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Estimation of fibrinogen concentration of dogs with hepatic dysfunction

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Abstract
The study was conducted to estimate the fibrinogen concentration in dogs affected with parenchymal, biliary and neoplastic hepatic disorders compared with dogs which are apparently healthy. Twenty apparently healthy dogs formed the control group. Twenty dogs in which 9 dogs formed the parenchymal disorder, six dogs with biliary disorder and five dogs with neoplastic disorder based on ultrasonographic investigation formed the experimental group. Since liver is major site for the synthesis and removal of thermoelastographic proteins, the present study was framed to measure the concentration of fibrinogen in healthy as well as dogs with various hepatic dysfunction. The fibrinogen concentration was significantly increased in dogs affected with parenchymal, biliary dysfunction and significantly reduced in dogs with neoplastic disorders of experimental group when compared with control group. Thus the results of this study conveys that there is a significant alteration in the concentration of fibrinogen in all three disorders of hepatic dysfunction dogs and it could be the cause for the haemostatic disorders in dogs.

Keywords: canine, hepatic dysfunction, plasma fibrinogen, clotting disorders

Introduction
Liver is the largest parenchymal gland in the body with high functional reserve capacity to regenerate and to maintain its integrity even after extensive pathological damage. It acts as a myriad for various metabolic functions in the body. The liver plays an important role in haemostasis. It is the site of synthesis synthesize and clearance of most of the clotting factors including fibrinogen and the factors II, V,VII, IX, X, XI and XIII [1]. Fibrinogen is an acute phase protein primarily synthesized by the liver. It helps in maintaining the homeostasis by playing significant role in blood clotting, fibrinolysis, cellular and matrix interactions, the inflammatory response, wound healing and neoplasia [2, 3]. Hence, in this study fibrinogen concentration in dogs with different hepatic dysfunctions were compared.

Materials and Methods
The study was conducted in Department of Veterinary Physiology, Madras Veterinary College. The study consisted of twenty apparently healthy dogs as control group and twenty dogs with hepatic pathology as experimental group. Based on clinical symptoms and Ultrasonographic examination, the hepatic disorder dogs were further classified into parenchymal, neoplastic, biliary disorder groups as per WSAVA guidelines. Blood samples were collected in an aseptic manner by venipuncture of saphenous / cephalic vein from each dog selected under the study. About two millilitres of whole blood was aliquoted in vacutainers coated with sodium citrate as an anticoagulant in dilution rate of 1: 9 for haemostatic studies. The hepatic disorder in dogs were classified into parenchymal, neoplastic, biliary disorder groups as per WSAVA guidelines.Fibrinogen was estimated using commercial kits supplied by Agappe Diagnostics as per the standard protocol [4]. The citrated plasma was diluted with Owren's Veronal Buffer at the ratio of 1:10. Two hundred microliters of the diluted plasma was pipetted into the test cuvette and incubation was done for 1-2 minutes at 37˚C. One hundred microliters of pre-warmed Thrombin test reagent was added forcibly into the test cuvette. The time taken for steel beads to get clot (in seconds) was recorded using semi- automated coagulation instrument (Mispa Clog).

Calculation
Calibration curve was constructed with the aid of the clotting time obtained with 1:10 plasma dilutions to determine the fibrinogen concentration in mg/dL. The standard curve for determination of fibrinogen concentration is given in Figure 1

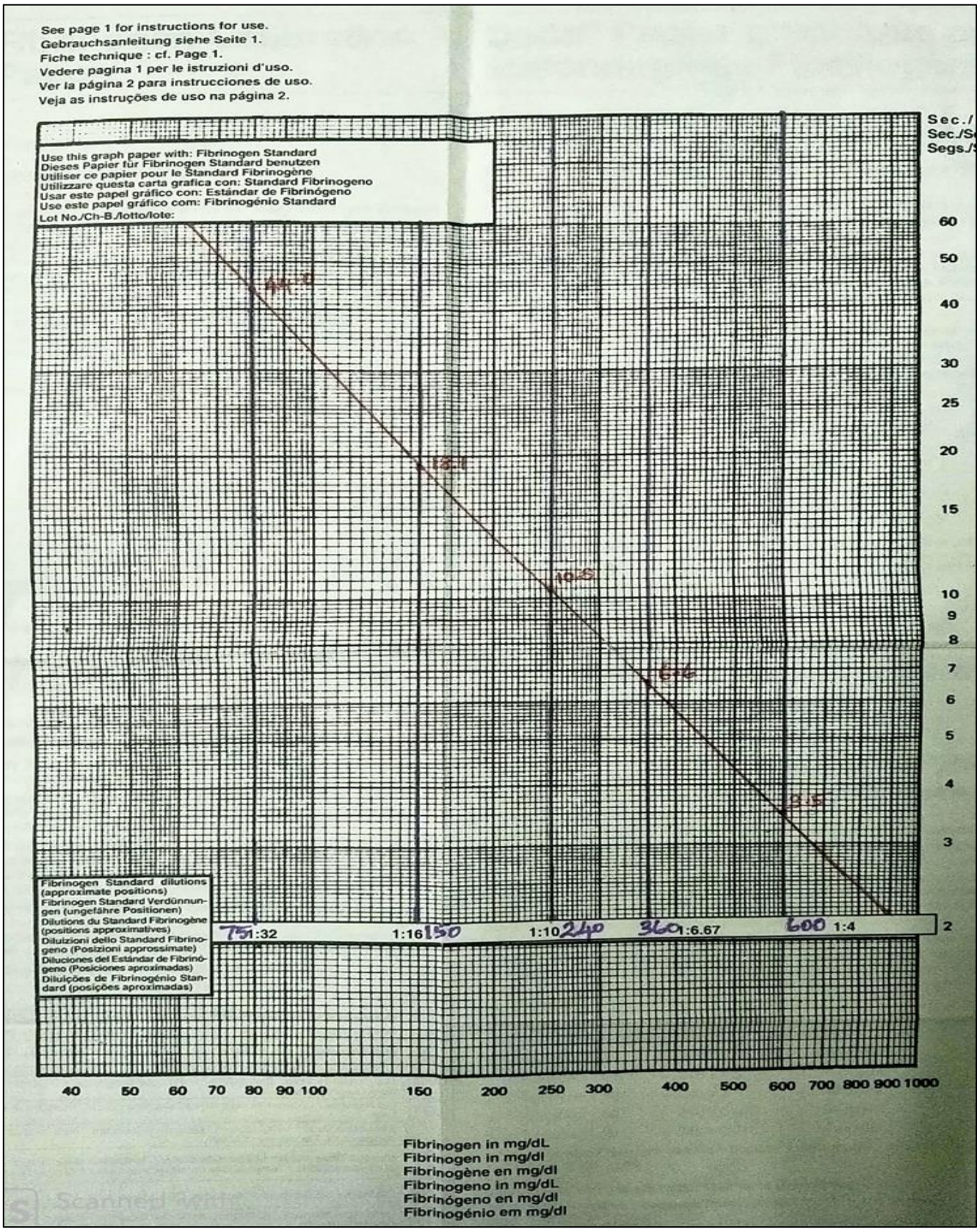

Fig 1: Standard curve for Fibrinogen concentration

Result

The results of fibrinogen concentration in the control and experimental groups are presented in the Table I. The mean ± SE values of fibrinogen concentration in control group was 223.78 ± 7.42 mg/dL and the mean ± SE values of fibrinogen time in parenchymal, neoplastic and biliary disorders of liver disease dogs were 390.30 ± 18.41 mg/dL, 175.84± 15.16mg/Dl and 278.23 ± 17.06mg/dL, respectively. There was a significant increase ($p< 0.05$) in fibrinogen concentration in the dogs with parenchymal and biliary disorder when compared to the control group. A significant decrease in the mean ± SE values of fibrinogen concentration was noticed in the dogs with neoplastic disorder when compared to the control group.

Table 1: Fibrinogen concentration of Control and Experimental groups

Parameters	Control group (n=20)	Experimental groups (n=20)			F-value
		Parenchymal disorders (n=9)	Neoplastic disorders (n=6)	Biliary disorders (n=5)	
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE	
Fibrinogen concentration (mg/ dL)	223.78 ± 7.42[b]	390.30 ± 18.41[d]	175.84 ± 15.16[a]	278.23 ± 17.06[c]	36.54**

Mean values having the same superscript within a row do not differ significantly.
**- Highly significant ($p< 0.01$)

Discussion

Fibrinogen is a significant protein of haemostatic process, with an important role in both plasmotic clot formation and as cofactor for the aggregation of platelets [5]. In the present study, there was an increased concentration of fibrinogen in the experimental group of dogs when compared to control group. This finding was similar to results obtained by [6]. In parenchymal and biliary disorders, the concentration of fibrinogen was typically increased due to with sustained or acute systemic inflammation. Hence, hyper fibrinogenemia in dogs with parenchymal and biliary disorder is an indicator of the inflammatory nature of this disorder [2, 7, 8]. Neoplastic disorder, which occurs due to prolonged hepatic insult and cirrhosis showed significantly reduced concentration of fibrinogen in circulation. The finding was similar to that reported in the study [4, 9]. The decreased fibrinogen concentration may be due to impaired synthesis of coagulation proteins.

Conclusion

The present study revealed that the fibrinogen concentration is increased significantly in dogs with parenchymal and biliary dysfunction and reduced significantly in dogs with neoplastic disorders. that alteration in hepatic function in dogs leads to changes in the fibrinogen function and concentration.

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