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Hematobiochemical Alteration in Naturally Infected Cattle with Fasciola under Tropical Region

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Abstract

Fascioliasis is among one of the emerging and re-emerging disease which has zoonotic importance and spread by feco-oral route. The migrating fluke causes extensive liver damage results in economic burden to the animal farmer. In present investigation 20 cattle were used to evaluate the hemato-biochemical alteration in naturally acquired fasciola infection and without other diseases. Decreased Hemoglobin, Packed cell volume (PCV), Red blood cells (RBC) count whereas; an elevated level of Mean corpuscular volume (MCV) and Mean corpuscular hemoglobin (MCH) was observed in infected cattle. Hypoproteinemia, hypoalbunemia and hypoglycemia was recorded in infected cattle. The activities of serum enzyme Aspartate aminotransferase (AST), Alanine amino transferase (ALT), Gamma-glutamyl tranferase (GGT) and Alkaline phosphatase (ALP) were increased in fasciola infection.

Keywords: *Fasciola, hypoproteinemia, hypoalbuminemia, GGT*

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INTRODUCTION

The fascioliasis, a food borne zoonotic disease, that affects herbivores, preferably to cattle and sheep, and less frequently the man, which is caused by the parasite *Fasciola hepatica* along with *Fasciola gigantica* (*F. gigantica*) [1]. Because of the changes in the climate fascioliasis is emerging or re-emerging in many countries, and its prevalence, intensity and geographic distribution are increasing [2]. In domestic fascioliasis include annual losses of more than US$3000 million to livestock production worldwide through livestock mortality and by decreased meat and milk productions, decreased female fertility and increased veterinary costs [3]. These flukes reside and graze on the mucosa of the bile ducts and liver parenchyma resulting in massive liver damage [4]. Liver performs a number of essential function and play a very vital role in vertebrates and hepatic damage has a variety of detrimental effects and the metabolic functions of the liver are gradually reduced in fascioliasis. Various biochemical attributes viz. blood glucose, creatinine, urea and serum proteins while the activity of certain serum enzymes such as; AST, ALT and ALP, GGT which increase following hepatic injury, can be measured for hepatic functions [5]. Very few studies on hemato-biochemical alterations due to naturally acquired fascioliasis in cattle have been documented. Therefore, the biochemical alterations in cattle due to bovine fascioliasis using cattle with naturally acquired fasciola infection and without other diseases using hemato-biochemical diagnostic procedure that are reliable has been carried out.

MATERIAL AND METHOD

The present experiment was conducted at Bihar Veterinary College, Patna on 20 non-infected cattle and 20 cattle with naturally acquired bovine fascioliasis and no other disease. Blood samples for both hematological (with anticoagulant) and serum biochemical (without anticoagulant) studies were collected from cattle from Sept 2013 to Oct 2014. Serum samples were harvested using the standard procedure for biochemical studies. The enzymatic estimations were done within

24 h of collection. The hematology was carried out using standard procedures. The erythrocytes indices like mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) was calculated using the standard formulae. The serum biochemical parameters including serum glucose, protein, albumin, blood urea, chloride, calcium, phosphorus, Alanine aminotrasferase (ALT), Aspartatate aminotransferase (AST) were estimated using kits supplied by Span Diagnostics on Spectrophotometer. The data were subjected to statistical analysis by using SPPSS version 17 [6].

RESULTS AND DISCUSSION

In the present investigation, the following findings for the clinical condition of the cattle were assessed: pale mucus membrane, anemia, weakness, frequent diarrhea, emaciation, anorexia, intermittent fever, weight loss, swelling at brisket region. Statistically significant low ($P<0.05$) concentration were seen in the hemoglobin, PCV, Total erythrocyte count (TEC) whereas; a significant increase was seen in MCV and MCH along with a non-significant effect in MCHC ($P>0.05$). In the analysis of serum of the infected animals, when compared with controls, it was found that there were statistically significant decrease in glucose, total protein, albumin and significant increase in the mean serum activity of aspartate aminotransferase, alanine aminotransferase, γ-glutamyl transferase, and alkaline phosphatase. Additionally, changes in hemato-biochemical parameters in the infected animals and control group are given in Table 1.

Table 1: *Hematobiochemical Values in Control and Fasciola Infested Cattle.*

S. No.	Parameter	Control (n= 20)	Infested (n= 20)
1.	TEC	6.61 ± 0.22	4.33 ± 0.15
2.	Hb	10.22 ± 0.3	5.99 ± 0.18
3.	PCV	31.46 ± 1.01	18.67 ± 0.58
4.	MCV	40.28 ± 1.31	50.01 ± 0.79
5.	MCH	13.71 ± 0.61	15.67 ± 0.33
6.	MCHC	32.44 ± 0.25	32.34 ± 0.20
7.	Glucose	62.29 ± 2.21	45.82 ± 1.40
8.	Total Protein	6.86 ± 0.08	5.37 ± 0.17
9.	Albumin	3.52 ± 0.04	2.47 ± 0.07
10.	AST	102.91 ± 3.70	220.01 ± 21.21
11.	ALT	32.89 ± 1.95	100.44 ± 7.98
12.	GGT	14.09 ± 0.78	43.97 ± 2.65
13.	ALP	83.26 ± 7.79	231.83 ± 12.17

In this study, the biochemical parameters of non-infected cattle were found to be within the reference ranges for normal cattle [7, 8]. Statistical analysis revealed a significantly ($p<0.05$) lower concentration of Hb, PCV, RBC in infected cattle than the control group. On the other end a significant ($p<0.05$) higher values of MCV and MCH were observed in infected group. However, a non-significant difference was observed for MCHC. Present findings are similar to other researchers in cattle [9,10] and in sheep [11]. The reduction in RBC counts, Hb and PCV in present investigation may be due to the acute loss of blood caused by the flukes or extensive loss of blood into bile duct due to the large amounts of flukes present in the liver. Severe anemia may occur because of chronic liver inflammation, which causes suppression in erythropoesis [7, 12, 13]. Hemoglobin and PCV may be a useful tool in predicting the extent of fluke load and in indicating the prognosis of infected sheep [14]. On the other hand, significant increase was obtained in MCV and MCH of the infected cattle, when compared with those of the control group. Similar higher MCV in the infected animals were reported earlier [10, 15].

Glucose concentration in present study was significantly lower ($p< 0.05$) in the infected cattle than the control group. The hypoglycaemia may be due to the disturbance in gluconeo-genesis, which resulted from he-patic disorder [16], elevation of the ketone bodies from gastroenteritis could result in depression in blood glucose [17], besides the depression of the hepatic gluconeogenic pathways and decrease in voluntary feed intake by the infected cattle [18]. In present study hypoproteinemia and hypoalbuminemia was observed in fasciola infected cattle. Total serum protein and albumin were significantly lower ($p<0.05$) in infected groups. This in agreement with the report of Anderson [19] in cattle infected with F. hepatica. Because of extensive liver damage the synthetic function of liver is hampered and may lead to reduced synthesis of albumin. The infestation of fasciola may produce cholangitis, biliary obstruction, destruction and fibrosis of hepatic tissue and anaemia [8]. Hypoproteinaemia may be due to infection of the liver, which produce destruction of liver parenchyma

resulting in drastic alteration in protein values [20]. Activities of serum enzymes AST, ALT, GGT and ALP were significantly higher ($p< 0.05$) in the infected group. The results of present investigation are in concurrence with published work [21, 22]. An elevation in serum enzymatic activities may also be attributed to the degenerative changes and cirrhosis of the liver cells and enlargement of gall bladder. Moreover, the cellular changes from parasitism increase the permeability of the hepatic cells and in turn result in the release of the enzymes into the serum. Since ALP is known to be excreted via the bile duct, its elevation may have synchronized with the arrival of the flukes to the bile duct. Elevation in GGT levels was an indicator of chronic changes, cholestasis and epithelial damage in bile ducts caused by presence of adult flukes in biliary tract [20, 23, 24]. However, the GGT activity increased in infected llamas due to hepatic toxicity and necrosis [25]. So it may be ascribed that the elevations in serum AST, ALT, GGT and ALP activities were sensitive indicators of hepatic cell damage and hepatic dysfunction in fascioliasis and that the hepatic damage was hepatobiliary.

CONCLUSION

This present work led to conclude that measuring the hemato-biochemical parameters could be useful in early diagnosis and prognosis of bovine fascioliasis.

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