STUDIES ON THROMBOCYTOPENIA IN DOGS AND ITS THERAPEUTIC MANAGEMENT

THESIS

Submitted

In partial fulfillment of the requirements for the Degree of

MASTER OF VETERINARY SCIENCE

IN

VETERINARY CLINICAL MEDICINE, ETHICS AND JURISPRUDENCE

BY
UTTAM KUMAR
Enrolment No.: V/13/0243

Bombay Veterinary College, Mumbai

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR – 440 001
(INDIA)
2015

DECLARATION OF THE STUDENT

I hereby declare that the experimental research work and interpretation of the thesis entitled **"Studies on thrombocytopenia in dogs and its therapeutic management"** or part thereof has not been submitted for any of the other degree or diploma of any university, nor the data have been derived from any thesis or publications of any university or scientific organization. The sources of material used and all assistance received during the course of investigation have been duly acknowledged.

Date- / /2015

Signature
(UTTAM KUMAR)
Enrolment No. V/13/0243
Reg. No. 1498

Date - / /2015

Signature
(Dr. D.G.Dighe)
Chairman, Advisory Committee
Assistant Professor,
Department of Veterinary Clinical
Medicine, Ethics and Jurisprudence

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Shri. Uttam Kumar has satisfactorily prosecuted his course of research work for a period of not less than one semester and that the thesis entitled **"Studies on thrombocytopenia in dogs and its therapeutic management"** submitted by him is the result of research work is sufficient to warrant its presentation to the examination in subject of Veterinary Clinical Medicine, Ethics and Jurisprudence for the award of degree by the Maharashtra Animal and Fishery Sciences University, Nagpur.

We also certify that the thesis or part thereof has not been previously submitted by him for a degree of any other university.

Place: Mumbai
Date:

Signature
Dr. D.G.Dighe
Advisor / Guide
Assistant Professor,
Department of Veterinary Clinical Medicine, Ethics and Jurisprudence

ADVISORY COMMITTEE

Name and Signature of Advisory Committee Members

Sr.No.	Name	Designation	Signature
1	Dr. R. V. Gaikwad	Professor Department of Veterinary Clinical Medicine, Ethics and Jurisprudence	
2	Dr. S. D. Moregoankar	Professor Department of Pathology	
3.	Dr .J. U. Patil	Assistant Professor Department of Preventive Medicine and Epidemiology	
4.	Dr. (Ms.) S. V. Bharucha	Assistant Professor Department of Veterinary Physiology	

……

CERTIFICATE

This is to certify that the thesis entitled **"Studies on thrombocytopenia in dogs and its therapeutic management"** submitted by **Shri. UTTAM KUMAR** to the Maharashtra Animal Sciences University, Nagpur, in partial fulfillment of the requirement for the degree of **MASTER OF VETERINARY SCIENCE (M. V. Sc.)** has been approved by the Student's Advisory Committee after examination in collaboration with the External Examiner.

.

Signature

Name & Signature of External Examiner

(Dr. (Mrs) M. M. Gatne)
Head of the Department

(Dr. D.G.Dighe)
Advisor/Guide

Sr.No.	Name	Designation	Signature
1	Dr. R.V.Gaikwad	Professor Department of Veterinary Clinical Medicine, Ethics and Jurisprudence	
2	Dr.S.D.Moregoankar	Professor Department of Pathology	
3.	Dr. J.U.Patil	Assistant Professor Department of Preventive Medicine and Epidemiology	
4.	Dr. (Ms.) S. V. Bharucha	Assistant Professor Department of Veterinary Physiology	

Date:

Signature with seal
Dean / **Associate Dean**
Bombay Veterinary College

Dedicated to My Family

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DATE:
Place: MUMBAI *(Uttam Kumar)*

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LISTS OF ABBREVIATIONS

Sr. No.	Abbreviation		Full Form
1	%	:	Percentage
2	@	:	At the rate of
3	A/B		Albumin:Globulin Ratio
4	ALB		Albumin
5	ALP	:	Alkaline phosphatase
6	B	:	Basophill
7	BMBT	:	Buccal Mucosa Bleeding Time
8	BUN	:	Blood Urea Nitrogen
9	Bw	:	Body Weight
10	Cmm	:	Cubic Millimeter
11	DB	:	Direct Bilirubin
12	df	:	Degree of freedom
13	ESR	:	Erythrocyte sedimentation Rate
14	fl	:	Femtolitre
15	GLB	:	Globulin
16	gm	:	Gram
17	Hb	:	Hemoglobin
18	I	:	Institutional Animal Ethical Committee
19	IB	:	Indirect Bilirubin
20	IU	:	International unit
21	Kg	:	Kilogram
22	L	:	Litre
23	L	:	Lymphocyte
24	M		Monocyte
25	MCH	:	Mean Corpuscular Hemoglobin
26	MCHC	:	Mean Corpuscular Hemoglobin Concentration
27	MCV	:	Mean Corpuscular Volume
28	mg	:	Milligram
29	Ml	:	Milliliter
30	MPLT		Manual Platelet Count
31	MPV	:	Mean Platelet Volume

32	N	:	Neutrophill
33	PCV	:	Packed Cell Volume
34	PDW		Platelet Distribution Width
35	Pg	:	Pico gram
36	PLT	:	Platelet
37	PT		Prothrombin Time
38	RBC	:	Red Blood Corpuscle
39	RDW	:	Red Cell Distribution Width
40	RI	:	Reticulocye Index
41	SE	:	Standard error
42	SGOT	:	Serum Glutamic Oxaloacetic Transaminase
43	SGPT	:	Serum Glutamic Pyruvic Transaminase
44	$t_{0.05}$		t value at 5% level of significance
45	TB	:	Total Bilirubin
46	TEC	:	Total Erythrocyte Count
47	TLC	:	Total leukocyte count
48	TP	:	Total Protein
49	WBC	:	White Blood Corpuscle

1. INTRODUCTION

Platelets are major components of the primary hemostasis system. The formation of the platelet plug is the initial response to endothelial damage; associated with either normal endothelial turnover or tissue damage via interactions between vascular endothelium and platelets.

When vascular endothelium is damaged, local vasoconstriction is initiated and maintained by substances secreted from nearby activated platelets. Platelets then adhere to sub-endothelial collagen via specific membrane receptors on the platelet— a process that initiates platelet activation. Platelets also bind to von Willebrand factor thus promoting further platelet adherence and activation at the site of vessel injury. Activated platelets change shape to increase surface area as well as to promote adherence and aggregation of other platelets via the release of the contents of the platelet-dense and alpha granules. Fibrinogen-mediated platelet-to-platelet adhesion (aggregation) follows exposure of fibrinogen receptors on the surface of activated platelets. The resultant platelet plug is composed of platelets adhered to the exposed vascular sub-endothelium and aggregated to each other. The platelet plug provides only a temporary seal for damaged vessels and is not sufficient to sustain long-term hemostasis (Stanley *et al*., 2011).

Secondary hemostasis is the process of formation of a stable fibrin clot over the already-formed platelet plug. It involves the sequential activation of multiple coagulation factors—a process that ultimately results in the formation of thrombin at the site of vascular damage —the central event of secondary hemostasis. The concept of the secondary hemostatic system has been of two path-ways, the intrinsic and extrinsic, both activating a common pathway and leading to the formation of thrombin and, ultimately, cross-linked fibrin (Kristensen *et al.;* 2003).

The ultimate formation of thrombin and cross-linked fibrin is the main endpoint of coagulation. However, the distinction of separate extrinsic and intrinsic pathways leading to that endpoint is changing. The Tissue factor (extrinsic) pathway

is now thought to be the main initiator of coagulation, with intrinsic factors serving to sustain the process. The division into intrinsic and extrinsic pathways does, however, aid in interpreting coagulation tests.

Thrombocytopenia is a frequent clinical problem in dogs and cats (Italiano and Hartwig, 2007). It is defined as persistent decrease in number of blood platelets that may be associated with hemorrhagic tendency. There are many causes of true thrombocytopenia. The major mechanisms included are increased platelet destruction, increased platelet consumption, decreased platelet production and increased platelet sequestration.

Increased platelet destruction can be caused by both immune and non immune mediated pathways. Immune mediated destruction is most commonly caused by primary immune thrombocytopenic purpura. It is an autoimmune disease, which may occur alone (Smith *et. al.,* 2005), with immune mediated hemolytic anaemia or with systemic lupus erythematosus. In immune thrombocytopenic purpura, it has been established that the presence of young platelets (larger than normal in size) are a sign of healthy bone marrow regeneration and indicates that the thrombocytopenia is caused from peripheral destruction. Secondary immune thrombocytopenic purpura can be associated with drugs such as antibiotics, anti-inflammatory drugs, cardiovascular drugs, diuretics, hormones, infections, neoplasia, and systemic autoimmune disease (Parry, 1989).

Non-immune mediated mechanisms of thrombocytopenia can also be the result of increased consumption (Wong and Rose, 2012). Increased consumption is resulted into disseminated intravascular coagulation in acutely ill patients. Other sources of platelet consumption are thrombotic microangiopathies such as thrombotic thrombocytopenic purpura and hemolytic uremic syndrome. Rapid loss of platelets may occur with massive hemorrhage due to traumatic blood loss or due to rodenticides. Increased platelet destruction may result in the release of platelets that are larger in size to compensate for the consumption (Mangalpally *et. al.* 2010).

Abnormal platelet distribution can be caused by sequestration of platelets in the spleen. Normally 30-40% of the total circulating platelet pool may be stored in

the spleen. Splenomegaly is a condition in which up to 90% of the platelets are sequestered in the spleen. Total platelet mass, survival and production are normal however, peripheral platelet counts are low. Hypersplenism is rare in animals, but has been reported in cases of canines with hypothermia (Russell, 2010)

Decreased or defective platelet production can be caused by bone marrow that is diseased or damaged by neoplasia, drugs, chemicals, toxins, irradiation, or infections. Primary bone marrow disorders such as leukemias, myelodysplasia, and myelofibrosis affect hematopoiesis and causes thrombocytopenia. Metastatic cancer and solid tumors can also affect hematopoiesis, but are rare in animals. Bone marrow defects that can cause pancytopenia may cause mature platelets smaller in size. Examples of veterinary drugs that affect hematopoiesis and may display associated thrombocytopenia are: chemotherapeutic drugs, such as Vincristicin, Cyclophosphamide, antibiotics such as Sulfonamides and Cephalosporins, Phenobarbital, and antifungals such as Griseofulvin in dogs. Jacobs (1998) reported dogs treated with anticonvulsants such as Phenobarbiturate developed thrombocytopenia. Corticosteroid treatments are used to suppress the immune system which causes decrease destruction of platelet in dogs in immune-mediated thrombocytopenia. In animals, many different types of viral, bacterial, fungal, and protozoan infections are common and can cause thrombocytopenia (Russell, 2010). In dogs, thrombocytopenia can occur with viral infections such as Canine Distemper and Parvovirus.

Treatment with immunosuppressive doses of glucocorticoids is the initial treatment of choice of immune mediated thrombocytopenia in dogs (New, 2012). Most patients exhibit platelet count recovery within 1-15 days after initiating treatment with glucocorticoids (Balog *et al.,* 2013). Papaya leaves extract was found to increase platelet count in human patients suffering from Dengue (Patil *et al.,* 2013). Platelet transfusions are commonly used in the management of thrombocytopenic patients (Sekhon and Roy, 2006). The study was planned to identify various reasons of thrombocytopenia and hemorrhagic diathesis (with or without).Since there is a paucity of literature in the veterinary field, the present research was planned with following objectives:

1. To study thrombocytopenia in dogs.

2. Therapeutic management of thrombocytopenia.

2. REVIEW OF LITERATURE

Thrombocytopenia is the most common platelet disorder observed in dogs and it occurs in a variety of pathological conditions. Understanding of the patho-physiological mechanisms of thrombocytopenia is necessary for therapeutic management hence the detailed review of literature pertaining to various aspects of thrombocytopenia and its therapeutic management in dogs is described under the following heads:-

2.1. Physiological functioning of platelets.

2.2. Classification of thrombocytopenia.

2.3. Clinical signs of thrombocytopenia.

2.4. Laboratory evaluation of thrombocytopenia and its interpretation.

2.5. Therapeutic management of thrombocytopenia.

2.1. Physiological functioning of Platelets:

Minnear (2006) reported that platelets are the key to the physiology of thrombosis and hemostasis and are the repositories for biologically active mediators that influence many cellular functions such as aggregation, adhesion, growth and mitogenesis as well as the matrix formation and fibrinolysis. He also stated that platelets support the vascular endothelium thus maintaining the semi permeable barrier to the passage of water and protein.

Brooks and Catalfamo (2010) found that the platelets play a critical role in the initiation, regulation, and localization of hemostasis. The platelets released from the bone marrow circulate in the vascular compartment as quiescent, non-adhesive, smooth discs. Approximately 100 billion platelets are released each day to maintain a peripheral platelet count of 2 million to 5 million cells per millimeter of blood. Injury to the vessel wall triggers platelet activation within nanoseconds. They stated that

in the initial step of activation, platelets rapidly transform into adhesive, spiny spheres capable of recognizing and binding to exposed matrix components of the subendothelium. Late stage platelet activation includes the exposure of platelet membrane phosphatidylserine (PS) and the release of PS rich micro particles, which act as scaffolding for the assembly of coagulation factor complexes.

Boudreaux and Catalfamo (2010) stated that platelets are the first line of defense against bleeding at sites of vascular injury and are major contributors to thrombosis, inflammation and neoplasia. They also observed that platelets have cell surface receptors that recognize signals from their environment and communicate those signals to a complex network of biomolecules that include ions, proteins, nucleotides and phospholipids. In turn, the binding of adhesive proteins to receptors results in the outside- in signaling of events that promote and enhance platelet granule release, platelet aggregate, fibrin formation, and clot retraction.

Brar *et al.* (2011) described that platelets are required for the maintenance of integrity of capillary endothelium and act as first line of defense in controlling the bleeding from the damaged endothelium. Platelets are essential for the clot retraction due to release of a protein thrombosthenin. Platelets play dual role in the inflammatory process due to release of vasoactive amines and other substances. They reported that platelets act as means of clearance of bacteria and also adsorb endotoxins to prevent sepsis/shock.

Balduini and Savoia (2013) reported that 51% of people with inherited thrombocytopenia are actually undiagnosed as to the actual etiology because their disease has not yet been described. He felt that the platelets are a major component of the primary hemostasis system which is defined as the formation of the platelet plug.

Kelley (2013) studied the physiological role played by platelets in disease processes which are numerous and diverse. Activated platelets are involved in clot formation which, if excessive, can cause myocardial infarction or ischemic stroke in human patients. She further stated that platelets can also cause bleeding if they are dysfunctional or are too few in number. Acquired thrombocytopenia is very common

while inherited thrombocytopenia is extremely rare.

Kuter (2014) opined that platelets are cell fragments that function in the clotting system and thrombopoietin helps to control the number of circulating platelets by stimulating the bone marrow to produce megakaryocytes, which in turn shed platelets from their cytoplasm. Thrombopoietin is produced in the liver at a constant rate and its circulating level is determined by the extent to which circulating platelets are cleared, and possibly by bone marrow megakaryocytes. He also suggested that platelets circulate for 7 to 10 days and about one third are always transiently sequestered in the spleen. Platelets are eventually destroyed by apoptosis, a process independent of the spleen.

2.2. Classification of thrombocytopenia:

2.2.1 Immune mediated thrombocytopenia:

2.2.1.1 Hemoprotozoal / Rickettsial infection:

Wilkerson *et al*. (2001) studied immune-mediated thrombocytopenia (IMT), a disorder in which bound IgG on the surface of platelets results in platelet removal and alteration in mean platelet volume. Using flow cytometry, alterations in platelet size, platelet surface-associated IgG and numbers of reticulated platelets were determined in 13 dogs with primary IMT and 4 dogs with secondary IMT induced by experimental infection with *Babesia gibsoni*.

Pantanowitz (2002) observed that thrombocytopenia is a common manifestation of all tick borne disease. Low platelet numbers contribute significantly towards the morbidity and mortality of infection. However, the pathogenesis of thrombocytopenia in many of the tick borne disease is poorly understood. The quantitative changes in platelet counts associated with infection may result from decreased marrow production, hypersplenism, consumption due to widespread endothelial damage, disseminated intravascular coagulation as well as immune mediated platelet destruction. Infection induced thrombocytopenia may infrequently be associated with serious thrombosis. Direct infection of platelets by select tick borne pathogens also facilitates their dissemination within the host.

Drazenovich *et al.* (2007) reported important tick- borne diseases which included Rocky Mountain spotted fever (RMSF), caused by *Rickettsia rickettsii*, canine monocytic ehrlichiosis, caused by *Ehrlichia canis.* Thrombocytopenia may occur due to ineffective haematopoiesis, immune-mediated platelet destruction, infectious or immune-mediated vasculitis, and sequestration or margination of platelets in infection, with *E. canis*, RMSF, bartonellosis and possibly anaplasmosis.

Kelly and Lucas (2009) observed that relatively high percentages of dogs were positive by PCR for *E. canis* (25%), *Anaplasma platys* (19%), and *Babesia canis vogeli* (7%). *Anaplasma platys* is the agent of Canine Infectious Cyclic thrombocytopenia and can cause low platelet counts in approximately 51% of infected dogs. Similarly, about every third of dogs infected with *B. canis vogeli* were thrombocytopenic and 72% of dogs infected with both *A. platys* and *B. canis vogeli* had low platelet counts.

Bodie *et al.* (2011) studied a case of marked thrombocytopenia (6 × 103 platelets [PLT]/mL) in a 10-month-old male pure-bred Beagle dog associated with a mean platelet volume (MPV) of 17.9 fL. Tests for *Rickettsia rickettsii*, *Ehrlichia canis*, and *Borrelia burgdorferi* were negative. Buccal bleeding time was normal. Over 3 months, PLT were 4 to 141 × 103 PLT/mL, and MPV was 11.4 to 25.1 fL; however, PLT were <50 × 103 PLT/mL and MPV was >16 fL during most of this period.

Temizel *et al.* (2011) evaluated erythrocyte indices and platelet indices in dogs with leishmaniasis (*L. infantum*). Canine leishmaniasis was diagnosed by polymerase chain reaction, and confirmed by Western blot in 54 dogs. These dogs were divided into three groups; asymptomatic, oligosymptomatic and symptomatic. Leishmaniasis free 25 dogs were served as controls. Microcytic or normocytic-hypochromic anemia was observed in dogs with Canine leishmaniasis. Platelet count was lower in dogs with Canine leishmaniasis in all clinical stages, compared to controls. Mean platelet volume (MPV) in dogs with Canine leishmaniasis was higher compared with controls, and it was significantly higher in asymptomatic dogs.

2.2.1.2. Drugs or vaccine induced thrombocytopenia:

Bruyette *et al*. (1997) reported thrombocytopenia in 8 of 11 dogs with anticoagulant rodenticide induced hemorrhage. Thrombocytopenia was transient and generally mild to moderate, but it become marked (i.e., less than 30,000 platelets/ul) in two cases. Petechial hemorrhages were not noted in any case. There was no relationship between hematocrit and platelet count. Anticoagulant rodenticide toxicity should be included as a differential diagnosis for dogs with hemorrhage accompanied by mild to moderate thrombocytopenia.

Jacobs *et al.* (1998) observed seizures in a 4 year old, 31kg neutered male mix breed dog characterized by salivation, defecation and tonic clonic activity. After seizure, the results of physical examination, CBC and serum biochemical analysis were within reference ranges. Phenobarbital (2.2 mg/kg) was prescribed. During the subsequent 5 month, seizure activity was not observed. Abnormality was not detected on physical examination. However, blood analysis and biochemical analysis revealed thrombocytopenia and neutropenia.

Jackson and Roy (2006) evaluated heparin induced thrombocytopenia (HIT) in human patients. Two types of HIT were described. Type 1 HIT is a modest transient decrease in platelet counts that occurs within the first 2 to 3 days after heparin initiation and returns to normal spontaneously, even with continuation of heparin. It is generally of no clinical significance. Type 2 HIT (White clot syndrome) is less common, seen in about 0.3 to 5% of patients treated with unfractionated heparin. It is caused by antibodies against platelet factor 4-heparin complex. It usually occurs 4 to 14 days after heparin initiation, but may occur earlier in patients with prior exposure to heparin. It should be suspected in any patient with falling platelet counts below the normal range, or a greater than 50% drop in the platelet count within the normal range.

Harrington *et al*. (2009) showed infusing immune mediated thrombocytopenia plasma into healthy recipients caused acute thrombocytopenia. Subsequently, this activity was attributable to the IgG fraction with the effect mitigated by splenectomy or corticosteroids.

Sycamore (2010) reported mild to moderate thrombocytopenia in five dogs after vaccination and observed clinical symptoms like lethargy, hemorrhage on the gums and skin on ventrum of the abdomen.

Kahn and Line (2011) studied thrombocytopenia in dogs, cats and horses associated with administration of certain drugs. They observed marrow suppression of megakaryocytes or generalized marrow stem cell suppression after administration of Estrogen, Chloramphenicol, Phenylbutazone, Diphenylhydantion, and Sulphonamides. Increased platelet destruction and consumption was observed after administration of Sulfisoxazole, Acetaminophen, Ristocetin, Levamisole, Aspirin, Methicillin, and Penicillin. However; they found drug reactions were idiosyncratic and therefore unpredictable. According to them, platelets usually returned to normal shortly after the drug was discontinued.

Maciel *et al.* (2011) evaluated hematological and electrophoretic alterations in puppies after innoculation of live attenuated vaccine against Canine Distemper virus and Canine Parvo virus. Mild to moderate thrombocytopenia was observed in dogs 3-5 days post-vaccination with live attenuated vaccines, mainly those against CDV and CPV. Besides the platelet damage caused by the CDV *per se*, infected animals showed secondary immune-mediated thrombocytopenia and decreased platelet production due to direct viral megakaryocyte infection.

New (2012) observed thrombocytopenia (IMT) also referred to as ITP (idiopathic thrombocytopenic purpura) in dogs. It occurs when antibodies target non-self antigens adsorbed on the surface of platelets or when immune complexes become bound to platelet surfaces. These antibody-sensitized platelets are then removed by the monocyte-macrophage phagocytic system (MMPS). Immune mediated platelet destruction can be primary with no underlying cause or secondary to drugs or vaccine administration and blood transfusion. When secondary to vaccines, it occurs typically 3-10 days post vaccination. In dogs, females are more commonly affected than males. Over-represented breeds include the Cocker Spaniel, Miniature and Toy Poodle, and Sheepdog.

Haung *et al.* (2012) investigated thrombocytopenia in dogs after vaccination

with distemper and hepatitis vaccines; however, the platelet count did not decrease below 1,00,000 cells/lL, nor did this decrease typically result in clinical signs of hemorrhage. In one case, a dog developed severe thrombocytopenia that resulted in clinical bleeding after recent vaccination.

2.2.1.3. Neoplasia associated thrombocytopenia:

Grindem *et al.* (1994) studied 10% of dogs with cancer at North Carolina State University Veterinary Teaching Hospital and found these dogs to be thrombocytopenic. The thrombocytopenia was associated with infectious/inflammatory etiologies in 4%, miscellaneous disorders (therapy, bone marrow failure, disseminated intravascular coagulation) in 35%, and neoplasia without identifiable secondary factors in 61 % of the cancer- bearing dogs.

Maczuzak *et al.* (2003) reported moderate to severe thrombocytopenia in Canine multiple myeloma or plasma cell myeloma infiltration affected dogs. Affected dogs exhibited signs of petechiae on mucous membranes, gingival bleeding, and epistaxis.

Maruyama *et al.* (2004) evaluated 208 dogs with malignant tumor and detected a low platelet count, prolonged PT, prolonged APTT, a low plasma fibrinogen concentration and high serum FDP. Furthermore; among DIC cases, a low platelet count was detected in 14 dogs (38.3%), prolonged PT in 15 dogs (45.5%), prolonged APTT in 16 dogs (69.6%), a low plasma fibrinogen concentration in 16 dogs (37.2%) and high serum FDP in 15 dogs (50.5%). The study suggested that; when APTT is prolonged, platelets become low. DIC would be most suspected in dogs with a malignant tumor.

Silva *et al*. (2008) observed thrombocytopenia in a 12-yr-old female Boxer dog affected with multiple myeloma; an uncommon malignant neoplastic disease of humans and domestic animals.

Thomas (2010) observed thrombocytopenia in dogs with neoplasia in 10-36% of the affected animals. Lymphoma, carcinoma, hemangiosarcoma, and hematopoetic neoplasia comprised of majority of cases. Thrombocytopenia was

frequently attributed to chemotherapy, decreased platelet production, or DIC.

Bruyland *et al.* (2010) studied a case of estrogen induced pancytopenia due to neoplastic change of cryptorchid testes. Pancytopenia is a medical condition in which there is a reduction in the numbers of red and white blood cells and of platelets due to damage to the stem cells or due to bone marrow failure. Bone marrow damage may be caused by infections, drugs, toxins, neoplasia, osteosclerosis, myelofibrosis or by an immune mediated mechanism or it may be idiopathic. In the acute form of pancytopenia, the destruction of progenitor and dividing cells leads to leucopenia /neutropenia within 5 days and thrombocytopenia within 8-10 days.

Kahn and Line (2011) represented hemangiosarcoma, lymphoma and adenocarcinoma associated with consumptive thrombocytopenia due to DIC in dogs. Immunologic and inflammatory mechanism cause increased platelet survival. However, bleeding tendencies without thrombocytopenia occasionally exist.

2.2.1.4. Miscellaneous causes of thrombocytopenia:

Cowan *et al*. (2004) reported a benign inherited giant platelet disorder which affects approximately 50% of Cavalier King Charles Spaniel dogs. It is characterized by thrombocytopenia, macrothrombocytes, or decreased platelet aggregation in response to ADP. They observed thrombocytopenia in Cavaliers to be inherited through an autosomal recessive mechanism. According to them Cavaliers might be useful models of inherited giant platelet disorders.

Kim *et al.* (2008) enrolled ninety-eight patients in their study that had experienced snake bites and observed a significant decrease in the hematocrit, platelet count, protein, albumin, ALP and cholesterol levels in those patients who experienced snake bite.

Zenker *et al.* (2009) conducted prospective evaluation of dogs with heat stroke from May 2005 to August 2008. Dogs that developed severe thrombocytopenia within 5 days of admission were included in the study. Six dogs were presented with heat stroke during that time period. Four developed severe

thrombocytopenia. All four dogs tested positive for antiplatelet antibodies and did not have elevated D-Dimers at that time. In those cases thrombocytopenia was due to immune mediated destruction and not due to DIC.

Kolkka (2010) reported immune-mediated thrombocytopenia (ITP) in the patients affected with Evan's Syndrome. This is primarly a canine disease, and while it can occur in any breed, small-breed dogs such as Cocker Spaniels, Bichon Frise, and Pugs can be pre-disposed.

Scott and Jutkowitz (2010) stated that alloimmune thrombocytopenias can be classified as types of secondary immune-mediated thrombocytopenia. They result from the production of alloantibodies that target platelet alloantigens and cause platelet destruction, primarily by phagocytosis of the opsonized platelets. Exposure to foreign platelet alloantigens may occur with pregnancy or blood transfusion, causing neonatal alloimmune thrombocytopenia or post-transfusion purpura, respectively.

Nakamura *et al*. (2013) observed thrombocytopenia in a dog which was stung by approximately 300 Africanized bees. Clinical examination revealed that severe diffuse erythema and edema over the entire body. Forty-eight hours after admission, the dog developed hematemesis, hematochezia and severe thrombocytopenia was identified. Supportive care, including IV crystalloid and colloid fluids, dextrose, fresh frozen plasma, oxygen therapy, broad spectrum antimicrobials, dexamethasone, and diphenhydramine was initiated. The dog's condition stabilized over the next 2 days. Extensive diagnostic investigation revealed no likely trigger other than the Africianized bee exposure, and a diagnosis of IMT was made.

2.3. Clinical signs of thrombocytopenia:

Benjamin (1998) observed petechiation and purpura on oral mucus membrane, ventral thoracic area and abdomen and also on the inner aspect of the thighs. According to him, hemorrhages may occur into the intestinal tract, the urogenital tract, the respiratory tract or the brain. Scleral or retinal hemorrhages can

also occur.

Sekhon and Roy (2006) reported that when the platelet count decreases below 10,000/ µL, spontaneous mucocutaneous bleeding (gingival bleed, epistaxis, menorrhagia, petechiae and ecchymosis) and life threatening, spontaneous intracranial hemorrhage or gastrointestinal bleeding increases rapidly. Severe thrombocytopenia could give rise to additional coagulation problems like abnormal clotting time and auto agglutination.

Brooks and Catalfamo (2010) stated that immune mediated thrombocytopenia typically cause signs of petechiae, ecchymosis and mucosal hemorrhage, such as epistaxis, hematuria, gingival and intestinal hemorrhage, and also prolonged bleeding after injury.

Scott and Jutkowitz (2010) recorded hemorrhage involving skin and mucosal surfaces in the dogs with primary IMT. Clinical signs of most affected dogs revealed petechiae, ecchymosis, epistaxis, gastrointestinal hemorrhage (melena, hematemesis, hematochezia), oral bleeding, vaginal bleeding, hemoptysis, and/or hematuria. Hemorrhages were especially common on the oral mucosae, ventral abdomen, inner limbs, and pinnae, where they might be mistaken for a rash. Occular lesions are also common and vary from mild conjunctival, sclera, iridal, or retinal hemorrhage to hyphema, severe retinal hemorrhage, retinal detachment, and blindness.

New (2012) observed that clinical signs directly related to thrombocytopenia can include petechiae, ecchymosis, prolonged bleeding after trauma and venipuncture, bruising, melena, hematemesis, intra-occular hemorrhage or blindness, hematuria, oral bleeding, neurologic signs associated with cerebral bleeding, and epistaxis. Petechiae and ecchymosis are easily seen on mucus membranes or thin-skinned regions such as the abdomen. Other signs that may be associated with thrombocytopenia may include fever, weight loss, enlarged lymph nodes, splenomegaly, hepatomegaly, abdominal masses, stiffness, joint pain, neurologic signs or edema. An increased risk of spontaneous hemorrhage is seen with platelet counts less than 3000 cells/µl. However, hemorrhage is unpredictable

in dogs with immune mediated thrombocytopenia.

2.4. Laboratory evaluation of thrombocytopenia and its interpretation:

2.4.1. Complete Blood Count:

Waner (2008) stated that infection with *E. canis* causes profound hematological changes including thombocytopenia in affected dogs. He found concomitant increase in the mean platelet volumes of all the thrombocytopenic dogs. There was a decline in total leukocyte count (7 out of 9 dogs) and in the absolute neutrophil count (5 out of 9 dogs). A decrease in the packed cell volume (PCV) and hemoglobin concentration was seen in 3 out of 9 dogs. Among the erythrocytic indices, a decline in the mean corpuscular volume (MCV) was detected in 5 of the 9 dogs, with an increase in the mean corpuscular hemoglobin concentration (MCHC) in 4 of the dogs tested.

Thomas (2009) evaluated thrombocytopenia in dogs and estimated platelet concentration (Automated or manual).There was increased mean platelet volume in thrombocytopenic dogs. He stated that microscopic examination of blood smears could be used to detect organisms, neoplastic cells, platelet clumping and to estimate the platelet concentration.

Brooks and Catalfamo (2010) opined that complete blood count is useful to detect infectious agent, neoplastic cells, spherocytes, schistocytes and also to assess platelet count and morphology, MPV and percentage of reticulated platelets. They stated that splenic/lymph node enlargement was useful to detect infectious agent and neoplastic cells. Coagulation tests such as PT, aPTT, fibrinogen, FDP or D- dimer were useful for detection of acquired hemorrhagic disorder or DIC.

Russell (2010) opined that Complete blood count (which includes platelet count, mean platelet volume and platelet distribution width) should be the first test performed in any animal that is suspected of having a platelet disorder. According to him mean platelet volume (MPV) (estimates platelet size) is inversely proportional to the platelet number. He reported the decrease in MPV in dogs that had early manifestations of immune mediated thrombocytopenia. Decrease in MPV are more

often associated with bone marrow failure. Platelet distribution width may be useful in differentiating between hyper-destructive thrombocytopenia (immune-mediated thrombocytopenia) and hypo-productive thrombocytopenia due to aplastic anemia. He suggested microscopic examination of the blood smear for platelet morphology and size, evidence of platelet clumping or adherence to leukocytes. It should be performed when platelet counts fall below the limit of sensitivity or linearity (usually 5,000– 20,000 platelets/ µL) of a hematology analyzer.

Fathi and Jamshidi (2013) studied hematological and biochemical changes of treatment of idiopathic thrombocytopenia in a Terrier dog using human intravenous immunoglobulin. They observed severe thrombocytopenia, mild leukocytosis, increase in the erythrocyte sedimentation rate and total protein concentration.

2.4.2. Coagulopathy tests

2.4.2.1. Buccal Mucosal Bleeding Time

Jergens *et al.* (1987) used buccal mucosal bleeding time (BMBT) to evaluate hemostatic competence of dogs. They performed BMBT in thrombocytopenic dogs (3) and dogs (7) with von Willebrand disease and found an increase in BMBT.

Thomas (2009) suggested buccal mucosal bleeding time as an *in vivo* assessment of primary hemostasis, prolonged with thrombocytopenia, platelet dysfunction, von Willebrand disease and vascular disorders.

2.4.2.2. Prothrombin Time (PT) & Activated Partial Prothromboplastin Time (aPPT):

Feldman *et al.* (1981) reported the normal PT range (6.4-7.4 sec) in dogs as a sensitive indicator of coagulation abnormalities as a consequence of hepatic disease. He also reported the normal aPTT range in dogs (9.5 – 10.5 sec).

Gangurde *et al.* (2006) studied and diagnosed disseminated intravascular

coagulation (DIC) with low platelet count in 6 dogs on the basis of signs and increased CBCT, ACT, PT, aPTT, TT, FDP and decreased plasma fibrinogen and presence of D-dimer. The therapeutic management of DIC by replacement of coagulation factors, proteins and fibrinogen was studied with the improvement in coagulation parameters.

Brooks and Catalfamo (2010) stated that coagulation tests such as PT, aPTT, fibrinogen, FDP or D- dimer are useful for detection of acquired hemorrhagic disorder or DIC.

2.5. Therapeutic management of thrombocytopenia:

2.5.1. Immunosuppressive drugs:

Rozanski *et al.* (2002) reported glucocorticoids such as Prednisolone are generally used in the treatment of IMT in dogs and humans. In addition, a single dose of Vincristine (0.02 mg/kg) has been recommended for treatment of refractory or severe IMT in dogs. He observed that addition of Vincristine to Prednisolone in the treatment of primary IMT is well-tolerated and is associated with a rapid increase in platelet counts in dogs with severe thrombocytopenia. Administration of combined Vincristine and Prednisolone is associated with a more rapid increase in platelet numbers, compared with the use of Prednisone alone. Early use of Vincristine seems warranted in dogs with severe primary IMT.

New (2012) reported corticosteroids are the initial therapy of choice for immune mediated thrombocytopenia. Prednisolone is used most frequently. He observed dogs attain a platelet count above 50,000 – 100,000 cells/µl within 7 days of starting corticosteroids in dogs. (Human IVIG is a sterile immunoglobulin (Ig) preparation that contains IgG and trace amounts of IgM, IgA, CD4, CD8, and human leukocyte antigen molecules. Human IVIG is effective in increasing platelet counts in about 85% of IMT patients, with 65% achieving normal platelet counts in dogs). Vincristine is occasionally given with corticosteroids and is thought to increase platelet counts by several mechanisms. In healthy dogs, it is thought to stimulate thrombopoiesis but in dogs with IMT, thrombopoiesis is already maximally

stimulated because giant circulating platelets and increased megakaryocytes within bone marrow aspirates are detected. Azathioprine, Mycophenolate mofetil, and cyclosporine are second line of therapy for IMT in dogs.

Poon (2012) reported that corticosteroids are the standard initial treatment for people with ITP as well as for Veterinary patients. In Veterinary patients, Prednisolone is used most frequently. Prednisolone and Vincristine both have mild immunosuppressive and thrombocytotic properties. He observed a significantly more rapid increase in platelet numbers on use of Prednisolone and Vincristine as compared to Prednisolone alone in the treatment of primary IMT in dogs. He observed that hIVIG is beneficial for acute management of presumptive primary IMT in dogs. A single hIVIG infusion at 0.5g/kg over 6-12 hours was safe and was associated with a significant decrease in platelet-count recovery time. Other immunosuppressive drugs such as azathioprine, cyclosporine, and mycophenolate mofetil have been used in conjunction with corticosteroids in dogs with IMT.

Nakamura *et al*. (2012) observed corticosteroids are the initial therapy of choice for dogs with IMT due to their consistent effect and relatively low cost. Prednisolone is used most frequently although dexamethasone therapy has been reported as well. The hIVIG infusion can be used for acute management of presumptive primary IMT in dogs. A single hIVIG infusion at 0.5g/kg over 6–12 hours was safe and was associated with a significant increase in platelet count. Vincristine appears to stimulate thrombopoiesis. They observed use of Prednisone and Vincristine to that of Prednisone alone in the treatment of primary IMT cases in dogs and found a significant increase in platelet numbers. In dogs, Azathioprine at 2 mg/kg, Cyclosporine at 15–30 mg/kg, Danazol at 5 mg/kg, Leflunomide at 4 mg/kg/day, and Mycophenolate mofetil at 10 mg/kg, can be used as second line of therapy.

Balog *et al*. (2013) assessed administration of Vincristine and Prednisolone together. It was associated with a more rapid increase in platelet numbers and a shortened duration of hospitalization of dogs with immune mediated thrombocytopenia, as compared with the use of Prednisolone alone. They assessed Human intravenous immunoglobulins (hIVIG) therapy versus placebo

therapy in dogs with ITP, and found that the dogs treated with hIVIG and prednisone had a reduction in platelet recovery time and length of hospitalization compared with those treated with Prednisone and placebo. However they noted that hIVIG is much more expensive and administration is more time consuming and challenging than treatment with Vincristine.

2.5.2. Papaya leaf extract:

Gammulle *et al.* (2011) evaluated the platelet increasing potential of mature papaya leaves versus immature papaya leaves. Thrombocytopenia was established in Wister rats with the oral administration of Hydroxyurea ($1/10^{th}$ of 15 mg/kg dose). Two groups of thrombocytopenic rats were orally treated with the high dose (0.72ml/100mg) of CLC (*Carica papaya* leaf concentrate) using either mature or immature leaves of the same plant, and non thrombocytopenic rats were given distilled water, for three consecutive days. Both mature and immature leaves of *C. papaya* showed a high potential for increasing platelets by 73.8% and 71.3% respectively. They concluded that freshly prepared concentrate from both mature and immature leaves of *Carica papaya*, effectively and comparably increases rat platelets when administered orally. Thus, the CLC has the potential to be developed as a plant based therapeutic agent for thrombocytopenia.

Ashfaq (2013) found that juice extracted from papaya leaves helps to increase the platelet count in patient with dengue fever. He opined that the platelet count of the patient that received the juice extract had increased significantly. The genes ALOX 12 and PTAFR were highly expressed amongst the patients that received the juice extract. He observed that these genes inhibit the growth of dengue virus and have maximum activity against DENV-2 replication.

Patil *et al.* (2013) studied the determining effect of the aqueous extract of *Carica papaya* leaves in increasing the platelet count in the thrombocytopenic rat model. The aqueous extract of *Carica papaya* leaves at a concentration of 400mg/kg and 800mg/kg were given to cyclophosphamide induced thrombocytopenic rats for a period of fifteen days. *Carica papaya* leaves extract was found to increase the platelet count. The study aimed at determining the possible

effects of papaya leaves in thrombocytopenia occurring in dengue fever.

Patil *et al.* (2013) observed that febrile thrombocytopenia is a common condition seen in dengue patients, which increases the mortality rate. They studied the use of *Carica papaya* in treating fever, pain and thrombocytopenia. Six subjects were randomly allotted in control and study group. The control group subjects were treated with only medical management and study group were treated with *C. papaya* leaf extract in addition to medical management. They observed that compared to the control group, those in the study group recovered earlier clinically, with a faster rise in platelet count.

Tahir *et al.* (2014) carried out a study on 55 Swiss albino mice. The mice were randomly divided into five groups (C, M 10, M 5, F 10 and F5). Thrombocytopenia was induced in all groups by a single intraperitoneal injection of carboplatin. After carboplatin injection, platelet count decreased. Male papaya leaf juice was given to groups M 10 and M 5 and female papaya leaf juice was given to F 10 and F 5. They found papaya leaf juice prevented fall in platelet count throughout the study period with P-value < 0.001. Higher dose (10 ml/kg) produced significantly higher responses as compared to low dose (5 ml/kg). Papaya leaf juice prevents reversible thrombocytopenia induced by carboplatin in a dose dependent manner. There is no difference between male and female plants in this respect.

3. MATERIAL AND METHOD

The present research work entitled **"Studies on thrombocytopenia in dogs and its therapeutic management"** was carried out on the in patients admitted in Bai Sakarbai Dinshaw Petit Hospital for Animals (BSDPHA), Parel, Mumbai-12 and the cases referred to the Teaching Veterinary Clinical Complex (TVCC), Parel.

3.1. Inclusion criteria and study design:

Dogs (24) of different breeds and age groups having platelet count less than 1,00,000/cmm with or without bleeding disorders were selected for the study. The dogs were examined for the presence or absence of any bleeding disorder exhibited clinically (ecchymosis, hemorrhages, epistaxis, hematochezia, melena, hematuria etc.), were clinically examined and detailed history of these dogs was undertaken. The dogs were further grouped into dogs with bleeding disorder (Group A) and dogs without bleeding disorder (Group B).

The selected dogs were then subjected to performing tests such as clotting time, Buccal Mucosa bleeding time, Prothrombin time (PT) and Activated Partial thromboplastin Time (aPTT).The dogs of Group A-1 were further classified into dogs with increased Prothrombin time(PT) and dogs with normal Prothrombin time(PT) (Group A-2). The dogs of Group B were also classified into dogs with increased Prothrombin time (Group B-1) and dogs with normal Prothrombin time (Group B-2). The Complete blood count, liver function test and kidney function tests were evaluated of all the dogs of used for present Study. Therapeutic management of thrombocytopenic dogs was further carried out on the basis of laboratory findings.

3.2. Laboratory evaluation of thrombocytopenia:

Laboratory evaluation of thrombocytopenia was carried out on all 24 dogs. The evaluation included hematology, coagulation profile, liver and kidney function tests, microscopic examination and manual platelet count.

3.2.1. Buccal Mucosal Bleeding Time (BMBT).

The dog was restrained properly. An incision of 1 mm deep and 5 mm long was taken with help of scalpel blade No-22 on the buccal mucosa of the upper lip. Blood was wiped with gauze and clotting was assessed every 30 seconds without disturbing the clotting process. The time required for bleeding to cease was noted (Min./Sec.)

3.2.2. Clotting time:

Clotting time was checked by putting a few drops of blood drawn from body, onto a glass slide. A stopwatch was started simultaneously. The time taken for the drops to clot was recorded. Normal clotting time of blood in dog is 2 to 6 minutes. (Brar *et al*.1998).

3.2.3. Prothrombin Time (PT):

The dog's plasma (0.1ml) was taken into a test cuvette and incubated at 37ºC for 2 minutes. Then 0.2 ml of pre warmed PT reagent was added into the test cuvette.Timer was started simultaneously and the clotting time was recorded in seconds.

3.2.4. Activated Partial Thromboplastin Time (aPTT):

The patient's plasma (0.1ml) was taken in a test cuvette and incubated at 37ºC, for 1 minute. 0.1 ml of aPTT reagent was added into the respective test cuvette, mixed well and incubated at 37º C for 3 minutes. After this 0.1 ml of pre-warmed calcium chloride was added into test cuvette and clotting time was recorded in seconds. For both PT and aPTT tests, blood was collected in 3.2% sodium citrate vials and values were determined using commercial coagulometer and Prieclot coagulation test kit.

3.2.5. Complete blood count and serum biochemistry:

For complete blood count (CBC), blood samples were collected in EDTA vials and mixed very carefully in order to avoid hemolysis. The complete blood count was carried out in all suspected dogs and included the following parameters: Estimation of haemoglobin (Hb), total red cell count (RBC), packed

cell volume (PCV) and calculation of various red cell indices such as MCV, MCH, and MCHC. These parameters were estimated by using Robonik Prietest auto haematology analyzer and were carried out as per standard protocols given by Benjamin (2001).

3.2.6. Liver function test:

Liver function test such as total bilirubin (mg/dl), direct bilirubin (mg/dl), indirect bilirubin (mg/dl), total protein (g/dl), albumin (g/dl), and globulin (g/dl) were performed after collecting blood in plain vial. These parameters were estimated by using Robonik Prietest auto biochemistry analyzer and were carried out as per standard protocols given by Benjamin (2001).

3.2.7. Kidney function test:

Kidney function tests such as serum creatinine (mg/dl) and (BUN) Blood urea nitrogen (mg/dl) were performed after collecting blood in plain vial. These parameters were estimated by using Robonik Prietest auto biochemistry analyzer and were carried out as per standard protocols given by Benjamin (2001).

3.2.8. Microscopic examination of RBC and WBC:

The RBC and WBC morphology for all the cases were examined microscopically. In addition, blood smear examination to detect hemo-parasites and fine needle aspiration cytology were also carried out in suspected cases. Presence of auto- agglutination and clumping were checked by microscopic examination of washed red blood cells at three temperatures i.e. at 4ºC, 37ºC and at room temperature in cases suspected for immune mediated diseases. Routine urine analysis, fine needle aspiration cytology and stool sample examination were performed in few cases.

3.2.9. Mean Platelet Volume and Platelet Distribution Width interpretation:

Automated hematologic analyzers can measure Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW). The platelet volume and platelet distribution width was determined with impedance or optical based analyzers by the change in resistance as platelet pass through an aperture containing an

electric field in single file. The degree to which the platelets alter the resistance as they pass through the field corresponds to their size. The different sized platelets in the sample were represented on a frequency distribution curve of proportion of platelets versus the platelet volume and the analyzer thus provides the result for mean volume of platelets. Mean platelet volume (MPV) represented the average platelet size and platelet distribution width (PDW) represented the heterogeneity of platelet size.

3.2.10. Platelet count:

Platelet count is helpful in determining the severity of thrombocytopenia, to check the course of disease and response to treatment. The venous blood was withdrawn in a plastic syringe and placed in a siliconized vial having 2.5 to 5 mg EDTA/ 2 ml of whole blood. Hemocytometer was used for counting of blood platelets by using 1% Ammonium oxalate or REES ECKER diluting fluid. An erythrocyte diluting pipette was rinsed with diluting fluid to reduce adherence of platelets to glass surface. Blood was drawn up to the 0.5 mark and diluents fluid up to 101 mark. The contents if the pipette were mixed thoroughly by shaking for 5 minutes. First few drops were discarded and both sides of counting chamber were charged. The hemocytometer was placed in a moist chamber and allowed to stand for 15 minutes. Under reduced illumination, the number of cells in the central ruled area on both sides of hemocytometer *i.e.,* 2 × 25 small squares, were counted. Total number of thrombocytes/µl = Number of of thrombocytes × 1000. Examination of the hemocytometer was carried out by microscope on 40x. Brar *et al.* (1998).

3.2.11. Reticulocyte count:

Reticulocyte index was estimated by incubating blood with equal amount of 0.5% new methylene for 15 to 20 minutes following which a smear was prepared, stained with Wright's stain and counted as per Brar *et al*. (1998).

3.2.12. Erythrocyte sedimentation rate (ESR):

ESR was estimated by Wintrobe tube method and results were expressed in millimeter (mm).

3.3. Snap 4Dx plus test:

Test Procedure of Snap 4Dx plus test was performed as per the standard procedure given in the literature enclosed with kit of SNAP 4Dx Plus Test Kit of IDEXX Laboratories, Inc. (IDEXX LABORATORIES, One IDEXX Drive, Westbrook, Maine 04092 USA)..

3.4. Therapeutic Manage:

3.4.1. Papaya Leaf Extract:

Group A-1.1 (3 dogs), A-2.1 (4 dogs), B-1.1 (3 dogs), and B-2.1 (2 dogs) were treated with Papaya leaf extract (Tab. Platex-150mg).Tab. Platex manufactured by Arjun Health care, Prabhadevi, Mumbai – 25 were procured and fed to dogs affected with thrombocytopenia @ 1 Tab. BID for 14 days.

3.4.2. Treatment with Prednisolone:

Group A-1.2 (4 dogs), A-2.2 (4 dogs), B-1.2 (2 dogs), and B-2.2 (2 dogs) were treated with Inj. Prednisolone @ 2 mg/kg was given intramuscular with tapering dose.

3.4.3 Supportive treatment

The dogs of all the groups were also treated with supportive treatment such as fluid therapy (Inj. Dextrose Normal Saline, Normal Saline, Ringers Lactate, 25% Dextrose), B-Complex, Haematanics, Liver Extract wherever required. Besdides this dogs of all group were also treated symptomatically with Vit.K , haemocoagulants etc. The dogs positive for *Ehrlichia.canis*, Trypanosoma and *Babesia canis* infection and were treated with Tab. Doxycycline @ 5 mg/kg b wt., Inj Quinapyramine sulphate @ 2.5 mg/ kg bwt.and Inj Diaminazine aceturate @ 3.5 mg/kg b wt. respectively.

3.5. Statistical Analysis:

Statistical analysis was carried out as per the methods given by **Snedecor and Cochran (2000).**Correlation coefficient was calculated for platelet count and other laboratory parameters. Paired t test was applied to compare the results before and after treatment.

4. RESULTS AND DISCUSSION

The present research work entitled “Studies on thrombocytopenia in dogs and its therapeutic management” was carried out in the Department of Veterinary Clinical Medicine, Ethics and Jurisprudence of Bombay Veterinary College, Parel, Mumbai-12. The cases included were dogs brought to the affiliated Bai Sakarabai Dinshaw Petit Hospital for Animals (BSDPDHA) and cases referred to Teaching Veterinary Clinical Complex (TVCC), Parel, Mumbai -12.

Total 24 dogs were included in present studies on the basis of low platelet count (below 100000/ cmm).Out of 24 dogs there were 15 dogs (Group A) having symptoms of bleeding and 9 dogs(Group B) were not having symptoms of bleeding.

4.1. Clinical manifestations:

The dogs with thrombocytopenia showed clinical manifestation (Fig. 1) of Anorexia (16%), Anemia (12.8%),Melena (12%), Hepatomegaly (9.6%), Vomition (9.6%), Splenomegaly (8%), Dehydration (7.2%), Fever (4%), Hematochezia (4%), Diarrhoea (3.2%), Hematemesis (2.4%), Icterus (2.4%), Lymph node enlargement (2.4%) ,ecchymoses (1.6%), epistaxis (1.6%), inappetance (0.8%) , oliguria(0.8%) , petechiae(0.8%) and tick infestation(0.8%).

The dogs of Group A were having bleeding diathesis with symptoms like epistaxis, hematochezia, melena, hematuria, hematemesis, petechiae or ecchymoses. Whereas, the dogs of Group B showed symptoms of anorexia, dehydration, icterus and oliguria. However these dogs did not show clinical manifestations of bleeding diathesis.

Overall impact of clinical symptoms Table 1 and Table 2 depict the clinical manifestation of Group A and B respectively, whereas clinical manifestation and physical examination results & impact of clinical manifestation are depicted in Table 3 and Fig.1 respectively. There were 15 dogs in Group A and 9 dogs in Group B. All cases were undergone clinical examinations such as heart rate, respiratory rate and rectal temperature which are depicted in Table 4.

Table 1: Details and clinical manifestation of dogs with bleeding disorders (Group A).

Category	Case No.	Age (years)	Sex *	Breed	Clinical signs
Group A-1	1	4	M	Labrador	Melena, Epistaxis, Fever, Anorexia, Hepatomegaly, Spleenomegaly, Enlarged L. N.
	2	9.5	M	Rottweiler	Melena, Vomition, Anorexia, Icterus, Dehydration, Hepatomegaly
	3	3	F	Labrador	Melena, Anorexia, Anemia, Icterus, Dehydration, Hepatomegaly, Spleenomegaly
	4	4	M	German Shepherd	Melena, Petechiae, Anorexia, Hepatomegaly
	5	12	M	Doberman	Melena, Hematochezia, Fever, Anorexia, Hepatomegaly, Spleenomegaly, Enlarged L. N.
	6	4.5	M	Saint Barnard	Melena, Hematochezia, Hematemesis, Diarrhoea, Vomition, Fever, Anorexia, Hepatomegaly, Spleenomegaly
	7	9	F	Labrador	Melena, Diarrhoea, Anorexia, Anemia, Dehydration.
Group A-2	8	5	M	Pomeranian	Melena, Vomition, Anorexia Hematochezia, Diarrhoea, Anemia.
	9	15	M	Labrador	Melena, Epistaxis.
	10	7	F	Non descript	Melena, Hematemesis, Ecchymoses, Anemic, Tick infestation, Vomition, Anorexia.
	11	8	F	Doberman	Melena, Anemic, Spleenomegaly.
	12	8	F	Non descript	Melena, Vomition, Hematemesis, Ecchymoses, Anorexia, Anemic, Spleenomegaly.
	13	4.5	F	Pomeranian	Melena, Hematochezia, Diarrhoea, Anemic, Spleenomegaly
	14	8	M	Labrador	Melena, Hematochezia, Fever, Anemic, Dehydration, Spleenomegaly, Enlarged L. N.
	15	8	M	Non descript	Melena, Vomition, Anemic, Dehydration.

* (M = Male; F = Female)

Table 2: Details and clinical manifestation of dogs with non-bleeding disorders (Group B).

Category	Case No.	Age (years)	Sex	Breed	Clinical signs
B-1	16	12	Male	Cocker Spaniel	Vomition, Anorexia, Anemia, Icterus, Dehydration, Hepatomegaly.
	17	10.5	Male	Pomeranian	Vomition, Anorexia, Dehydration.
	18	12	Male	Golden Retriever	Vomition, Anorexia, Dehydration.
	19	10	Male	Labrador	Anorexia, Anemia, Spleenomegaly.
	20	9	Female	Pug	Vomition, Fever, Anorexia, Anemia.
B- 2	21	5	Female	Boxer	Anemia, Dehydration, Hepatomegaly, Spleenomegaly.
	22	8	Male	Doberman	Vomition, Anorexia, Anemia, Oligouria, Dehydration.
	23	1.5	Male	Labrador	Vomition, Anorexia, Anemia, Spleenomegaly.
	24	4	Male	Doberman	Anorexia, Anemia.

Table 3: Frequency distribution of clinical manifestation of thrombocytopenia

Clinical Signs	No. of cases exhibiting the clinical sign	Frequency distribution of clinical manifestation of thrombocytopenia (%)
Anorexia	20	16
Anemia	16	12.8
Melena	15	12
Hepatomegaly	12	9.6
Vomition	12	9.6
Splenomegaly	10	8
Dehydration	9	7.2
Fever	5	4
Hematochezia	5	4
Diarrhoea	4	3.2
Hematemesis	3	2.4
Icterus	3	2.4
LN enlargement	3	2.4
Ecchymoses	2	1.6
Epistaxis	2	1.6
Inappetance	1	0.8
Oligouria	1	0.8
Petechiae	1	0.8
Tick Infestation	1	0.8

Table 4: Details of clinical examination of dogs having thrombocytopenia.

Category	Case No.	H.R. (bpm)	R.R. (per minute)	R.T. (^{o}F)
Group A-1	1	87	39	104.6
	2	102	26	101.6
	3	89	28	102.0
	4	123	18	101.6
	5	142	34	105.2
	6	99	30	104.2
	7	80	32	101.2
Group A-2	8	139	29	100.8
	9	96	26	101.2
	10	79	20	101.4
	11	86	26	101.2
	12	102	22	101.2
	13	143	23	100.2
	14	115	29	106.2
	15	105	30	101.0
Group B-1	16	94	36	102.0
	17	145	18	101.4
	18	110	24	100.6
	19	97	21	100.2
	20	125	34	103.8
Group B-2	21	112	20	100.4
	22	98	26	99.4
	23	106	28	100.8
	24	103	23	102.0

* H.R. = Heart Rate; R.R. = Respiratory rate; R.T. = Rectal Temperature.

* bpm = beats per minute; **^{o}F =** degree Fahrenheit.

4.2. Prothrombin time:

All (24) dogs were subjected to prothrombin time test on 0^{th} day. The dogs of Group A were sub grouped on the basis of Prothrombin time into Group A-1 and A-2. Group A-1 consisted of dogs with increased Prothrombin time where as Group A-2 was consisted of dogs with normal Prothrombin time. Similarly, The Group B dogs were classified on the basis of Prothrombin time into Group B-1 and B-2. Group B-1 includes dogs with increased Prothrombin time while remaining dogs with normal Prothrombin time grouped under Group B-2. Table 5 depicts Prothrombin time in different groups.

The Prothrombin time of Group A-1 ranged from 17 to 26 sec. Mean ± SE value of Prothrombin time on 0^{th} day was 20 ± 1.25 sec, while in Group A -2 Mean ± SE value of same was 12.88 ± 0.61 sec. with the range from 10 to 15 sec. In Group B-1 PT ranged from 16 to 26 sec. with Mean ± SE on 0^{th} day of 20.6 ± 2.27 sec. and in Group B-2 PT ranged from 11 to 14 sec. with Mean ± SE value of 12.5 ± 0.87 sec.

4.3. Therapeutic Management:

The dogs with thrombocytopenia of subgroups A-1 and A-2 as well as subgroups B-1 and B-2 were subdivided into A-1.1, A-1.2, A-2.1, A-2.2, B-1.1,B-1.2,B-2.1 and B-2.2. Dogs of Groups A-1.1, A- 2.1, B-1.1 and B- 2.1 were treated with Papaya leaves extract (Tab. Platex) and whereas dogs of Groups A -1.2, A-2.2, B-1.2 and B-2.2 were treated with immunosuppressant drug inj. Prednisolone. The classification is also depicted in Table 6.

4.3.1. Group A -1.1

The dogs of Group A-1.1 were having bleeding disorder v.i.z. melena, hematochezia, hematemesis, epistaxis, petichae. The thrombocyte count of this group ranged from 44,000 to 64,000/cmm. Coagulopathy test of all 6 dogs revealed increased Prothrombin Time. The detailed laboratory findings are described below. Case 1 of this group was having clinical symptoms of melena, epistaxis and it was positive for *Ehrlichia canis* infection. Its clotting time, aPTT as well as ESR was increased however BMBT was normal. Case 2 had melena and increased serum bilirubin and serum creatinine (5.6 mg/dl).Its clotting time, BMBT and ESR was increased. Melena, icterus, severe anemia (Hb 4.1gm%)

Table 5: Prothrombin time of all the dogs on 0th Day.

Case No.	Prothrombin Time (Seconds)
1	18
2	26
3	20
4	18
5	18
6	23
7	17
8	14
9	14
10	13
11	15
12	10
13	12
14	14
15	11
16	26
17	16
18	19
19	26
20	16
21	11
22	14
23	14
24	11

Table 6: Distribution of dogs in different groups and their therapeutic management.

<table>
<tr><td rowspan="6">Group A
(Bleeding)
(15 dogs)</td><td rowspan="2">Group A-1
(Increased Prothombin Time) (7 dogs)</td><td>Group A-1.1
(Papaya Leaves extract Tab. Platex) (3 dogs)</td></tr>
<tr><td>Group A-1.2
(Inj. Prednisolone) (4 dogs)</td></tr>
<tr><td rowspan="2">Group A-2
(Normal Prothombin Time) (8 dogs)</td><td>Group A-2.1
(Papaya Leaves extract Tab. Platex) (4 dogs)</td></tr>
<tr><td>Group A-2.2
(Inj. Prednisolone) (4 dogs)</td></tr>
<tr><td rowspan="4">Group B
(Non-bleeding)
(9 dogs)</td><td rowspan="2">Group B-1
(Increased Prothombin Time)
(5 dogs)</td><td>Group B-1.1
(Papaya Leaves extract Tab. Platex) (3 dogs)</td></tr>
<tr><td>Group B-1.2
(Inj. Prednisolone) (2 dogs)</td></tr>
<tr><td rowspan="2">Group B-2
(Normal Prothombin Time) (4 dogs)</td><td>Group B-2.1
(Papaya Leaves extract Tab. Platex) (2 dogs)</td></tr>
<tr><td>Group B-2.2
(Inj. Prednisolone) (2 dogs)</td></tr>
</table>

were clinical symptoms of Case 3 .The laboratory investigations revealed increased aPTT and ESR however, BMBT was normal.

All these dogs were treated with Papaya leaves extract (Tab. Platex) and symptomatic treatment of each disease condition. Case 1 received treatment of Tab.Doxycycline @ 5 mg/kg b.wt. for 14 days. Case 2 received supportive treatment of 10%Fructose, fluid therapy and liver tonics. Case 3 also received treatment for jaundice similar to Case 2.

4.3.2. Group A -1.2

Dogs of Group A-1.2 were having symptoms of bleeding diathesis and had increased Prothrombin time. The thrombocyte count of this group ranged from 18,000 to 72,000/cmm. All dogs were treated with inj Prednisolone @ 20 mg /kg b.wt. Case 4 was having petechiael hemorrhages and had history of hypersensitivity to antirabies vaccine. The laboratory examination revealed increased aPTT with normal BMBT and clotting time. Case 5 had history of melena,hematochezia and laboratory investigations revealed *Ehrlichia canis* and Trypanosoma spps.mixed infection.The SGPT and serum creatinine levels were elevated.The ESR and clotting time was found to be elevated .Case 6 was having melena, hematochezia and hematemesis and laboratory investigations revealed *Ehrlichia canis* infection. The SGOT level was elevated. The dog had high aPTT and BMBT.The melena, diarrhea and vomition were clinical symptoms of Case 7. The clotting time, aPTT found to be increased.

All these dogs were treated with inj Prednisolone @ 20 mg /kg b.wt and symptomatic treatment of each disease condition.Case 4 received antibiotic inj. Cefotaxim @ 10 mg/kg BID b.wt. alongwith supportive treatment. Case 5 was treated with Doxycyclin @ 5 mg/kg bwt BID for 14 daysas well as inj Quinapyramin @ 4.4mg/kg b.wt. and other supportive treatment such as haematinics, liver tonics. Case 6 was also treated with Doxycycline @ 5 mg/kg b.wt BID for 14 days along with supportive treatment. Case 7 was treated with antibiotic Ampicillin and Cloxicillin @ 20 mg/kg b. wt BID.

4.3.3. Group A -2.1

The dogs of the Group A-2.1 were having thrombocytopenia with bleeding diathesis. The thrombocyte count of this group ranged from 25,000 to 51,000/cmm. The dogs of this group were having normal Prothrombin time. The clinical symptoms were melena, hematochezia, hematemesis, epistaxis, petichae. All dogs of this group were treated with Papaya leaves extract. Case 8 was having sever leucocytosis and neutrophilia along with regenerative anaemia.The dogs had increased clotting time and normal aPTT, BMBT. The dog was treated with antibiotic Ampicillin and Cloxacillin @ 20 mg/kg b.wt. along with supportive treatment with haematinics, and essential amino acid supplementation.

Case 9 was having epistaxis and melena. The dog was having normal aPTT, BMBT and clotting time. The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. and supportive treatment such as haematinics and essential amino acid supplementation. Case 10 was having hematemesis. There was severe leucocytosis and neutrophilia. The dog was having normal aPTT, BMBT and clotting time. The dog is treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. and other supportive treatment. Melena, ecchymoses was observed in Case 11. Blood smear examination revealed microfilarae.It had increased SGPT & ALP suggesting liver dysfunction.The dog was treated with inj.Ivermectin @ 200µg /kg b.wt. alongwith Ampicillin and Cloxacillin @ 20 mg/kg b.wt. and other supportive treatment.

4.3.4. Group A -2.2

The dogs of the Group A-2.2 were having thrombocytopenia with bleeding diathesis. The thrombocyte count of this group ranged from 18,000 to 87,000/cmm. The dogs of this group were having normal Prothrombin time. The clinical symptoms were hematemesis, melena and petechiae. All dogs of this group were treated with inj. Prednisolone @ 20 mg/kg bwt.

Case 12 was having severe anaemia and increased SGPT and SGOT values. Clotting time, aPTT and BMBT was found to be in normal range. The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. BID alongwith supportive treatment like haematinics, essential amino acids

supplementation,and liver tonics. Case 13 was very old age dog having increased SGPT & SGOT values. Clotting time, aPTT and BMBT was found to be in normal range. The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt BID. along with supportive treatment like haematinics, essential amino acids supplementation, and liver tonics. Case 14 were having melena, hematochezia, ecchymoses and later detected Ehrlichia *canis* infection. The laboratory examination revealed increased ESR,clotting time however, aPTT and BMBT was found to be normal. The dog was treated with Tab. Doxycycline @ 5 mg/kg b.wt. BID alongwith supportive treatment like haematinics, essential amino acids supplementation and liver tonics. Case 15 was having Lymphadenopathy with severe anaemia (Haemoglobin 2.7 gms%). The laboratory examination revealed increased ESR,clotting time however, clotting time ,aPTT and BMBT was found to be normal. The dog was treated with Doxycycline @ 5 mg/kg b.wt. BID alongwith supportive treatment like haematinics, essential amino acids supplementation and liver tonics.

4.3.5. Group B -1.1:

The dogs of the Group B -1.1 were having thrombocytopenia without bleeding diathesis. The thrombocyte count of this group ranged from 33,000 to 57,000/cmm.The dogs of this group were having increased Prothrombin time. The clinical symptoms were anoxia,vomtion,fever,anaemia. All dogs of this group were treated with Papaya leaves extract (Tab. Platex).

Case 16 was having icterus and anemia. The laboratory examination revealed increased ESR, clotting time however, aPTT and BMBT was found to be normal. Total bilirubin, Alkaline Phosphatase showed increased levels and serum creatinine was marginally high. The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. BID alongwith supportive treatment like haematinics, essential amino acids supplementation, liver tonics. Case 17 was having increased serum creatinine (6.5 mg/dl) The laboratory examination revealed increased ESR, clotting time however, aPTT and BMBT was found to be normal. The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. BID alongwith fluid therapy @ 50 ml /kg b.wt.,inj.Frusimide @ 1 mg /kg b.wt ,supportive treatment like haematinics, liver tonics. Serum creatinine (8.3 mg/dl) was also found to be increased in Case 18. The laboratory examination revealed increased ESR however, clotting time aPTT and BMBT was found to be normal.

The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. BID alongwith fluid therapy @ 50 ml /kg b.wt.,inj.Frusimide @ 1 mg /kg b.wt ,supportive treatment like haematinics, liver tonics.

4.3.6. Group B -1.2:

The dogs of the Group B-1.2 were having thrombocytopenia without bleeding diathesis. The thrombocyte count of this group ranged from 12,000 to 39,000/cmm.The dogs of this group were having increased Prothrombin time. The clinical symptoms were anorexia, high fever, anaemia. All dogs of this group were treated with inj Prednisolone.

Case 19 was having with anorexia and anaemia. The laboratory examination revealed increased clotting time however, ESR, aPTT and BMBT was found to be normal. The S.G.P.T and S.G.O.T levels were increased and serum Albumin level were decreased. The dog was suffering from splenic tumor. The dog was treated with Inj. Cefotaxime @ 25 mg/kg b.wt. BID alongwith essential amino acids, haematinics and liver tonics.The dog was suggested surgical removal of spleen after the recovery from thrombocytopenia.Case 20 was suffering from high fever, anorexia and vomition. The laboratory examination revealed increased clotting time, ESR however; aPTT and BMBT was found to be normal. The dog was treated with Inj. Enrofloxacin @ 5 mg/kg b.wt.OD alongwith essential amino acids, haematinics, and liver tonics.

4.3.7. Group B-2.1 :

All the dogs of this group were not having bleeding diathesis. Normal Prothrombin Time was characteristic feature of this group. The thrombocyte count of this group ranged from 11,000 to 62,000/cmm. The clinical symptoms were anorexia, vomitions, oligourea, anaemia. The dogs of this group were treated with Papaya leaves extract (Tab. Platex) for 14 days. On the clinical examination it was revealed that Case 21 was having spleen tumor & anemia. The laboratory examination revealed increased ESR however, clotting time, aPTT and BMBT was found to be normal. SGPT and SGOT were found to be increased.The serum albumin was low. The dog was treated with Inj. Cefotaxime @ 25 mg/kg b.wt. BID along with essential amino acids, haematinics, and liver tonics. Case 22 was having increased serum creatinine

(9.3 mg/dl). Vomitions, anorexia, oliguria were the clinical findings. The laboratory examination revealed increased ESR however, clotting time, aPTT and BMBT was found to be normal. The dog was treated with Inj. Ampicillin and Cloxacillin @ 20 mg/kg b.wt. BID along with fluid therapy @ 50 ml /kg b.wt ,Inj.Frusimide @ 1 mg /kg b.wt ,supportive treatment like haematinics, liver tonics.

4.3.8. Group B-2.2:

All the dogs of this group were not having bleeding diathesis and were having normal Prothrombin Time. The thrombocyte count of this group ranged from 31,000 to 84,000/cmm. The clinical symptoms were anorexia, vomitions, anaemia. All dogs of this group were treated with Inj Prednisolone.

Case 23 was having vomitions, anorexia and developed anaemia. The laboratory examination revealed increased ESR however, clotting time, aPTT and BMBT was found to be normal. The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. BID alongwith fluid therapy @ 50 ml /kg b.wt., supportive treatment like haematinics, liver tonics.Case 24 was having anorexia. The laboratory examination revealed increased ESR, clotting time, BMBT however, aPTT was found to be normal. The dog was treated with Ampicillin and Cloxacillin @ 20 mg/kg b.wt. BID alongwith fluid therapy @ 50 ml /kg b.wt., supportive treatment like liver tonics.

4.4. Laboratory findings after treatment and its interpretation:

The Mean ± SE values of all groups with t tests are depicted in table 5 to table 12.

4.4.1. Coagulopathies tests:

4.4.1.1. Prothrombin time (PT):

The dogs of Group A-1.1 had PT value 21.33 ± 2.40 sec on 0^{th} day, which reduced to 17.33 ± 2.40 sec on 7^{th} day of treatment which further reduced to 14.33 ± 2.33 sec after 14^{th} days of treatment.(Table 8, Fig.2).The PT value of Group A-1.2 dogs was 19.00 ± 1.35 sec on 0^{th} day, which reduced to 15.75 ± 0.95 sec on 7^{th} day of treatment which further reduced to 12.50 ± 0.96 sec after treatment of 14^{th} day.(Table 10, Fig.5) .The dogs value of Group A-2.1 with PT

on 0th day was 14.00 ± 0.41 sec, which became 14.25 ± 0.25 sec on 7th of treatment which further reduced to 11.75 ± 0.75 sec on 14th days after treatment.(Table 12, Fig.8). The PT value of dogs of Group A-2.2 was 11.75 ± 0.85 sec on 0th day, which became 12.75 ± 1.65 sec on 7th day after treatment which further increased to 13.00 ± 1.08 sec after treatment on 14th days.(Table 14, Fig.11).

The dogs of Group B-1.1 had PT 20.33 ± 2.96 sec on 0th day, which reduced to 18.00 ± 3.06 sec on 7th day after treatment which further reduced to 16.33 ± 1.33 sec on 14th days after treatment. (Table 16, Fig.14).The PT value of dogs of Group B-1.2 was 21.00 ± 4.08 sec on 0th day, which decreased to 20.00 ± 3.27 sec on 7th days after treatment which further became 21.00 ± 3.27 sec after treatment on 14th days(Table 18, Fig.17).The Group B-2.1 PT values were 12.50 ± 1.22 sec on 0th day which increased to 14.00 ± 0.00 sec after treatment on 7th days which further decreased to 13.00 ± 0.00 sec on 14th days after treatment(Table 20, Fig.20). The dogs of Group B-2.2 had PT value 12.50 ± 1.22 sec on 0th day, which further decreased to 10.00 ± 0.82 sec after treatment on 7th day which further increased 13.00 ± 0.82 sec on 14th days after treatment (Table 22, Fig.23).

The PT value is responsible for extrinsic coagulation pathway and also dependent on liver functioning of dogs (Smith *et.al* 2005) .The therapeutic management of thrombocytopenia along with supporting treatment with antibiotics , liver tonics, B-complex which might have cause improvement in liver functioning. Hence the PT value of all above groups showed reduction its value after treatment. This was in agreement with Smith *et.al* (2005). There was a marginal increase in PT values and the PT value was within normal limit except dogs of Group B-2.2.

4.4.1.2. Activated Partial Thromboplastin Time (aPTT):

The aPPT value of dogs of Group A-1.1 had 26.00 ± 4.62 sec on 0th day, that reduced to 21.67 ± 2.96 sec on 7th day after treatment which further reduced to 16.33 ± 2.33 sec after 14th days of treatment (Table 8, Fig.2). The dogs of Group A-1.2 had aPTT value 19.00 ± 1.35 sec on 0th day that reduced to 15.75 ± 0.95 sec on 7th days after treatment which further decreased to 12.50 ± 0.96 sec on 14th days after treatment. (Table 10, Fig., Fig.5).The aPTT value of Group A-

Table 7: Mean ± SE values of Complete blood count of Group A- 1.1 dogs On 0^{th} Day, 7^{th} day & 14^{th} day along with paired t-test used for 0^{th} day & 14^{th} day. (Referred value $t_{0.05}$=4.3)

Parameter/ Case	0^{th} Day	7^{th} Day	14^{th} Day	**T Test** df=2
HB (g%)	9.90 ± 2.97	9.37 ± 1.79	9.97 ± 1.86	0.06
TEC ($X10^6/\mu$)	4.50 ± 1.29	4.09 ± 1.05	4.62 ± 0.76	0.23
PCV (%)	29.57 ± 7.88	28.90 ± 4.91	31.63 ± 6.17	1.05
RDW (%)	17.10 ± 2.98	19.63 ± 4.28	20.20 ± 6.19	0.85
PDW (%)	11.53 ± 0.82	13.23 ± 0.90	12.73 ± 1.85	0.72
MPV (fl)	12.13 ± 1.47	15.27 ± 2.50	13.40 ± 1.88	0.76
MCV (fl)	67.24 ± 3.82	76.11 ± 10.58	67.92 ± 4.01	0.13
MCH (pg)	21.84 ± 0.80	24.23 ± 2.58	21.39 ± 0.68	1.02
MCHC (g/dl)	32.52 ± 1.83	32.10 ± 0.96	31.61 ± 1.10	0.45
TLC ($X10^3/\mu l$	34.80 ± 27.25	28.91 ± 16.44	18.41 ± 7.76	0.81
N (%)	82.33 ± 1.86	74.00 ± 5.69	61.33 ± 4.91	6.53*
L (%)	14.67 ± 1.33	24.33 ± 5.24	37.67 ± 4.91	6.38*
E (%)	2.00 ± 0.58	0.67 ± 0.33	0.33 ± 0.33	1.89
M (%)	1.00 ± 0.00	1.00 ± 0.58	0.67 ± 0.33	1.00
B (%)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	NA
PLT (/cmm)	55333.33 ± 5925.46	78666.67 ± 22228.61	171000.00 ± 52557.90	2.18
MPLT (/cmm)	66333.33 ± 3527.67	82000.00 ± 17785.76	178000.00 ± 51539.63	2.08
ESR (mm/20min)	76.00 ± 25.77	53.33 ± 17.75	12.00 ± 3.00	2.81
RI (%)	0.50 ± 0.00	0.50 ± 0.00	0.50 ± 0.00	NA

*Significant ($P \leq 0.05$)

Table 8: Mean ± SE values of Biochemical tests and Coagulopathy profile of Group A- 1.1 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (referred value $t_{0.05} = 4.3$)

Parameter/ Case	0th Day	7th Day	14th Day	T Test df=2
Liver Function Tests				
TB (mg/dl)	6.55 ± 2.96	5.00 ± 2.25	1.67 ± 1.07	2.10
DB (mg/dl)	3.57 ± 1.59	3.03 ± 1.47	0.93 ± 0.59	1.94
IB (mg/dl)	2.99 ± 1.48	1.97 ± 0.78	0.73 ± 0.48	2.05
SGOT (IU/L)	237.33 ± 75.81	236.00 ± 63.95	156.00 ± 67.72	3.72
SGPT (IU/L)	237.33 ± 90.46	247.67 ± 41.34	119.67 ± 41.81	0.97
ALP (IU/L)	541.67 ± 173.01	410.00 ± 148.03	273.67 ± 152.29	2.86
TP (g/dl)	5.20 ± 0.46	5.17 ± 0.58	5.50 ± 0.21	0.85
ALB (g/dl)	2.29 ± 0.30	2.48 ± 0.23	2.78 ± 0.19	1.55
GLB (g/dl)	2.91 ± 0.50	2.69 ± 0.63	2.72 ± 0.39	1.74
A/G	0.85 ± 0.21	1.03 ± 0.24	1.08 ± 0.20	1.78
Kidney Function Tests				
BUN (mg/dl)	57.53 ± 31.30	47.40 ± 21.95	44.53 ± 23.42	1.60
Creatinine (mg/dl)	2.50 ± 1.57	2.00 ± 1.10	1.43 ± 0.64	1.15
Coagulopathy Profile				
PT (sec)	21.33 ± 2.40	17.33 ± 2.40	14.33 ± 2.33	3.36
aPTT (sec)	26.00 ± 4.62	21.67 ± 2.96	16.33 ± 2.33	1.87
Clotting time (min.)	5.17 ± 0.60	5.33 ± 0.60	4.17 ± 0.33	1.15
BMBT (Min.)	4.00 ± 0.58	3.33 ± 0.60	4.17 ± 0.44	1.00

*Significant ($P \leq 0.05$)

Table 9: Mean ± SE values of Complete blood count of Group A- 1.2 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (referred value $t_{0.05} = 3.18$)

Parameter/ Case	0th Day	7th Day	14th Day	**T Test** df=3
HB (g%)	9.48 ± 1.92	9.88 ± 1.55	9.85 ± 1.31	0.53
TEC ($X10^6/\mu$)	3.52 ± 0.71	4.69 ± 0.36	4.86 ± 0.28	2.30
PCV (%)	27.88 ± 6.07	33.58 ± 4.26	32.98 ± 4.16	2.41
RDW (%)	14.65 ± 0.24	14.93 ± 0.73	19.40 ± 3.56	0.45
PDW (%)	12.00 ± 0.98	11.85 ± 0.44	14.90 ± 1.23	1.39
MPV (fl)	12.98 ± 1.68	15.50 ± 2.65	15.53 ± 2.81	1.31
MCV (fl)	67.34 ± 1.79	70.89 ± 4.31	67.14 ± 5.21	0.05
MCH (pg)	22.37 ± 0.31	20.68 ± 1.81	20.00 ± 1.58	1.69
MCHC (g/dl)	31.41 ± 1.15	29.05 ± 1.12	29.82 ± 0.96	1.25
TLC ($X10^3/\mu l$	29.53 ± 8.04	23.88 ± 4.00	21.40 ± 6.52	1.87
N (%)	79.75 ± 5.02	74.50 ± 4.17	59.50 ± 2.72	7.90*
L (%)	18.00 ± 5.20	23.25 ± 4.37	38.00 ± 2.16	5.86*
E (%)	0.25 ± 0.25	0.25 ± 0.25	1.25 ± 0.63	1.22
M (%)	1.75 ± 0.25	1.50 ± 0.87	1.25 ± 0.25	1.00
B (%)	0.25 ± 0.25	0.50 ± 0.29	0.00 ± 0.00	1.00
PLT (/cmm)	54000.00 ± 12247.45	112500.00 ± 20422.62	279750.00 ± 34318.06	8.74*
MPLT (/cmm)	51500.00 ± 13456.72	114000.00 ± 18854.71	283750.00 ± 33641.18	8.41*
ESR (mm/20min)	45.75 ± 15.10	34.00 ± 3.85	12.50 ± 3.10	2.50
RI (%)	0.50 ± 0.00	0.65 ± 0.12	0.75 ± 0.25	1.00

*Significant ($P \leq 0.05$)

Table 10: Mean ± SE values of Biochemical tests & Coagulopathy profile of Group A- 1.2 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (Referred value $t_{0.05}$ = 3.18)

Parameter / Case	0th Day	7th Day	14th Day	T Test df=3
Liver Function Tests				
TB (mg/dl)	0.65 ± 0.10	0.69 ± 0.08	0.52 ± 0.07	1.29
DB (mg/dl)	0.36 ± 0.11	0.43 ± 0.05	0.28 ± 0.08	0.58
IB (mg/dl)	0.29 ± 0.07	0.26 ± 0.05	0.24 ± 0.05	0.38
SGOT (IU/L)	439.12 ± 329.84	351.24 ± 258.21	194.45 ± 98.25	1.05
SGPT (IU/L)	260.76 ± 119.71	217.43 ± 102.14	146.11 ± 68.43	2.18
ALP (IU/L)	275.83 ± 123.72	231.38 ± 97.78	169.54 ± 61.85	1.62
TP (g/dl)	6.72 ± 0.34	5.79 ± 0.21	6.12 ± 0.74	1.26
ALB (g/dl)	3.49 ± 0.29	2.88 ± 0.24	3.16 ± 0.10	1.10
GLB (g/dl)	3.23 ± 0.49	2.91 ± 0.43	2.96 ± 0.72	0.40
A/G	1.23 ± 0.34	1.09 ± 0.24	1.25 ± 0.26	0.04
Kidney Function Tests				
BUN (mg/dl)	16.28 ± 2.68	20.36 ± 3.21	23.95 ± 7.69	0.78
Creatinine (mg/dl)	1.87 ± 0.68	0.95 ± 0.15	1.02 ± 0.18	1.05
Coagulopathy Profile				
PT (sec)	19.00 ± 1.35	15.75 ± 0.95	12.50 ± 0.96	3.52*
aPTT (sec)	24.75 ± 4.05	21.00 ± 2.94	17.50 ± 3.12	1.81
Clotting time (min)	4.75 ± 1.30	4.63 ± 0.38	4.38 ± 0.24	0.30
BMBT (Min.)	3.50 ± 0.65	3.50 ± 0.20	3.38 ± 0.13	0.86

*Significant (P ≤ 0.05)

Table 11. Mean ± SE values of Complete blood count of Group A- 2.1 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (referred value $t_{0.05} = 3.18$)

Parameter/ Case	0th Day	7th Day	14th Day	**T Test** df=3
HB (g%)	7.78 ± 1.76	9.00 ± 0.99	9.70 ± 1.29	2.89
TEC ($X10^6/\mu$)	3.62 ± 0.85	3.95 ± 0.27	4.45 ± 0.48	1.83
PCV (%)	24.48 ± 4.47	27.38 ± 3.37	27.83 ± 4.08	6.82*
RDW (%)	16.35 ± 1.59	18.53 ± 3.53	20.13 ± 1.64	5.63*
PDW (%)	11.50 ± 2.92	14.95 ± 1.99	13.33 ± 1.03	0.70
MPV (fl)	12.08 ± 0.52	32.83 ± 21.87	8.78 ± 0.96	3.13
MCV (fl)	73.40 ± 6.37	69.07 ± 5.87	62.22 ± 3.90	1.29
MCH (pg)	22.08 ± 1.00	22.70 ± 1.52	22.06 ± 1.84	0.01
MCHC (g/dl)	31.17 ± 1.56	33.01 ± 0.70	35.25 ± 1.90	1.29
TLC ($X10^3/\mu l$	43.98 ± 18.74	40.73 ± 13.88	15.45 ± 5.67	1.82
N (%)	84.00 ± 2.48	74.75 ± 2.17	67.25 ± 3.33	8.31*
L (%)	13.50 ± 2.60	23.25 ± 1.97	29.75 ± 3.28	7.47*
E (%)	1.50 ± 0.29	0.75 ± 0.75	1.00 ± 0.41	1.73
M (%)	0.75 ± 0.25	1.00 ± 0.00	1.75 ± 0.48	1.41
B (%)	0.25 ± 0.25	0.25 ± 0.25	0.25 ± 0.25	0.00
PLT (/cmm)	45500.00 ± 7421.81	122250.00 ± 22095.91	250000.00 ± 14005.95	11.16*
MPLT (/cmm)	42000.00 ± 7538.79	124750.00 ± 18865.20	255000.00 ± 15378.56	10.58*
ESR (mm/20min)	44.25 ± 6.47	47.25 ± 6.37	18.75 ± 1.97	4.35*
RI (%)	1.08 ± 0.58	0.63 ± 0.13	0.63 ± 0.13	0.72

*Significant ($P \leq 0.05$)

Table 12: Mean ± SE values of Biochemical tests & Coagulopathy profile of Group A- 2.1 dogs On 0^{th} Day, 7^{th} day & 14^{th} day along with paired t-test used for 0^{th} day & 14^{th} day (referred value $t_{0.05} = 3.18$)

Parameter / Case	0^{th} Day	7^{th} Day	14^{th} Day	**T Test** df=3
Liver Function Tests				
TB (mg/dl)	0.48 ± 0.05	0.53 ± 0.05	0.53 ± 0.05	0.58
DB (mg/dl)	0.25 ± 0.03	0.30 ± 0.06	0.33 ± 0.05	1.57
IB (mg/dl)	0.23 ± 0.05	0.23 ± 0.03	0.20 ± 0.00	0.52
SGOT (IU/L)	79.75 ± 24.35	86.25 ± 29.88	79.25 ± 30.41	0.03
SGPT (IU/L)	227.50 ± 155.82	190.50 ± 114.56	172.75 ± 103.87	1.03
ALP (IU/L)	1459.50 ± 1275.74	820.25 ± 690.98	616.75 ± 469.25	0.04
TP (g/dl)	6.08 ± 0.39	5.83 ± 0.40	5.15 ± 0.26	2.45
ALB (g/dl)	2.60 ± 0.21	3.25 ± 0.22	2.93 ± 0.06	2.10
GLB (g/dl)	3.48 ± 0.32	2.43 ± 0.40	2.23 ± 0.22	3.55*
A/G	0.77 ± 0.09	2.05 ± 0.41	1.35 ± 0.12	4.15*
Kidney Function Tests				
BUN (mg/dl)	17.50 ± 3.08	26.85 ± 6.59	27.43 ± 3.77	3.46*
Creatinine (mg/dl)	1.03 ± 0.12	1.08 ± 0.17	1.08 ± 0.27	0.19
Coagulopathy Profile				
PT (sec)	14.00 ± 0.41	14.25 ± 0.25	11.75 ± 0.75	2.63
aPTT (sec)	11.75 ± 1.11	11.75 ± 1.49	12.75 ± 0.63	0.77
Clotting time (min.)	5.88 ± 0.77	4.88 ± 0.43	4.63 ± 0.24	1.35
BMBT (Min.)	3.88 ± 0.13	3.38 ± 0.24	3.38 ± 0.13	2.45

Table 13: Mean ± SE values of Complete blood count of Group A- 2.2 dogs On 0^{th} Day, 7^{th} day & 14^{th} day along with paired t-test used for 0^{th} day & 14^{th} day (referred value $t_{0.05} = 3.18$)

Parameter/ Case	0^{th} Day	7^{th} Day	14^{th} Day	**T Test** df=3
HB (g%)	5.25 ± 1.14	7.75 ± 1.23	8.08 ± 1.17	3.49*
TEC ($X10^6/\mu$)	2.39 ± 0.46	3.44 ± 0.44	3.66 ± 0.35	7.22*
PCV (%)	16.58 ± 2.78	24.50 ± 2.84	25.97 ± 3.60	4.31*
RDW (%)	16.08 ± 1.05	17.15 ± 0.73	20.40 ± 3.66	0.97
PDW (%)	13.40 ± 2.12	11.85 ± 2.26	12.58 ± 2.57	1.62
MPV (fl)	11.30 ± 0.97	10.65 ± 0.42	12.20 ± 1.21	0.59
MCV (fl)	72.76 ± 3.06	72.33 ± 4.53	70.26 ± 4.95	0.35
MCH (pg)	24.64 ± 2.57	22.34 ± 1.23	21.86 ± 1.30	0.93
MCHC (g/dl)	28.81 ± 2.01	31.13 ± 1.78	31.30 ± 1.66	1.77
TLC ($X10^3/\mu l$	11.35 ± 5.54	13.38 ± 1.99	10.25 ± 2.35	0.29
N (%)	69.25 ± 6.91	65.75 ± 9.31	56.50 ± 5.61	2.13
L (%)	28.50 ± 7.18	32.25 ± 10.22	42.50 ± 5.92	2.52
E (%)	0.75 ± 0.75	1.00 ± 0.71	0.25 ± 0.25	0.58
M (%)	1.50 ± 0.29	1.00 ± 0.41	0.75 ± 0.48	1.19
B (%)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	NA
PLT (/cmm)	35000.00 ± 17392.53	81750.00 ± 14049.76	176250.00 ± 46938.57	4.02*
MPLT (/cmm)	35000.00 ± 16088.30	77250.00 ± 14114.86	168000.00 ± 45094.35	4.35*
ESR (mm/20min)	33.75 ± 12.91	22.25 ± 7.33	23.75 ± 5.44	1.29
RI (%)	1.05 ± 0.52	0.50 ± 0.00	0.53 ± 0.02	1.00

*Significant ($P \leq 0.05$)

Table 14: Mean ± SE values of Biochemical tests & Coagulopathy profile of Group A- 2.2 dogs on 0^{th} Day, 7^{th} day & 14^{th} day along with paired t-test used for 0^{th} day & 14^{th} day (referred value $t_{0.05} = 3.18$)

Parameter/ Case	0^{th} Day	7^{th} Day	14^{th} Day	**T Test** df=3
Liver Function Tests				
TB (mg/dl)	0.55 ± 0.06	0.75 ± 0.15	0.50 ± 0.07	0.48
DB (mg/dl)	0.25 ± 0.10	0.40 ± 0.09	0.30 ± 0.07	0.33
IB (mg/dl)	0.30 ± 0.07	0.35 ± 0.06	0.20 ± 0.06	0.82
SGOT (IU/L)	196.50 ± 93.60	226.75 ± 122.01	106.50 ± 36.19	1.55
SGPT (IU/L)	202.00 ± 64.01	182.50 ± 77.98	99.00 ± 39.44	2.21
ALP (IU/L)	140.25 ± 6.20	160.25 ± 13.84	92.11 ± 34.13	1.26
TP (g/dl)	6.73 ± 0.64	6.33 ± 0.31	5.88 ± 0.15	1.27
ALB (g/dl)	3.05 ± 0.47	3.48 ± 0.33	3.30 ± 0.19	0.56
GLB (g/dl)	3.68 ± 0.90	2.81 ± 0.60	2.58 ± 0.31	1.14
A/G	1.10 ± 0.45	1.53 ± 0.48	1.35 ± 0.19	2.66
Kidney Function Tests				
BUN (mg/dl)	18.35 ± 4.31	17.43 ± 4.10	18.00 ± 4.41	0.05
Creatinine (mg/dl)	0.88 ± 0.18	1.13 ± 0.21	0.80 ± 0.12	0.25
Coagulopathy Profile				
PT (sec)	11.75 ± 0.85	12.75 ± 1.65	13.00 ± 1.08	1.67
aPTT (sec)	13.25 ± 2.06	14.25 ± 2.17	11.75 ± 1.25	1.73
Clotting time (min.)	5.25 ± 1.30	4.63 ± 0.47	4.63 ± 0.47	0.70
BMBT (Min.)	3.63 ± 0.38	3.88 ± 0.43	3.75 ± 0.25	1.00

*Significant ($P \leq 0.05$)

Table 15: Mean ± SE values of Complete blood count of Group B-1.1 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (reffered value $t_{0.05}$=4.3)

Parameter/ Case	0th Day	7th Day	14th Day	**T Test** df=2
HB (g%)	9.43 ± 1.94	10.67 ± 1.89	10.77 ± 1.68	2.55
TEC ($X10^6/\mu$)	4.49 ± 0.90	4.75 ± 0.61	5.09 ± 0.44	1.22
PCV (%)	30.10 ± 5.04	31.92 ± 5.74	35.17 ± 1.62	1.22
RDW (%)	15.63 ± 5.88	14.53 ± 1.07	17.30 ± 2.54	0.36
PDW (%)	14.23 ± 2.52	13.30 ± 3.00	12.73 ± 1.29	0.40
MPV (fl)	13.73 ± 1.86	14.37 ± 1.83	12.03 ± 1.54	1.60
MCV (fl)	68.20 ± 2.90	62.74 ± 3.02	69.89 ± 5.49	0.42
MCH (pg)	20.98 ± 0.41	21.64 ± 1.22	20.86 ± 1.71	0.07
MCHC (g/dl)	30.88 ± 1.55	33.48 ± 0.87	30.49 ± 4.34	0.11
TLC ($X10^3/\mu l$	40.17 ± 13.47	28.13 ± 13.06	20.17 ± 6.99	2.46
N (%)	73.00 ± 7.02	82.33 ± 4.81	67.00 ± 8.08	0.83
L (%)	23.00 ± 5.51	17.00 ± 5.13	33.00 ± 8.08	1.50
E (%)	2.33 ± 1.45	0.67 ± 0.33	0.00 ± 0.00	1.61
M (%)	1.67 ± 1.20	0.00 ± 0.00	0.00 ± 0.00	1.39
B (%)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	NA
PLT (/cmm)	47000.00 ± 7211.10	75000.00 ± 2081.67	159333.33 ± 43240.93	2.83
MPLT (/cmm)	49666.67 ± 7264.83	74333.33 ± 666.67	158333.33 ± 39717.05	2.76
ESR (mm/20min)	47.00 ± 24.17	42.67 ± 23.38	41.33 ± 15.43	0.58
RI (%)	0.67 ± 0.17	0.50 ± 0.00	0.50 ± 0.00	1.00

*Significant ($P \leq 0.05$)

Table 16: Mean ± SE values of Biochemical tests & Coagulopathy profile of Group B-1.1 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (referred value $t_{0.05} = 4.3$)

Parameter / Case	0th Day	7th Day	14th Day	**T Test** df=2
Liver Function Tests				
TB (mg/dl)	0.97 ± 0.52	0.87 ± 0.16	0.61 ± 0.06	0.63
DB (mg/dl)	0.32 ± 0.19	0.46 ± 0.06	0.35 ± 0.07	0.18
IB (mg/dl)	0.65 ± 0.33	0.41 ± 0.15	0.26 ± 0.11	0.96
SGOT (IU/L)	34.77 ± 2.46	54.47 ± 14.73	45.07 ± 9.58	1.41
SGPT (IU/L)	38.03 ± 9.90	42.20 ± 11.28	36.07 ± 6.89	0.44
ALP (IU/L)	1495.45 ± 1354.35	681.10 ± 569.52	297.67 ± 211.27	1.05
TP (g/dl)	7.16 ± 0.48	6.54 ± 0.24	5.67 ± 0.36	1.78
ALB (g/dl)	2.72 ± 0.31	2.73 ± 0.35	2.50 ± 0.53	0.76
GLB (g/dl)	4.44 ± 0.78	3.81 ± 0.59	3.17 ± 0.35	1.55
A/G	0.68 ± 0.18	0.78 ± 0.21	0.84 ± 0.26	0.67
Kidney Function Tests				
BUN (mg/dl)	133.63 ± 39.58	74.23 ± 19.68	67.60 ± 15.45	2.72
Creatinine (mg/dl)	5.61 ± 1.88	3.26 ± 1.08	2.40 ± 0.47	2.24
Coagulopathy Profile				
PT (sec)	20.33 ± 2.96	18.00 ± 3.06	16.33 ± 1.33	2.31
aPTT (sec)	12.67 ± 0.88	11.00 ± 1.15	13.00 ± 1.73	0.13
Clotting time (min.)	6.33 ± 0.88	7.00 ± 0.76	4.67 ± 0.33	2.50
BMBT (Min.)	3.50 ± 0.29	3.83 ± 0.44	3.00 ± 0.29	NA

*Significant ($P \leq 0.05$)

Table 17: Mean ± SE values of Complete blood count of Group B-1.2 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (referred value $t_{0.05}$=12.71)

Parameter/ Case	0th Day	7th Day	14th Day	**T Test** df=1
HB (g%)	4.85 ± 0.65	7.40 ± 0.40	8.90 ± 1.05	7.50
TEC ($X10^6/\mu$)	2.48 ± 0.37	3.35 ± 0.42	4.01 ± 0.44	11.71
PCV (%)	16.90 ± 2.29	20.85 ± 5.18	29.30 ± 3.27	7.00
RDW (%)	17.70 ± 3.35	21.45 ± 0.12	18.90 ± 0.08	0.28
PDW (%)	16.90 ± 7.10	13.35 ± 6.00	23.30 ± 6.41	1.71
MPV (fl)	11.60 ± 1.63	12.25 ± 0.69	9.20 ± 1.47	3.00
MCV (fl)	68.52 ± 1.05	72.87 ± 1.96	73.07 ± 0.15	2.97
MCH (pg)	19.78 ± 0.82	22.47 ± 1.85	22.19 ± 0.41	7.80
MCHC (g/dl)	28.85 ± 0.76	30.77 ± 1.71	30.38 ± 0.63	14.40*
TLC ($X10^3/\mu l$	32.30 ± 8.74	33.69 ± 12.91	26.70 ± 5.97	0.51
N (%)	87.50 ± 4.49	83.00 ± 8.98	88.00 ± 5.72	4.33
L (%)	10.50 ± 3.67	12.00 ± 6.53	11.00 ± 5.31	3.50
E (%)	1.00 ± 0.82	2.00 ± 0.82	1.00 ± 0.00	0.00
M (%)	0.50 ± 0.41	3.00 ± 1.63	0.00 ± 0.41	0.00
B (%)	0.50 ± 0.41	0.00 ± 0.00	0.00 ± 0.00	1.00
PLT (/cmm)	25500.00 ± 11022.70	47500 ± 15921.7	97000.00 ± 16329.93	7.92
MPLT (/cmm)	21500.00 ± 9389.71	44500 ± 27352.6	112000.00 ± 30210.37	2.10
ESR (mm/20min)	18.50 ± 7.76	61.18 ± 23.00	46.00 ± 11.84	0.54
RI (%)	0.50 ± 0.00	0.50 ± 0.00	0.50 ± 0.00	NA

*Significant (P ≤ 0.05)

Table 18: Mean ± SE values of Biochemical tests & Coagulopathy profile of Group B-1.2 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (referred value $t_{0.05} = 12.71$)

Parameter/ Case	0 Day	7 Day	14 Day	T Test df=1
Liver Function Tests				
TB (mg/dl)	0.60 ± 0.16	0.50 ± 0.16	0.40 ± 0.12	1.00
DB (mg/dl)	0.35 ± 0.12	0.25 ± 0.12	0.30 ± 0.08	1.00
IB (mg/dl)	0.25 ± 0.04	0.25 ± 0.04	0.10 ± 0.04	1.43
SGOT (IU/L)	82.50 ± 24.09	87.50 ± 24.90	110.00 ± 9.80	0.89
SGPT (IU/L)	102.50 ± 15.11	87.00 ± 13.06	126.00 ± 19.60	0.09
ALP (IU/L)	67.75 ± 16.53	194.00 ± 98.80	96.00 ± 6.94	1.28
TP (g/dl)	5.90 ± 0.24	5.70 ± 0.49	6.10 ± 0.12	0.11
ALB (g/dl)	2.57 ± 0.30	2.50 ± 0.33	1.90 ± 0.04	1.71
GLB (g/dl)	3.33 ± 0.06	3.20 ± 0.16	4.20 ± 0.08	25.67*
A/G	0.77 ± 0.10	0.78 ± 0.06	0.45 ± 0.00	2.51
Kidney Function Tests				
BUN (mg/dl)	30.25 ± 5.43	27.45 ± 3.14	28.40 ± 4.20	4.67
Creatinine (mg/dl)	1.00 ± 0.24	1.05 ± 0.29	1.80 ± 0.29	9.00
Coagulopathy Profile				
PT (sec)	21.00 ± 4.08	20.00 ± 3.27	21.00 ± 3.27	4.00
aPTT (sec)	12.50 ± 1.22	12.00 ± 0.82	18.00 ± 3.27	0.60
Clotting time (min.)	7.00 ± 0.82	5.50 ± 0.41	6.00 ± 0.41	3.00
BMBT (Min.)	2.50 ± 0.41	4.25 ± 0.61	3.50 ± 0.00	2.00

*Significant ($P \leq 0.05$)

Table 19: Mean ± SE values of Complete blood count of Group B-2.1 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (reffered value $t_{0.05}$=12.71)

Parameter/ Case	0th Day	7th Day	14th Day	**T Test** df=1
HB (g%)	5.70 ± 0.40	7.00 ± 0.70	8.10 ± 0.50	29.00*
TEC ($X10^6$/µ)	2.64 ± 0.19	3.24 ± 0.27	4.20 ± 0.03	5.75
PCV (%)	17.25 ± 0.53	24.65 ± 4.12	28.90 ± 0.90	23.44*
RDW (%)	14.00 ± 1.06	14.45 ± 1.51	13.60 ± 0.16	0.40
PDW (%)	6.95 ± 2.16	8.55 ± 1.27	9.20 ± 1.35	2.16
MPV (fl)	12.90 ± 0.57	16.45 ± 2.74	14.10 ± 22.66	0.67
MCV (fl)	66.05 ± 6.71	75.39 ± 6.56	68.81 ± 1.70	0.11
MCH (pg)	21.62 ± 0.30	21.64 ± 0.01	19.29 ± 1.12	0.55
MCHC (g/dl)	33.18 ± 2.91	29.04 ± 2.54	28.03 ± 2.47	3.92
TLC ($X10^3$/µl	37.40 ± 7.84	31.80 ± 2.20	6.10 ± 8.94	15.07*
N (%)	84.00 ± 0.82	79.00 ± 0.00	70.00 ± 1.22	25.00*
L (%)	14.00 ± 0.82	12.50 ± 2.04	27.00 ± 0.00	13.00
E (%)	0.50 ± 0.41	2.00 ± 1.63	2.00 ± 0.82	1.00
M (%)	1.00 ± 0.82	6.50 ± 3.67	1.00 ± 0.41	0.33
B (%)	0.50 ± 0.41	0.00 ± 0.00	0.00 ± 0.00	1.00
PLT (/cmm)	36500.00 ± 20820.66	68500.00 ± 15921.68	115000.00 ± 33476.36	7.71*
MPLT (/cmm)	31500.00 ± 17554.68	70000.00 ± 13880.44	133000.00 ± 26536.14	12.18*
ESR (mm/20min)	34.00 ± 6.53	34.50 ± 9.39	41.00 ± 3.67	0.71
RI (%)	0.50 ± 0.00	0.50 ± 0.00	0.50 ± 0.00	NA

Table 20: Mean ± SE values of Complete blood count, Biochemical tests & Coagulopathy profile of Group B-2.1 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day. (referred value $t_{0.05} = 12.71$)

Parameter/ Case	0 Day	7 Day	14 Day	T Test df=1
Liver Function Tests				
TB (mg/dl)	0.44 ± 0.03	0.52 ± 0.26	0.20 ± 0.17	0.14
DB (mg/dl)	0.17 ± 0.03	0.22 ± 0.10	0.10 ± 0.13	0.50
IB (mg/dl)	0.27 ± 0.06	0.30 ± 0.16	0.10 ± 0.04	7.67
SGOT (IU/L)	64.74 ± 38.59	86.66 ± 47.63	123.00 ± 40.74	3.17
SGPT (IU/L)	66.63 ± 44.39	57.37 ± 33.18	77.00 ± 22.05	0.61
ALP (IU/L)	83.69 ± 3.52	77.32 ± 4.34	71.00 ± 0.13	2.79
TP (g/dl)	6.13 ± 0.43	5.71 ± 0.17	5.00 ± 0.46	16.14*
ALB (g/dl)	2.94 ± 0.60	3.22 ± 0.07	2.00 ± 0.37	1.71
GLB (g/dl)	3.19 ± 0.17	2.50 ± 0.24	3.00 ± 0.09	2.27
A/G	0.94 ± 0.24	1.31 ± 0.16	0.67 ± 0.10	0.89
Kidney Function Tests				
BUN (mg/dl)	75.25 ± 31.31	50.30 ± 8.98	28.20 ± 22.49	1.80
Creatinine (mg/dl)	5.30 ± 3.27	4.20 ± 2.45	1.10 ± 1.51	1.09
Coagulopathy Profile				
PT (sec)	12.50 ± 1.22	14.00 ± 0.00	13.00 ± 0.00	0.33
aPTT (sec)	16.00 ± 2.45	16.00 ± 2.45	11.00 ± 0.00	1.67
Clotting time (min.)	3.75 ± 0.61	7.00 ± 0.82	4.50 ± 0.00	1.00
BMBT (Min.)	3.00 ± 0.00	3.50 ± 0.41	4.00 ± 0.41	1.00

*Significant ($P \leq 0.05$)

Table 21: Mean ± SE values of Complete blood count of Group B-2.2 dogs On 0^{th} Day, 7^{th} day & 14^{th} day along with paired t-test used for 0^{th} day & 14^{th} day (reffered value $t_{0.05}$=12.71)

Parameter/ Case	0^{th} Day	7^{th} Day	14^{th} Day	**T Test** df=1
HB (g%)	4.45 ± 0.45	4.70 ± 1.40	6.85 ± 0.55	24.00*
TEC ($X10^6/\mu$)	1.51 ± 0.33	1.93 ± 0.31	3.09 ± 0.13	6.32
PCV (%)	13.70 ± 1.96	17.25 ± 2.49	25.25 ± 3.23	7.45
RDW (%)	13.80 ± 0.08	18.00 ± 2.04	15.50 ± 3.43	0.40
PDW (%)	6.85 ± 1.02	10.25 ± 0.69	12.50 ± 1.47	1.85
MPV (fl)	9.45 ± 0.04	13.35 ± 1.02	9.45 ± 0.12	0.00
MCV (fl)	93.29 ± 7.71	89.94 ± 1.37	81.27 ± 7.00	0.67
MCH (pg)	30.94 ± 4.43	23.91 ± 2.14	22.14 ± 0.52	1.45
MCHC (g/dl)	32.92 ± 2.03	26.65 ± 2.78	27.46 ± 1.73	14.98*
TLC ($X10^3/\mu l$	42.45 ± 29.03	46.30 ± 32.66	42.85 ± 27.88	0.29
N (%)	84.50 ± 5.31	85.50 ± 6.94	74.00 ± 6.53	0.72
L (%)	13.00 ± 4.90	14.00 ± 7.35	24.50 ± 6.94	0.79
E (%)	1.50 ± 0.41	0.00 ± 0.00	0.50 ± 0.41	NA
M (%)	1.00 ± 0.00	0.50 ± 0.41	0.50 ± 0.41	1.00
B (%)	0.00 ± 0.00	0.00 ± 0.00	0.50 ± 0.41	1.00
PLT (/cmm)	57500.00 ± 21637.16	130500.00 ± 15921.68	253500.00 ± 49398.04	2.25
MPLT (/cmm)	58000.00 ± 17146.43	121500.00 ± 11022.70	249500.00 ± 50214.54	2.32
ESR (mm/20min)	73.50 ± 6.94	65.50 ± 10.21	49.00 ± 18.78	2.76
RI (%)	0.50 ± 0.00	0.50 ± 0.00	0.50 ± 0.00	NA

*Significant ($P \leq 0.05$)

Table 22: Mean ± SE values of Biochemical tests & Coagulopathy profile of Group B-2.2 dogs On 0th Day, 7th day & 14th day along with paired t-test used for 0th day & 14th day (referred value $t_{0.05} = 12.71$)

Parameter/ Case	0th Day	7th Day	14th Day	T Test df=1
Liver Function Tests				
TB (mg/dl)	0.55 ± 0.04	0.95 ± 0.53	0.70 ± 0.16	1.00
DB (mg/dl)	0.25 ± 0.04	0.45 ± 0.29	0.40 ± 0.00	3.00
IB (mg/dl)	0.30 ± 0.00	0.50 ± 0.24	0.30 ± 0.16	0.00
SGOT (IU/L)	121.50 ± 62.46	53.50 ± 0.41	64.50 ± 5.31	0.69
SGPT (IU/L)	73.00 ± 8.98	76.00 ± 2.45	79.50 ± 6.94	2.60
ALP (IU/L)	158.00 ± 94.71	189.00 ± 2.45	113.00 ± 0.00	0.39
TP (g/dl)	8.20 ± 1.06	6.10 ± 0.00	6.25 ± 0.04	1.56
ALB (g/dl)	3.05 ± 0.69	2.50 ± 0.16	3.45 ± 0.53	0.27
GLB (g/dl)	5.15 ± 0.37	3.60 ± 0.16	2.80 ± 0.57	9.76
A/G	0.58 ± 0.09	0.70 ± 0.07	1.38 ± 0.47	1.15
Kidney Function Tests				
BUN (mg/dl)	36.30 ± 4.16	43.40 ± 12.17	68.55 ± 24.37	1.30
Creatinine (mg/dl)	1.10 ± 0.16	1.05 ± 0.12	1.50 ± 0.16	1.00
Coagulopathy Profile				
PT (sec)	12.50 ± 1.22	10.00 ± 0.82	13.00 ± 0.82	0.20
aPTT (sec)	14.00 ± 0.00	13.50 ± 0.41	14.50 ± 2.86	0.14
Clotting time (min.)	5.00 ± 0.82	4.75 ± 1.02	4.50 ± 0.41	1.00
BMBT (Min.)	4.00 ± 0.82	4.00 ± 0.82	3.75 ± 0.20	0.33

*Significant ($P \leq 0.05$)

2.1 dogs was 14.00 ± 0.41 sec on 0th day, which became 14.25 ± 0.25 sec after treatment on 7th days which further decreased to 11.75 ± 0.75 sec after treatment on 14th days.(Table 12, Fig.8).The aPTT value of Group A-2.2 dogs on 0th day was 13.25 ± 2.06 sec, which became 14.25 ± 2.17 sec on 7th days after treatment which further reduced to 11.75 ± 1.25 sec after treatment of 14th days.(Table 14, , Fig. 11).

The dogs of Group B-1.1 had aPTT value 12.67 ± 0.88 sec on 0th day, which reduced to 11.00 ± 1.15 sec after treatment on 7th days which further became 13.00 ± 1.73 sec on 14th days after treatment (Table 16,Fig.14).The Group B-1.2 dogs had aPTT value 12.50 ± 1.22 sec on 0th day, which became 12.00 ± 0.82 sec after treatment on 7th days that further became 18.00 ± 3.27 after treatment of 14th day (Table 18, Fig.). The dogs of Group B-2.1 with aPTT value on 0th days was 16.00 ± 2.45 sec, that was on 7th days was 16.00 ± 2.45 sec which further decreased to 11 sec. after treatment on 14th day(Table 20, Fig.). The aPTT value of Group B-2.2 dogs was 14 sec on 0th day which became 13.50 ± 0.41 sec after treatment on 7th day. On 14th day the value was 14.50 ± 2.86 sec (Table 22, Fig.23).

Smith *et al.* (2005) stated that aPTT are prolonged in patients with deficiencies of factors needed to trigger the intrinsic pathway following in vitro contact activation, such as factors VIII, IX, XI, and XII. According to them the aPTT may be prolonged if any of these factors falls to less than 35% of normal. This could be the reason for few dogs of Group B did not show bleeding diathesis in spite of prolonged aPTT. This is in agreement with Smith *et al.* (2005).

In the present study there might be deficiency of clotting factors which might have triggered prolonged aPTT. Moake (2015) reported that aPTT is also prolonged due to an autoantibody against factor VIII and antibodies against protein-phospholipid complexes. The aPTT became normal in all the dogs of different groups after therapeutic management of thrombocytopenia. The dogs of Groups A-1.1,A-2.1, B-1.1,B-2.1 were treated with Papaya leaves extract while Groups A-1.2,A-2.2,B-1.2 and 2.2 were treated Prednisolone. The Prednisolone treatment might have caused immunosuppressive effect against autoantibody against factor VIII and antibodies against protein-phospholipid complexes. Hence aPTT values became normal. Also all the dogs were treated with

antibiotic and other supportive treatment s.a liver tonics,B-complex and fluids which might have improved functioning of liver.

4.4.1.3. Clotting time:

The clotting time of the dogs of this Group A-1.1 on 0^{th} day was 5.17 ± 0.60 min, which became 5.33 ± 0.60 min on 7^{th} day after treatment that further became normal to 4.17 ± 0.33 min after 14^{th} days of treatment (Table 8, , Fig.2).The clotting time of the dogs of this Group A-1.2 on 0^{th} day was 4.75 ± 1.30 min, which became normal 4.63 ± 0.38 min on 7^{th} day after treatment that further became normal to 4.38 ± 0.24 min after 14^{th} days of treatment (Table 10, Fig.5). The dogs of Group A-2.1 the clotting time on 0^{th} day was 5.88 ± 0.77 min which became normal to 4.88 ± 0.43 min. It further, became normal to 4.63 ± 0.24 min on 14^{th} day (Table 12, Fig.8). On 0^{th} day the clotting time of dogs of Group A-2.2 was 5.25 ± 1.30 min which reduced to 4.63 ± 0.47 min on 7^{th} day and remain steady on 14^{th} day (4.63 ± 0.47 min) (Table 14, Fig.11).

The clotting time of the dogs of this Group B-1.1 on 0^{th} day was 6.33 ± 0.88 min, which became 7.00 ± 0.76 min on 7^{th} day after treatment that further became normal to 4.67 ± 0.29 min after 14^{th} days of treatment (Table 16, Fig.14). The dogs of Group B-1.2 the clotting time on 0^{th} day was 7.00 ± 0.82 min which reduced to 5.50 ± 0.41 min. It further became to 6.00 ± 0.41 min on 14^{th} day(Table 18, Fig.17). On 0^{th} day the clotting time of dogs of Group B-2.1 was 3.75 ± 0.61 min which increased to 7.00 ± 0.82 min on 7^{th} day and became normal to 4.50 min. after treatment on 14^{th} day (Table 20, Fig.20).The dogs of Group B-2.2 had clotting time 5.00 ± 0.82 min on 0^{th} day, which reduced to 4.75 ± 1.02 after treatment on 7^{th} day which further became normal to 3.75 ± 0.20 on 14^{th} day after treatment (Table 22, Fig. 23).

Moderate prolongation of clotting time before treatment could be due to consumption of clotting factors due to bleeding. Smith *et al.* (2005) stated that clotting time is prolonged in severe thrombocytopenia due to lack of platelet phospholipids necessary for assembly of coagulation factor complexes. Similar finding were noticed in the present study. Improvement in clotting treatment in Papaya leaves extract therapy and Prednisolone therapy was observed might be attributed to improvement in functioning of liver. This is in agreement with

Jorgensen *et al.* (1982) who observed improvement in clotting therapy after Prednisolone therapy.

4.4.1.4. Buccal Mucosa Bleeding Time (BMBT):

The dogs of Group A-1.1 the BMBT on 0^{th} day was 4.00 ± 0.58 min on 0^{th} day, which reduced to 3.33 ± 0.60 min. On 7^{th} day which further increased to 4.17 ± 0.44 min on 14^{th} day after treatment (Table 8, Fig.2).On 0^{th} day the BMBT of dogs of Group A-1.2 was 3.50 ± 0.65 min, which remain steady to 3.50 ± 0.20 min on 7^{th} day after treatment and it was slightly reduced to 3.38 ± 0.13 min after treatment on 14^{th} day(Table 10, Fig. 5). The BMBT of the dogs of this Group A-2.1 on 0^{th} day was 3.88 ± 0.33 min which became 3.38 ± 24 min on 7^{th} day after treatment which further remain steady to 3.38 ± 0.13 min after treatment on 14^{th} day (Table 12, Fig. 8). The BMBT of the dogs of this Group A-2.2 on 0^{th} day was 3.63 ± 0.38 min which became 3.88 ± 0.43 min on 7^{th} day after treatment which further slightly reduced to 3.75 ± 0.25 min on 14^{th} day after treatment (Table 14, Fig.11).

The BMBT of the dogs of this Group B-1.1 on 0^{th} was 3.50 ± 0.29 min which slightly increased to 3.83 ± 0.44 min on 7^{th} day which further slight decreased to 3.00 ± 0.29 min on 14^{th} day after treatment (Table 16, Fig.14). The BMBT of dogs on 0^{th} day of Group B-1.2 was 2.50 ± 0.41 min which increased to 4.25 ± 0.61 min after treatment on 7^{th} day which further slightly decreased to 3.50 ± 0.00 on 14^{th} day after treatment(Table 18, Fig.17). On 0^{th} day the BMBT of dogs of Group B-2.1 was 3 min which became 3.50 ± 0.41 min on 7^{th} day after treatment which further increased to 4.00 ± 0.41 min on 14^{th} days after treatment (Table 20, Fig.20). The BMBT of dogs on 0^{th} day of Group B-2.2 was 4.00 ± 0.82 min which remain steady on 7^{th} day (4.00 ± 0.82 min) after treatment which further slightly decreased to 3.75 ± 0.20 min after treatment on 14^{th} day (Table 23).

Erne (2003) opined that the buccal mucosa bleeding time (BMBT) is an *in vivo* test used to evaluate primary hemostasis According to him in the presence of adequate platelet numbers, the BMBT primarily serves as a test of platelet and vessel wall function. However, Silverstein and Kellett-Gregory (2010) contradicted this statement. In the present study BMBT of all dogs was found to be in normal range.

4.4.2. Complete Blood Count:

4.4.2.1. Hemoglobin (Hb):

The dogs of the Group A-1.1 had haemoglobin 9.90 ± 2.97 gm% on 0th day, that became 9.37 ± 1.79 gm% on 7th day after treatment that further slightly increased to 9.97 ± 1.86 gm% after treatment of 14th days(Table 7, Fig.3). The haemoglobin of the dogs of Group A-1.2 was 9.48 ± 1.92 gm% on 0th day which slightly increased to 9.88 ± 1.55 gm% on 7th day after treatment which further became 9.85 ± 1.31 gm% after treatment on 14th day(Table 9,Fig.6). The dogs of Group A-2.1 the haemoglobin on 0th day was 7.78 ± 1.76 gm% on 0th day, which increased to 9.00 ± 0.99 gm% 0n 7th day which further slightly increased to 9.70 ± 1.29 gm% on 14th day after treatment(Table 11,Fig. 9). On 0th day the haemoglobin of dogs of Group A-2.2 was 5.25 ± 1.14 gm% which increased to 7.75 ± 1.23 gm% on 7th day after treatment which further increased to 8.08 ± 1.17 gm% on 14th days after treatment(Table 13,Fig.12).

The haemoglobin of dogs of Group B-1.1 on 0th day was 9.43 ± 1.94 gm% which increased to 10.67 ± 1.89 gm% on 7th day after treatment which further increased to 10.77 ± 1.68 gm% on 14th days after treatment(Table 15, Fig.15). The haemoglobin of the dogs of this Group B-1.2 on 0th was 4.85 ± 0.65 gm% which increased to 7.40 ± 0.40 gm% on 7th day which further increased to 8.90 ± 1.05 gm% on 14th day after treatment(Table 17,Fig.18).The dogs of the Group B-2.1 had haemoglobin 5.70 ± 0.40 gm% on 0th day, that increased to 7.00 ± 0.70 gm% on 7th day after treatment that further increase to 8.10 ± 0.50 gm% after treatment of 14th days(Table 19,Fig.21). The haemoglobin of the dogs of Group B-2.2 was 4.45 ± 0.45 gm% on 0th day which slightly increased to 4.70 ± 1.40 gm% on 7th day after treatment which further increased to 9.85 ± 1.31 gm% after treatment on 14th day(Table 21,Fig.24).

Slight to moderate increase in haemoglobin is observed in all the groups might be attributed to stopping the bleeding diathesis (if any) along with treatment with hematinics preparations. Similar observation were reported by Weiss and Tvdten (2004) and Saini *et al.* (2005)

4.4.2.2. Total Erythrocyte count (TEC):

The TEC of the dogs of Group A-1.1 was 4.50 ± 1.29 x10^6 µl on 0^{th} day which became to 4.09 ± 1.05 x10^6 µl on 7^{th} day after treatment which further became normal to 4.62 ± 0.76 x10^6 µl on 14^{th} days after treatment(Table 7,Fig.3). The dogs of the Group A-1.2 had TEC 3.52 ± 1.92 x10^6 µl on 0^{th} day, that slightly increased to 4.69 ± 0.36 x10^6 µl on 7^{th} day after treatment that further became normal to 4.86 ± 0.28 x 10^6 µl after treatment on 14^{th} days(Table 9,Fig.6). On 0^{th} day the TEC of dogs of Group A-2.1 was 3.62 ± 0.85 x 10^6 µl which became to 3.95 ± 0.27 x 10^6 µl on 7^{th} day after treatment which further slightly increased to 4.45 ± 0.48 x 10^6 µl on 14^{th} days after treatment(Table 11,Fig.9). The TEC of the dogs of this Group A-2.2 on 0^{th} was 2.39 ± 0.46 x 10^6 µl which increased to 3.44 ± 0.44 x 10^6 µl on 7^{th} day which further slightly increased to 3.66 ± 0.35 x 10^6 µl on 14^{th} day after treatment(Table 13,Fig.12).

The TEC of the dogs of this Group B-1.1 on 0^{th} was 4.49 ± 0.90 x 10^6 µl which increased to 4.75 ± 0.61 x 10^6 µl on 7^{th} day which further slightly increased to 5.09 ± 0.44 on 14^{th} day after treatment(Table 15,Fig.15). The dogs of the Group B-1.2 had TEC 2.48 ± 0.37 x10^6 µl on 0^{th} day, that increased to 3.35 ± 0.42 x10^6 µl on 7^{th} day after treatment that further increased to 4.01 ± 0.44 x 10^6 µl after treatment on 14^{th} days (Table 17,Fig.18). The dogs of the Group B-2.1 had TEC 2.64 ± 0.19 x 10^6 µl on 0^{th} day, that became 3.24 ± 0.27 x 10^6 µl on 7^{th} day after treatment that further increased to 4.20 ± 0.03 gm% after treatment of 14^{th} days (Table 19,Fig.21). On 0^{th} day the TEC of dogs of Group B-2.2 was 1.51 ± 0.33 x 10^6 µl which slightly increased to 1.93 ± 0.31 x 10^6 µl on 7^{th} day after treatment which further increased to 3.09 ± 0.13 x 10^6 µl on 14^{th} days after treatment. (Table 24,Fig.).

The lower values of TEC are due to anaemia observed either due to bleeding diathesis or due to secondary anorexia observed during the period of sickness.However, after treatment of all the dogs showed moderate increasing trend due to treatment due to haematinics preparations, treatment of thrombocytopenia. This is in agreement with Fathi and Jamshidi (2014) who observed low TEC in a thrombocytopenic Terrier breed of dog. With treatment with human intravenous immunoglobulins, TEC increased after treatment along with thrombocytic count.

4.4.2.3. Packed Cell Volume (PCV):

. The dogs of this Group A-1.1 had PCV on 0^{th} day was 29.57 ± 7.88 % that slightly decreased to 28.90 ± 4.91% on 7^{th} day after treatment which further increased to 31.63 ± 6.17 % on 14^{th} days after treatment(Table 7,Fig. 3). On 0^{th} day the PCV of dogs of Group A-1.2 was 27.88 ± 6.07 % which increased to 33.58 ± 4.26 % on 7^{th} day after treatment which further slightly decreased to 32.98 ± 4.16 % on 14^{th} days after treatment(Table 9,Fig.6). The PCV of the dogs of this Group A-2.1 on 0^{th} day was 24.48 ± 4.47 % which increased to 27.38 ± 3.37 % on 7^{th} day which further increased to 27.83 ± 4.08 % on 14^{th} day after treatment (Table 11, Fig.9). The dogs of the Group A-2.2 had PCV 16.78 ± 2.97 % on 0^{th} day which increased to 24.50 ± 2.84 % on 7^{th} day after treatment which further increased to 25.97 ± 3.60 % after treatment of 14^{th} days (Table 13, Fig.12).

On 0^{th} day the PCV of dogs of Group B-1.1 was 30.10 ± 5.04 % which increased to 31.92 ± 5.74 % on 7^{th} day after treatment which further increased to 35.17 ± 1.62 % on 14^{th} days after treatment (Table 15, Fig.15).The PCV value of Group B-1.2 dogs was 16.90 ± 2.29 % on 0^{th} day, which increased to 20.85 ± 5.18 % after treatment on 7^{th} days which further increased to 29.30.75 ± 3.27 % after treatment on 14^{th} days (Table 17,Fig.18). The dogs of this Group B-2.1 had PCV on 0^{th} day was 17.25 ± 0.53 % that became 24.65 ± 4.12% on 7^{th} day after treatment which further increased to 28.90 ± 0.90 % on 14^{th} days after treatment (Table 19,Fig. 21). The dogs of the Group A-2.2 had PCV 13.70 ± 1.96 % on 0^{th} day, which increased to 17.25 ± 2.49 % on 7^{th} day after treatment which further increased to 25.25 ± 3.23 % after treatment of 14^{th} days (Table 21, Fig. 24).

The low PCV value indicates dehydration and/or anaemia in dogs (Benjamin, 2001). Fathi and Jamshidi (2014) reported low PCV values with thrombocytopenic Terrior breed of dog showed low PCV that could be due to accompanied clinical sign of diarrhea. However, the dog recovered after treatment with human immunoglobulin and supportive treatment. In the present study moderate improvement in PCV values are observed due to treatment with fluids along with either Papaya leaves extract or Prednisolone.

4.4.2.4. Red Cell Distribution Width (RDW):

The dogs of Group A-1.1 had RDW on 0th day 17.10 ± 2.98 % that increased to 19.63 ± 4.28% on 7th day after treatment which further increased to 20.63 ± 20 % on 14th days after treatment (Table 7, Fig. 3). On 0th day the RDW of dogs of Group A-1.2 was 14.65 ± 0.24 % which slightly increased to 14.93 ± 0.73 % on 7th day after treatment which further increased to 19.40 ± 3.56 % on 14th days after treatment (Table 9, ,Fig.6).The RDW of the dogs of this Group A-2.1 on 0th day was 11.50 ± 2.92 % which increased to 14.95 ± 1.99 % on 7th day which became 13.33 ± 1.03 % on 14th day after treatment(Table 11,Fig.9). The dogs of the Group A-2.2 had RDW 16.35 ± 1.59 % on 0th day, that which increased to 18.53 ± 3.53% on 7th day after treatment which further increased to 20.13 ± 1.64 % after treatment of 14th days (Table 13,Fig.12).

On 0th day the RDW of dogs of Group B-1.1 was 15.63 ± 5.88 % which became 14.53 ± 1.07 % on 7th day after treatment which further increased to 17.30 ± 2.54 % on 14th days after treatment (Table 15,Fig.15).The RDW value of Group B-1.2 dogs was 17.70 ± 3.35 % on 0th day, which increased to 21.45 ± 0.12% after treatment on 7th days which became 18.90 ± 0.08 % after treatment on 14th daysT(Table 17,Fig.18). he dogs of this Group B-2.1 had RDW on 0th day was 14.00 ± 1.06 % which increased to 14.45 ± 1.51 % on 7th day after treatment which decreased to 13.60 ± 0.16 % on 14th days after treatment(Table 19,Fig.21).The dogs of the Group A-2.2 had RDW 13.80 ± 0.08 % on 0th day, which increased to 18.00 ± 2.04 % on 7th day after treatment which decreased to 15.50 ± 3.43 % after treatment of 14th days. (Table 21, Fig. 24).

Red cell distribution width (RDW) gives early indication of iron deficiency of anaemia (Weiss,2010). In the present research increased RDW values might be related to iron deficiency might have been developed due to bleeding diasthesis or secondary to anorexia causing deficiency of iron in non bleeding cases.

4.4.2.5. Platelet Distribution Width (PDW):

The PDW of the dogs of this Group A-1.1 on 0th day was 11.53 ± 0.82 % which increased to 13.23 ± 0.90 % on 7th day which became 12.73 ± 1.85 % on 14th day after treatment (Table 7, Fig. 3). The dogs of the Group A-1.2 had PDW

12.00 ± 0.98 % on 0th day, which became 11.85 ± 0.44 % on 7th day after treatment which further increased to 14.90 ± 1.23 % after treatment of 14th days (Table 9,Fig.6).The PDW value of Group A-2.1 dogs was 11.50 ± 2.92 % on 0th day, which increased to 14.95 ± 1.99% after treatment on 7th days which became 13.33 ± 1.03 % after treatment on 14th days(Table 11,Fig.9). The dogs of this Group A-2.2 had PDW on 0th day was 13.40 ± 2.12 % which decreased to 11.85 ± 2.26 % on 7th day after treatment which further decreased to 12.58 ± 2.57 % on 14th days after treatment(Table 13,Fig.12).

The dogs of this Group B-1.1 had PDW on 0th day was 14.23 ± 2.52 % that decreased to 13.23 ± 3.00% on 7th day after treatment which further decreased to 12.73 ± 1.29 % on 14th days after treatment(Table 15,Fig.15). On 0th day the PDW of dogs of Group B-1.2 was 16.90 ± 7.10 % which decreased to 13.35 ± 6.00 % on 7th day after treatment which further increased to 23.30 ± 6.41 % on 14th days after treatment (Table 17,Fig.18). The PDW value of Group B-2.1 dogs was 6.95 ± 2.16 % on 0th day, which increased to 8.55 ± 1.27% after treatment on 7th days which further increased to 9.20 ± 1.35 % after treatment on 14th days (Table 19,Fig.21). The dogs of this Group B-2.2 had RDW on 0th day was 6.85 ± 1.02 % which increased to 10.25 ± 0.69 % on 7th day after treatment which further increased to 12.50 ± 1.47 % on 14th days after treatment(Table 21,Fig.24).

The platelet distribution width (PDW) represents heterogenecity of platelet size. Increased number of large number of platelets increased platelet heteriogenecity.PDW should increase during bone marrow response to thrombocytopenia.PDW has been used to discriminate between immune mediated thrombocytopenia and thrombocytopenia in aplastic anaemia in human being (Kaito *et al.,* 2005).However, in the present study PDW value increased above normal only in Group B-1.2 which indicated that the cause of thrombocytopenia might be immune mediated. However, its confirmation by platelet size could not be ascertained.

4.4.2.6. Mean Platelet Volume (MPV):

The MPV of the dogs of this Group A-1.1 on 0th day was 12.13 ± 1.47 fl which increased to 15.27 ± 2.50 fl on 7th day which became 13.40 ± 1.88 fl on 14th day after treatment (Table 7, Fig. 3).The dogs of the Group A-1.2 had MPV

12.98 ± 1.68 fl on 0th day, which increased to 15.50 ± 2.65 fl on 7th day after treatment which further increased to 15.53 ± 2.81 fl after treatment of 14th days (Table 9, Fig. 6). The MPV value of Group A-2.1 dogs was 12.08 ± 0.52 fl on 0th day, which increased to 32.83 ± 22.87 fl after treatment on 7th days which became 8.78 ± 0.96 fl after treatment on 14th days (Table 11,Fig.9). The dogs of this Group A-2.2 had MPV on 0th day was 11.30 ± 0.97 fl which decreased to 10.65 ± 0.42 fl on 7th day after treatment which further decreased to 12.20 ± 1.21 fl on 14th days after treatment(Table 13, Fig.12).

The dogs of this Group B-1.1 had MPV on 0th day was 13.73 ± 1.86 fl that increased to 14.37 ± 1.83 fl on 7th day after treatment which further decreased to 12.03 ± 1.54 fl on 14th days after treatment(Table 15,Fig.15). On 0th day the MPV of dogs of Group B-1.2 was 11.60 ± 1.63 fl which increased to 12.25 ± 0.69 fl on 7th day after treatment which decreased to 9.20 ± 1.47 fl on 14th days after treatment (Table 17, Fig. 18). The MPV value of Group B-2.1 dogs was 12.90 ± 0.57 fl on 0th day, which increased to 16.45 ± 2.74fl after treatment on 7th days which decreased to 14.10 ± 2.66 fl after treatment on 14th days (Table 19,Fig.21). The dogs of this Group B-2.2 had MPV on 0th day was 9.45 ± 0.04 fl which increased to 13.35 ± 1.02 fl on 7th day after treatment which decreased to 9.45 ± 0.12 fl on 14th days after treatment(Table 21, Fig. 24).

Elevated Mean Platelet Volume (MPV) have been associated with an adequate /increased number of megakaryocytes on bone marrow cytology in human being and dogs (Karpatkin and Garg, 1974). Russell (2010) commented that the MPV estimates platelet size and is inversely proportion to platelet number. In the present study MPV of all groups was found to be normal in range before treatment, however the platelet count was below normal before treatment.

4.4.2.7. Mean Corpuscular Volume (MCV):

The MCV of the dogs of this Group A-1.1 on 0th day was 67.24 ± 3.82 fl which increased to 76.11 ± 10.58 fl on 7th day which became 67.92 ± 4.01 fl on 14th day after treatment (Table 7). The dogs of the Group A-1.2 had MCV 67.34 ± 1.79 fl on 0th day, which increased to 70.89 ± 4.31 fl on 7th day after treatment which further decreased to 67.14 ± 5.21 fl after treatment of 14th days(Table 9). The MCV value of Group A-2.1 dogs was 73.40 ± 6.37 fl on 0th day, which decreased to 69.07 ± 5.87 fl after treatment on 7th days which became 62.22 ±

3.90 fl after treatment on 14th days(Table 11). The dogs of this Group A-2.2 had MCV on 0th day was 72.76 ± 3.06 fl which decreased to 72.33 ± 4.53 fl on 7th day after treatment which further decreased to 70.26 ± 4.95 fl on 14th days after treatment(Table 13).

The dogs of this Group B-1.1 had MCV on 0th day was 68.20 ± 2.90 fl that became 62.74 ± 3.02 fl on 7th day after treatment which further increased to 69.89 ± 5.49 fl on 14th days after treatment(Table 15). On 0th day the MCVdogs of Group B-1.2 was 68.52 ± 1.05 fl which increased to 72.87 ± 1.96 fl on 7th day after treatment which increased to 73.07 ± 0.15 fl on 14th days after treatment(Table 17). The MCV value of Group B-2.1 dogs was 66.05 ± 6.71 fl on 0th day, which increased to 75.39 ± 6.56 fl after treatment on 7th days which decreased to 68.81 ± 1.70 fl after treatment on 14th days (Table 19). The dogs of this Group B-2.2 had MCV on 0th day was 93.29 ± 7.71 fl which decreased to 89.94.35 ± 1.37 fl on 7th day after treatment which decreased to 81.27 ± 7.00 fl on 14th days after treatment(Table 21).

The MCV values of thrombocytopenic dogs before and after treatment did not show much deviation from normal values.

4.4.2.8. Mean Corpuscular Hemoglobin (MCH):

The MCH of the dogs of this Group A-1.1 on 0th day was 21.84 ± 0.80 pg which increased to 24.23 ± 2.58 pg on 7th day which became 21.39 ± 0.68 pg on 14th day after treatment (Table 7,Fig.3). The dogs of the Group A-1.2 had MCH 22.37 ± 0.31 pg on 0th day that become 20.68 ± 1.81.31 pg on 7th day after treatment which further decreased to 20.00 ± 1.58 pg after treatment of 14th days(Table 9,Fig.6). The MCH value of Group A-2.1 dogs was 22.08 ± 1.00 pg on 0th day, which increased to 22.70 ± 1.52 pg after treatment on 7th days which became 22.06 ± 1.84 pg after treatment on 14th days (Table 11, Fig. 9). The dogs of this Group A-2.2 had MCH on 0th day was 24.64 ± 3.06 pg which decreased to 22.34 ± 1.23 pg on 7th day after treatment which further became to 21.86 ± 1.30 pg on 14th days after treatment (Table 13,Fig.12).

The dogs of this Group B-1.1 had MCH on 0th day was 20.98 ± 0.41 pg that increased to 21.64 ± 1.22 pg on 7th day after treatment which further became to 20.86 ± 1.71 pg on 14th days after treatment (Table 15, Fig. 15). On

0th day the MCH of dogs of Group B-1.2 was 19.78 ± 0.82 pg which increased to 22.47 ± 1.85 pg on 7th day after treatment which became to 22.19 ± 0.41 pg on 14th days after treatment (Table 17, Fig. 18). The MCH value of Group B-2.1 dogs was 21.62 ± 0.30 pg on 0th day, which increased to 21.64 ± 0.01 pg after treatment on 7th days which decreased to 19.29 ± 1.12 fl after treatment on 14th days (Table 19, Fig. 21). The dogs of this Group B-2.2 had MCH on 0th day was 30.94 ± 4.43 pg which decreased to 23.91.35 ± 2.14 pg on 7th day after treatment which decreased to 22.14 ± 0.52 pg on 14th days after treatment(Table 21, Fig. 24).

The MCH values of thrombocytopenic dogs before and after treatment did not show much deviation from normal values.

4.4.2.9 Mean Corpuscular Hemoglobin Concentration (MCHC):

The MCHC of the dogs of this Group A-1.1 on 0th day was 32.52 ± 1.83 g/dl which became to 32.10 ± 0.96 g/dl on 7th day which slightly reduced 31.61 ± 1.10 g/dl on 14th day after treatment (Table 7, Fig. 3).The dogs of the Group A-1.2 had MCHC 31.41 ± 1.15 pg on 0th day that decreased to 29.05 ± 1.12. g/dl on 7th day after treatment which further increased to 29.82 ± 0.96 g/dl after treatment of 14th days (Table 9,Fig.6). The MCHC value of Group A-2.1 dogs was 31.17 ± 1.56 g/dl on 0th day, which increased to 33.01 ± 0.70 g/dl after treatment on 7th days which further increased to 35.25 ± 1.90 g/dl after treatment on 14th days (Table 11, Fig. 9). The dogs of this Group A-2.2 had MCHC on 0th day was 28.81 ± 2.01 g/dl which increased to 31.13. ± 1.78 g/dl on 7th day after treatment, while further remained steady as 31.30 ± 1.66 g/dl on 14th days after treatment (Table 13, Fig. 12).

The dogs of this Group B-1.1 had MCHC on 0th day was 30.88 ± 1.55 g/dl that increased to 33.48 ± 0.87 g/dl on 7th day after treatment which further became to 30.49 ± 4.34 g/dl on 14th days after treatment(Table 15, Fig.15). On 0th day the MCHC of dogs of Group B-1.2 was 28.85 ± 0.76 g/dl which increased to 30.77 ± 1.71 g/dl on 7th day after treatment which became to 30.38 ± 0.63 g/dl on 14th days after treatment (Table 17, Fig. 18). The MCHC value of Group B-2.1 dogs was 33.18 ± 2.91 g/dl on 0th day, which decreased to 29.04 ± 2.54 g/dl after treatment on 7th days which decreased to 28.03 ± 2.47 g/dl after treatment on 14th days (Table 19, Fig. 21). The dogs of this Group B-2.2 had MCH on 0th day

was 32.92 ± 2.03 g/dl which decreased to 26.65 ± 2.78 g/dl on 7th day after treatment which increased to 27.46 ± 1.73 g/dl on 14th days after treatment (Table 21, Fig. 24).

The MCHC values of dogs with thrombocytopenia in different groups might have lower values initially before treatment, might be due to the bleeding diathesis or secondary to anorexia causing deficiency of iron. This has been observed in almost all the groups even after treatment of thrombocytopenia and supplementation of iron. It could be due to small observation period the lower values of MCHC were observed even after treatment.

4.4.2.10. Total Leucocyte count (TLC):

The TLC of the dogs of this Group A-1.1 on 0th day was 34.80 ± 27.25 x10^3/cmm which reduced to 28.91 ± 16.44 x 10^3/cmm on 7th day which further reduced to 18.41 ± 7.76 x 10^3 /cmm on 14th day after treatment (Table 7, Fig. 3). The dogs of the Group A-1.2 had TLC 31.41 ± 1.15 x 10^3 /cmm on 0th day that decrease to 29.53 ± 8.04 x 10^3 /cmm on 7th day after treatment which further decreased to 21.40 ± 6.52 after treatment of 14th days (Table 9, Fig. 6). The TLC value of Group A-2.1 dogs was 43.98 ± 18.74 x 10^3 /cmm on 0th day, which reduced to 40.73 ± 13.88 x 10^3 /cmm after treatment on 7th days which further reduced to 15.45 ± 5.67 x 10^3 /cmm after treatment on 14th days (Table 11,Fig.9). The dogs of this Group A-2.2 had TLC on 0th day was 11.35 ± 5.54 x 10^3 /cmm which increased to 13.38 ± 1.99 x 10^3 /cmm on 7th day after treatment which further reduced to 10.25 ± 12.35 x 10^3 /cmm on 14th days after treatment (Table 12).

The dogs of this Group B-1.1 had TLC on 0th day was 40.17 ± 13.47 x 10^3 /cmm that reduced to 28.13 ± 13.06 x 10^3 /cmm on 7th day after treatment which further reduced to 20.17 ± 6.99 x 10^3 /cmm on 14th days after treatment (Table 15,Fig.15). On 0th day the TLC of dogs of Group B-1.2 was 32.30 ± 8.74 x 10^3 /cmm which increased to 33.69 ± 12.91 x 10^3 /cmm on 7th day after treatment which further reduced to 26.70 ± 5.97 x 10^3 /cmm on 14th days after treatment (Table 17,Fig.18). The TLC value of Group B-2.1 dogs was 37.40 ± 7.84 x 10^3 /cmm on 0th day, which decreased to 31.80 ± 2.20 x 10^3 /cmm after treatment on 7th days which further decreased to 6.10 ± 8.94 x 10^3 /cmm l after treatment on 14th days (Table 19, Fig. 21). The dogs of this Group B-2.2

had TLC on 0^{th} day was 42.45 ± 29.03 x 10^3 /cmm which increased to 46.30 ± 32.66 x 10^3 /cmm on 7^{th} day after treatment which further reduced to 42.85 ± 27.88 x 10^3 /cmm on 14^{th} days after treatment (Table 21,Fig.24).

The TLC of all dogs with thrombocytopenia showed increased in leucocyte count as the cases selected were having infections like *Ehrlichia canis, Trypanosoma spps*. or dogs were having icterus or renal failure due to infectious cause or due to secondary bacterial infection before treatment. All dogs when treated were administered either specific antibiotics (e.g.Doxycycline/Quinapyramin for Ehrlichia spps /Trypanosoma infection).Most of the cases the clinical recovery was observed after treatment, the TLC remained high.

4.4.2.11. Neutrophil:

The Neutrophil of the dogs of this Group A-1.1 on 0^{th} day was 82.33 ± 1.86 % which reduced to 74.00 ± 5.69 % on 7^{th} day which further reduced to 61.33 ± 4.91 % on 14^{th} day after treatment (Table 7). The dogs of the Group A-1.2 had Neutrophil 79.75 ± 5.02 % on 0^{th} day that decreased to 74.50 ± 4.17 %on 7^{th} day after treatment which further reduced to 59.50 ± 2.72% after treatment on 14^{th} day (Table 9).The Neutrophil value of Group A-2.1 dogs was 84.00 ± 2.48 % on 0^{th} day, which reduced to 74.75 ± 2.17 % after treatment on 7^{th} days which further reduced to 67.25 ± 3.33 % after treatment on 14^{th} days (Table 11). The dogs of this Group A-2.2 had Neutrophil on 0^{th} day was 69.25 ± 6.91 % which reduced to 65.75 ± 3.91 % on 7^{th} day after treatment which further reduced to 56.50 ± 5.61 % on 14^{th} days after treatment (Table 13).

The dogs of this Group B-1.1 had Neutrophil on 0^{th} day was 73.00 ± 7.02 % that became 82.33 ± 4.81 % on 7^{th} day after treatment which further reduced to 67.00 ± 8.08 % on 14^{th} days after treatment (Table 15). On 0^{th} day the Neutrophil of dogs of Group B-1.2 was 87.50 ± 4.49 % which reduced to 83.00 ± 8.98 % on 7^{th} day after treatment which increased to 88.00 ± 5.72 % on 14^{th} days after treatment (Table 17). The Neutrophil value of Group B-2.1 dogs was 84.00 ± 0.82 % on 0^{th} day, which decreased to 79.00 % after treatment on 7^{th} days which further decreased to 70.00 ± 1.22 % after treatment on 14^{th} days (Table 19). The dogs of this Group B-2.2 had Neutrophil on 0^{th} day was 84.50 ±

5.31 % which increased to 85.50 ± 6.94 % on 7th day after treatment which further reduced to 74.00 ± 6.53 % on 14th days after treatment(Table 21).

The neutrophil count is associated with acute bacterial infection (Brar *et al.,* 2001). Since there was increased TLC before treatment and even in certain cases after treatment neutrophil count also showed similar trend before and after treatment of thrombocytopenic dogs.

4.4.2.12. Platelet Count:

The Platelet count of the dogs of this Group A-1.1 on 0th day was 55333.33 ± 5925.46 /cmm which increased to 78666.67 ± 22228.61 /cmm on 7th day which further increased to 1710000 .00 ± 52557.90 /cmm on 14th day after treatment (Table 7, Fig. 4). The dogs of the Group A-1.2 had Platelet count 54000.00 ± 12247.45 /cmm on 0th day that increased to 112500.00 ± 20422.62 /cmm on 7th day after treatment which further increased to 279750.00 ± 34318.06 /cmm after treatment on 14th day (Table 9, Fig. 7). The Platelet count value of Group A-2.1 dogs was 45500.00 ± 7421.81 /cmm on 0th day, which increased to 122250.00 ± 22095.91 /cmm after treatment on 7th days which further increased to 250000.00 ± 14005.95/cmm after treatment on 14th days (Table 11, Fig. 10).The dogs of this Group A-2.2 had Platelet count on 0th day was 35000.00 ± 17392.53 /cmm which increased to 81750.00 ± 14049.76 /cmm on 7th day after treatment which further increased to 176250.00 ± 46938.57 /cmm on 14th days after treatment (Table 13, Fig. 13).

The dogs of this Group B-1.1 had Platelet count on 0th day was 47000.00 ± 7211.10 /cmm which increased to 75000.00 ± 2081.67/cmm on 7th day after treatment which further increased to 159333.33 ± 43240.93 /cmm on 14th days after treatment (Table 15,Fig.16). On 0th day the Platelet count of dogs of Group B-1.2 was 25500.00 ± 11022.70 /cmm which increased to 47500.00 ± 15921.68 /cmm on 7th day after treatment which further increased to 97000.00 ± 16329.93 /cmm on 14th days after treatment (Table 17, Fig. 19). The Platelet count value of Group B-2.1 dogs was 36500.00 ± 20820.66 /cmm on 0th day which increase to 68500.00 ± 15921.68 /cmm after treatment on 7th days which further increased to 115000.00 ± 33476.36 after treatment on 14th days (Table 19, Fig. 22). The dogs of this Group B-2.2 had Platelet count on 0th day was 57500 ± 21637.16 /cmm which increased to 130500.00 ± 15921.68 /cmm on 7th day after

treatment which further increased to 253500.00 ± 49398.04 /cmm on 14th days after treatment (Table 21,Fig.25).

The platelet count of all groups of animals was below 1,00,000 /cmm. Reduction of platelet count could be due to increased platelet destruction, increased platelet consumption, decreased platelet production and increased platelet sequestration (Jackson and Kruth, 1985).

Papaya leaves extract contain active compounds papain, chymopapain, alkaloids, flavonoides, flavonaols, benzylglucosinolate and tannins. These compounds stimulate and / or improve the megakaryocytes to produce sufficient number of platelets to maintain the suitable platelet count in mammals in particular during chemotherapy. As pro platelet formation is regulated by a caspase (protease) activation, protein digestion by these enzymes may increase the platelet count (Tahir *et al*.,2014). Papaya leaves extract was given to dogs of Group A-1.1,A-2.1,A and B-1.1,B-2.1 for 14 days.

Tefft (2014) stated that Prednisolone reduces Fc-mediated phagocytosis of red blood cells and platelets by macrophages & antibody production. Thereby there is increased in platelet count after treatment with Prednisolone in immune mediated thrombocytopenic dogs. Loftin (2008) opined that corticosteroids are the initial treatment of choice for most patients with immune mediated thrombocytopenia, and they act by several different mechanisms, the most important of which is impaired macrophage destruction of antibody bound platelets. In addition, steroids also inhibit antibody production and may also increase capillary resistance to hemorrhage, which is obviously of clinical benefit in immune mediated thrombocytopenic patients. In the present study dogs affected with thrombocytopenia when treated with Prednisolone showed increase in platelet count.

From study it was observed that Papaya leaves extract in Group A-1.1 increased the platelet count by 2.09 times whereas Prednisolone increased the platelet count in Group A-1.2 by 4.18 times. In Group A-2.1 platelet count increased by 4.49 times by treatment with Papaya leaves extract, whereas in dogs of Group A-2.2 platelet count increased by 4.03 times after treatment with Prednisolone.

The platelet count of dogs of Group B-1.1treated with papaya leaves extract increased by 2.39 times whereas the dogs of Group B-1.2 treated with Prednisolone the platelet count increased by 2.80 times. The dogs of Group B-2.1 received treatment with papaya leaves extract showed increased in platelet count by 2.15 times whereas dogs of Group B-2.2 treated with Prednisolone showed increased in platelet count by 3.40 times.

4.4.2.13. Manual Platelet Count (MPT):

The MPLT of the dogs of this Group A-1.1 on 0^{th} day was 66333.33 ± 3527.67 /cmm which increased to 82000.00 ± 17785.76 /cmm on 7^{th} day which further increased to 178000.00 ± 51539.63 /cmm on 14^{th} day after treatment The dogs (Table 7,Fig.4). of the Group A-1.2 had MPLT 51500.00 ± 13456.72 /cmm on 0^{th} day that increased to 114000.00 ± 18854.71 /cmm on 7^{th} day after treatment which further increased to 283750.00 ± 33641.18 /cmm after treatment on 14^{th} day (Table 9, Fig. 7). The MPLT value of Group A-2.1 dogs was 42000.00 ± 7538.79 /cmm on 0^{th} day, which increased to 124750.00 ± 18865 /cmm after treatment on 7^{th} days which further increased to 255000.00 ± 15378.56 /cmm after treatment on 14^{th} days (Table 11, Fig. 10). The dogs of this Group A-2.2 had MPLT on 0^{th} day was 35000.00 ± 16088.30 /cmm which increased to 77250.00 ± 14114.86 /cmm on 7^{th} day after treatment which further increased to 168000.00 ± 45094.35 /cmm on 14^{th} days after treatment (Table 13, Fig.13).

The dogs of this Group B-1.1 had MPLT on 0^{th} day was 49666.67 ± 7264.83 /cmm which increased to 74333.33 ± 666.67/cmm on 7^{th} day after treatment which further increased to 158333.33 ± 39717.05 /cmm on 14^{th} days after treatment (Table 15,Fig.16). On 0^{th} day the MPLT of dogs of Group B-1.2 was 21500.00 ± 9389.71 /cmm which increased to 44500.00 ± 2735.26 /cmm on 7^{th} day after treatment which further increased to 112000.00 ± 30210.37 /cmm on 14^{th} days after treatment (Table 17,Fig.19). The MPLT value of Group B-2.1 dogs was 31500.00 ± 17554.68 /cmm on 0^{th} day which increase to 70000.00 ± 13880.44 /cmm after treatment on 7^{th} days which further increased to 133000.00 ± 26536.14 after treatment on 14^{th} days (Table 19, Fig. 22). The dogs of this Group B-2.2 had Platelet count on 0^{th} day was 58000.00 ± 17146.43 /cmm which increased to 121500.00 ± 11022.70 /cmm on 7^{th} day after treatment which further increased to 249500.00 ± 50214.54 /cmm on 14^{th} days after treatment (Table 21, Fig. 23).

The manual platelet count was to done to avoid errors as suggested by Russell (2010). Platelet count by machine and by method differs slightly due to machine errors.

4.4.2.14. Erythrocyte Sedimentation Rate (ESR):

The ESR of the dogs of this Group A-1.1 on 0^{th} day was 76.00 ± 25.77 mm which decreased to 53.33 ± 17.75 mm on 7^{th} day which further reduced to 12.00 ± 3.00 mm on 14^{th} day after treatment (Table 7). The dogs of the Group A-1.2 had ESR 45.75 ± 15.10 on 0^{th} day which reduced to 34.00 ± 3.85 mm on 7^{th} day after treatment which further reduced to 12.50 ± 3.10 mm after treatment on 14^{th} day (Table 9). The ESR value of Group A-2.1 dogs was 44.25 ± 6.47 mm on 0^{th} day which increased to 47.25 ± 6.37 after treatment on 7^{th} days which further reduced to 18.75 ± 1.97 mm after treatment on 14^{th} days (Table 11). The dogs of this Group A-2.2 had ESR on 0^{th} day was 33.75 ± 12.91mm which decreased to 22.25 ± 7.33 mm on 7^{th} day after treatment which further increased to 23.75 ± 5.44 mm on 14^{th} days after treatment(Table 13).

The dogs of this Group B-1.1 had ESR on 0^{th} day was 47.00 ± 24.17 mm which reduced to 42.67 ± 23.38 mm on 7^{th} day after treatment which further reduced to 41.33 ± 15.43 mm on 14^{th} days after treatment (Table 15). On 0^{th} day the ESR of dogs of Group B-1.2 was 18.50 ± 7.76 mm which increased to 61.18 ± 23.00 mm on 7^{th} day after treatment which further decreased to 46.00 ± 11.84 mm on 14^{th} days after treatment(Table 17). The ESR value of Group B-2.1 dogs was 34.00 ± 6.53 mm on 0^{th} day which increase to 34.50 ± 9.39 mm after treatment on 7^{th} days which became 41.00 ± 3.67 mm after treatment on 14^{th} days (Table 19). The dogs of this Group B-2.2 had ESR on 0^{th} day was 73.50 ± 6.94 mm which reduced to 65.50 ± 10.21mm on 7^{th} day after treatment which further decreased to 49.00 ± 18.78 mm on 14^{th} days after treatment (Table 21).

Increased ESR is associated with general and local infection (Brar *et al.,* 2001).In the present study strong correlation of platelet count and ESR was observed (Table 23).

4.4.2.15. Reticulocyte index (RI):

The RI of the dogs of this Group A-1.1 on 0^{th} day was 0.05 ± 0.00 % which remains steady (0.50 ± 0.00 %) on 7^{th} day which further remains steady

Table 23: Correlation of parameters (Hb, MPLT, ESR, PT, aPTT, Clotting time, BMBT) of blood analysis with Platelet count.

Parameter	Correlation with Platelet (all 24 dogs)	Correlation with Platelet (15 Dogs with bleeding diathesis)	Correlation with Platelet (9 Dogs without bleeding diathesis)
Hb	-0.06194	0.217607	0.217607
MPLT	0.960941	0.927509	0.927509
ESR	0.376748	0.541406	0.541406
PT	-0.04954	0.442525	0.442525
aPTT	-0.11487	0.156595	0.156595
Clotting time	0.278587	0.584296	0.584296
BMBT	0.029271	0.309749	0.309749

(0.50 ± 0.00 %) on 14th day after treatment (Table 7). The dogs of the Group A-1.2 had RI 0.50 ± 0.00 % on 0th day which increased to 0.65 ± 0.12 % on 7th day after treatment which further increased to 0.75 ± 0.25 % after treatment on 14th day(Table 9). The RI value of Group A-2.1 dogs was 1.08 ± 0.58 % on 0th day which reduced to 0.63 ± 0.13% after treatment on 7th days which further remains steady (0.63 ± 0.13%) after treatment on 14th days (Table 11). The dogs of this Group A-2.2 had RI on 0th day was 1.05 ± 0.52 % which decreased to 0.50 ± 0.00 % on 7th day after treatment which further increased to 0.53 ± 0.02 % on 14th days after treatment (Table 13).

The dogs of this Group B-1.1 had RI on 0th day was 0.67 ± 0.17 % which reduced to 0.50 ± 0.00 % on 7th day after treatment which further remains steady (0.50 ± 0.00 %) on 14th days after treatment (Table 15). On 0th day the RI of dogs of Group B-1.2 was 0.50 ± 0.00 % which remains steady (0.50 ± 0.00 %) on 7th day after treatment which further remains steady (0.50 ± 0.00 %) on 14th days after treatment (Table 17). The RI value of Group B-2.1 dogs was 0.50 ± 0.00 % on 0th day which remains steady (0.50 ± 0.00 %) after treatment on 7th days which remains steady(0.50 ± 0.00 %) after treatment on 14th days (Table 19). The dogs of this Group B-2.2 had RI on 0th day was 0.50 ± 0.00 % on 0th day which remains steady (0.50 ± 0.00 %) after treatment on 7th days which remains steady(0.50 ± 0.00 %) after treatment on 14th days (Table 21).

Reticulocyte index (RI) helps to find out the regenerative or non regenerative response in treatment of anaemia. In the present study the RI levels were found to be in normal range before and after treatment.

4.4.3. Liver Function Test:

4.4.3.1. Total Bilirubin (TB):

The TB of the dogs of this Group A-1.1 on 0th day was 6.55 ± 2.96 mg/dl which decreased to 5.00 ± 2.25 mg/dl on 7th day which further reduced to 1.67 ± 1.07 mg/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had TB 0.65 ± 0.10 mg/dl on 0th day which became 0.69 ± 0.08 mg/dl on 7th day after treatment which further reduced to 0.52 ± 0.07 mg/dl after treatment on 14th day (Table 10). The TB value of Group A-2.1 dogs was 0.48 ± 0.05 mg/dl on 0th day which increased to 0.53 ± 0.05 mg/dl after treatment on 7th days which

further remains steady (0.53 ± 0.05 mg/dl) after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had TB on 0th day was 0.55 ± 0.06 mg/dl which increased to 0.75 ± 0.15 mg/dl on 7th day after treatment which further reduced to 0.50 ± 0.07 mg/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had TB on 0th day was 0.97 ± 0.52 mg/dl which reduced to 0.87 ± 0.16 mg/dl on 7th day after treatment which further reduced to 0.61 ± 0.06 mg/dl on 14th days after treatment (Table 16). On 0th day the TB of dogs of Group B-1.2 was 0.60 ± 0.16 mg/dl which decreased to 0.50 ± 0.16 mg/dl on 7th day after treatment which further decreased to 0.40 ± 0.12 mg/dl on 14th days after treatment (Table 18). The TB value of Group B-2.1 dogs was 0.44 ± 0.03 mg/dl on 0th day which increased to 0.52 ± 0.26 mg/dl after treatment on 7th days which further decreased to 0.20 ± 0.17 mg/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had TB on 0th day was 0.55 ± 0.04 mg/dl which increased to 0.95 ± 0.53 mg/dl on 7th day after treatment which further reduced to 0.70 ± 0.16 mg/dl on 14th days after treatment (Table 22).

Total bilirubin (TB) was found to be moderately or severely increased in dogs of Groups A-1.1,A-1.2,-2.2,B-1.1,B-1.2,B-2.2 before treatment. These dogs showed decreasing trend or reduction in levels of TB after treatment might be due to effect of supportive treatment.

4.4.3.2. Direct Bilirubin (DB):

The DB of the dogs of this Group A-1.1 on 0th day was 3.57 ± 1.59 mg/dl which decreased to 3.03 ± 1.47 mg/dl on 7th day which further reduced to 0.93 ± 0.59 mg/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had DB 0.36 ± 0.11 mg/dl on 0th day which became 0.43 ± 0.05 mg/dl on 7th day after treatment which further reduced to 0.28 ± 0.08 mg/dl after treatment on 14th day (Table 10). The DB value of Group A-2.1 dogs was 0.25 ± 0.03 mg/dl on 0th day which increased to 0.30 ± 0.06 mg/dl after treatment on 7th days which further increase to 0.33 ± 0.05 mg/dl after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had DB on 0th day was 0.25 ± 0.10 mg/dl which increased to 0.40 ± 0.09 mg/dl on 7th day after treatment which further decreased to 0.30 ± 0.07 mg/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had DB on 0th day was 0.32 ± 0.19 mg/dl which increased to 0.46 ± 0.06 mg/dl on 7th day after treatment which further reduced to 0.35 ± 0.07 mg/dl on 14th days after treatment (Table 16). On 0th day the TB of dogs of Group B-1.2 was 0.35 ± 0.12 mg/dl which decreased to 0.25 ± 0.12 mg/dl on 7th day after treatment which further increased to 0.30 ± 0.08 mg/dl on 14th days after treatment (Table 18). The DB value of Group B-2.1 dogs was 0.17 ± 0.03 mg/dl on 0th day which increased to 0.22 ± 0.10 mg/dl after treatment on 7th days which further decreased to 0.10 ± 0.13 mg/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had DB on 0th day was 0.25 ± 0.04 mg/dl which increased to 0.45 ± 0.29 mg/dl on 7th day after treatment which further decreased to 0.40 ± 0.00 mg/dl on 14th days after treatment (Table 22).

In the present study dogs with thrombocytopenia with or without bleeding disorder showed moderately increased levels of direct bilirubin levels in all groups which subsequently reduced or showed tendency of decrease in levels after treatment.

4.4.3.3. Indirect Bilirubin (IB):

The IB of the dogs of this Group A-1.1 on 0th day was 2.99 ± 1.48 mg/dl which reduced to 1.97 ± 0.78 mg/dl on 7th day which further reduced to 0.73 ± 0.48 mg/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had IB 0.29 ± 0.07 mg/dl on 0th day which decreased to 0.26 ± 0.05 mg/dl on 7th day after treatment which further reduced to 0.24 ± 0.05 mg/dl after treatment on 14th day (Table 10). The IB value of Group A-2.1 dogs was 0.23 ± 0.05 mg/dl on 0th day which reduced to 0.23 ± 0.03 mg/dl after treatment on 7th days which further increase to 0.20 ± 0.00 mg/dl after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had IB on 0th day was 0.30 ± 0.07 mg/dl which increased to 0.35 ± 0.06 mg/dl on 7th day after treatment which further decreased to 0.20 ± 0.06 mg/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had IB on 0th day was 0.65 ± 0.33 mg/dl which reduced to 0.41 ± 0.15 mg/dl on 7th day after treatment which further reduced to 0.26 ± 0.11 mg/dl on 14th days after treatment (Table 16). On 0th day the TB of dogs of Group B-1.2 was 0.25 ± 0.04 mg/dl which remains steady (0.25 ± 0.12 mg/dl on 7th day after treatment which further decreased to 0.10 ±

0.04 mg/dl on 14th days after treatment (Table 18). The IB value of Group B-2.1 dogs was 0.27 ± 0.06 mg/dl on 0th day which increased to 0.30 ± 0.16 mg/dl after treatment on 7th days which further decreased to 0.10 ± 0.04 mg/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had IB on 0th day was 0.30 ± 0.00 mg/dl which increased to 0.50 ± 0.24 mg/dl on 7th day after treatment which further decreased to 0.30 ± 0.16 mg/dl on 14th days after treatment (Table 22).

In the present study dogs of different groups showed moderately increased levels of indirect bilirubin levels in A-1.1, B-1.1 which these levels subsequently reduced or showed tendency of decrease after treatment.

4.4.3.4. Serum Glutamic Oxaloacetic Transaminase (SGOT):

The SGOT of the dogs of this Group A-1.1 on 0th day was 237.33 ± 75.81 IU/L which reduced to 236.00 ± 63.95 IU/L on 7th day which further reduced to 156 .00 ± 67.72 IU/L on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had SGOT 439.12 ± 329.84 IU/L on 0th day which decreased to 351.24 ± 258.21 IU/L on 7th day after treatment which further reduced to 194.45 ± 98.25 IU/L after treatment on 14th day (Table 10). The SGOT value of Group A-2.1 dogs was 79.75 ± 24.35 IU/L on 0th day which increased to 86.25 ± 29.88 IU/L after treatment on 7th days which further reduced to 79.25 ± 30.41 IU/L after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had SGOT on 0th day was 196.50 ± 93.60 IU/L which increased to 226.75 ± 122.01 IU/L on 7th day after treatment which further decreased to 106.50 ± 36.19 IU/L on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had SGOT on 0th day was 34.77 ± 2.46 IU/L which increased to 54.47 ± 14.73 IU/L on 7th day after treatment which further reduced to 45.07 ± 9.58 IU/L on 14th days after treatment (Table 16). On 0th day the SGOT of dogs of Group B-1.2 was 82.50 ± 24.09 IU/L which increased to 87.50 ± 24.90 IU/L on 7th day after treatment which further increased to 110.00 ± 9.80 IU/L on 14th days after treatment (Table 18). The SGOT value of Group B-2.1 dogs was 64.74 ± 38.59 IU/L on 0th day which increased to 86.66 ± 47.63 IU/L after treatment on 7th days which further increased to 123.00 ± 40.74 IU/L after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had SGOT on 0th day was 121.50 ± 62.46 IU/L which decreased to 53.50 ± 0.41 IU/L on

7th day after treatment which further increased to 64.50 ± 5.31 IU/L on 14th days after treatment (Table 22).

In the present study dogs of different Groups A-1.1,A-1.2,A-2.1,A-2.2,B-1.2,B-2.1,B-2.2 showed increased levels of SGOT levels which reduced or showed tendency of decrease in levels after treatment.

4.4.3.5. Serum Glutamic Pyruvic Transaminase (SGPT):

The SGPT of the dogs of this Group A-1.1 on 0th day was 237.33 ± 90.46 IU/L which increased to 247.67 ± 41.34 IU/L on 7th day which further reduced to 119.67 ± 41.81 IU/L on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had SGPT 260.76 ± 119.71 IU/L on 0th day which decreased to 217.43 ± 102.14 IU/L on 7th day after treatment which further reduced to 146.11 ± 68.43 IU/L after treatment on 14th day (Table 10). The SGPT value of Group A-2.1 dogs was 227.50 ± 155.82 IU/L on 0th day which reduced to 190.50 ± 114.56 IU/L after treatment on 7th days which further reduced to 17.75 ± 103.87 IU/L after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had SGPT on 0th day was 202.00 ± 64.01 IU/L which reduced to 182.50 ± 77.98 IU/L on 7th day after treatment which further decreased to 99.00 ± 39.44 IU/L on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had SGPT on 0th day was 38.03 ± 9.90 IU/L which increased to 42.20 ± 11.28 IU/L on 7th day after treatment which further reduced to 36.07 ± 6.89 IU/L on 14th days after treatment (Table 16). On 0th day the SGPT of dogs of Group B-1.2 was 102.50 ± 15.11 IU/L which decreased to 87.00 ± 13.06 IU/L on 7th day after treatment which further increased to 126.00 ± 19.60 IU/L on 14th days after treatment (Table 18). The SGPT value of Group B-2.1 dogs was 66.63 ± 44.39 IU/L on 0th day which decreased to 57.37 ± 33.18 IU/L after treatment on 7th days which further increased to 77.00 ± 22.05 IU/L after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had SGPT on 0th day was 73.00 ± 8.98 IU/L which became 76.00 ± 2.45 IU/L on 7th day after treatment which further increased to 79.50 ± 6.94 IU/L on 14th days after treatment (Table 22).

In the present study dogs of different Groups A-1.1, A-1.2, A-2.1, A-2.2, B-1.2, B-2.1, B-2.2 showed increased levels of SGPT levels which reduced or showed tendency of decrease in levels after treatment.

4.4.3.6. Alkaline Phosphatase (ALP):

The ALP of the dogs of this Group A-1.1 on 0^{th} day was 541.67 ± 173.01 IU/L which reduced to 410.00 ± 148.03 IU/L on 7^{th} day which further reduced to 273.67 ± 152.29 IU/L on 14^{th} day after treatment (Table 8). The dogs of the Group A-1.2 had ALP 275.83 ± 123.72 IU/L on 0^{th} day which decreased to 231.38 ± 97.78 IU/L on 7^{th} day after treatment which further reduced to 169.54 ± 61.85 IU/L after treatment on 14^{th} day (Table 10). The ALP value of Group A-2.1 dogs was 1459.50 ± 1275.74 IU/L on 0^{th} day which reduced to 820.25 ± 690.98 IU/L after treatment on 7^{th} days which further reduced to 616.75 ± 469.25 IU/L after treatment on 14^{th} days (Table 12). The dogs of this Group A-2.2 had ALP on 0^{th} day was 140.25 ± 6.20 IU/L which increased to 160.25 ± 13.84 IU/L on 7^{th} day after treatment which further decreased to 92.11 ± 34.13 IU/L on 14^{th} days after treatment (Table 14).

The dogs of this Group B-1.1 had ALP on 0^{th} day was 1495.45 ± 1354.35 IU/L which decreased to 681.10 ± 569.52 IU/L on 7^{th} day after treatment which further reduced to 297067 ± 211.27 IU/L on 14^{th} days after treatment (Table 16). On 0^{th} day the ALP of dogs of Group B-1.2 was 67.75 ± 16.53 IU/L which increased to 194.00 ± 98.80 IU/L on 7^{th} day after treatment which further increased to 96.00 ± 6.94 IU/L on 14^{th} days after treatment (Table 18). The ALP value of Group B-2.1 dogs was 83.69 ± 3.52 IU/L on 0^{th} day which decreased to 77.32 ± 4.34 IU/L after treatment on 7^{th} days which further increased to 71.00 ± 0.13 IU/L after treatment on 14^{th} days (Table 20). The dogs of this Group B-2.2 had ALP on 0^{th} day was 158.00 ± 94.71 IU/L which became 189.00 ± 2.45 IU/L on 7^{th} day after treatment which further increased to 113.00 ± 0.00 IU/L on 14^{th} days after treatment (Table 22).

In the present study dogs of different Groups A-1.1,A-1.2,A-2.1,B-1.1,B-2.2 showed increased levels of ALP levels which reduced or showed tendency of decrease in levels after treatment.

4.4.3.7. Total Protein (TP):

The TP of the dogs of this Group A-1.1 on 0th day was 5.20 ± 0.46 gm/dl which reduced to 5.17 ± 0.58 g/dl on 7th day which further became 5.50 ± 0.21 gm/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had TP 6.72 ± 0.34 gm/dl on 0th day which decreased to 5.79 ± 0.21 gm/dl on 7th day after treatment which further became 6.12 ± 0.74 gm/dl after treatment on 14th day (Table 10). The TP value of Group A-2.1 dogs was 6.08 ± 0.39 g/dl on 0th day which reduced to 5.83 ± 0.40 g/dl after treatment on 7th days which further reduced to 5.15 ± 0.26 g/dl after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had TP on 0th day was 6.73 ± 0.64 g/dl which decreased to 6.33 ± 0.31 g/dl on 7th day after treatment which further decreased to 5.88 ± 0.15 g/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had TP on 0th day was 7.16 ± 0.48 g/dl which decreased to 6.54 ± 0.24 g/dl on 7th day after treatment which further reduced to 5.67 ± 0.36 g/dl on 14th days after treatment (Table 16). On 0th day the TP of dogs of Group B-1.2 was 5.90 ± 0.24 g/dl which decreased to 5.70 ± 0.49 g/dl on 7th day after treatment which further became to 6.10 ± 0.12 g/dl on 14th days after treatment (Table 18). The TP value of Group B-2.1 dogs was 6.13 ± 0.43 g/dl on 0th day which decreased to 5.71 ± 0.17 g/dl after treatment on 7th days which further decreased to 5.00 ± 0.46 g/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had TP on 0th day was 8.20 ± 1.06 g/dl which decreased to 6.10 ± 0.00 2.45 g/dl on 7th day after treatment which further became to 6.25 ± 0.04 g/dl on 14th days after treatment (Table 22).

In the present study dogs of non of the Groups showed reduced levels of total proteins before treatment and after treatment except dogs of Group B-2.2 (before treatment) where levels were slightly increased due to dehydration.

4.4.3.8. Albumin:

The Albumin of the dogs of this Group A-1.1 on 0th day was 2.29 ± 0.30 gm/dl which increased to 2.48 ± 0.23 g/dl on 7th day which further increased to 3.16 ± 0.10 gm/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had Albumin 3.49 ± 0.29 gm/dl on 0th day which decreased to 2.88 ± 0.24 gm/dl on 7th day after treatment which further increased to 3.96 ± 0.10 gm/dl after treatment on 14th day (Table 10). The Albumin value of Group A-2.1 dogs was 2.60 ± 0.21 g/dl on 0th day which increased to 3.25 ± 0.22 g/dl after

treatment on 7th days which further reduced to 2.93 ± 0.06 g/dl after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had Albumin on 0th day was 3.05 ± 0.47 g/dl which increased to 3.48 ± 0.33 g/dl on 7th day after treatment which further decreased to 3.30 ± 0.19 g/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had Albumin on 0th day was 2.72 ± 0.31 g/dl which became to 2.73 ± 0.35 g/dl on 7th day after treatment which further reduced to 2.50 ± 0.53 g/dl on 14th days after treatment (Table 16). On 0th day the Albumin of dogs of Group B-1.2 was 2.57 ± 0.30 g/dl which decreased to 2.50 ± 0.33 g/dl on 7th day after treatment which further decreased to 1.90 ± 0.04 g/dl on 14th days after treatment (Table 18). The Albumin value of Group B-2.1 dogs was 2.94 ± 0.60 g/dl on 0th day which increased to 3.22 ± 0.07 g/dl after treatment on 7th days which further decreased to 2.00 ± 0.37 g/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had Albumin on 0th day was 3.05 ± 0.69 g/dl which decreased to 2.50 ± 0.16 2.45 g/dl on 7th day after treatment which further became to 3.45 ± 0.53 g/dl on 14th days after treatment (Table 22).

The dogs of Group A-1.1 showed hypoalbuminemia before treatment and further showed increased levels of serum albumin after treatment. The dogs of Group B-2.1 showed decreased levels of serum albumin after treatment. This could be due to the dogs included in this group had renal failure (Serum creatinine 9.3 mg/dl) due to which loss of proteins through urine might have lead to hypoalbuminemia.

4.4.3.9. Globulin:

The Globulin of the dogs of this Group A-1.1 on 0th day was 2.91 ± 0.50 gm/dl which decreased to 2.69 ± 0.63 g/dl on 7th day which further became to 2.72 ± 0.39 gm/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had Globulin 3.23 ± 0.49 gm/dl on 0th day which decreased to 2.91 ± 0.43 gm/dl on 7th day after treatment which further increased to 2.96 ± 0.72 gm/dl after treatment on 14th day (Table 10). The Globulin value of Group A-2.1 dogs was 3.48 ± 0.32 g/dl on 0th day which decreased to 2.43 ± 0.40 g/dl after treatment on 7th days which further reduced to 2.23 ± 0.22 g/dl after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had Globulin on 0th day was

3.68 ± 0.90 g/dl which decreased to 2.81 ± 0.60 g/dl on 7th day after treatment which further decreased to 2.58 ± 0.31 g/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had Globulin on 0th day was 4.44 ± 0.78 g/dl which decreased to 3.81 ± 0.59 g/dl on 7th day after treatment which further reduced to 3.17 ± 0.35 g/dl on 14th days after treatment (Table 16). On 0th day the Globulin of dogs of Group B-1.2 was 3.33 ± 0.06 g/dl which decreased to 3.20 ± 0.16 g/dl on 7th day after treatment which further increased to 4.20 ± 0.08 g/dl on 14th days after treatment (Table 18). The Globulin value of Group B-2.1 dogs was 3.19 ± 0.17 g/dl on 0th day which decreased to 2.50 ± 0.24 g/dl after treatment on 7th days which further increased to 3.00 ± 0.09 g/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had Globulin on 0th day was 5.15 ± 0.37 g/dl which decreased to 3.60 ± 0.16 g/dl on 7th day after treatment which further decreased to 2.80 ± 0.57 g/dl on 14th days after treatment (Table 22).

Almost all dogs of different groups showed normal globulin levels before and after treatment except dogs of Group A-2.1 after treatment globulin levels showed slightly less levels than normal.

4.4.3.9. Albumin and Globulin Ratio:

The A/G of the dogs of this Group A-1.1 on 0th day was 0.85 ± 0.21% which became 1.03 ± 0.24 % on 7th day which further became to 1.08 ± 0.20% on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had A/G 1.34 ± 0.49 % on 0th day which decreased to 1.09 ± 0.24 % on 7th day after treatment which further became to 1.25 ± 0.26% after treatment on 14th day (Table 10).The A/G value of Group A-2.1 dogs was 0.77 ± 0.09 % on 0th day which increased to 2.05 ± 0.41 % after treatment on 7th days which further reduced to 1.35 ± 0.12 % after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had A/G on 0th day was 1.10 ± 0.45 % which increased to 1.53 ± 0.48 % on 7th day after treatment which further decreased to 1.35 ± 0.19 % on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had A/G on 0th day was 0.68 ± 0.18 % which became to 0.78 ± 0.21 % on 7th day after treatment which further became

0.84 ± 0.26 % on 14th days after treatment(Table 16). On 0th day the A/G of dogs of Group B-1.2 was 0.77 ± 0.10 % which became 0.78 ± 0.06 % on 7th day after treatment which further decreased to 0.45 ± 0.00 % on 14th days after treatment (Table 18). The A/G value of Group B-2.1 dogs was 0.94 ± 0.24 % on 0th day which increased to 1.31 ± 0.16 % after treatment on 7th days which further decreased to 0.67 ± 0.10 % after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had A/G on 0th day was 0.58 ± 0.09 % which became 0.70 ± 0.07 % on 7th day after treatment which further increased to 1.38 ± 0.47% on 14th days after treatment (Table 22).

All dogs of different groups showed normal Albumin/Globulin ratio before and after treatment except dogs of Group B-1.1, B-2.2 before treatment. It could be due to the inclusion of dogs with renal failure in which the loss of proteins through urine might has caused below normal Albumin/Globulin ratio.

4.4.4. Kidney Function Test:

4.4.4.1. Blood Urea Nitrogen:

The BUN of the dogs of this Group A-1.1 on 0th day was 57.53 ± 31.30 mg/dl which reduced to 47.40 ± 21.95 mg/dl on 7th day which further reduced to 44.53 ± 23.42 mg/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had BUN 16.28 ± 2.68 mg/dl on 0th day which became 20.36 ± 3.21 mg/dl on 7th day after treatment which further increased to 23.95 ± 7.69 mg/dl after treatment on 14th day (Table 10). The BUN value of Group A-2.1 dogs was 17.50 ± 3.08 mg/dl on 0th day which increased to 26.85 ± 6.59 mg/dl after treatment on 7th days which further increased to 27.43 ± 3.77 mg/dl after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had BUN on 0th day was 18.35 ± 4.31 mg/dl which became 17.43 ± 4.10 mg/dl on 7th day after treatment which further became 18.00 ± 4.41 mg/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had BUN on 0th day was 133.63 ± 39.58 mg/dl which reduced to 74.23 ± 19.68 mg/dl on 7th day after treatment which further reduced to 67.60 ± 15.45 mg/dl on 14th days after treatment (Table 16). On 0th day the BUN of dogs of Group B-1.2 was 30.25 ± 5.43 mg/dl which reduced to 50.30 ± 8.98 mg/dl on 7th day after treatment which further reduced to 28.40 ± 4.20 mg/dl on 14th days after treatment (Table 18). The BUN value of

Group B-2.1 dogs was 75.25 ± 31.31 mg/dl on 0th day which increased to 50.30 ± 8.98 mg/dl after treatment on 7th days which further decreased to 28.20 ± 22.29 mg/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had BUN on 0th day was 36.30 ± 4.16 mg/dl which increased to 43.40 ± 12.17 mg/dl on 7th day after treatment which further increased to 68.55 ± 24.37 mg/dl on 14th days after treatment (Table 22).

The dogs of Group A-1.1,B-1.1,B-1.2,B-2.1,B-2.2 had increased BUN levels before treatment which subsequently reduced to normal except dogs of Groups B-1.2 and B-2.1 in which BUN levels were above normal ,however, showing decreasing trend.

4.4.4.2. Serum Creatinine:

The Serum Creatinine of the dogs of this Group A-1.1 on 0th day was 2.50 ± 1.57 mg/dl which reduced to 2.00 ± 1.10 mg/dl on 7th day which further reduced to 1.43 ± 0.64 mg/dl on 14th day after treatment (Table 8). The dogs of the Group A-1.2 had Serum Creatinine 1.87 ± 0.68 mg/dl on 0th day which decreased to 0.95.36 ± 0.15 mg/dl on 7th day after treatment which further increased to 1.02 ± 0.18 mg/dl after treatment on 14th day (Table 10). The Serum Creatinine value of Group A-2.1 dogs was 1.03 ± 0.12 mg/dl on 0th day which increased to 1.08 ± 0.17 mg/dl after treatment on 7th days which further increased to 1.08 ± 0.27 mg/dl after treatment on 14th days (Table 12). The dogs of this Group A-2.2 had Serum Creatinine on 0th day was 0.88 ± 0.18 mg/dl which increased to 1.13 ± 0.21 mg/dl on 7th day after treatment which further reduced to 0.80 ± 0.12 mg/dl on 14th days after treatment (Table 14).

The dogs of this Group B-1.1 had Serum creatinine on 0th day was 5.61 ± 1.88 mg/dl which reduced to 3.26 ± 1.08 mg/dl on 7th day after treatment which further reduced to 2.40 ± 0.47 mg/dl on 14th days after treatment (Table 16). On 0th day the Serum Creatinine of dogs of Group B-1.2 was 1.00 ± 0.24 mg/dl which increased to to 1.05 ± 0.29 mg/dl on 7th day after treatment which further increased to 1.80 ± 0.29 mg/dl on 14th days after treatment (Table 18). The Serum Creatinine value of Group B-2.1 dogs was 5.30 ± 3.27 mg/dl on 0th day which decreased to 4.20 ± 2.45 mg/dl after treatment on 7th days which further decreased to 1.10 ± 1.51 mg/dl after treatment on 14th days (Table 20). The dogs of this Group B-2.2 had Serum Creatinine on 0th day was 1.10 ± 0.16 mg/dl

which decreased to 1.05 ± 0.12 mg/dl on 7th day after treatment which further increased to 1.50 ± 0.16 mg/dl on 14th days after treatment (Table 22).

The dogs of Group A-1.1,B-1.1,B-2.1 had increased Serum creatinine levels before treatment which subsequently reduced to normal except dogs of Groups B-1.1 however showed decreasing trend.

From above study it was observed that Papaya leaves extract in Group A-1.1 increased the platelet count by 2.09 times whereas Prednisolone increased the platelet count in Group A-1.2 by 4.18 times. In Group A-2.1 platelet count increased by 4.49 times by treatment with Papaya leaves extract, whereas in dogs of Group A-2.2 platelet count increased by 4.03 times after treatment with Prednisolone.

The platelet count of dogs of Group B-1.1 treated with papaya leaves extract increased by 2.39 times whereas the dogs of Group B-1.2 treated with Prednisolone the platelet count increased by 2.80 times. The dogs of Group B-2.1 received treatment with papaya leaves extract showed increased in platelet count by 2.15 times whereas dogs of Group B-2.2 treated with Prednisolone showed increased in platelet count by 3.40 times.

The overall percentage of improvement in platelet no. in all groups treated with papaya leaves extract was estimated to be 11.12% whereas the overall percentage of improvement in platelet no. in all groups treated with Prednisolone was estimated to be 14.41%. From this study it is concluded that overall treatment with Prednisolone is 29.59% more efficacious to elevate platelet count at 14 days of treatment.

From the present study it is concluded that Prednisolone as well as Papaya leaves extract are effective in treatment of thrombocytopenia in dogs in bleeding as well as non bleeding diathesis. However, in the present study Prednisolone was found more efficacious except in Group A-2.1 It is also concluded that coagulopathy profile such as PT, aPTT, clotting time, BMBT can be used to assess improvement in thrombocyte count.

4.5. Correlation Analysis:

Parameters of Blood analysis of all the dogs (24), dogs with bleeding diathesis (15) and dogs with non bleeding diathesis (9) were analyzed to observe correlation with platelet count Table (23).

Positive correlation was observed in between ESR, Manual platelet count (MPLT) with platelet count of the group of all dogs.

In dogs with bleeding diathesis, clotting time, BMBT, PT, ESR and MPLT had positive correlation with platelet count whereas in non bleeding group of dogs positive correlation with platelet count was observed with only ESR and MPLT.

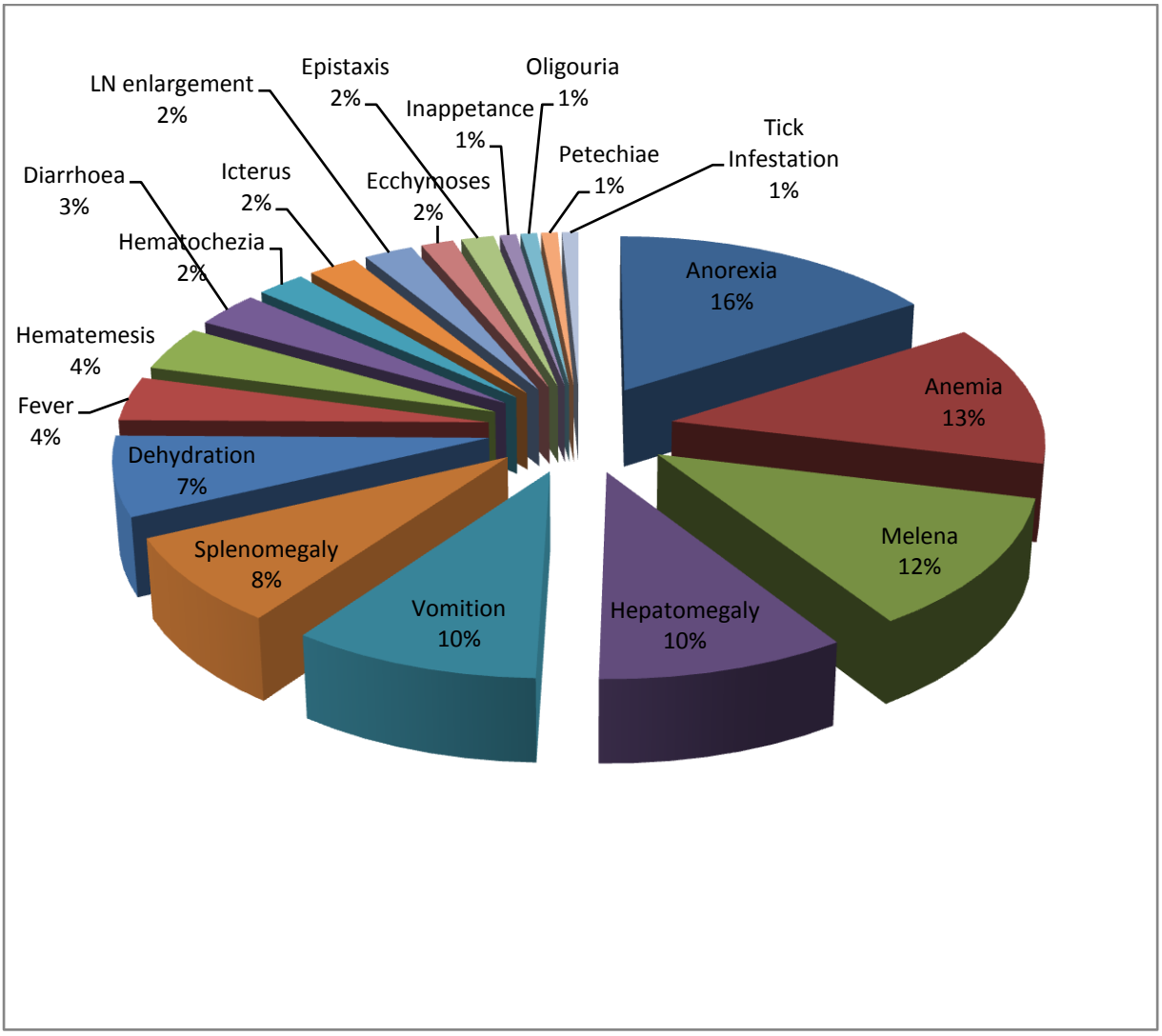

Fig.1 :- Frequency Distribution of Clinical Manifestation of Thrombocytopenia.

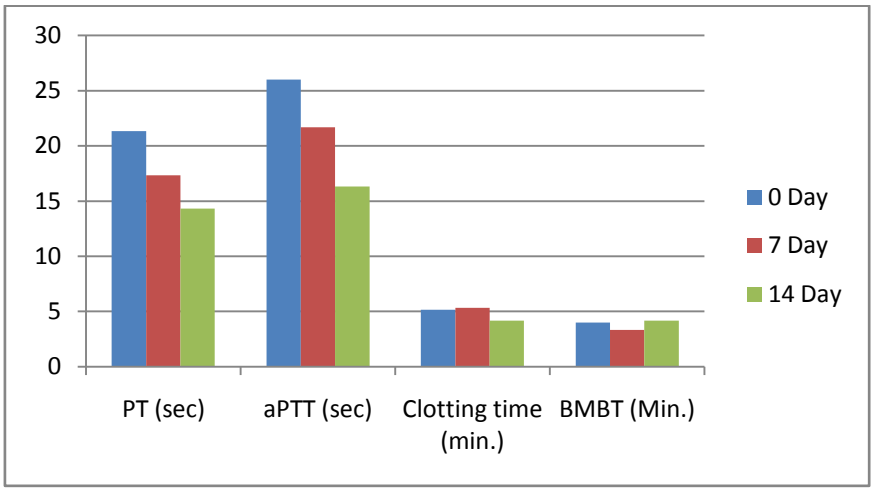

Fig. 2 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group A-1.1 on 0^{th} day, 7^{th} day & 14^{th} days

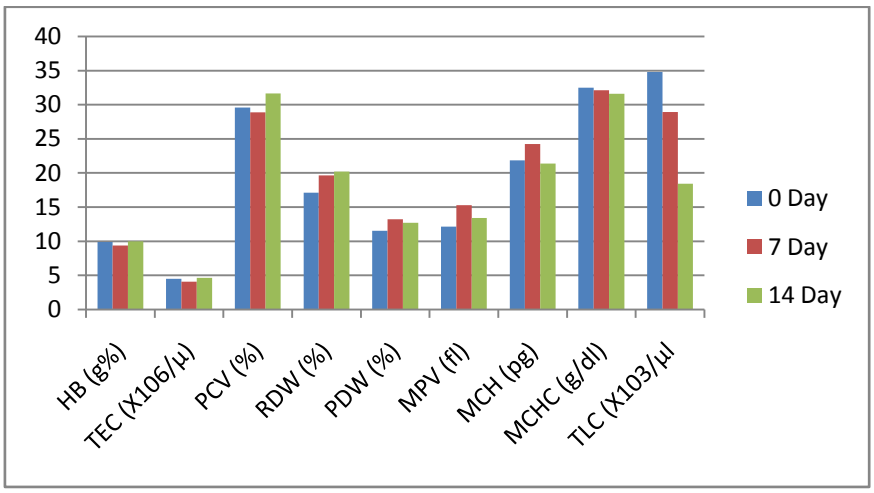

Fig. 3 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group A-1.1 on 0^{th} day, 7^{th} day & 14^{th} days

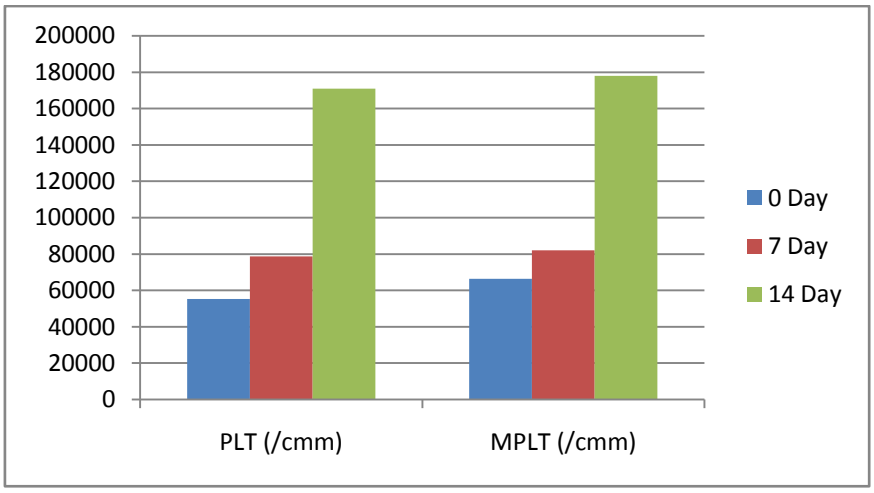

Fig. 4 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group A-1.1 on 0^{th} day, 7^{th} day & 14^{th} days

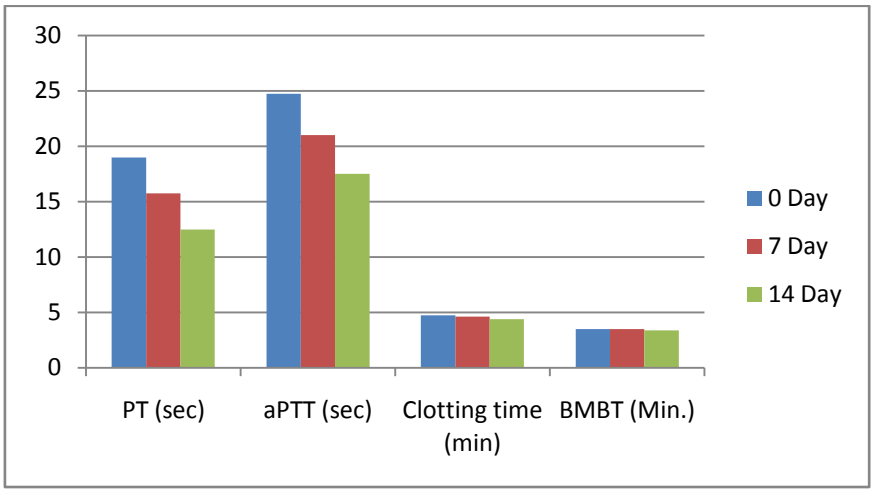

Fig. 5 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group A-1.2 on 0th day, 7th day & 14th days

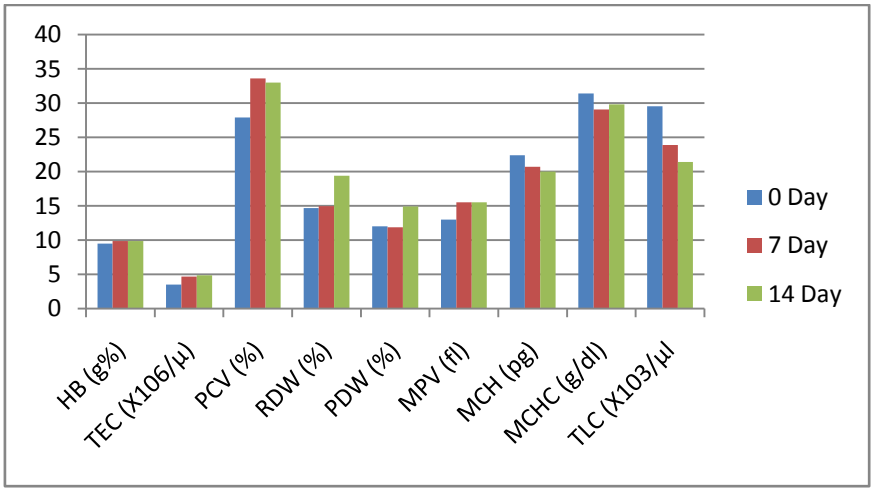

Fig. 6 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group A-1.2 on 0th day, 7th day & 14th days

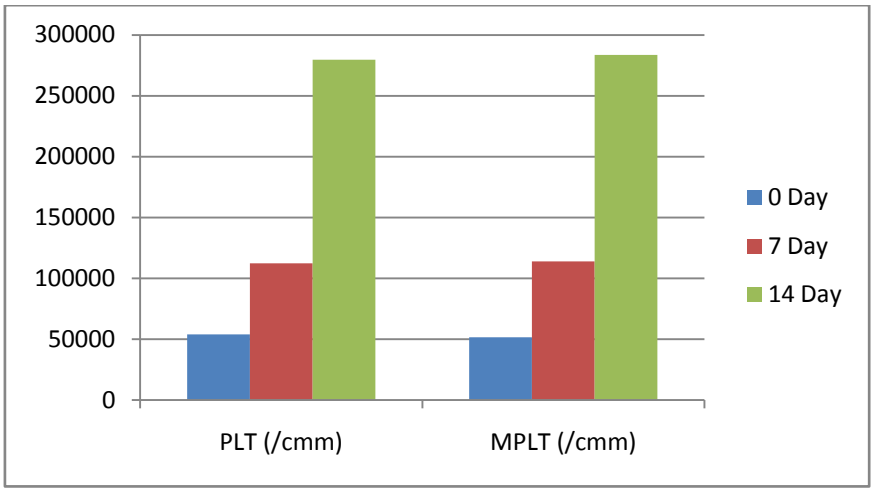

Fig. 7 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group A-1.2 on 0th day, 7th day &14th days

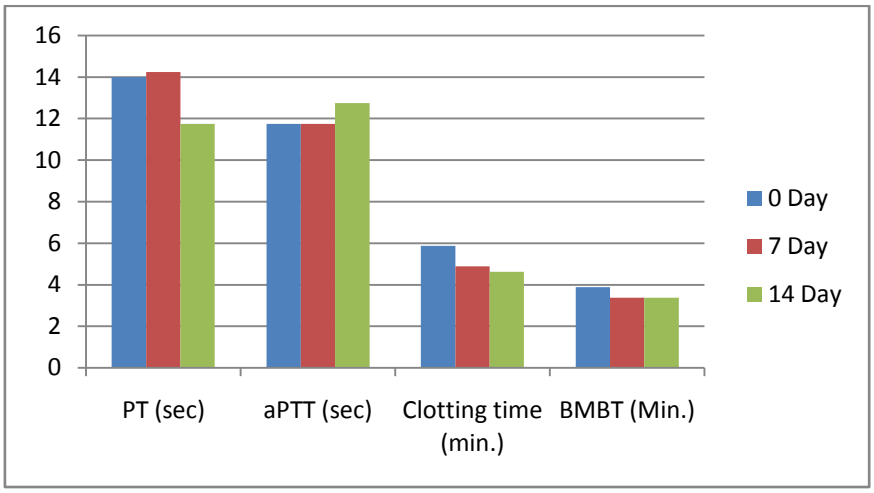

Fig. 8 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group A-2.1 on 0^{th} day, 7^{th}day &14^{th} days

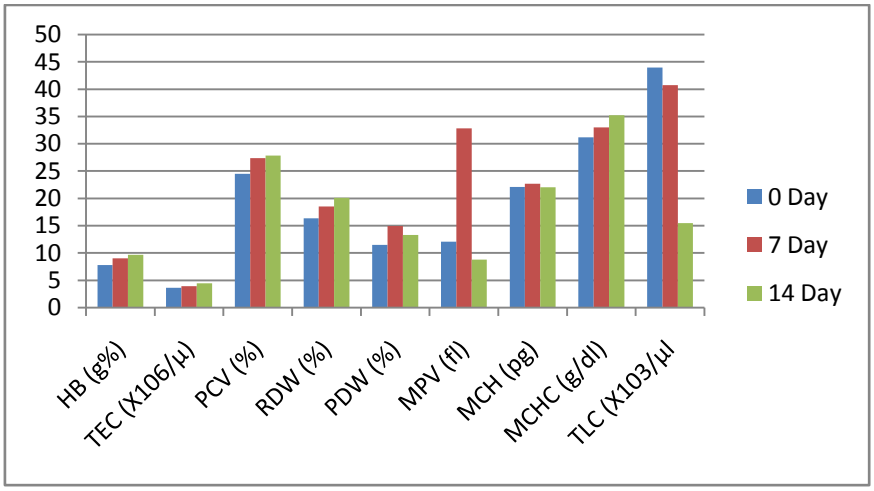

Fig. 9 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group A-2.1 on 0^{th} day, 7^{th} day & 14^{th} days

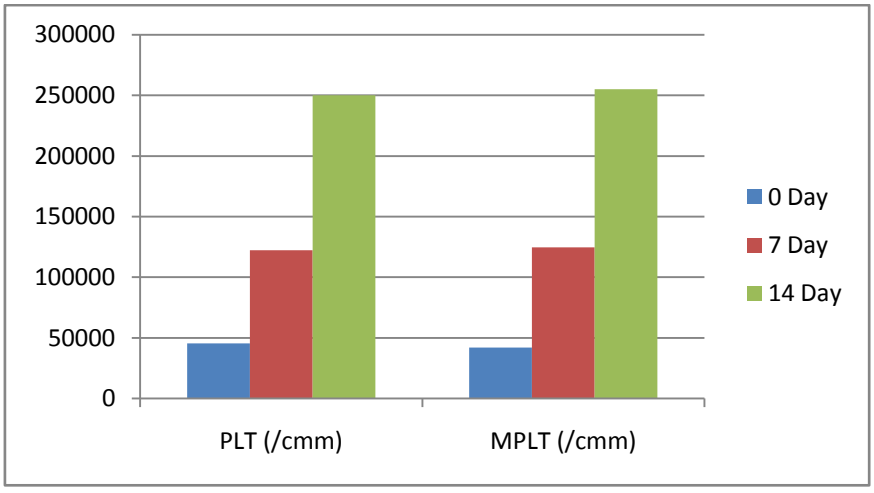

Fig. 10 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group A-2.1 on 0^{th} day, 7^{th} day & 14^{th} days

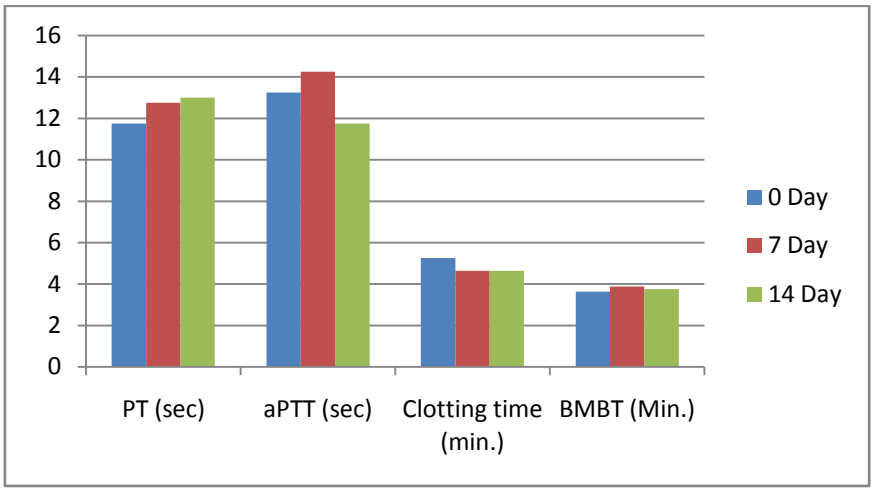

Fig. 11 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group A-2.2 on 0th day, 7th day & 14th days

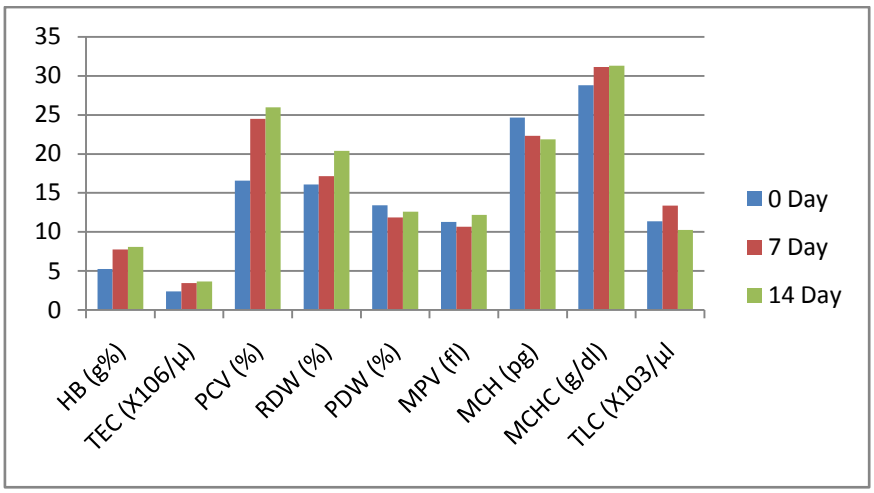

Fig. 12 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group A-2.2 on 0th day, 7th day & 14th days

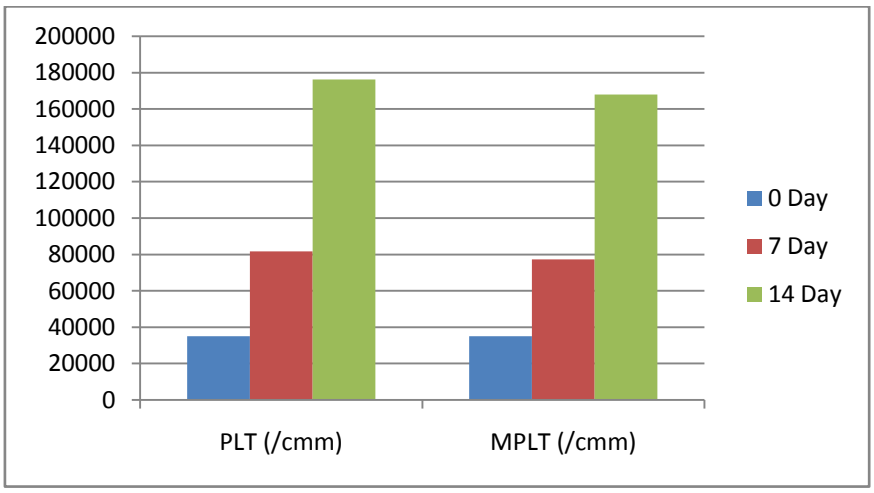

Fig. 13 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group A-2.2 on 0th day, 7th day & 14thdays

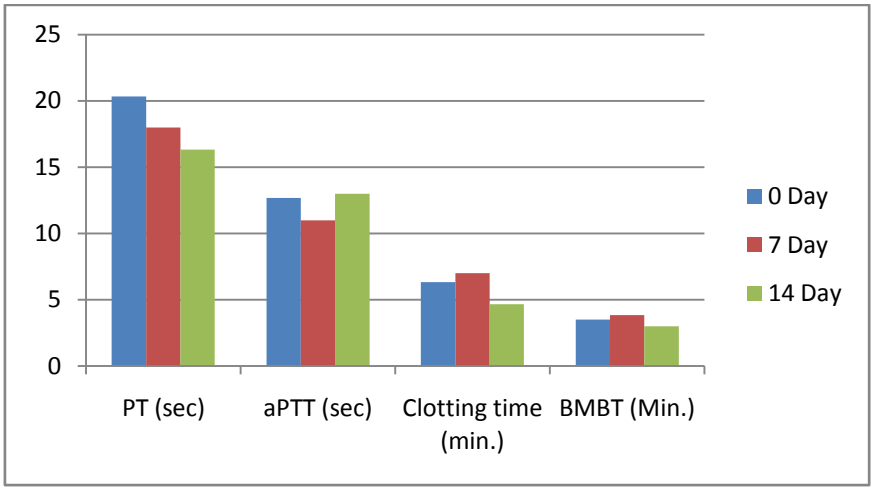

Fig. 14 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group B-1.1 on 0th day, 7thhday & 14th days

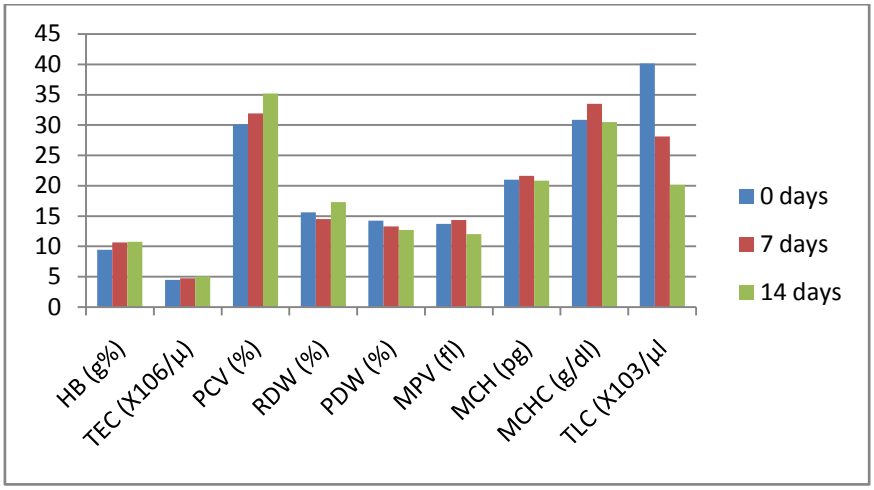

Fig. 15 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group B-1.1 on 0th day, 7th day & 14th days

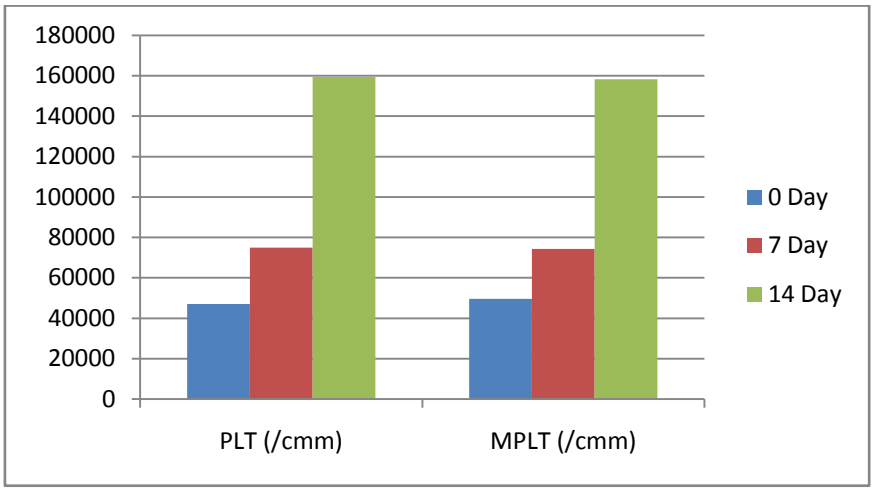

Fig. 16 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group B-1.1 on 0th day, 7th day & 14th days

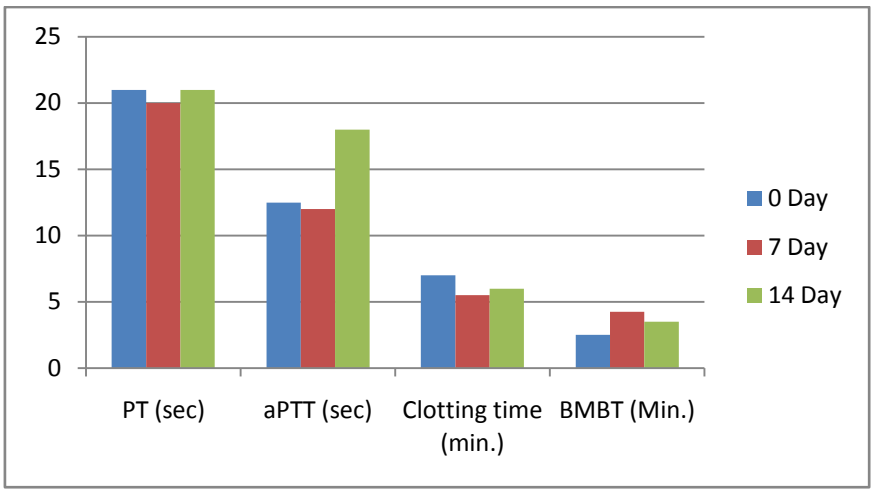

Fig. 17 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group B-1.2 on 0th day, 7th day & 14th days

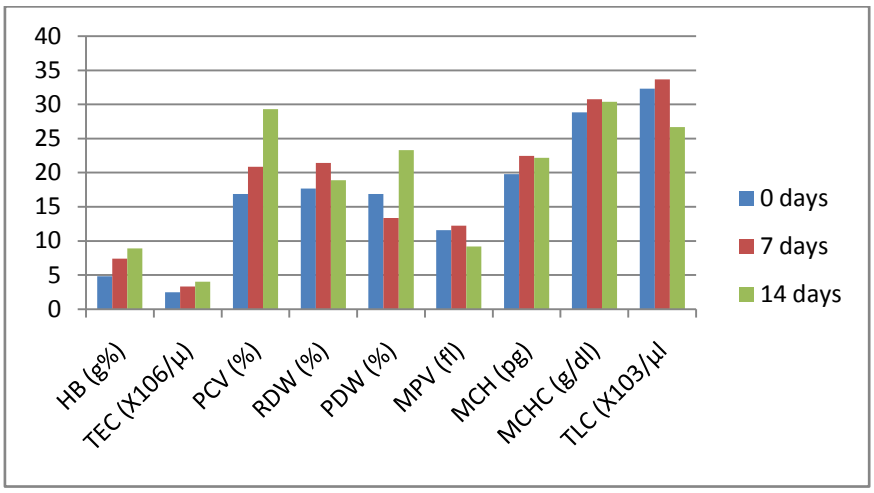

Fig. 18 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group B-1.2

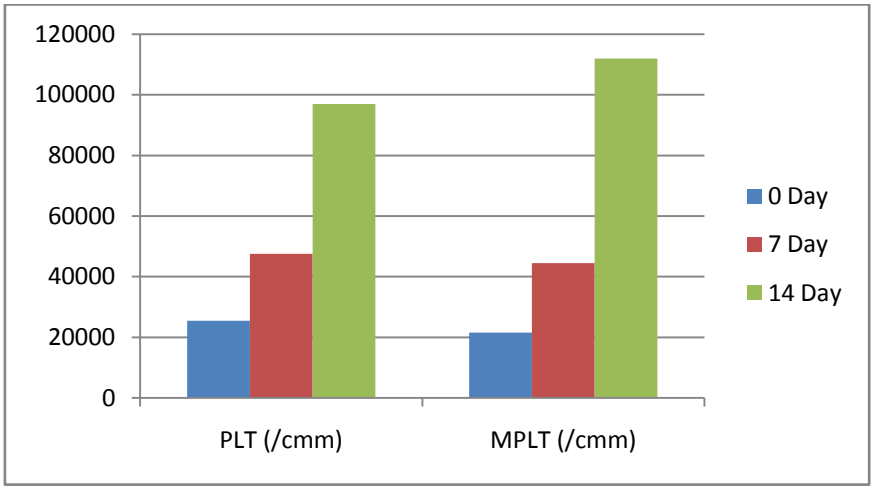

Fig. 19 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group B-1.2 on 0th day, 7th day & 14th days

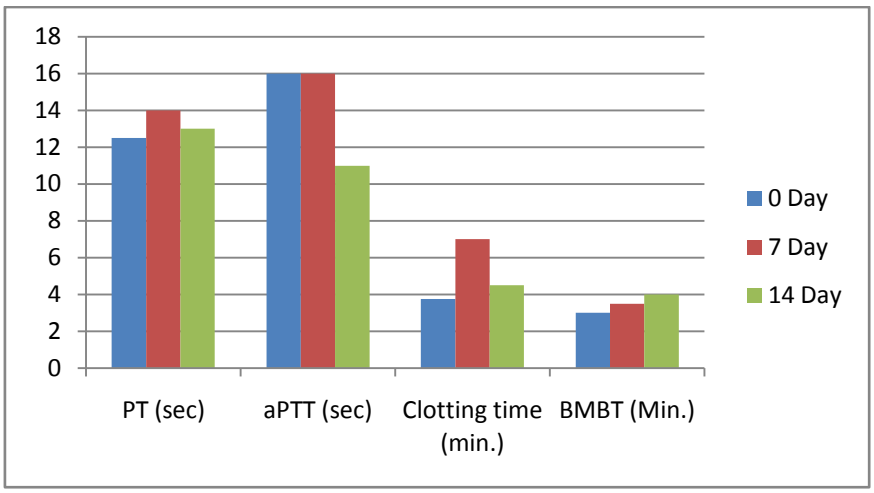

Fig. 20 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group B-2.1 on 0th day, 7th day & 14th days

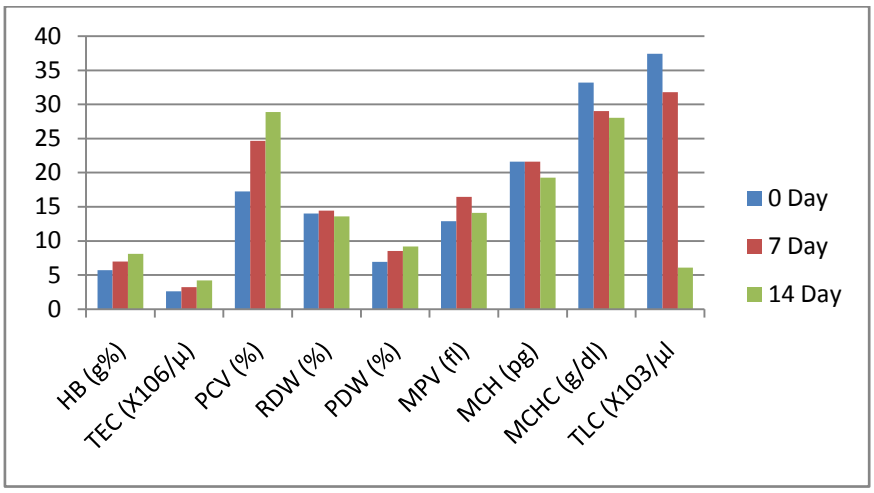

Fig. 21 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group B-2.1on 0th day, 7th day & 14th days

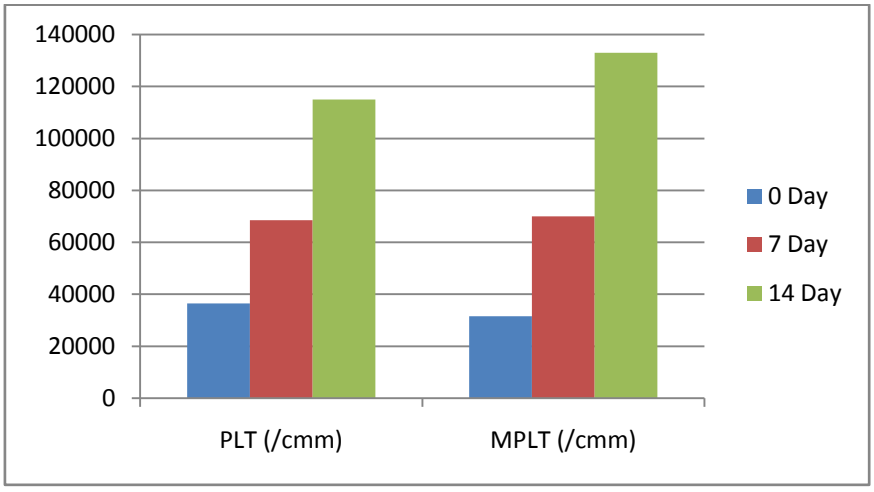

Fig. 22 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group B-2.1 on 0th day, 7th day & 14th days

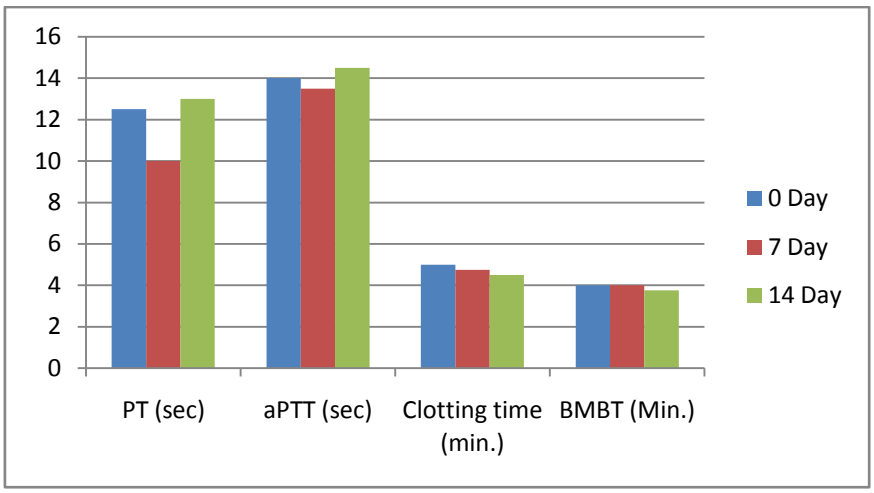

Fig. 23 Comparison of Coagulopathy tests (PT, aPTT, Clotting time, BMBT) of group B-2.2 on 0th day, 7th day & 14th days

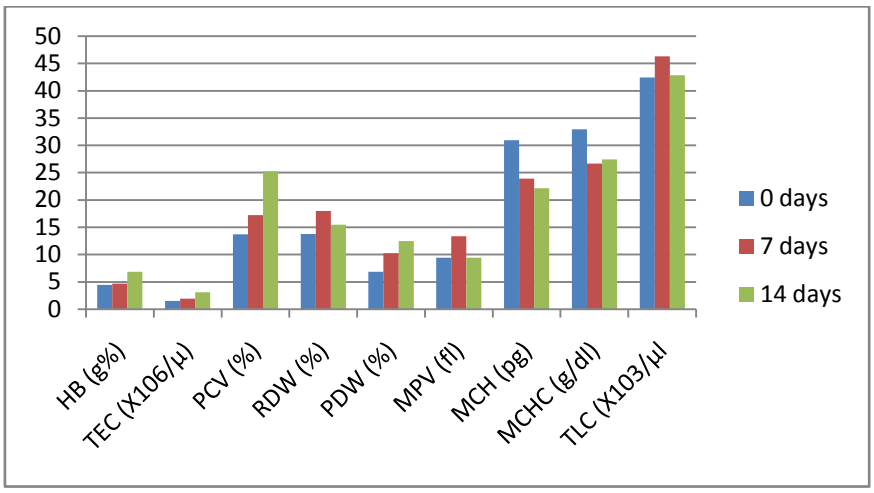

Fig. 24 Comparison of Hematological parameters (Hb, TEC, PCV, RDW, PDW, MPV, MCH, MCHC, TLC) of group B-2.2 on 0th day, 7th day & 14th days

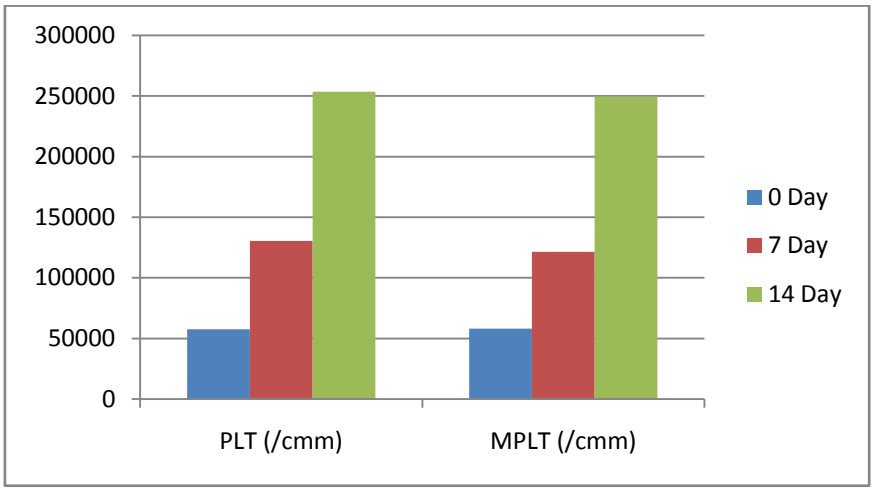

Fig. 25 Comparison of Platelet count (PLT) & Manual Platelet count (MPLT) of group B-2.2on 0thday, 7th day & 14th days

Plate 1: Dog (Case 5) was Showing Melena and Hematochezia

Plate 2: Echymoses in inguinal region of dog (case 10)

Plate 3:Drug (Prednisolone Acetate) used for Groups A-1.2, A-2.2, B-1.2 and B-2.2

Plate 4:Drug Tab. Platex Papaya leaves Extract) used for Groups A-1.1, A-2.1, B-1.1 and B-2.1

5. Summary and Conclusion

The present research work entitled “Studies on thrombocytopenia in dogs and its therapeutic management” was carried out in the Department of Veterinary Clinical Medicine, Ethics and Jurisprudence of Bombay Veterinary College, Parel, Mumbai-12. The inpatients brought to the Bai Sakarabai Dinshaw Petit Hospital for Animals (BSDPDHA) and cases referred to Teaching Veterinary Clinical Complex (TVCC), Pare, Mumbai-12 were included in the study..

Total 24 dogs were selected in present studies on the basis of low platelet count (below 100000/ µL). These dogs were clinically examined and further classified into dogs with bleeding symptoms (Group A) and dog without bleeding symptoms (Group B). The dogs were subjected to coagulopathies test (PT and aPTT), BMBT, autoagglutination, clotting time. On the basis of Prothrombin time (PT), dogs of Group A and B were again subgrouped into dogs with increased PT and dogs with normal PT (Group A-2) , similarly increased PT(Group B-2) and dogs with normal PT(Group B_2) respectively.

The dogs with thrombocytopenia of subgroups A-1 and A-2 as well as subgroups B-1 and B-2 were subdivided into A-1.1, A-1.2, A-2.1, A-2.2,B-1.1,B-1.2,B-2.1 and B-2.2. Dogs of Groups A-1.1, A- 2.1,B-1.1 and B- 2.1 were treated with Papaya Extract (Tab. Platex) and where as dogs of Groups A -1.2, A-2.2, B-1.2 and B-2.2 were treated with immunosuppressant drug inj Prednisolone. Further, all dogs were subjected for complete blood count, liver function tests and kidney function tests on 0^{th} day, 7^{th} day and 14^{th} day.

Blood analysis of the dogs of Group A-1.1 on 0^{th} day revealed Platelet count 55,333.33 ± 5925.46/cmm which increased to 78,666.67 ± 22,228.61/cmm on 7^{th} day and on 14^{th} day it became 1,71,000.00 ± 52,557.90/cmm, Mean Platelet Volume on 0^{th} day 12.13 ± 1.47 fl which further increased to 15.27 ± 2.50 fl on 7^{th} day and 12.73 ± 1.85 fl on 14^{th} day, Platelet Distribution Width (PDW) on 0^{th} day 17.10 ± 2.98 % , on 7^{th} day 13.23 ±0.90 % and further reduced to 12.73 ± 1.85%,ESR was on 0^{th} day 76.00 ± 25.77 mm,7^{th} day 53.33 ± 17.75 mm and on 14^{th} day 12.00 ± 3.00 mm,

Prothrombin time (PT) was on 0^{th} day 21.33 ± 2.40 sec,7^{th} day 17.33 ± 2.40 sec and further reduced 14.33 ± 2.33 sec, Activated Partial Thromboplastin Time (aPTT) was on 0^{th} day 26.00 ± 4.62 sec, on 7^{th} day 21.67 ± 2.96 sec and further reduced to 16.33 ± 2.33 sec on 14^{th} day, Clotting time was 5.17 ± 0.60 min on 0^{th} day, 5.33 ± 0.60 min on 7^{th} day and reduced on 14 day to 4.17 ± 0.33 mins, Buccal Mucosal Bleeding Time(BMBT) was 4.00 ± 0.58 min on 0^{th} day 3.33 ± 0.60 min on 7^{th} day and 4.17 ± 0.44 min on 14^{th} day.

Blood analysis of the dogs of Group A-1.2 on 0^{th} day revealed Platelet count 54,000.00 ± 12,247.45 /cmm on 7^{th} day which significantly (P ≥ 0.05) increased to 2,79,750.00 ± 34,318.06/cmm on 14^{th} day, Mean Platelet Volume on 0^{th} day 12.98 ± 1.68 fl which further increased to 15.53 ± 2.81 fl on 14^{th} day, Platelet Distribution Width (PDW) on 0^{th} day 12.00 ± 0.98 % ,increased to 14.90 ± 1.23%on 14^{th} day, ESR was on 0^{th} day 45.75 ± 15.10 mm decreased to 12.50 ± 3.10 mm on 14^{th} day, Prothrombin time(PT) was on 0^{th} day 19.00 ± 1.35 sec, further significantly (P ≥ 0.05) reduced to 12.50 ± 0.96 sec, Activated Partial thromboplastin Time(aPTT) was on 0^{th} day 24.75 ± 4.05 sec, further reduced to 17.50 ± 3.12 sec on 14^{th} day, Clotting time was 4.75 ± 1.30 min on 0^{th} day, reduced on 14 day to 4.38 ± 0.24 mins, Buccal Mucosal Bleeding Time (BMBT) was 3.50 ± 0.65 min on 0^{th} day reduced to 3.38 ± 0.13 min on 14^{th} day.

Blood analysis of the dogs of Group A-2.1 on 0^{th} day revealed Platelet count 45,500.00 ± 7421.81/cmm which increased to 1,22,250.00 ± 220095.91/cmm on 7^{th} day and on 14^{th} day it significantly (P ≥ 0.05) increased to 2,50,000 ± 14005.95/cmm, Mean Platelet Volume on 0^{th} day 12.08 ± 0.52 fl which further increased to 32.83 ± 21.87 fl on 7^{th} day and 8.78 ± 0.96 fl on 14^{th} day, Platelet Distribution Width (PDW) on 0^{th} day 11.50 ± 2.92 % ,on 7^{th} day 14.95 ± 1.99 % and further reduced to 13.33 ± 1.03 %, ESR was on 0^{th} day 44.25 ± 6.47 mm, 7^{th} day 47.25 ± 6.37 mm and on 14^{th} day 18.75 ± 1.97 mm, Prothrombin time(PT) was on 0^{th} day 14.00 ± 0.41 sec, 7^{th} day 14.25 ± 0.25 sec and further reduced 11.75 ± 0.75 sec, Activated Partial thromboplastin Time (aPTT) was on 0^{th} day 11.75 ± 1.11 sec, on 7^{th} day 11.75 ± 2.96 sec and further became to 12.75 ± 0.63 sec on 14^{th} day, Clotting time was 5.88 ± 0.77 min on 0^{th} day, 4.88 ± 0.43 min on 7^{th} day and

reduced on 14 day to 4.63 ± 0.24 mins, Buccal Mucosal Bleeding Time (BMBT) was 3.88 ± 0.13 min on 0^{th} day 3.38 ± 0.24 min on 7^{th} day and 3.38 ± 0.13 min on 14^{th} day.

Blood analysis of the dogs of Group A -2.2 on 0^{th} day revealed Platelet count 35,000.00 ± 17392.53 /cmm which increased to 81,750.00 ± 14049.76 /cmm on 7^{th} day and on 14^{th} day it significantly ($P \geq 0.05$) increased to 1,76,250.00 ± 46938.57 /cmm, Mean Platelet Volume on 0^{th} day 11.30 ± 10.97 fl which further decreased to 10.65 ± 0.42 fl on 7^{th} day and 12.20 ± 1.21 fl on 14^{th} day, Platelet Distribution Width (PDW) on 0^{th} day 13.40 ± 2.12 % ,on 7^{th} day 11.85 ± 2.26 % and further became to 12.58 ± 2.57% ,ESR was on 0^{th} day 33.75 ± 12.91 mm,7^{th} day 22.25 ± 7.33 mm and on 14^{th} day 23.75 ± 5.44 mm, Prothrombin time(PT) was on 0^{th} day 11.75 ± 0.85 sec, on 7^{th} day 12.75 ± 1.65 sec and further became 13.00 ± 1.08 sec on 14^{th} day, Activated Partial thromboplastin Time (aPTT) was on 0^{th} day 13.25 ± 2.06 sec, on 7^{th} day 14.25 ± 2.17 sec and further reduced to 11.75 ± 1.25 sec on 14^{th} day. Clotting time was 5.25 ± 1.30 min on 0^{th} day, 4.63 ± 0.47 min on 7^{th} day and same on 14^{th} day to 4.63 ± 0.47 mins, Buccal Mucosal Bleeding Time (BMBT) was 3.63 ± 0.38 min on 0^{th} day 3.88 ± 0.43 min on 7^{th} day and 3.75 ± 0.25 min on 14^{th} day.

Blood analysis of the dogs of Group B -1.1 on 0^{th} day revealed Platelet count 47,000.00 ± 7211.10 /cmm which increased to 75,000.00 ± 2081.87 /cmm on 7^{th} day and on 14^{th} day increased to 1,59,333.33 ± 43240.93 /cmm, Mean Platelet Volume on 0^{th} day 13.73 ± 1.86 fl which further increased to 14.37 ± 1.83 fl on 7^{th} day and 12.03 ± 1.54 fl on 14^{th} day, Platelet Distribution Width (PDW) on 0^{th} day 14.23 ± 2.52 % ,on 7^{th} day 13.30 ± 3.00 % and further reduced to 12.73 ± 1.29 %, ESR was on 0^{th} day 47.00 ± 24.17 mm, 7^{th} day 42.67 ± 23.38 mm and on 14^{th} day 41.33 ± 15.43 mm, Prothrombin time (PT) was on 0^{th} day 20.33 ± 2.96 sec,7^{th} day 18.00 ± 3.06 sec and further reduced to 16.33 ± 1.33 sec, Activated Partial thromboplastin Time (aPTT) was on 0^{th} day 12.67 ± 0.88 sec, on 7^{th} day 11.00 ± 1.15 sec and 13.00 ± 1.73 sec on 14^{th} day, Clotting time was 6.33 ± 0.88 min on 0^{th} day, 7.00 ± 0.76 min on 7^{th} day and reduced on 14 day to 4.67 ± 0.33 mins, Buccal

Mucosal Bleeding Time (BMBT) was 3.50 ± 0.29 min on 0th day 3.83 ± 0.44 min on 7th day and 3.00 ± 0.29 min on 14th day.

Blood analysis of the dogs of Group B -1.2 on 0th day revealed Platelet count 25,500.00 ± 11022.70 /cmm which increased to 47,500.00 ± 15921.7 /cmm on 7th day and on 14th day increased to 97,000.00 ± 16329.93 /cmm, Mean Platelet Volume on 0th day 11.60 ± 1.63 fl which further increased to 12.25 ± 0.69 fl on 7th day and 9 ± 20 fl on 14th day, Platelet Distribution Width (PDW) on 0th day 16.90 ± 7.10 % ,on 7th day 13.35 ± 6.00 % and further increased to 23.30 ± 6.41 %, ESR was on 0th day 18.50 ± 7.76 mm, 7th day 61.18 ± 23.00 mm and on 14th day 46.00 ± 11.84 mm, Prothrombin time (PT) was on 0th day 21.00 ± 4.08 sec,7th day 20.00 ± 3.27 sec and became 21.00 ± 3.27 sec on 14th day, Activated Partial thromboplastin Time (aPTT) was on 0th day 12.50 ± 1.22 sec, on 7th day 12.00 ± 0.82 sec and 18.00 ± 3.27 sec on 14th day, Clotting time was 7.00 ± 0.82 min on 0th day, 5.50 ± 0.41 min on 7th day and on 14th day to 6.00 ± 0.41 mins, Buccal Mucosal Bleeding Time (BMBT) was 2.50 ± 0.41 min on 0th day 4.25 ± 0.61 min on 7th day and 3.50 ± 0.00 min on 14th day.

Blood analysis of the dogs of Group B -2.1 on 0th day revealed Platelet count 36,500.00 ± 20820.66 /cmm which increased to 68,500.00 ± 15921.68 /cmm and on 14th day increased to 1,15,000.00 ± 33476.36 /cmm, Mean Platelet Volume on 0th day 12.90 ± 0.57 fl which further increased to 16.45 ± 2.74 fl on 7th day and 14.10 ± 22.66 fl on 14th day, Platelet Distribution Width (PDW) on 0th day 6.95 ± 2.16 % ,on 7th day 8.55 ± 1.27 % and further increased to 9.20 ± 1.35 %, ESR was on 0th day 34.50 ± 9.39 mm, 7th day 34.50 ± 3.39 mm and on 14th day 41.00 ± 3.67 mm, Prothrombin time (PT) was on 0th day 12.50 ± 1.22 sec, 7th day 14.00 ± 0.00 sec and reduced to 13.00 ± 0.00 sec on 14th day, Activated Partial thromboplastin Time (aPTT) was on 0th day 16 ± 2.45 sec, on 7th day 16.45 ± 02.45 sec and 11.00 ± 0.00 sec on 14th day, Clotting time was 3.75 ± 0.61 min on 0th day, 7.00 ± 0.82 min on 7th day and on 14th day to 4.50 ± 0.00 mins, Buccal Mucosal Bleeding Time (BMBT) was 3.00 ± 0.00 min on 0th day 3.50 ± 0.41 min on 7th day and 4.00 ± 0.41 min on 14th day.

Blood analysis of the dogs of Group B -2.2 on 0^{th} day revealed Platelet count 57,500.00 ± 21637.16 /cmm which increased to 1,30,500.00 ± 15921.68 /cmm and on 14^{th} day increased to 2,53,000.00 ± 49398.04 /cmm, Mean Platelet Volume on 0^{th} day 9.45 ± 0.04 fl which further increased to 13.35 ± 1.02 fl on 7^{th} day and 9.45 ± 0.12 fl on 14^{th} day, Platelet Distribution Width (PDW) on 0^{th} day 6.85 ± 1.02 % ,on 7^{th} day 10.25 ± 0.69 % and further increased to 12.50 ± 1.47 %, ESR was on 0^{th} day 73.50 ± 0.64 mm, 7^{th} day 65.50 ± 10.21 mm and on 14^{th} day 49.00 ± 18.78 mm, Prothrombin time (PT) was on 0^{th} day 12.50 ± 1.22 sec, 7^{th} day 10.00 ± 0.82 sec and 13.00 ± 0.00 sec on 14^{th} day, Activated Partial thromboplastin Time (aPTT) was on 0^{th} day 14 ± 0.0 sec, on 7^{th} day 13.50 ± 0.41 sec and 14.50 ± 2.86 sec on 14^{th} day, Clotting time was 5.00 ± 0.82 min on 0^{th} day, 4.75 ± 1.02 min on 7^{th} day and on 14^{th} day to 4.50 ± 0.41 mins, Buccal Mucosal Bleeding Time (BMBT) was 4.00 ± 0.82 min on 0^{th} day 4.00 ± 0.82 min on 7^{th} day and 3.75 ± 0.20 min on 14^{th} day.

From above study it was observed that Papaya leaves extract in Group A-1.1 increased the platelet count by 2.09 times whereas Prednisolone increased the platelet count in Group A-1.2 by 4.18 times. In Group A-2.1 platelet count increased by 4.49 times by treatment with Papaya leaves extract, whereas in dogs of Group A-2.2 platelet count increased by 4.03 times after treatment with Prednisolone.

The platelet count of dogs of Group B-1.1treated with papaya leaves extract increased by 2.39 times whereas the dogs of Group B-1.2 treated with Prednisolone the platelet count increased by 2.80 times. The dogs of Group B-2.1 received treatment with papaya leaves extract showed increased in platelet count by 2.15 times whereas dogs of Group B-2.2 treated with Prednisolone showed increased in platelet count by 3.40 times.

The overall percentage of improvement in platelet no. in all groups treated with papaya leaves extract was estimated to be 11.12% whereas the overall percentage of improvement in platelet no. in all groups treated with Prednisolone was estimated to be 14.41%. From this study it is concluded that overall treatment with Prednisolone is 29.59% more efficacious to elevate platelet count at 14 days of treatment.

From the present study it is concluded that Prednisolone as well as Papaya leaves extract are effective in treatment of thrombocytopenia in dogs in bleeding as well as non bleeding diathesis. However, in the present study Prednisolone was found more efficacious except in Group A-2.1 It is also concluded that coagulopathy profile such as PT, aPTT, clotting time, BMBT can be used to assess improvement in thrombocyte count.

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THESIS ABSTRACT

1	**Title of the thesis (in Capital letters)**	**:**	**"STUDIES ON THROMBOCYTOPENIA IN DOGS AND ITS THERAPEUTIC MANAGEMENT"**
2	**Full name of student**	**:**	Uttam Kumar
3	**Name and address of Major Advisor**	**:**	Dr. D. G. Dighe Department of Veterinary Clinical Medicine, Ethics and Jurisprudence Bombay Veterinary College, Parel, Mumbai – 400 012
4	**Degree to be awarded**	**:**	M.V.Sc.
5	**Year of award of degree**	**:**	2015
6	**Major subject**	**:**	Department of Veterinary Clinical Medicine, Ethics and Jurisprudence
7	**Total number of pages in the thesis**	**:**	
8	**Number of words in the abstract**	**:**	651
9	**Signature of Student**	**:**	
10	**Signature, Name and address of forwarding authority (HOD / SH)**	**:**	
11	**Signature of the Associate Dean**	**:**	

Abstract

The present research work entitled “Studies on thrombocytopenia in dogs and its therapeutic management” was carried out in the Department of Veterinary Clinical Medicine, Ethics and Jurisprudence of Bombay Veterinary College, Parel, Mumbai-12. The inpatients brought to the Bai Sakarabai Dinshaw Petit Hospital for Animals (BSDPDHA) and cases referred to Teaching Veterinary Clinical Complex (TVCC), Pare, Mumbai-12 were included in the study..

Total 24 dogs were selected in the present study on the basis of low platelet count (below 100000/ µL). These dogs were clinically examined and further classified into dogs with bleeding symptoms (Group A) and dog without bleeding symptoms (Group B). The dogs were subjected to coagulopathy test (PT). On the basis of Prothrombin time (PT), dogs of Group A and B were again subgrouped into dogs with increased PT (Group A-1) and dogs with normal PT(Group A-2) , similarly increased PT(Group B-1) and dogs with normal PT(Group B-2) respectively.

The dogs with thrombocytopenia of subgroups A-1 and A-2 as well as subgroups B-1 and B-2 were subdivided into A-1.1, A-1.2, A-2.1, A-2.2, B-1.1, B-1.2 ,B-2.1 and B-2.2 . Dogs of Groups A-1.1, A- 2.1,B-1.1 and B- 2.1 were treated with Papaya leaves extract (1 B.I.D. for 14 days) and whereas dogs of Groups A -1.2, A-2.2, B-1.2 and B-2.2 were treated with inj. Prednisolone(@20mg/kg b.w.). Further, all dogs were subjected for Coagulopathy tests (aPTT, BMBT, Clotting time) complete blood count, liver function tests and kidney function tests on 0^{th} day,7^{th} day and 14^{th} day.

Blood analysis of the dogs of Group A-1.1 on 0^{th} day revealed Platelet count 55,333.33 ± 5925.46/cmm which increased to 1,71,000 ± 52,557.90/cmm on 14^{th} day whereas in Group A-1.2 it significantly (P≥0.05) increased from 54,000 ± 12,247.45/cmm (0^{th} day) to 2,79,750.00 ± 34,318.06/cmm (14^{th} day).The platelet count of dogs of Group A-2.1 was significantly (P≥0.05) increased from 45,500 ± 7421.81/cmm (0^{th} day) to 2,50,000 ± 14,005.95/cmm (14^{th} day) whereas in Group A-2.2 dogs it significantly (P≥0.05) increased from 35,000.00 ± 17,11392/ cmm (0^{th} day) to 1,76,250.00 ± 46,938.57/cmm (14^{th} day).

Blood analysis of the dogs of Group B-1.1 on 0^{th} day revealed Platelet count 47,000 ± 7211.10/cmm which increased to 1,59,333.33 ± 43240.93/cmm on 14^{th} day whereas the dogs of Group B-1.2 it increased from 25,500 ± 11022.70/cmm (0^{th} day) to 97,000.00 ± 16,329.93/cmm (14^{th} day). In dogs of Group B-2.1 showed increase in thrombocyte count from 36,500 ± 20,820.66/cmm (0th day) to 1,15,000 ± 33,476.36/cmm (14^{th} day) whereas dogs of Group B-2.2 showed increased in thrombocyte count from 57,500 ± 21,637.16/cmm (0^{th} day) to 2,53,500 ± 49,398.04/cmm (14th day).

From above study it was observed that Papaya leaves extract in Group A-1.1 increased the platelet count by 2.09 times whereas Prednisolone increased the platelet count in Group A-1.2 by 4.18 times. In Group A-2.1 platelet count increased by 4.49 times by treatment with Papaya leaves extract, whereas in dogs of Group A-2.2 platelet count increased by 4.03 times after treatment with Prednisolone.

The platelet count of dogs of Group B-1.1treated with papaya leaves extract increased by 2.39 times whereas the dogs of Group B-1.2 treated with Prednisolone the platelet count increased by 2.80 times. The dogs of Group B-2.1 received treatment with papaya leaves extract showed increased in platelet count by 2.15 times whereas dogs of Group B-2.2 treated with Prednisolone showed increased in platelet count by 3.40 times.

From above study it is concluded that Prednisolone as well as Papaya leaves extract are effective in treatment of thrombocytopenia in dogs in bleeding as well as non bleeding diathesis. However, in the present study Prednisolone was found more efficacious except in Group A-2.1 It is also concluded that coagulopathy profile such as PT, aPTT, clotting time, Buccal Mucosa Bleeding Time (BMBT) can be used to assess improvement in platelet count.

From the above study, it can be concluded that overall treatment with Prednisolone is 29.59% more efficacious to elevate platelet count at 14 days of treatment.

प्रबंध सारांश

1.	प्रबंधाचे नांव	:	**'श्वानांमधील थ्रोम्बोसायटोपेनियावरील अभ्यास व त्यावरील औषधोपचार'**
2.	विद्यार्थ्याचे नांव	:	उत्तम कुमार
3.	मार्गदर्शकाचे नांव	:	**डॉ. डी.जी. दिघे** सहाय्यक प्राध्यापक, चिकित्सालयीन औषध वैद्यकशास्त्र, नितीशास्त्र व न्यायशास्त्र विभागपशुवैद्यकीय महाविद्यालय, परळ, मुंबई—400 012
4.	प्दवी	:	पदव्युत्तर पदवी
5.	पदवी प्रदान करण्याचे वर्ष	:	2015
6.	मुख्य विषय	:	चिकित्सालयीन औषध वैद्यकशास्त्र, नितीशास्त्र व न्यायशास्त्र
7.	प्रबंधाची एकूण पाने	:	
8.	सारांशाचे एकूण शब्द	:	640
9.	विद्यार्थ्याची सही	:	
10.	विभाग प्रमुखाचे नाव, सही आणि पत्ता	:	
11.	सहयोगी अधिष्ठाता मुंबई पशुवैद्यकीय महाविद्यालय परळ, मुंबई—400 012	:	

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सारांश

'श्वानांमधील थ्रोम्बोसायटोपेनियावरील अभ्यास व त्यावरील औषधोपचार' हे सदरहू संशोधन मुंबई पशुवैद्यकीय महाविद्यालय मुंबईच्या चिकित्सालयीन औषध वैद्यकशास्त्र, नितीशास्त्र व न्यायशास्त्र या विभगात करण्यात आले. ह्या संशोधनात एकूण 24 थ्रोम्बोसायटोपेनिया पिडीत श्वान रुग्णांवर अभ्यास करण्यात आला. हे रुग्ण बाई साकरबाई दिनशा पेटीट जनावरांच्या इस्पितळात दाखल झालेले होते. तर काही पशुवैद्यकीय शैक्षणिक संकुलनात तपासण्यात आले.

एक लाखापेक्षा पेक्षा कमी कमी प्लेटलेट असलेल्या 24 श्वानांना या अभ्यासाठी निवडण्यात आले. ह्या श्वानांची शारीरीक तपासणी करुन रक्तस्त्राव होणारे श्वान (अ गट), रक्तस्त्राव न होणारे श्वान (ब गट) असे दोन गट करण्यात आले. त्यानंतर श्वानांवर प्रोथ्रॉम्बीन टाईम ही चाचणी परीक्षा करण्यात येऊन ज्या श्वानांचा प्रोथ्रॉम्बीन टाईम वाढला आहे व ज्यांचा प्रोथ्रॉम्बीन टाईम योग्य आहे अशा 'अ' व 'ब' गटातील श्वानांचे उपगट पाडण्यात आले. उदा. 'अ' गटाचे 'अ—1' व 'अ—2' तसेच 'ब' गटाचे 'ब—1' व 'ब—2' असे गट पाडण्यात आले.

'अ—1' गटातील 7 श्वानांना पपईच्या पानांचा अर्क व 8 श्वानांना प्रेडनिसोलोनने उपचार करण्यात आला. उपचाराप्रमाणे 'अ—1' गटाचे 'अ—1. 1' व 'अ—1.2', तर 'अ—2' गटाचे 'अ—2.1' व 'अ—2.2', तर 'ब—1' गटाचे 'ब—1. 1' व 'ब—1.2' व 'ब—2' गटाचे 'ब—2.1' व 'ब—2.2' असे उपगट करण्यात आले. 'अ—1.1', 'अ—2.1', तसेच 'ब—1.1' व 'ब—2.1' या गटातील श्वानांना पपईच्या पानांचा रस व गट क्र. 'अ—1.2', 'अ—2.2', तसेच 'ब—1.2' व 'ब—2.2' या गटातील श्वानांना प्रेडनिसोलोनने उपचार करण्यात आले. सर्व श्वानांच्या रक्ताच्या तपासणीमध्ये यकृत कार्याची तपासणी व मुत्रपिंड कार्याची तपासणी तसेच रक्तजल गोठण प्रोफाईल इत्यादी तपासण्या अनुक्रमे उपचाराचा शून्यावा दिवस, सातवा दिवस व चौदावा दिवस या दिवशी सर्व श्वानांवर घेण्यात आल्या.

रक्ताच्या चाचणीमध्ये गट क्र. 'अ—1.1' ह्या श्वानांच्या प्लेटलेटची संख्या सुमारे 55,333.33 ± 5925.46 /क्यु. मि. मि. वरुन वाढून 1,71,000 ± 52,557. 90 /क्यु. मि. मि. वर 14 दिवसात गेली. गट क्र. 'अ—1.2' च्या श्वानांच्या प्लेटलेटची संख्या 54,000 ± 12247.45/क्यु. मि. मि. वरुन वाढून 2,79,750 ± 34,318.06/क्यु. मि. मि. वर 14 दिवसात गेली. गट क्र. 'अ—2.1' या श्वानांच्या प्लेटलेटची संख्या 45,000 ± 7421.81/क्यु. मि. मि. वरुन वाढून 2,50,000 ± 14,005.95/क्यु. मि. मि. एवढी 14 दिवसात वाढली. तर गट क्र. 'अ—2.2' च्या श्वानांच्या प्लेटलेटची संख्या 35,000 ± 17,113.92/क्यु. मि. मि. वरुन वाढून 1,76,250 ± 46,938.57/क्यु. मि. मि. वर 14 दिवसात गेली.

गट क्र. 'ब—1.1'च्या श्वानांच्या रक्ताच्या चाचणीमध्ये प्लेटलेटची संख्या 47,000 ± 7,111.10/क्यु. मि. मि. वरुन वाढून 1,59,333.33 ± 43240. 93/क्यु. मि. मि. वर 14 दिवसात गेली. गट क्र. 'ब—1.2'च्या श्वानांमध्ये प्लेटलेटची संख्या 25,500.00 ± 11,022.70/क्यु. मि. मि. वरुन वाढून 97,000 ± 16,329.93/क्यु. मि. मि. वर 14 दिवसात गेली. गट क्र. 'ब—2. 1'च्या श्वानांमध्ये प्लेटलेटची संख्या 36,500 ± 20,820.66/क्यु. मि. मि. वरुन वाढून 1,15,000 ± 33,476.36/क्यु. मि. मि. वर 14 दिवसात पोहचली. तर गट क्र. 'ब—2.2'च्या श्वानांमध्ये प्लेटलेटची संख्या 57,500.00 ± 21,537. 16/क्यु. मि. मि. वरुन वाढून 2,53,500 ± 49,398.04/क्यु. मि. मि. एवढी 14 दिवसात पोहचली.

वरील अभ्यासावरुन गट क्र. 'अ—1.1' ह्या श्वानांच्या प्लेटलेटची संख्या पपईच्या पानाच्या अर्काच्या उपचसरामुळे सुमारे 2.09 पटीने वाढलेली आढळून आली,तसेच प्रेडनिसोलोन या औषधाच्या उपयोगाने गट क्र. 'अ—1.2' ह्या श्वानांमध्ये प्लेटलेटची संख्या 4.18 पटीने वाढलेली आढळून आली गट क्र. 'अ—2.1' ह्या श्वानांमध्य पपईच्या पानांच्या अर्काच्या उपचारामुळे प्लेटलेटची संख्या सुमारे 4.49 पटीने वाढलेली आढळली,तसेच गट क्र. 'अ—2.2' मधील श्वानांमध्ये प्रेडनिसोलोन या औषधाच्या उपचाराने प्लेटलेटची संख्या 4.03 पटीने वाढलेली निदर्शनात आली.

त्याचबरोबर गट क्र. 'ब—1.1'मधील श्वानांची पपईच्या पानांच्या अर्काच्या उपचारामुळे प्लेटलेटची संख्या सुमारे 2.39 पटीने वाढलेली आढळून आली, तसेच प्रेडनिसोलोन या औषधाच्या उपचाराअंती गट क्र. 'ब—1.2' ह्या श्वानांमध्ये प्लेटलेटची संख्या 2.80 पटीने वाढलेली आढळून आली गट क्र. 'ब—2.1' ह्या श्वानांमध्ये पपईच्या पानांच्या अर्काच्या उपचारामुळे प्लेटलेटची संख्या सुमारे 2.15 पटीने वाढलेली आढळली,तसेच गट क्र. 'ब—2.2' मधील श्वानांमध्ये प्रेडनिसोलोन हे औषध दिले असता प्लेटलेटची संख्या 3.4 पटीने वाढलेली निदर्शनात आली.

वरील संशोधनाअंती असे निष्कर्षित करण्यात येते की, श्वानातील रक्तस्त्राव असलेल्या किंवा नसलेल्या थ्रोम्बोसायटोपेनिया या आजारात प्रेडनिसोलोन तसेच पपईच्या पानांचा अर्क गुणकारी ठरतो. सदर संशोधनात प्रेडनिसोलोन हे औषध गट क्र. 'अ—2.1' वगळता जास्त गुणकारी आढळले. ह्यासोबत असेही निष्कर्षित करण्यात येते की, रक्त गोठण प्रक्रियेतील परिमाणांच्या तपासणीअंती पी. टी., ए. पी. टी. टी., गोठण वेळ, बी. एम. बी. टी. यांचा प्लेटलेटच्या संख्येतील सुधारणेसाठी तपासणी/मोजणी उपयुक्त ठरते.

वरील संशोधनाअंती असे निष्कर्षित करण्यात येते की, प्रेडनिसोलोनचा उपचार हा पपईच्या पानांच्या अर्काच्या उपचारापेक्षा 29.69 % अधिक गुणकारी ठरला.

VITA

The author Dr. Uttam Kumar was born on 15th September 1984, at Khagaria district of Bihar. He has completed his primary education in Railway Praveshika School and passed the S.S.C. Examination with 50.50%. He completed his H.S.C. Education with 63.66% from Koshi College, Khagaria.

He completed his graduation From Bihar Veterinary College, Patna (Bihar) with first class (73.92%) in the year 2013. He actively participated in college cultural programmes & sports. He has completed his course work for Masters Degree from discipline Veterinary Clinical Medicine, Ethics and Jurisprudence from Bombay veterinary college, Mumbai, under M.A.F.S.U., Nagpur. During these two fruitful years in the department he has assisted many research projects in the department.

He has actively participated and presented abstracts and posters in different national conferences and seminars. During his college days, as a student of Bombay veterinary college, he participated in various campaigns and social activities in the college.

The author can be contacted at **dr.uttam98@gmail.com**.