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Hyperfibrinogenemia in thrombocytopenic dogs with *Babesia gibsoni*: Evaluation of fibrinogen as a diagnostic indicator

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Abstract
Fibrinogen is an essential component of the haemostatic process, with key roles both in plasmatic clot formation and as a cofactor for the aggregation of platelets. Thirty thrombocytopenic dogs (<25,000 cells/cmm) of different signalments affected with *Babesia gibsoni* with signs of bleeding including echymosis, pupura, hematuria, scleral haemorrhage, melena, epistaxis were included for this study. The average mean and SE values of fibrinogen in healthy and affected animals were 119.58 ± 3.82 mg/dl and 394.81 ± 6.89 mg/dl. Hyperfibrinogenemia, in our study seems predominant in dogs affected with *babesia gibsoni* which could be attributed due to endothelial damage and acute inflammation**.** Measurement of plasma fibrinogen concentration proved useful in the evaluation of coagulopathies due to *babesia* and inflammatory disorders. It can be considered as one of the routine test in the diagnosis and to assess the severity of progression of coagulative disorders in canine vector-borne diseases.

Keywords: Fibrinogen, *Babesia gibsoni*, thrombocytopenia, dogs

Introduction
Plasma fibrinogen is one of the most important factors in the coagulation cascade and its concentration increased in other clinical conditions such as infections, haemodynamic impairment, cardiac, lung and aortic diseases and malignancies, as an acute-phase reactant (Hajsadeghi *et al*., 2012) [4]. Inherited disorder can cause fibrinogen deficiency, due to reduced synthesis in liver failure and during consumptive coagulopathies (Mischke *et al*., 1998) [5], whereas fibrinogen concentrations may be increased in the acute phase of inflammation (Ceron *et al*., 2005) [2].

Thrombocytopenic and thrombopathic dogs affected with vector borne diseases represent a major proportion of mortalities and morbidities in our Small Animal Outpatient and Critical Care Units, Madras Veterinary College Teaching Hospital (MVCTH). Advanced and expensive diagnostic modalities for the platelet function assays including Thromoboelastography (TEG) and platelet aggregometry seems currently unavailable in veterinary practice. Alternatively, canine specific fibrinogen assays have been standardised and useful in dogs with bleeding tendencies.

Aim- To evaluate canine specific fibrinogen in thrombocytopenic dogs affected with *Babesia gibsoni* and to interpret its diagnostic significance.

Materials and Methods
Thirty thrombocytopenic dogs (<25,000 cells/cmm) of different signalments affected with *Babesia gibsoni* (confirmed by blood smear and PCR) with signs of bleeding including echymosis, pupura, hematuria, scleral haemorrhage, melena, epistaxis were included for this study.

About 1.8 ml of venous blood was collected in 0.2 ml sodium citrate (3.2%) coated tube, centrifuged at 3000 rpm for 15 minutes and the plasma was subjected to fibrinogen estimation by using Mispa Clog ™ coagulation analyzer M/s Agappe Diagnostics Ltd.

Calibration Protocol for fibrinogen on Mispa Clog ™ coagulation analyzer
Fibrinogen levels were calibrated and a curve was constructed using this reference plasma by preparing a series of dilutions (Table 1) in buffer to give a range of fibrinogen concentrations.

The clotting time of each of these dilutions (clotting times/fibrinogen concentration (mg/dL) were plotted on graph paper and the linear correlation coefficient between clotting times in the region of 5.3-32 sec were studied.

Table 1: Fibrinogen level and clotting times

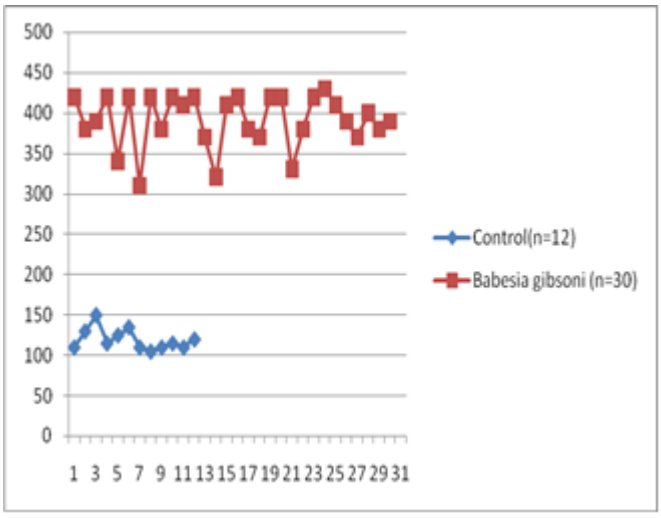
Dilution ratio	Fibrinogen mg/dl	sec
1:5	422	5.3
1:6.67	316.5	6.8
1:10	211	7.4
1:20	105.5	19
1:30	70.33	32

Results and Discussion

The results were statistically analysed by using student unpaired‘t’ test and interpreted.

Table 2: Fibrinogen level in control and clinical group

Groups	Mean fibrinogen level (mg/dl)	T value
Control dogs (*n=12*)	119.58 ± 3.82	24.50**
Dogs with *Babesia gibsoni* (n=30)	394.81 ± 6.89	
** *P*<0.01 significant at 1% level		



Graph: 1 Level of fibrinogen in control and affected animals

The average mean and SE values of fibrinogen in healthy and affected animals were 119.58 ± 3.82 and 394.81 ± 6.89 (Table-2 & Graph-1). In the present study, significant hyperfibrinogenemia in *Babesia gibsoni* group correlated with the earlier studies of Ulutas *et al*., 2005 [9].

Elevation of fibrinogen concentration in *Babesia canis* due to an acute phase response and endothelial damage induced by hemolysis, and the interaction of parasitized erythrocytes with the endothelial cells (Ulutas *et al.*, 2005; Schetters, 2005) [9, 7]. The increases in fibrinogen concentrations are likely due to increased rate of synthesis probably stimulated by cytokines, growth factors, hormones, and other cellular effectors (Blomback., 1996) [1]. Fibrinogen is an inflammatory marker (acute phase protein), widely used in veterinary medicine (Weiss and Tvedten, 2004b) [10]. Hyperfibrinogenemia is a common finding in dogs affected by either natural or experimental (Schetters *et al*., 1997) [8] babesiosis.

The blood fibrinogen concentration may increase in acute and chronic conditions as an acute phase reactant in canine ehrlichiosis. There are few studies on the relationship between fibrinogen concentration and vector-borne diseases in dogs, (Ruiz de Gopegui *et al.*, 2007) [6]. Edirimanne *et al.*, (2014) [3] reported that fibrinogen levels were significantly higher in dogs with ehrlichiosis.

Hyperfibrinogenemia in 74% of dogs and altered haemostasis profile was observed in most dogs affected with canine *Babesiosis*. The incidence of DIC with secondary fibrinogenolysis may preclude findings of hyperfibrinogenemia in affected animals as although an acute phase response induces hyperfibrinogenemia, DIC tends to induce hypofibrinogenemia (Ruiz de Gopegui *et al*., 2007) [6].

Conclusion

Hyperfibrinogenemia, in our study seems predominant in dogs affected with *babesia gibsoni* which could be attributed due to endothelial damage and acute inflammation**.** Elevated fibrinogen indicates the excessive coagulation, and all through were risk factors for thromboembolic disorders in *Babesiosis* affected dogs.

Measurement of plasma fibrinogen concentration proved useful in the evaluation of coagulopathies due to *babesia* and inflammatory disorders. It can be considered as one of the routine test in the diagnosis and to assess the severity of progression of coagulative disorders in canine vector-borne diseases. However other markers including C reactive protein, factor VIII and intercellular adhesion molecule needs to be determined to ascertain haemostatic disorders.

References

1. Blomback B. Fibrinogen and fibrin-proteins with complex roles in hemostasis and thrombosis. Thrombosis Research 1996; 83:1-75.
2. Ceron JJ, Eckersall PD, Martynez-Subiela S. Acute phase proteins in dogs and cats: Current knowledge and future perspectives. Vet. Clin. Pathol. 2005; 34:85-99.
3. Edirimanne ERKV, Ariyarathna HS, Beijerink NJ, De Silva DDN. Latest clinical manifestations of canine ehrlichiosis: “The Pup Killer” - A Preliminary Communication. Wayamba Journal of Animal Science. 2014; 880-892.
4. Hajsadeghi S, Kerman SR, Khojandi M, Vaferi H, Ramezani R, Jourshari NM *et al*. Accuracy of D-dimer: fibrinogen ratio to diagnose pulmonary thromboembolism in patients admitted to intensive care units. Cardiovascular Journal of Africa. 2012; 23(8):446-456.
5. Mischke R. Hemostatic disorders as a complication of autoimmune hemolytic anemia in dogs. Dtsch Tierarztl. Wochenschr, 1998; 105:13-16.
6. Ruiz de Gopegui R, Peñalba B, Goicoa A, Espada Y, Fidalgo LE, Espino L. Clinico-pathological findings and coagulation disorders in 45 cases of canine babesiosis in Spain. Veterin ary Journal. 2007; 174(1):129-132.
7. Schetters T. Vaccination against canine babesiosis. Trends in Parasitology 2005; 21:179-184.
8. Schetters TP, Moubri K, Precigout E, Kleuskens J, Scholtes N, Gorenflot A. Different Babesia canis isolates, different diseases. Parasitology 1997; 115:485-493.
9. Ulutas B, Bayramli G, Ulutas PA, Karagenc T. Serum concentration of some acute phase proteins in naturally occurring canine babesiosis: A preliminary study. Veterinary Clinical Pathology. 2005; 34:144-147.
10. Weiss D, Tvedten H. The complete blood count and bone marrow examination: general comments and selected techniques. In: Willard, M.D., Tvedten, H. (Eds.), Small Animal Clinical Diagnosis by Laboratory Methods. fourth ed. WB Saunders, Philadelphia, 2004b, 14-37.