



Biochemical Changes in Crimean Congo Haemorrhagic Fever in Seropositive Bovine

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Abstract

Crimean Congo Haemorrhagic Fever (CCHF) is emerging tick borne haemorrhagic disease with increasing animal as well as human health impact. In present study 212 serum samples were analyzed for different biochemical parameters. Among them 106 serum samples were sero-positive. In sero-positive bovine AST and ALT were increased highly significantly ($p > 0.01$), while albumin was decreased highly significantly ($p > 0.01$). In sero-positive cattle, significantly ($p > 0.05$) increased in value of alanine aminotransferase and significantly ($p > 0.05$) decreased value of albumin was observed. In sero-positive buffalo, aspartate aminotransferase and alanine aminotransferase were found increased highly significantly ($p > 0.01$). Whereas albumin was decreased highly significantly ($p > 0.01$). The replication of CCHF virus occurs in liver and kidney which causes the organ damage in bovine.

Keywords: CCHF, Biochemical changes, Bovine



Introduction

Crimean Congo Haemorrhagic Fever (CCHF) is a zoonotic viral disease that is asymptomatic in infected animals, but a serious threat to the health of humans caused by the CCHF virus (CCHFv). Crimean Congo Haemorrhagic Fever virus belongs to family *Bunyaviridae*, Genus *Nairovirus* (Ergonul, 2007). Crimean Congo Haemorrhagic Fever (CCHF) has been reported from more than 30 countries in Africa, Asia and Southeastern Europe (Yilmaz *et al.*, 2008). At least 28 species of the *Ixodid* ticks distributed among seven spp. genera, (*Hyalomma*, *Rhipicephalus*, *Boophilus*, *Dermacentor*, *Amblyomma*, *Haemaphysalis*, and *Ixodes*) are naturally infected with CCHF virus worldwide (Hoogstraal, 1979). The transmission of the virus is through the bite of a contaminated tick or direct contact with infected patients or the products of affected animals (livestock) (Mehravaran *et al.*, 2013). The replication of virus occurs in liver but also occur in many tissues including brain, heart, lung, pancreas and kidney (Zivcec *et al.*, 2016). The laboratory investigations showed cytopenia, raised prothrombin time (PT) and activated partial thromboplastin time (aPTT), raised creatinine phosphokinase (CPK) and lactic dehydrogenase (LDH) as well as altered liver and renal functions (Patel *et al.*, 2011).

Material and Method

The blood samples were collected from the bovine. Approximately 6 ml of blood was collected in a clot activator vial and allowed to clot at room temperature. Serum was harvested by centrifugation at 3000 rpm for 5 minutes and stored at - 20°C for biochemical analysis. The sero-positive cattle (n=80) and buffalo (n=26) serum samples were analyzed for the different biochemical parameters *viz.*, serum total protein (g/dl), albumin (g/dl), globulin (g/dl), creatine phosphokinase-CPK (U/L), aspartate amino transferase-AST (U/L), alanine amino transferase-ALT (U/L), blood urea nitrogen-BUN (mg/dl) and creatinine (mg/dl) with the help of Clinical Serum Biochemistry Auto-analyzer (CKK 300) and equal number of serum samples were taken from the sero-negative cattle and buffalo. The comparisons of serum biochemical values between sero-positive and seronegative bovine, cattle and buffalo were done. The result was analyzed by using independent sample t-test.

Results and Discussion

The biochemical values of sero-negative and sero-positive bovine is presented in Table 1. Highly significantly ($p < 0.01$) increase in the mean (\pm SE) values of AST (92.99 ± 4.27 IU/L) and ALT (38.08 ± 1.46 IU/L) and highly significantly ($p < 0.01$) decrease in the mean (\pm SE) values of albumin (3.47 ± 0.05 g/dl) was observed. There was significant ($p < 0.05$) increase in the mean (\pm SE) values of creatinine (1.44 ± 0.03 mg/dl). There was non-significant increase in the mean (\pm SE) values of globulin (3.92 ± 0.08 g/dl) and CPK (29.95 ± 1.44 IU/L) and non-significant decrease in the mean (\pm SE) values of total protein (7.39 ± 0.10 g/dl) and BUN (25.83 ± 0.82 mg/dl) in sero-positive bovines in comparison with sero-negative bovines.

Table 1: Serological values of CCHF Sero-negative and Sero-positive bovine samples (Mean \pm SE)

Serological Parameters	Sero-negative Bovine (n=106)	Sero-positive Bovine (n=106)	T test
Total Protein (g/dl)	7.58 \pm 0.07	7.39 \pm 0.10	NS
Albumin (g/dl)	3.68 \pm 0.04	3.47 \pm 0.05	**
Globulin (g/dl)	3.89 \pm 0.07	3.92 \pm 0.08	NS
CPK (IU/L)	29.82 \pm 0.69	29.95 \pm 1.44	NS
AST (IU/L)	70.15 \pm 1.48	92.99 \pm 4.27	**
ALT (IU/L)	29.35 \pm 0.88	38.08 \pm 1.46	**
BUN (mg/dl)	25.93 \pm 0.53	25.83 \pm 0.82	NS
Creatinine (mg/dl)	1.35 \pm 0.03	1.44 \pm 0.03	*

**Highly significant ($p < 0.01$), *Significant ($p < 0.05$), NS- Non-significant

The biochemical values of sero-negative and sero-positive cattle is presented in Table 2. In sero-positive cattle significant ($p < 0.05$) increase in the mean (\pm SE) values of alanine aminotransferase (36.05 ± 1.59 IU/L) and significant ($p < 0.05$) decrease in the mean (\pm SE) values of albumin (3.52 ± 0.05 g/dl) in comparison to sero-negative cattle. Non-significant increase in the mean (\pm SE) values of globulin (3.94 ± 0.08), CPK (30.93 ± 1.80), AST (81.57

± 3.56 IU/L) and creatinine (1.40 ± 0.03 mg/dl) was observed, while total protein (7.46 ± 0.11 g/dl) and BUN (24.75 ± 0.86 mg/dl) values decreased non-significantly were observed between the groups.

Table 2: Serological values of CCHF Sero-negative and Sero-positive cattle samples (Mean \pm SE)

Serological Parameters	Sero-negative Cattle(n=80)	Sero-positive Cattle (n=80)	T test
Total Protein (g/dl)	7.57 ± 0.10	7.46 ± 0.11	NS
Albumin (g/dl)	3.69 ± 0.04	3.52 ± 0.05	*
Globulin (g/dl)	3.88 ± 0.08	3.94 ± 0.08	NS
CPK (IU/L)	29.72 ± 0.82	30.93 ± 1.80	NS
AST (IU/L)	70.43 ± 1.73	81.57 ± 3.56	NS
ALT (IU/L)	30.03 ± 0.97	36.05 ± 1.59	*
BUN (mg/dl)	26.12 ± 0.58	24.75 ± 0.86	NS
Creatinine (mg/dl)	1.31 ± 0.04	1.40 ± 0.03	NS

**Highly Significant ($p < 0.01$), *Significant ($p < 0.05$), NS- Non-significant

The biochemical values of sero-negative and sero-positive buffalo is presented in Table 3. In sero-positive buffalo, the mean (\pm SE) values of AST (128.16 ± 11.16 IU/L) and ALT (44.35 ± 3.12 IU/L) increased highly significantly ($p < 0.01$) and the mean (\pm SE) values of albumin (3.33 ± 0.88 g/dl) decreased significantly ($p < 0.01$) in comparison to sero-negative buffalo. There was non-significant increase in the mean (\pm SE) values of BUN (29.13 ± 1.90 mg/dl) and creatinine (1.58 ± 0.52 mg/dl), whereas decreased value of total protein (7.17 ± 0.23 g/dl), globulin (3.84 ± 0.17 g/dl) and CPK (26.94 ± 1.97 IU/L) were observed between the groups.

Table 3: Serological values of CCHF Sero-negative and Sero-positive buffalo samples (Mean \pm SE)

Serological Parameters	Sero-negative Buffalo (n=26)	Sero-positive Buffalo (n=26)	T test
Total Protein (g/dl)	7.60 ± 0.11	7.17 ± 0.23	NS
Albumin (g/dl)	3.65 ± 1.11	3.33 ± 0.88	*
Globulin (g/dl)	3.95 ± 0.11	3.84 ± 0.17	NS
CPK (IU/L)	30.15 ± 1.22	26.94 ± 1.97	NS
AST (IU/L)	69.29 ± 2.89	128.16 ± 11.16	**
ALT (IU/L)	27.67 ± 2.00	44.35 ± 3.12	**
BUN (mg/dl)	25.32 ± 1.19	29.13 ± 1.90	NS
Creatinine (mg/dl)	1.49 ± 0.56	1.58 ± 0.52	NS

**Highly Significant ($p < 0.01$), *Significant ($p < 0.05$), NS- Non-significant

Pieper *et al.* (2003) observed the dysfunction or loss of balance in the concentrations of serum proteins. The higher value of creatine phosphokinase in CCHF affected patients was reported by Duru & Fisgin (2009). The increased serum creatine phosphokinase is perhaps indicative of severe damage to the liver and other organs. The higher value of AST occurred due to trauma, necrosis, fibrosis or neoplasia of liver or muscle (Washington & Van Hoosier, 2012). The elevated value of ALT indicates the sever hepatic damage. The higher value of creatinine and change in value of creatinine indicate the damage of the kidney and also a reliable indicator of renal function (Bente *et al.*, 2013). It has been observed that kidney is damaged in Crimean Congo Haemorrhagic Fever due to release of cytokines. This may increase the level of creatinine.

Conclusion

The mean (\pm SE) values of ALT, AST and creatinine were significantly ($p < 0.05$) higher and albumin level was decreased significantly ($p < 0.05$) in the sero-positive animals than the sero-negative animals.

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Conflict of Interests

There is no conflict of interest.

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