HAEMATO-BIOCHEMICAL ASPECTS IN CHRONIC RENAL FAILURE IN DOGS

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The study was conducted at Teaching Veterinary Hospital of College of Veterinary Science, GADVASU, Ludhiana. Dogs with one or more signs of vomiting, melena, hypersalivation, oliguria, polyuria and polydypsia were selected. These animals were subjected to clinical and haemato-biochemical examinations. The purpose of this study was to evaluate haemato-biochemical parameters in a number of 14 dogs with renal failure. The most consistent clinical findings were anorexia followed by vomiting and melena. Most of the affected dogs were anaemic with high total leucocyte count and absolute neutrophil count. Liver enzymes (ALT, AST, ALKP and TB) and renal function parameters (BUN and creatinine), were higher than the normal reference ranges as reported in literature.
Keywords: Dogs, Biochemistry, Haematology, Renal failure.

Renal failure is characterized by sudden loss of ability of the kidneys to excrete wastes, concentrated urine, conserve electrolytes and maintain fluid balance (Kralova *et al.,* 2010). Renal failure is a common cause of mortality in dogs and is more prevalent in aged animals. Most common clinical signs observed in dogs with renal failure are vomiting, hypersalivation, melena, polyuria (PU) and polydipsia (PD), (Robertson and Seguin, 2006). Mucous membranes of dogs with chronic renal failure are pale due to presence of non-regenerative anaemia (Wallace, 2010).

Anaemia in chronic renal failure is induced by conjunctive substitution phenomenon in renal parenchyma level with reduced erythropoietin secretion in this level (Codreanu, 2008). Creatinine is an endogenous marker of glomerular filtration rate (GFR) as it is completely filtered, not reabsorbed or secreted whereas urea is synthesized by the liver, filtered by kidneys and reabsorbed by renal tubules. Besides, fever, GIT bleeding and increased protein uptake also increases BUN and therefore plasma urea is not a good indicator of GFR (Heine and Here, 2007). Uremia is known to cause decrease red blood cell survival (Weiss and Goodnough, 2005).

The aim of the present study was to correlate with some haemato-biochemical parameters like blood urea nitrogen and creatinine considering the intensity of clinical signs in fourteen dogs diagnosed with chronic kidney disease.

Materials and Methods

Fourteen dogs presented at Small Animal Clinics of Teaching Veterinary Hospital, College of Veterinary Science, GADVASU, Ludhiana diagnosed with renal failure were assessed in this study. Complete history was taken in regard to sex, age, breed and clinical signs. Animals showing signs of vomiting, hypersalivation, melena, oliguria, PU and PD were selected and their blood as well as serum samples were subjected to haematology and serum biochemistry to confirm the diagnosis.

The group contained eight males and six females from different breeds, with an average age of 7.21 years (from 2.5 years to 14 years). Blood was collected from cephalic vein by venepuncture in EDTA tubes for haematological analysis and without any anticoagulant for biochemical examination. The parameters analysed were haemoglobin, packed cell volume, total erythrocyte count, total leukocyte count and platelet count with the help of Fully Automatic Laser Based Haematology Analyser. Differential leukocyte count (DLC) was done manually using Giemsa stained blood smears. The biochemical analysis was done using Virtos DT 350 Chemistry system, for liver

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functioning tests like estimation of total bilirubin (TB), alanine amino transferase (ALT), aspartate amino transferase (AST) and alkaline phosphatase (ALKP), total protein (TP), albumin & globulin and for kidney function tests like blood urea nitrogen (BUN), creatinine and phosphorus.

Major breeds among these 14 dogs were Labradors (7) followed by Pomeranian (4), Dalmation (1), St Bernard (1) and Beegal (1). Clinical presentation of these animals revealed that all the dogs had anorexia (14), followed by vomition (12), melena (6), oliguria (5), polyuria (3) polydypsia (3), ocular discharge (2), hypersalivation (2) and facial swelling (1).

Increased levels of serum creatinine (2 to 20.1 mg/dl) and blood urea nitrogen (42 to 234 mg/dl) were noticed in all of the dogs taken into study (Table-1). In 12 out of the 14 (85.7%) dogs, an increase in hematocrit levels was noticed with values ranging from 19.1% to 41.2% and decreased hemoglobin levels were noticed in 11 out of 14 dogs

Results and Discussion

(78.5%) with values ranging from 3.6-13.8 g/dl (Table-1). Platelets levels were on the higher side, and in severe cases (n=2) platelets values were over 600 K/µL.Mean TEC was $3.98\pm0.39\times10^3$ /cumm with a range of 1.63-6.36. The mean levels of TLC, absolute neutrophil, absolute lymphocyte, absolute eosinophil counts were 22.8 ± 6.19 $(8.38\text{-}83.64)\times10^3$ /cumm, 20.67 ± 5.88 $(6.72\text{-}78.62)\times10^3$ /cumm, 1.86 ± 0.36 $(0.19\text{-}5.05)\times10^3$ /cumm, 0.11 ± 0.08 $(0\text{-}1.06)\times10^3$ /cumm, respectively. TLC, absolute neutrophil and absolute eosinophil counts were found to be on higher side as compared to normal reference ranges. Similar findings were also reported by Kaneko *et al.* (2008).

Table-1. Biochemistry and haematology results in 14 dogs with chronic renal failure (mean± standard error)

Parameters	Units	Dogs (n=14)	Range
Creatinine	mg/dL	9.7±1.26	2-20.1
Blood urea nitrogen	mg/dL	131±18.26	42-234
Hematocrit	%	26.42±2.44	19.1-41.2
Hemoglobin	g/dL	8.72±0.86	3.6-13.8
T.E.C.	10^3 /cumm	3.98±0.39	1.63-6.36
Phosphorus	mg/dl	11.24±1.10	6.9-20
TB	U/L	1.08±0.65	0.2-9.5
ALT	U/L	67.57±8.47	33-134
AST	U/L	62.92±26.7	16-389
ALKP	U/L	155.21±29.93	54-425
Sodium	mEq/L	142.64±6.63	77-175
Potassium	mEq/L	4.45±0.33	3.1-7.1
Chloride	mEq/L	125.92±2.27	113-141

The mean values of phosphorus in renal failure dogs were 11.24±1.10 mg/dl (6.9-20). The mean values of TB, ALT, AST, ALKP were 1.08±0.65 (0.2-9.5 U/L), 67.57±8.47 (33-134 U/L), 62.92±26.7 (16-389 U/L) and 155.21±29.93 (54-425 U/L) respectively. In accordance to our study, Strid *et al* (2002) reported that the prevalence of GIT symptoms is higher in dogs with renal failure, while Robertson and Seguin (2006) remarked most consistent presenting complaint in renal failure is PU and PD. The mean values observed of various minerals i.e. phosphorus and calcium were 11.24±1.1 (6.9-20 mg/dL) and 10.19±0.39 (7.2-13.8 mg/dL), respectively. The mean values for electrolytes like sodium, potassium and chloride were 142.64±6.63 (77-175 mEq/L), 4.45±0.33 (3.1-7.1 mEq/L) and 125.92±2.27 (113-141 mEq/L) respectively. High TB in dogs

affected with renal failure, can be due to asepticaemia causing multi organ damage, thus resulting in hepatorenal syndrome as also reported by Tsao (2011). Increase in blood urea nitrogen in renal failure is caused by impaired ability to excrete proteinaceous catabolites because of marked reduction in GFR as also mentioned by Robertson and Seguin (2006). Creatinine is produced by metabolism in muscles and is not secreted or reabsorbed by the tubules, so creatinine is used as a reliable indicator to evaluate renal function as also recommended by Squires (2007).

In the present study, a direct relation could be made between the degree of anaemia and the extent of chronic renal failure as assessed by serum creatinine concentrations, contrary to that in a previous study by Bradea *et al.* (2013), it was reported that the extent of chronic kidney disease was correlated with the degree of anaemia. Most common hematological change in patients with chronic kidney disease is normochromic and normocytic anemia as also reported in previous studies by Kralova (2010). Further histopathological studies regarding the extent of chronic renal failure in dogs are needed.

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