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Haematological and serum biochemical changes in hepatic disorders in dogs

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Abstract
The present study was conducted at Veterinary College Hospital, Hebbal, Bengaluru to study the haematological and serum biochemical changes in hepatic disorders in dogs. Ten apparently healthy dogs (control group) and 20 dogs with clinical signs suggestive of hepatic disorders were selected for the present study. The blood samples were collected from cephalic or saphenous vein under aseptic conditions and subjected to haematological and biochemical analysis. The major haematological changes observed were reduced Hb concentration, TEC, PCV, platelet count and increased TLC. The major biochemical changes recorded were increased ALT, GGT, Total bilirubin and decreased Total Protein and Albumin in dogs with hepatic disorders compared to control group.

Keywords: Hepatic disorders, ALT, haematolgy, biochemistry

Introduction
Liver is the largest internal organ in the body that performs many important functions such as metabolizing proteins, fats and carbohydrates; storing essential vitamins, minerals and nutrients; producing digestive enzymes that support digestion; detoxifying toxins including drugs; producing bile to aid in digestion and eliminating waste from the body.
Hepatic disorders refer to any liver abnormality that prevents it from functioning normally. Diagnosis of hepatic disorders can be difficult as the symptoms may be ambiguous or may easily interfere with the symptoms of other disease. However, the diagnosis can be made using a combination of history and clinical signs, haematological and biochemical analysis, radiography, ultrasonography and biopsy or tissue analysis [1]. Haematological and biochemical analysis are frequently used first line diagnostic procedures. The objective of the present study was to know the haematological and biochemical changes in hepatic disorders in dogs.

Materials and Methods
The present work was carried out at Veterinary College Hospital, Hebbal, Bengaluru. Ten apparently healthy dogs, irrespective of age, breed and gender, which were presented for routine health check-up or vaccination were selected as control group. About 20 dogs with the clinical signs such as lethargy, inappetence, vomiting, diarrhoea, polydipsia, polyuria, ascites, bleeding tendencies, icterus and hepatic encephalopathy were selected as clinical cases and subjected to a thorough physical examination, haematology and serum biochemical profile.
The blood samples were collected from cephalic or saphenous vein under aseptic conditions and divided into two parts. One part was immediately transferred to EDTA vacutainer to analyze haematological parameters. The other part was transferred to a clot activator containing vacutainer for serum separation to analyze biochemical parameters. All the haemato-biochemical parameters were estimated on the same day of collection.
Haematological parameters such as Haemoglobin (Hb), Total Leukocyte Count (TLC), Platelet Count, Total Erythorcyte Count and Packed Cell Volume (PCV) were estimated by Mindray Auto Haematology Analyzer BC 2800 Vet. The biochemical parameters such as Alanine aminotransferase (ALT), Gamma-glutamyl transferase (GGT), Total protein (TP), Albumin and Total bilirubin were estimated using Micro Lab RX-50 using the reagent kits (ErbaR) supplied by Transasia Bio- Medicals Ltd. at the wavelength specified in the procedures. The statistical analysis of the obtained data was performed by unpaired t-test using the statistic software Graph Pad Prism version 7.0.

Results and Discussion

The present study revealed a significant decrease of haemoglobin in dogs with hepatic disorders (11.16 ± 0.96 g/dl) compared to control group (15.93 ± 0.58 g/dl). The reduced haemoglobin levels in hepatic diseases could be attributed to increased degradation of RBCs due to their increased transit time through the spleen due to reduced portal blood flow and/or increased fragility of RBCs due to high levels of bile acids, reduced nutrient uptake and reduced availability of micronutrients from liver [2]. There was a significant increase in mean TLC concentration (20.90 ± 2.61 x103/µl) compared to control group (12.49 ± 0.28 x103/µl). The increase in the total leukocyte count might be a consequence of hepatocellular damage, infection, sepsis or absorption of intestinal bacterial toxins [3]. Stress might also result in elevated TLC levels. A significant decrease in mean Platelet count was observed in dogs with hepatic disorders (223.42 ± 12.22 x103/µl), which could be due to reduced thrombopoietin synthesis or a consumptive coagulopathy. It can also be caused by infectious diseases like leptospirosis which affect the liver [4]. A significant decrease in Total Erythrocyte Count was observed in dogs with hepatic disorders (4.88 ± 0.40 x 106/µl) compared to control group (6.84 ± 0.27 x 106/µl). In contrary, [5] reported normal TEC levels in copper associated chronic hepatitis in Labrador Retrievers. The decrease in Total Erythrocyte Count might be due to increased degradation of RBC [6]. A significant decrease in PCV was observed in dogs with hepatic disorders (33.51 ± 2.81%) compared to control group (49.24 ± 1.79%). The reduced PCV values in dogs with hepatic disorders might be due to the dehydration seen in dogs affected with various hepatobiliary disorders [7].

The present study revealed a significant increase in ALT activity in dogs with hepatic disorders (158.20 ± 29.99 U/L) compared to control group (32.44 ± 2.73 U/L). The increase in ALT levels might be due to altered hepatocellular membrane permeability, hepatocellular necrosis and inflammation with degree proportional to number of injured hepatocytes [8] as ALT is present in high concentrations within the cytoplasm and mitochondria of hepatocytes. In another study, [9] reported significantly elevated ALT values in dogs with hepatitis, whereas no significant alteration was observed in dogs with cirrhosis which might be due to absence of significant ongoing inflammation or intrahepatic cholestasis or decreased viable parenchymatous mass resulting in occasionally normal levels of ALT in dogs with cirrhosis [10]. A significant increase in mean GGT levels was observed in dogs with hepatic disorders (19.23 ± 3.55 U/L) compared to control group (3.89 ± 0.60 U/L). Elevations of serum levels of GGT are attributed to cholestasis or biliary hyperplasia resulting in enzyme induction. Intrahepatic and extrahepatic cholestasis results in moderate to marked increase in GGT activity, while acute hepatocellular injury results in mild elevation in GGT activity [6]. Corticosteroid administration or increased endogenous corticosteroid production may also result in increased serum GGT activity in dogs, likely due to enzyme induction. In dogs, serum GGT activity is less sensitive but more specific marker than ALP in the diagnosis of hepatobiliary disorders [4]. There was a significant decrease in total protein levels in dogs with hepatic disorders (5.13 ± 0.18 g/dl) compared to control group (5.73 ± 0.16 g/dl). Hypoprotenemia could be due to the disruption in the hepatic protein metabolism, marked decline in diet intake, malabsorption and ongoing protein losing enteropathies like gastroenteritis, gastrointestinal ulcerations and chronic gastritis [6]. The present study revealed a significant decrease in albumin levels in dogs with hepatic disorders (2.18 ± 0.15 g/dl) compared to control group (2.73 ± 1.10g/dl). Liver being the main site of synthesis and degradation of most of the proteins, any hepatic disorder (chronic hepatitis and cirrhosis) are responsible for decrease in albumin concentration. But hypoalbuminemia may also occur without impairment in hepatic albumin synthesis due to either leakage of albumin from hepatic lymph or increase in volume of distribution as in cases of ascites [11]. Decreased nutrient uptake associated with hepatopathies may also result in hypoalbuminemia [12]. The present study revealed a significant increase in total bilirubin values in dogs with hepatic disorders (1.17 ± 0.24 mg/dl) compared to control group (0.22 ± 0.03 mg/dl). Hyperbilirubinemia is attributed to disturbance of balance between rate of production, metabolism and excretion of bilirubin [13].

Table 1: Haematological profile in healthy dogs and dogs affected with hepatic disorders

Sl. No.	Parameter	Healthy dogs (N=10)	Dogs affected with hepatic disorders (N=20)	p-value
1	Hb (g/dl)	15.93 ± 0.58	11.16 ± 0.96**	0.0023
2	TLC (x103/µl)	12.49 ± 0.28	20.90 ± 2.61*	0.0326
3	Platelet count (x103/µl)	273.40 ± 8.66	223.42 ± 12.22*	0.0113
4	TEC (x106/µl)	6.84 ± 0.27	4.88 ± 0.40**	0.0029
5	PCV (%)	49.24 ± 1.79	33.51 ± 2.81**	0.0008

Note: * -significant at $P<0.05$; ** - significant at $P<0.01$; ns - non significant

Table 2: Serum biochemical profile in healthy dogs and dogs affected with hepatic disorders

Sl. No.	Parameter	Healthy dogs (N=10)	Dogs affected with hepatic disorders (N=20)	p-value
1	ALT (U/L)	32.44 ± 2.73	158.20 ± 29.99**	0.0066
2	GGT (U/L)	3.89 ± 0.60	19.23 ± 3.55**	0.0054
3	Total protein (g/dl)	5.73 ± 0.16	5.13 ± 0.18*	0.0401
4	Albumin (g/dl)	2.73 ± 0.14	2.18 ± 0.15*	0.0268
5	Total Bilirubin (mg/dl)	0.22 ± 0.03	1.17 ± 0.24**	0.0091

Note: * -significant at $P<0.05$; ** - significant at $P<0.01$; ns - non significant

Conclusion: The major haematological changes observed were reduced Hb concentration, TEC, PCV, platelet count and increased TLC. The major biochemical changes recorded were increased ALT, GGT, Total bilirubin and decreased Total Protein and Albumin in dogs with hepatic disorders compared to control group.

References

1. Negasee KA. Hepatic diseases in canine and feline: A review. Veterinary Medicine Open Journal. 2021;6(1):22-31.
2. Bush BM. Interpretation of laboratory results for small animal clinicians. Edn 1, Blackwell Sciences, Lowa, 2002, 317-319.
3. Twedt DC. Jaundice, hepatic trauma, and hepatic encephalopathy. Veterinary Clinics of North America: Small Animal Practice. 1981;11(1):121-145.
4. Lawrence YA, Steiner JM. Laboratory evaluation of the

liver. Veterinary Clinics: Small Animal practice. 2016;47(3):539-553.
5. Hoffmann G, Van Den Ingh TSGAM, Bode P, Rothuizen J. Copper-associated chronic hepatitis in Labrador Retrievers. Journal of Veterinary Internal Medicine. 2006;20(4):856- 861.
6. Lakshmi K, Padmaja K. Clinico-Pathological Evaluation of Hepatobiliary Disorders in Dogs. International Journal of Current Microbiology and Applied Sciences. 2021;10(2):1733-1738.
7. Prebavathy T, Amaravathi P, Rajesh K, Vaikuntarao V, Bharathi S, Raghunath M. Haematobiochemical alterations in hepatic diseases in dogs. Journal of Entomology and Zoology Studies. 2020;8(5):1382-1384.
8. Kramer JW, Hoffman WE. Clinical biochemistry of domestic animals. Edn 5, Academic Press, London, 1997, 303-325.
9. Shrivastava S, Gupta N, Gupta DK, Shukla PC. Haematological and Enzymatic alterations associated with Hepatic Disorders in Canines. Intas Polivet. 2010;11(2):369-371.
10. Twedt DC. Cirrhosis: A consequence of chronic liver disease. Veterinary Clinics of North America: Small Animal Practice. 1985;15(1):151-176.
11. Tantary HA, Soodan JS, Chirag S, Ansari MM. Haematological and biochemical studies on hepatic disorders in dogs. International Journal of Veterinary Science. 2014;3(3):135-138.
12. Elhiblu MA, Dua K, Mohindroo J, Mahajan SK, Sood NK, Dhaliwal PS. Clinico-haemato- biochemical profile of dogs with liver cirrhosis. Veterinary World. 2015;8(4):487-491.
13. Bera A, Lodh C. Clinico-Hematobiochemical Evaluation of Hepatic Disorders in Canines and its Correlation with Imaging Diagnosis. Intas Polivet. 2019;20(1):137-142.