

Serum Biochemistry Alterations in Theileriosis Affected Crossbred Cows in Banaskantha District of Gujarat

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Abstract: *Theileria annulata* is prevalent in tropical countries and is responsible for causing 'Theileriosis' in cattle and buffalo. *Hyalomma* species of ticks are responsible for transmission of theileriosis in cattle. The present study was carried out in order to evaluate alterations in serum biochemical parameters in theileriosis affected crossbred dairy cows of Banaskantha District of Gujarat, India. A total of 117 crossbred cows were screened out of which, 20 were positive for theileriosis and subjected to estimation of serum biochemical parameters. Results suggest significant alterations in serum biochemical parameters which should be considered for favorable clinical outcome with appropriate therapeutic management.

Keywords: Theileriosis, *Theileria annulata*, *Hyalomma*, crossbred cows, Banaskantha District, Gujarat.

I. INTRODUCTION

Bovine tropical theileriosis is caused by *Theileria annulata*, an intracellular organism which is mainly transmitted by *Hyalomma anatolicum anatolicum* ticks. The disease is frequently reported in Gujarat and is responsible for higher production losses as well as greater mortality rates. The most commonly used diagnostic test by field veterinarians for theileriosis is examination of peripheral blood smear after staining with Giemsa stain [1]. Serum biochemical parameters provide information on involvement of specific organ function in the progression of disease which ultimately helps in appropriate therapeutic approach towards a favorable clinical outcome.

II. MATERIALS AND METHODS

From October-2011 to March-2012, a total of 117 crossbred cows in Banaskantha District of Gujarat State (India) were screened for theileriosis by peripheral blood smear examination technique. Giemsa stain was used for staining blood smears. Out of 117, twenty crossbred cows positive for theileriosis were considered under diseased group (Group-A) while ten crossbred cows negative for theileriosis served as normal control group (Group-B). Blood samples were collected in a container without use of anticoagulants in order to separate sera. Estimation of serum biochemical parameters was carried out by using standard assay kits (Merck Specialties Pvt. Ltd.) Statistical analysis of data was carried out as per standard methods using Student's "t" test [2].

III. RESULTS AND DISCUSSION

Serum biochemical alterations in theileriosis affected crossbred cows (Group-A) with that of normal cows (Group-B) are compared in TABLE: 1. Serum creatinine and blood urea nitrogen (BUN) estimation helps in assessment of renal

functions. The difference in mean values of serum creatinine and BUN was statistically non-significant in both groups. These findings are in correlation with Ugalmugle *et al.* [3]. There are reports depicting statistically significant increase in serum creatinine as well as BUN levels in theileriosis affected cows [4, 5]. Aulakh and Singla [6] reported increased levels of BUN and decreasing levels of serum creatinine in theileriosis.

Table-1: Serum biochemical alterations in crossbred cows with theileriosis (Mean±S.E.)

| Parameter (units) | Group-A (Theileriosis positive) (n=20) | Group-B (Normal) (n=10) |
|--------------------------|--|-------------------------------|
| Total Protein (g/dl) | 4.94**±0.12 | 6.90±0.17 |
| Serum creatinine (mg/dl) | 1.53±0.08 | 1.52±0.12 |
| BUN (mg/dl) | 10.17±0.31 | 10.87±0.56 |
| AST (IU/L) | 124.74**±0.56 | 96.01±2.63 |
| ALT (IU/L) | 42.38**±0.34 | 32.30±1.62 |
| (**=P<0.01) | | |

Cows under Group-A showed statistically significant ($P<0.01$) increase in liver specific enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT) as compared to cows in Group-B. Similar observations were recorded by Ugalmugle *et al.* [3], Sandhu *et al.* [4] and Saber *et al.* [7]. Increased levels of AST in Group-A cows indicates involvement of hepatic tissues either with coagulative necrosis, hepatic cord distortion, lymphocytic infiltration in the periportal areas suggesting severe damage to hepatobiliary system or hypoxia resulting from anemia and jaundice. Increased levels of ALT in Group-A cows suggested involvement either of hepatic necrosis or an alteration in cell membrane permeability causing leakage of these cytoplasmic enzymes in the blood. Furthermore, Group-A cows revealed significantly ($P<0.01$) decreased levels of total serum protein compared to cows in Group-B. Similar observations were documented by Ugalmugle *et al.* [3], Sandhu *et al.* [4], Singh *et al.* [5], Aulakh and Singla [6], Saber *et al.* [7], Col and Uslu [8], Omer *et al.* [9], Yadav and Sharma [10] and Sahu *et al.* [11]. Liver failure may attribute to hypoalbuminemia, hypoglobulinemia and lowered total serum protein counts in theileriosis [11]. Serum biochemical alterations in this study evinced existence of liver insufficiency in theileriosis affected crossbred cows of Banaskantha District of Gujarat.

IV. CONCLUSIONS

Serum biochemical alterations in theileriosis affected crossbred cows revealed lowered total protein levels indicative of hypoproteinemia. Serum creatinine and BUN levels did not alter significantly in cows with theileriosis. Increased levels of AST and ALT suggested possible involvement of hepatic tissues in disease progression among crossbred dairy cows. It is concluded that serum biochemical alterations should be considered in order to evaluate clinical health status of crossbred dairy cows affected with theileriosis. The possibilities of organ-functions involvement can also be ruled out. Evaluation of serum biochemical alterations aids in initiation of appropriate therapeutic regimen for a favorable clinical outcome of theileriosis in crossbred cows.

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