



Haemato-biochemical changes in parasitic infested calves reported at district veterinary hospital, Narail

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ARTICLE INFO

Article history

Accepted 19 October 2019

Online release 29 October 2019

Keyword

Parasite
Hemato-biochemical
Calve
Narail

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ABSTRACT

The study was carried out at District Veterinary Hospital, Narail to investigate the haemato-biochemical parameters in normal healthy, trematode and gastrointestinal nematode infected calves and after treatment with specific drugs. A total number of 15 indigenous calves were used. They were divided into three (n=5) as healthy control, trematode and nematode infected group. Faecal examination, hematological and biochemical parameters were performed before anthelmintic treatment (at day 0) and after anthelmintic treatment at end of experiment (day 60). A significantly ($p < 0.05$) lower RBC count, Hb concentration and PCV were recorded in parasitic infected calves compared to control but improved significantly ($p < 0.01$) after treatment with respective drugs. The erythrocyte sedimentation rate (ESR) was in trematode and nematode infected group significantly ($p < 0.01$) higher than control. Significantly ($p < 0.05$) higher WBC was recorded in trematode and Nematode infected group compared to control group. Serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT) level of trematode infected group was significantly ($p < 0.01$) higher compared to nematode and control group. The AST and ALT level significantly ($p < 0.01$) improved in treatment group of trematode infected calves compared to nematode infected and control. It concluded that the larva of trematode harbour in liver cause marked damage to liver parenchyma resulting increase transaminases. The nematode sucks blood in stomach and intestine that induced a great change in the blood chemistry of calves.

INTRODUCTION

Bangladesh is an agricultural country. More than 80% people in this country depend on agriculture. Parasitism is one of the main constraints for cattle rearing in Bangladesh (Jabbar and Green, 1983) and is believed to be of enormous economic importance (Islam, 1985). Among the parasitic diseases trematode liver fluke and gastrointestinal nematode are common problem of cattle in tropical and sub tropical region of the world including Bangladesh. Liver fluke that harbour in the liver and migration of parasitic larvae that damage liver parenchyma and results changes in serum trans-aminases (Siddiqui et.al., 1989 and Chakraborty, 1994). The economic

losses due to single or mixed nematode infected in the forms of mortality, lower health condition, retarded growth and decrease in production of milk and meat (Faiz, 1972). The hot, humidity, damp and rainy weather of this country favors the transmission and dissemination of parasitic infestation. The parasites affect all species of animals that adversely influence the productive efficiency of cattle.

Calves under rural managemental conditions in Bangladesh are usually maintained just to induce letting down of milk in cows. As a result, most of the calves maintained under traditional management system start eating grass at their

early life which invariably exposed to early parasitic infection. Samad (2008) explained that parasitological examination of faecal samples of clinically sick calves up to 12 months with the history of digestive disorders that's were 82.62% calves had nine different gastro-intestinal parasitic infection.

The knowledge about normal values of biochemical variables in blood serum and other physiological variables is important for assessment of damage of organs and tissues in different diseases and for assessment of development from the welfare aspect (Terosky et al., 1997). The values of biochemical variables in calfs serum differ from the values in adult animals. Different authors ascertained that there are deficient data available about physiological values of biochemical variables in calves and that result of various studies differ with Hanschke & Schulz, (1982); Bouda & Jagos, (1984); Steinhardt et al., (1993); Knowles et al., (2000) and Mohri et al., (2007).

Extensive haemorrhage was found in the liver parenchyma in acute fascioliasis. When the fluke reached the bile ducts the half life of erythrocytes was reduced to less than six days as a result of the ingestion of blood by liver fluke infected sheep (Symons and Bora, 1967). The liver enzymes were more elevated in cattle infected with *Fasciola spp.* These clinical manifestations determined the specific hepatic enzyme activities in the cattle infected with fascioliasis (Bicek et al., 2005). Haematological values are influenced by age, sex, region, climate, altitude, day length, nutritional status and life habits of species and such other physiological factors. For proper management feeding, breeding, prevention and treatment of diseases, it is desirable to know their normal hematological values under local conditons but normal values is hardly available in this literature as research on this line have rarely been carried out under local condition.

Little work has been done to establish the haemato-biochemical values of parasitic infested animal of Bangladesh. Our veterinarians, physiologist and nutritionist have been referring the data given in standard text books and

literatures, all of which pertain to foreign breeds of cattle, which may mislead the diagnosis and treatment of diseases. Considering the above fact the present study was undertaken to investigate haemato-biochemical values of normal calves and calves affected with trematode and nematode.

MATERIALS AND METHODS

This study was carried out at District Veterinary Hospital, Narail. A total number of 15 indigenous calves were used. The following procedures were adopted in conducting the experiment.

Selection of animals

The experiment was conducted on a total of 15 indigenous calves of Narail that hospitalized with District veterinary hospital, Narail. The calves were of either sex and aged between 1 and 8 months. The animals were divided into three equal group as control (n=5), trematode *Paramphistomum spp* and *Fasciola spp.* infected (n=5) and gastrointestinal nematode *Ascaridia spp.* infected (n=5). The age of the animals were determined on the basis of history from owner of calves.

Collection and examination of faecal sample

The faeces from all the animals were collected directly from the rectum and examined by direct smear and flotation sedimentation techniques. Trematode and gastrointestinal nematode were diagnosed on the basis of morphological characteristics of parasitic eggs as described by Soulsby (1986).

Collection of blood

Blood samples of each calf were collected aseptically from the jugular vein before administration of anthelmintics and on in around 60 days post-treatment, simultaneously in two separate tubes one with double oxalate as anticoagulant and the other tube without adding any anticoagulant. The hematological studies were performed within 2 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 then 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 until the biochemical analysis was done in diagnostic laboratory at Narail.

Anthelmintic treatment

Trematode infected calves were treated with triclabendazole and Levamisol (Endex®-Novartis Bangladesh Ltd.) @ 12 mg/kg body weight orally. Gastrointestinal nematode infected cattle were treated with combination of tetramisole hydrochloride and oxclozanide (Levanid® -The ACME Laboratories Bangladesh Ltd.) @7.5 mg/kg body weight orally and also use Fenbendaszol (Fenvet®-Techno Drugs Ltd.) @10 mg/kg body weight orally and Piperazine citrate (Piper vet®-Squar Agro vet Ltd.) @ 100 mg/kg body weight orally for nematode infection.

Hematological studies

Total erythrocyte count (TEC)

Blood sample was drawn with red cell pipette exactly up to 5 marks. Hayem's solution was immediately drawn exactly up to 101 marks. The pipette was shaken by an electric shaker for 2 minutes. TEC was performed by Hemocytometer, according to Lamberg and Rothstein (1977). The result was expressed in million per micro liter of blood.

Estimation of hemoglobin (Acid hematin method)

The hemoglobin content was determined by Hellige-heniometer method as described by Lamberg and Rothstein (1977). Briefly, N/10 hydrochloric acid was placed in the graduated diluting tube up to 2 gm mark. Exactly 20 CMM mark (0.02 ml) blood was added into the dilution fluid by sahli pipette and was mixed. Thus acid hematin was formed. After 5 minutes, distilled water was added drop by drop until the

color of the content matched to the standard color of the comparator. The Hb content was expressed in g%.

Erythrocyte Sedimentation Rate (ESR)

The fresh anticoagulated blood was taken into the Wintrobe's hemotocrit tube by using special loading pipette exactly up to 0 mark. Excess blood above mark was wiped away by cotton. Then the tubes were placed standing in a vertical position on a wooden rack. After one hour, the erythrocyte sedimentation rate was recorded from the top of the pipette. The ESR was expressed in mm in 1st hour.

Packed cell volume (PCV)

After completion of ESR recording, the Wintrobe tubes were placed in the centrifuge machine and were centrifuged for 30 minutes @ 3000 rpm. Then, the hematocrit or PCV was recorded. The percent volume occupied by the hematocrit was calculated by using the following formula as described by Lamberg and Rothstein (1977).

$$\text{PCV}\% = \frac{\text{Height of the red cell column in cm}}{\text{Height of the total blood in cm}} \times 100$$

Total leukocyte count (TLC)

For counting the leukocytes, well-mixed oxalated venous blood was drawn with white cell pipette exactly up to 0.5 marks. 1% HCL was immediately drawn exactly up to 11 mark of the pipette. The content was mixed vigorously by eight-knot motion for 2 minutes. TLC was performed by Hemocytometer as described by Lamberg and Rothstein (1977). The result was expressed in thousand per micro-liter of blood.

Biochemical studies

Biochemical parameters were measured by using Reflotron® auto analyzer (Boehringer Mannheim, Germany) in Diagnostic Laboratory at Narail.

Aspartate Aminotransferase (AST) or Serum glutamic pyruvic transaminase (SGPT), Alanin

Aminotransferase (ALT) or Serum glutamic oxaloacetic transaminase (SGPT) were measured in "Reflotron®" instrument according to the procedure described by Deneke et al., (1985).

Statistical analysis

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

RESULTS AND DISCUSSION

Hematological parameters

The total erythrocyte count, hemoglobin concentration and packed cell volume were

significantly lower in trematode and nematode infected calves compared to control group. The trematode infected group had the lowest values and differ significantly ($p < 0.01$) to that of nematode infected group. Insignificant ($p < 0.05$) differences were recorded among post treatment (both trematode and nematode) groups compared to control group. Significantly ($p < 0.01$) higher erythrocyte sedimentation rates (ESR) were recorded in trematode and nematode infected groups compared to control group. The highest value was recorded in the nematode infected group. Though the differences among control and post treatment nematode and trematode group exist but it was insignificant ($p > 0.05$).

The total leukocyte count in both trematode and nematode infected group were significantly ($p < 0.01$) higher compared to control but an insignificant ($p > 0.05$) difference exist between control and post treatment groups.

Table 1

Hematological values (mean \pm SE) of calves (n=5 in each group) in control group and before & after treatment with anthelmintics.

Parameters	Control (apparently healthy) Calves	Nematode infected		Trematode infected	
		Pre- treatment calves	Post- treatment calves	Pre- treatment calves	Post- treatment calves
TEC (million/cu.mm)	7.77 \pm 1.18	4.28 \pm 0.84**	6.73 \pm 0.53NS	5.91 \pm 0.42*	7.92 \pm 0.76NS
Hb (gm%)	12.59 \pm 0.82	6.74 \pm 0.53**	11.01 \pm 0.65NS	9.41 \pm 0.91**	11.84 \pm 0.26NS
PCV (%)	38.65 \pm 2.12	26.30 \pm 0.95**	35.62 \pm 2.19**	31.32 \pm 1.74**	39.12 \pm 0.78NS
ESR (mm in 1st hr)	1.29 \pm 0.31	2.64 \pm 0.21**	1.27 \pm 0.21NS	3.52 \pm 0.41**	1.60 \pm 0.20NS
TLC (thousand/cu.mm)	7.65 \pm 0.78	10.21 \pm 0.82**	7.84 \pm 1.19NS	13.09 \pm 1.03**	8.45 \pm 0.69NS

* = Significant at 5% level of probability ($p < 0.05$)

** = Significant at 1% level of probability ($p < 0.01$) NS = Not significant ($p > 0.05$)

TEC (Million/cu.mm)

Biochemical parameters

Serum biochemical profiles aspartate aminotransferase and alanin aminotransferase level of trematode infected group had significantly ($P < 0.01$) higher than gastrointestinal nematode infected and control group. The AST and ALT values in the

treatment group of trematode infected calves were decreased significantly ($P < 0.01$) compared to the treatment group of gastrointestinal nematode infected and control. There was a significant ($p < 0.01$) difference between trematode and nematode infected group but insignificant ($p > 0.05$) differences among control and post treatment group.

Table 2

Biochemical values (mean \pm SE) of calves (n=5 in each group) in control group and before & after treatment with anthelmintics.

Parameters	Control (apparently healthy) Calves	Nematode infected calves		Terematode infected calves	
		Pre- treatment Values	Post- treatment Values	Pre- treatment Values	Post- treatment Values
AST (U/L)	44.00 \pm 7.62	69.60 \pm 10.98*	46.20 \pm 5.50NS	104.52 \pm 5.26**	43.56 \pm 1.47NS
ALT (U/L)	16.22 \pm 4.21	24.26 \pm 2.88**	16.58 \pm 3.02NS	33.29 \pm 1.56**	22.22 \pm 0.70*

* = Significant at 5% level of probability (p<0.05)

** = Significant at 1% level of probability (p<0.01) NS = Not significant (p>0.05)

Hematological parameters

Hematological parameters are presented in Table 1. It is evident that control group had higher total erythrocyte, Hb concentration and PCV comparing with infected groups. These findings are resemble with those of Jagpreet Singh et al., (2013), Al-Emarah et al., (2012), Rahman et al., (2009). Mohsin et al., (1991) who reported significantly (P<0.01) decreased values of total erythrocyte, haemoglobin and packed cell volume in *Fasciola gigantica* infected cattle. Vishe et al., (2012), recorded a pronounced reduction in the values of hemoglobin, packed cell volume, total erythrocyte count. A decrease TEC, Hb and PCV is an indication of severe anaemia whereas increased total leukocyte is an indication of severe parasitic larva burden in different orualis which probably caused marked eosinophilia. The higher total leukocyte counts is trematode infected group and gastrointestinal nematode infected group. This study similar to that of Vishe et al., (2012) who also reported an increased TLC with marked eosinophilia. The erythrocyte sedimentation rate (ESR) of trematode and gastrointestinal nematode infected group had significantly (P<0.01) higher than control group. This is probably due to a deficiency of plasma proteins due to parasitic infection.

The present findings of hematological activity of infected group clearly indicate that the migration of metacercaria through hepatic parenchyma

causes deleterious effects on host physiology. Associated changes in hemoglobin marked with reduced total erythrocyte count. *Fasciola gigantica* infection revealed significantly lower erythrocyte count, Hb concentration and PCV% which indicated anemia. The larvae of *Haemonchus spp.* suck blood, move and larvae enter into the abomasum. Large number of parasites caused a rapidly developing severe haemorrhagic gastritis. The most frequent lesions found in the biliary ducts, portal system fibrosis and biliary duct hyperplasia. Lymphocytes, plasmocytes, eosinophils and neutrophils were found in cattle, characteristics of a chronic disease had similar result in study of Martina and Jozica (2012) and Bostelman et al., (2000).

Biochemical parameters

It is evident that serum aspartate aminotransferase and alanine aminotransferase level of trematode and gastrointestinal nematode infected calves were higher than control group (Table 2).

It could be depicted that AST and ALT values decreased significantly (P<0.01) in treatment group of trematode infected compared to the control and gastrointestinal nematode infected calves (Table 2). Serum transaminases values of present findings are very much similar to Martina et al., (2012) who reported that the AST and ALT level of adult cattle increase chiefly by cell necrosis. The present findings is also

similar to Al-Emarah et al., (2012), Siddiqui et al., (1989), who found an increase SGOT and SGPT level in Black Bengal goats infected with gastrointestinal helminths. Bulum and Mengi (2000) reported that AST, ALT level of cattle affected with fascioliasis were significantly higher than ill healthy cattle. Al-Emarah et al., (2012), biochemical parameter recorded a significant increases in active serum enzyme ALT (19.77 ± 2.94) and AST (67.98 ± 16.36).

The present findings of serum transaminases activity of infected group clearly indicate that the enzymes were more elevated in trematode and nematode infected calves than in healthy ones. These clinical manifestations determined the specific hepatic enzyme activities in calves which could be significant criteria for the early diagnosis of the disease.

CONCLUSION

The study was carried out at District Veterinary Hospital, Narail to investigate the haemato-biochemical parameters in normal healthy, trematode and nematode infected calves and after treatment with specific drugs. Blood and fecal samples were collected and examined from calves that's were hospitalized. Total erythrocyte count, hemoglobin concentration & packed cell volume were decreased and erythrocyte sedimentation rate, total leukocyte count & serum aminotransferase enzymes were increased in parasitic infected calves than apparently healthy calves. Haemato-biochemical parameters are very useful tools for the assessment in different diseases of calves. Further studies in different areas with large and wide ranges of animals in Bangladesh will assist to understand more about diseases.

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