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Biochemical changes in Ehrlichia affected dogs

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Abstract

20 healthy dogs and 20 Ehrlichia affected dogs were selected for present study. These healthy and Ehrlichia affected dogs were subjected for various biochemical parameters. Biochemical analysis revealed significant increase in AST, ALT, Total Bilirubin, creatinine and Alkaline phosphatase levels in ehrlichia affected dogs when compared to healthy dogs whereas TP and albumin values were significantly decreased. Non significant difference was noticed in globulin levels in ehrlichia affected dogs when compared to healthy dogs.

Keywords: biochemical, ehrlichiosis, dogs

Introduction

Vector-borne diseases affect millions of people and domestic animals worldwide resulting in significant morbidity and mortality rates. In dogs, vector-borne disease such as Canine Ehrlichiosis (tropical canine pancytopenia) is caused by rickettsial agent *Ehrlichia canis*. It is a febrile, tick born disease manifested by pancytopenia particularly thrombocytopenia [9]. Ehrlichiosis cause significant clinical, haematological and biochemical alterations of varied intensity in dogs, even with lower grades of parasitaemia. Functional loss of several of the liver functions is depicted on the host in the form of ascites, bleeding disorders, prerenal azotemia, and hepatic encephalopathy and is the major cause of death [15]. Laboratory findings most frequently observed are thrombocytopenia, leucopenia, anaemia and hypergammaglobulinaemia. Liver is widely regarded as the target organ affected with canine monocytic ehrlichiosis as is exemplified by increase in activity of specific liver enzymes (AST, ALT, AP, and bilirubin) along with histological alterations pertaining to severe diffuse centrilobular degeneration and chronic active hepatitis along with generalized hypoproteinemia and hypoalbuminemia [15]. Hence the present study was undertaken to know the biochemical changes in ehrlichiosis affected dogs in and around Bangalore.

Materials and Methods

The dogs having pyrexia and lymph node enlargement acted as a basis for selection based on the clinical signs. Further from these dogs blood samples were collected in EDTA vials. These blood samples were subjected for platelet count. The blood samples with platelet count less than 1.5 lakh/ μ l were further subjected for polymerase chain reaction. Around 20 dogs which were positive by PCR were subjected to biochemical analysis. The dogs which were healthy and came for vaccination or general check-up were also subjected for biochemical tests which were considered as control group and compared with the affected group.

The serum samples were collected from Ehrlichia suspected case using serum vacutainers under aseptic conditions. After collection, blood was allowed to clot at room temperature and centrifuged for serum separation. Sera samples were transferred into Eppendorf tubes and maintained at 4^o degree and all the biochemical Parameters were estimated on same day of collection.

The following biochemical parameters were estimated using Semi-automatic biochemistry analyser RX-50 (Microlab) and reagents manufactured by transasia Bio-medicals Ltd, Solan, HP. SGOT, SGPT, Total protein (TP), Albumin, Serum creatinine, Total bilirubin, ALP, Gamma-glutamyltransferase (GGT).

Results and Discussion

The study was conducted at Veterinary College Hebbal, Bangalore. The results of the present study obtained are presented herewith. In the present study 54 dogs were suspected for Canine ehrlichiosis based on the clinical signs. These 54 dogs were subjected for estimation of platelet count. Out of 54 suspected dogs 32 dogs showed platelet count less than $150 \times 10^3/\text{ul}$. These 32 dogs were further subjected for Polymerase chain reaction. 20 dogs showed positive for PCR. These 20 PCR positive cases were considered for biochemical studies and were compared with 20 healthy dogs which were considered as control group.

Biochemical parameters in canine Ehrlichiosis

The mean \pm SE of various Biochemical parameters of healthy control dogs in comparison with canine Ehrlichiosis affected dogs are presented herewith.

Aspartate aminotransferase (AST IU/L)

The Mean \pm SE of, AST values in healthy control group and Canine Ehrlichiosis affected dogs were; 39.25 ± 1.24 and 94.53 ± 12.65 respectively depicted in table (1) and figure (3). There was a significant ($P \leq 0.05$) increase in aspartate aminotransferase level in the affected dogs compared to healthy dogs. Increased AST levels in canine ehrlichia affected dogs has also been reported by several research workers [1, 4].

Alanine aminotransferase (ALT IU/L)

The Mean \pm SE of, ALT values in healthy control group and Canine Ehrlichiosis affected dogs were; 29.13 ± 1.49 and 63.79 ± 6.33 respectively depicted in table (1) and figure (3). There was a significant ($P \leq 0.05$) increase in alanine aminotransferase level in the affected dogs compared to healthy dogs which is in agreement with several research workers [11, 1, 16, 4].

Total bilirubin (mg/dl)

The Mean \pm SE of, total bilirubin values in healthy control group and Canine Ehrlichiosis affected dogs were; 0.14 ± 0.01 and 0.36 ± 0.05 respectively depicted in table (1) and figure (2). There was a significant ($P \leq 0.05$) increase in total bilirubin level in the affected dogs compared to healthy dogs

Alkaline phosphatase (IU/L)

The Mean \pm SE of, alkaline phosphatase values in healthy control group and affected Canine Ehrlichiosis dogs were; 198.76 ± 8.77 and 382.85 ± 31.46 respectively depicted in table (1) and figure (2). There was a significant ($P \leq 0.05$) increase in alkaline phosphatase level in the affected dogs compared to healthy dogs.

Increase in these values is indicative of hepatic dysfunction leading to hypoproteinemia in Ehrlichiosis [14, 1].

Total protein (g/dl)

The Mean \pm SE of, total protein values in healthy control group and Canine Ehrlichiosis affected dogs were; 5.67 ± 0.19 and 4.57 ± 0.24 respectively depicted in table (1) and figure (3). There was a significant ($P \leq 0.05$) decrease in total protein level in the affected dogs compared to healthy dogs

Albumin (g/dl)

The Mean \pm SE of total albumin values in healthy control group and effected Canine Ehrlichiosis dogs were; 3.26 ± 0.09 and 2.53 ± 0.12 respectively depicted in table (1) and figure (1). There was a significant ($P \leq 0.05$) decrease in total albumin level in the affected dogs compared to healthy dogs

Globulin (g/dl)

The Mean \pm SE of, total globulin values in healthy control group and Canine Ehrlichiosis affected dogs were; 2.41 ± 0.21 and 2.12 ± 0.28 respectively depicted in table (1) and figure (1). There was a non- significant ($P \geq 0.05$) difference in total globulin level in the affected dogs compared to healthy dogs.

There was a significant decrease in total protein, and Albumin level in the affected dogs compared to healthy dogs whereas non- significant difference in total globulin level was observed in the affected dogs in comparison with healthy dogs.

Results of our study is in agreement with several research workers [5, 1, 16, 3, 12] whereas other research workers [10, 4] have reported increased Total protein values in ehrlichia affected dogs.

Reduction in the levels of total protein and albumin may be due to partial or complete anorexia in ehrlichia affected dogs or also may be due to vasculitis leading to peripheral loss to edematous inflammatory fluid [17].

Ehrlichia in dogs can affect internal organs like liver, kidney. Since liver is affected there may be decreased production of protein and albumin leading to hypoproteinemia and hypoalbuminemia and also there is excretion of protein in urine leading to proteinuria [6].

In our study the globulin values showed no significant difference between healthy and ehrlichiosis affected dogs. Mylonakis *et al.*, 2010 also reported no changes in globulin levels in healthy and ehrlichiosis dogs. Whereas others [7, 8] reported hyperglobulinaemia in ehrlichia affected dogs.

Creatinine (mg/dl)

The Mean \pm SE of, creatinine values in healthy control group and Canine Ehrlichiosis affected dogs were; 1.07 ± 0.04 and 1.32 ± 0.08 respectively depicted in table (1) and figure (1). There was a significant ($P \leq 0.05$) increase in creatinine level in the affected dogs compared to healthy dogs. Increase in the creatinine levels in ehrlichia affected dogs has been reported by several researchers [11, 1, 2, 3], which is in agreement with our results. The reason for the increase in creatinine may be due to affection of the kidney by *E. canis* organism and due to Immune mediated complex glomerulonephritis indicating involvement of kidney in ehrlichiosis [1].

Gama-glutamyltransferase(U/L)

The Mean \pm SE of, gama-glutamyltransferase values in healthy control group and affected Canine Ehrlichiosis dogs were; 5.92 ± 0.36 and 5.98 ± 1.50 respectively depicted in table (1) and figure (2). There was a non- significant ($P \geq 0.05$) difference in gama-glutamyltransferase level in the affected dogs compared to healthy dogs

Table 1: Comparison of Biochemical parameters in Canine Ehrlichiosis affected dogs with Healthy control dogs (Mean ± SE).

SL. No	Parameter	Healthy dogs N=20	Ehrlichia Affected dogs N=20	P values
1	AST (IU/L)	39.25±1.24 ^a	94.53±12.65 ^b	.000
2	ALT (IU/L)	29.13±1.49 ^a	63.79±6.33 ^b	.000
3	Total protein (g/dl)	5.67±0.19 ^a	4.57±0.24 ^b	.001
4	Albumin(g/dl)	3.26±0.09 ^a	2.53±0.12 ^b	.000
5	Globulin(g/dl)	2.41±0.21	2.12±0.28	.407
6	Creatinine(mg/dl)	1.07±0.04 ^a	1.32±0.08 ^b	.006
7	Total bilirubin(mg/dl)	0.14±0.01 ^a	0.36±0.05 ^b	.001
8	Alkaline phosphatase(IU/L)	198.76±8.77 ^a	382.85±31.46 ^b	.000
9	GGT(U/L)	5.92±0.36	5.98±1.50	.971

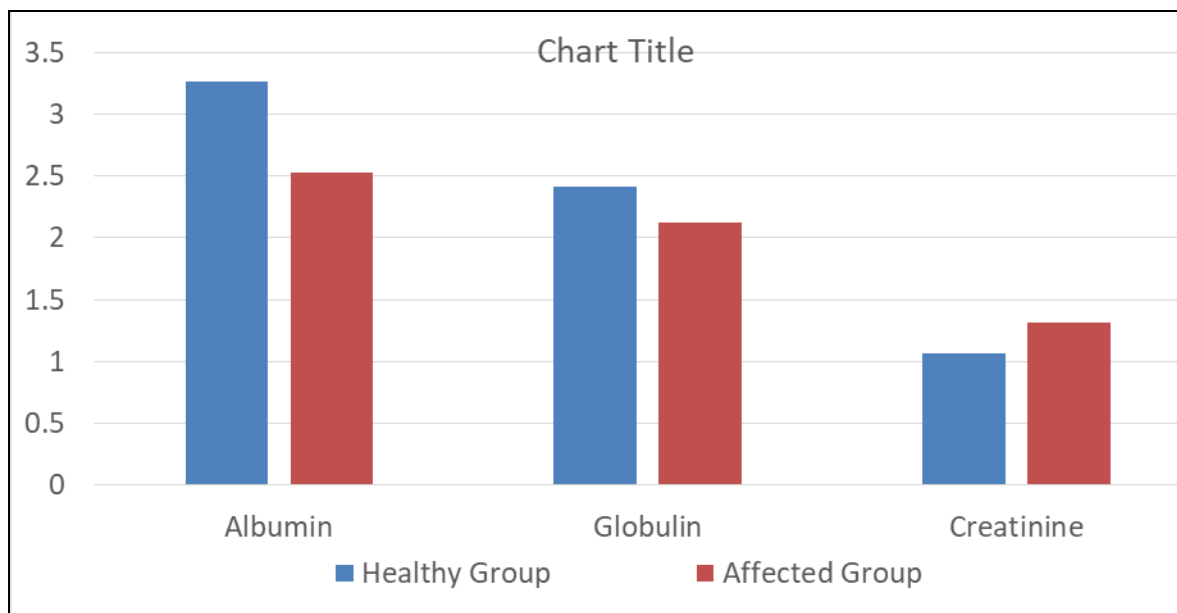


Fig 1: Bar chart depicting comparison of Albumin, Globulin and Creatinine values of Canine Ehrlichia affected group with healthy control group

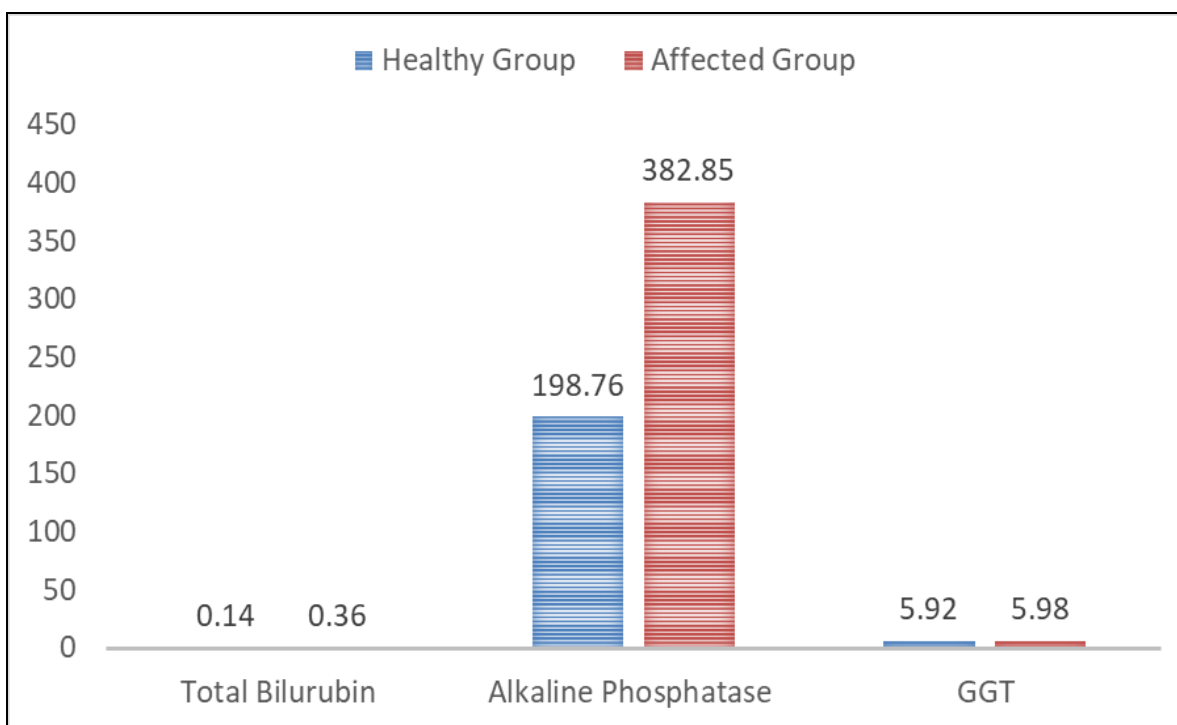


Fig 2: Bar chart depicting comparison of Total Bilirubin, Alkaline Phosphatase and GGT values of Canine Ehrlichia affected group with healthy control group

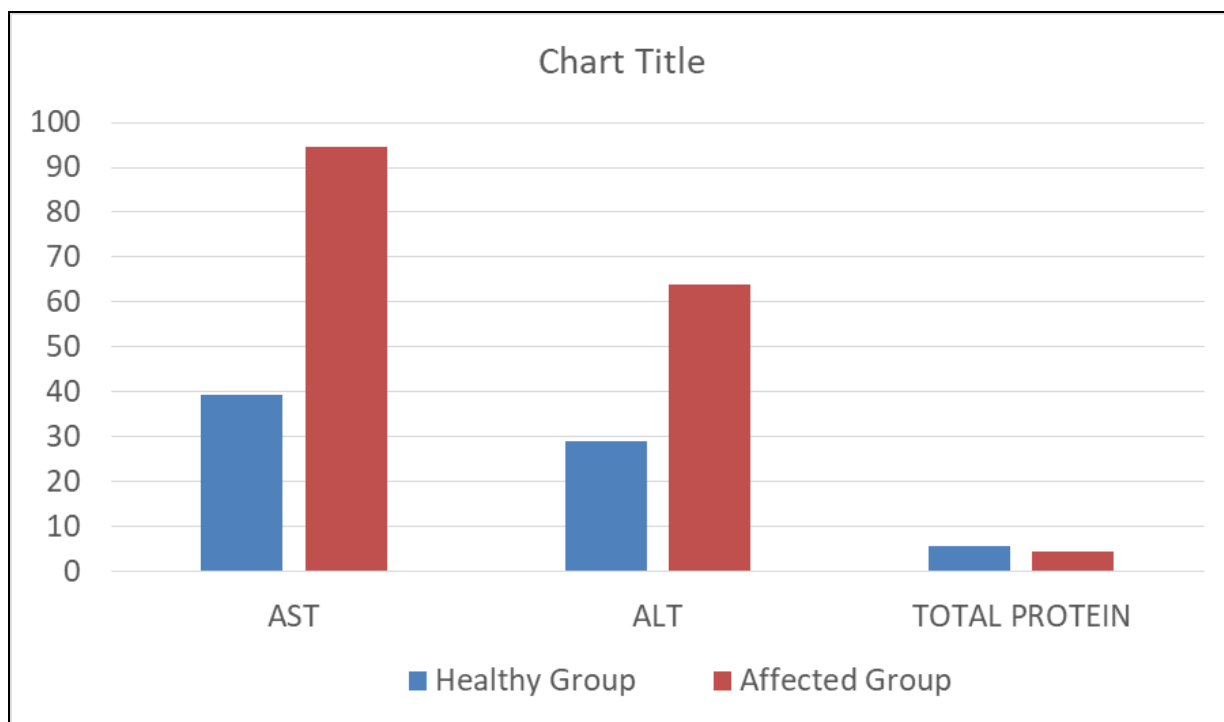


Fig 3: Bar chart depicting comparison of AST, ALT and Total Protein values of Canine Ehrlichia affected group with healthy control group

Conclusion

The blood samples from 54 suspected cases of canine ehrlichiosis were subjected for platelet count. Out of 54 suspected cases 32 dogs showed platelet count of less than $150 \times 10^3/\mu\text{l}$. In these 32 dogs 20 dogs were positive based on PCR test. These 20 dogs were subjected for detailed biochemical study. Biochemical analysis revealed significant increase in AST, ALT, Total Bilirubin, creatinine and Alkaline phosphatase levels in ehrlichia affected dogs when compared to healthy dogs whereas TP and albumin values were significantly decreased. Non-significant difference was noticed in globulin levels in ehrlichia affected dogs when compared to healthy dogs.

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