assessment of Agro-Business Opportunities and Constraints. Bangladesh Development Series, The World Bank, Washington DC, USA.
- Bergmeyer and Horder, 1980. Clin. Chem. Acta 105:147 f. (1980); International Federation of Clinical Chemistry, Scientific Committee, J. Clin. Chem. Biochem., 18: 521-534.
- Chakraborty, D. and Lodh, C. 1994. Blood biochemical profile in *Fasciola haemonchus* and *Dictyocaulus* species infection in goat: A comparative study. Indian Vet. J., 71: 286-288.
- Chaudhry, N.I., Durrani and T. Aziz, 1984. The incidence of gastrointestinal parasites in buffaloes and calves of Azad Kashmir. Pakistan. Vet. J., 4(1): 60-61.
- Dutta et al., 1994. Haematological values of local duck of Assam in relation to sex. Ind. Vet J. (71) 1048-1082.
- Faiz, M.A., 1972. Report on "Investigation in to the epidemiology of parasitic disease in East Pakistan". In: Activities on the Research sections of Directorate of Livestock Services Bangladesh.
- Haroun, E.M. and Hussein. M.F., 1975. Clinico-pathological studies on naturally-occurring bovine fascioliasis in the Sudan. J. Helminthol. 49(3):143-52.
- Lamberg, S.L., Rothstein, R. 1977: Laboratory Manual of Hematology and Urinalysis. Avi. Publishing Company, Inc, West Port Connecticut, USSR.
- Malviya, H.C., Pathanaik, B., Tiwari H.C., and Sharma. B.K., 1979. Measurement of the blood loss caused by *Haemonchus contortus* infection in sheep. Indian Vet. J. 56:709-710.
- Nettleton, D. and Beckett, P., 1976. Hamatology of the indigenous goat in Swizerland. Trop. Anim. Health Prod., 8: 60-61.
- Petrie, A. and Watson. P., 1999. Statistics for Veterinary and Animal Science. First edn., Blackwell Science, USA, pp. 81-85.
- Roberts, 1968. Observation on experimental acute fascioliasis in sheep. Br. Vet. J. 124 (10) : 433-450. Helm. Abstr. 38(4) : No. 5134(1969).
- Rowlands, D., and R.B., Clampitt, 1979. Plasma enzyme levels in ruminants infected with *Fasciola hepatica*. Vet. Parasitol. 5, 155-175.
- Samad, M.A., 1996. Pashu Palon O Chikitsavidya. 1st Publication, Lyric Epic Prokashoni, BAU Campus, Mymensingh
- Siddiqua, A., Manna M.A. and Hussain, M.A., 1990. Hematological studies in black Bengal goats (*Capra hircus*) naturally infected with intestinal parasites. Indian. J. Anim. Health, 29: 77-79.
- Sinclair, K.B., 1964. Studies on the anemia of ovine fascioliasis. British Vet. Jour., 120 (5): 212-222.
- Soulsby, E.J.L., 1986. Helminths Arthropods and Prorozoa of Domesticated Animals. 7th ELBS, Bailliere, Tindall, London.
- Symons, L. E. A. and Boray, J. C., 1967. Anaemia of ovine fascioliasis. Veterinary Record, 81, 130.