ABSTRACT

Buffaloes are the important multipurpose farm animals in the Indian sub-continent, contributing significantly to meat and milk production. Tropical fasciolosis caused by *Fasciola gigantica* is regarded as one of the most important diseases of buffaloes in humid tropical regions of the world. Bio-chemical changes are regarded as important indicators for actual pathogenesis and clinical diagnosis. Serum samples were collected randomly from buffaloes (n=100) slaughtered at a local abattoir. Serum biochemical parameters have been compared between the *Fasciola* positive and the negative groups. The present study revealed that there was a highly significant difference (P<0.01) between the bilirubin direct and bilirubin total levels in the positive and negative groups. The albumin (3.44±0.09 g/dl) and total protein (12.09±0.41 g/dl) in affected animals were reduced when compared with the negative group. Aspartate aminotransferase was reported higher in positive animals (233.11±6.35 IU/L) as compared to negative (217.09±6.32 IU/L). Alkaline phosphatase values were found similar in both the groups. The findings of this study revealed that detection of biochemical alterations especially bilirubin can be used as an early indicator of pathophysiological changes caused by *F. gigantica* in buffaloes.

Keywords: biochemical changes, buffalo, fasciola gigantica, aspartate aminotransferase, alkaline phosphatase

INTRODUCTION

Tropical fasciolosis in buffaloes is asymptomatic, subclinical and/or chronic form of the disease, adversely affecting their reproductive cycle, weight gain, food conversion efficiency and productivity. The host suffers from unnoticed ill effects of the disease for a prolonged period before the disease is detected at a veterinary clinic and/or the abattoir (Edith et al., 2010). Traditionally, *Fasciola gigantica* infection is diagnosed by faecal examination. This has several disadvantages such as time consumption, requirement of large volume of faeces, inability to detect prepatent and ectopic infections and high false negative percentage in chronic infections due to intermittent shedding of eggs in faeces. Furthermore, clinical disease can
occur as early as 3-4 weeks post infection while faecal examination can confirm the diagnosis only after 13 weeks. Serological tests are highly sensitive epidemiological tools for the detection of the disease, but their application is limited by cost and expertise in most developing countries. Serum biochemistry of infected animals can be a good indication of the degree of damage to the host and the severity of infection (Otesile et al., 1991). Biochemical changes induced by *F. gigantica* in experimentally infected animals have been studied extensively. However, similar information on natural *F. gigantica* infection in buffaloes is scanty (Swarup and Pachauri, 1987; Chaudhri et al., 1988; Raval, 2006). The present investigation records the changes in serum biochemical constituents of buffaloes naturally infected with *F. gigantica*.

**MATERIALS AND METHODS**

Samples of 5 ml of blood was aseptically collected from the jugular vein without anticoagulant randomly from slaughtered buffaloes (*n*=100) in sterile tubes. The blood was allowed to clot at room temperature in an inclined position and the serum separated was transferred to Eppendrof’s tubes. These tubes were transported in ice packed conditions to the working lab. The sera were then centrifuged at 2500 rpm for 10 minutes to remove suspended RBC’s, and clear sera was labeled as Fasciola positive (referral) and negative (control) sera samples prior to their storage at -20°C in deep freeze. Animals whose livers were observed to be infected with *Fasciola* were considered as the positive group (*n*= 54) whereas the negative group (*n*= 46) consisted of the animals which did not have *Fasciola* infection at necropsy. Biochemical parameters were analyzed by using diagnostic kits in an auto analyzer and compared by unpaired t-test (Snedecor and Cochran, 1994).

**RESULTS AND DISCUSSION**

The mean values of the *Fasciola* positive and the negative buffaloes are presented in Table 1.

Domestic ruminants experimentally infected with *F. gigantica* exhibit substantial changes both in their serum proteins as well as serum activities of hepatic enzymes. These biochemical changes take place in two stages. The first stage coincides with the period of fluke migration. Synchronously with the onset of traumatic hepatitis and progressive hypoalbuminaemia, the serum concentrations of aspartate aminotransferase (AST) progressively increase and attain the highest level by week 6 post infection. The second stage is associated with the presence of adult parasites in the bile ducts and is attended by further deterioration in albumin. The elevated AST declines significantly, and the alkaline phosphatase (ALP) show elevated trends from the 6th week post infection onwards (Mbuh and Mbwaye, 2005; Ahmed et al., 2006; Edith et al., 2010).

The biochemical parameters of the buffalo naturally infected with *F. gigantica* (irrespective of the stage) revealed a significant increase in bilirubin (direct and total) in the *Fasciola* positive buffaloes as compared to that of *Fasciola* negative buffaloes. These findings were in agreement with the observations of Raval (2006). Cholestasis develops during the migration of immature flukes through the liver and attachment of mature flukes in bile ducts as well and is related to alterations of the structural integrity of hepatocytes (Yang et al., 1998). Total protein and albumin levels in the
positive group were reduced as compared with the negative group. The decrease in these biochemical constituents is because of their reduced synthesis and increased plasma leakage into the gut. High AST value in Fasciola positive buffaloes may be due to extensive hepatic cell damage by the migrating flukes. This enzyme is specific for the liver and higher values indicate soft tissue damage. Increases in AST activities accompanied by reduction in bile flow and increase in bilirubin concentration were also found in sheep (Ferre et al., 1995). Contrary to earlier observations of marginal increases in ALP concentrations in F. gigantica affected buffaloes at necropsy (Swarup and Pachauri, 1987), no significant difference could be depicted in the ALP levels of the positive and negative groups. The reason for this may be that most of the cases included here were in an acute stage of the disease.

The findings of this study revealed that biochemical parameters, especially bilirubin, are early indicators of pathophysiological changes caused by *F. gigantica* in buffaloes. They may be useful for disease forecasting, assessment of the efficacy of drugs against early stages of the parasite and in time application of control strategies.

### REFERENCES


### Table 1. Mean values of biochemical parameters in Fasciola positive and negative buffaloes (Mean±SE).

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameters</th>
<th>Fasciola Negative</th>
<th>Fasciola Positive</th>
<th>t-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Albumin (g/dl)</td>
<td>3.55±0.11</td>
<td>3.44±0.09</td>
<td>0.79</td>
</tr>
<tr>
<td>2</td>
<td>Globulin (g/dl)</td>
<td>9.29±0.50</td>
<td>8.65±0.41</td>
<td>0.99</td>
</tr>
<tr>
<td>3</td>
<td>A : G</td>
<td>0.43±0.02</td>
<td>0.51±0.05</td>
<td>1.38</td>
</tr>
<tr>
<td>4</td>
<td>TSP (g/dl)</td>
<td>12.58±0.53</td>
<td>12.09±0.41</td>
<td>1.15</td>
</tr>
<tr>
<td>5</td>
<td>BID(mg/dl)</td>
<td>1.42±0.03</td>
<td>1.73±0.04</td>
<td>5.86**</td>
</tr>
<tr>
<td>6</td>
<td>BIT(mg/dl)</td>
<td>1.67±0.04</td>
<td>1.99±0.04</td>
<td>5.42**</td>
</tr>
<tr>
<td>7</td>
<td>AST (IU/L)</td>
<td>217.09±6.32</td>
<td>233.11±6.35</td>
<td>1.78</td>
</tr>
<tr>
<td>8</td>
<td>ALP(IU/L)</td>
<td>75.61±2.24</td>
<td>75.43±3.99</td>
<td>0.04</td>
</tr>
</tbody>
</table>

ALP-alkaline phosphatase, TSP-total serum protein, A G ratio-albumin globulin ratio, BID-bilirubin direct, BIT-bilirubin total, AST-aspartate aminotransferase.

** Significant at P<0.01


