

# EFFECT OF RENAL FAILURE ON DIFFERENT BODY SYSTEMS AND ITS CLINICAL MANIFESTATIONS IN DOGS

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During the period of study, a total of 553 dogs were diagnosed with clinical manifestations of renal insufficiency. The average  $\pm$  S.E. of Blood Urea, Blood Urea Nitrogen and Serum creatinine were found to be  $235.85 \pm 5.98$ ,  $110.62 \pm 2.78$  and  $9.08 \pm 0.30$  mg/dl, respectively in dogs with renal insufficiency, whereas in apparently healthy dogs the values were  $36.47 \pm 1.03$ ,  $17.25 \pm 0.45$  and  $1.17 \pm 0.02$  mg/dl. It was observed that 39.60% dogs suffering from renal insufficiency were showing only the gastrointestinal symptoms, The figure for dogs with urogenital symptoms was 26.76%. The involvement of hemopoietic system was observed in 24.23% cases. Multi-system involvement was observed in 9.41 percent cases.

**Keywords:** Clinical manifestations, Different body systems, Renal failure.

Renal failure is major cause of mortality in geriatric dogs. The vast etiological agents, various clinical symptoms with multiple system involvement and poor prognosis leads difficult for clinician to arrive accurate diagnosis. In view of this, the study was designed to find out the *Effect of renal failure on different body systems and its clinical manifestations in dogs.*

## Materials and Methods

In the study, dogs presented at Teaching Veterinary Clinical Complex (TVCC), Nagpur Veterinary College, Nagpur and having age of above 6 years with clinical signs of suspected renal insufficiency were subjected for blood urea, blood urea nitrogen and serum creatinine estimations. In cases where the azotemia was recorded, a detailed history, physical examination and blood biochemical tests were carried out. During the period of study, total 553 dogs were diagnosed with clinical manifestations of renal failure. These dogs were having serum creatinine level 2 mg/dl or more were considered as renal failure. Total 81 apparently healthy dogs presented for castration or ovariectomy were *Indian Journal of Canine Practice* ISSN: 2277-6729 e-ISSN: 2349-4174

selected as control group for comparison of various parameters (Blood Urea, BUN and Serum creatinine) in the study. The details of clinical signs and blood -biochemical parameters undertaken are discussed hereunder.

## Results and Discussion

### Status of Azotemia in dogs:

Azotemia is an increase in the concentration of non-protein nitrogenous waste products (Blood Urea, Blood Urea Nitrogen (BUN) and Serum creatinine) in blood. The severity of azotemia depends not only upon the degree of renal impairment, but also upon the rate of deterioration. Advanced chronic renal failure is the most common cause of azotemia. In this study, a total of 553 dogs were diagnosed with clinical manifestations of renal failure. The average  $\pm$  S.E. of biochemical parameters of control group and dogs with renal failure are depicted in Table 1. The average  $\pm$  S.E. of Blood Urea, Blood Urea Nitrogen and Serum

creatinine were found to be  $235.85 \pm 5.98$ ,  $110.62 \pm 2.78$  and  $9.08 \pm 0.30$  mg/dl, respectively in dogs with renal insufficiency,

whereas in apparently healthy dogs the values were  $36.47 \pm 1.03$ ,  $17.25 \pm 0.45$  and  $1.17 \pm 0.02$  mg/dl. The Blood Urea, Blood Urea Nitrogen and Serum creatinine levels in dogs with renal insufficiency were well above the normal physiological limits and indicated azotemia. Higher levels of these parameters in a study of 36 cases of dogs and documented the mean  $\pm$  SE of BUN and Serum creatinine concentrations as  $122.00 \pm 71.00$  mg/dl and  $7.50 \pm 5.00$  mg/dl

respectively. The values in the present investigation in dogs presented on day 1, were much higher than the values reported by several other researchers and highly significant than the control group. This could be because of the fact that the dogs having Serum creatinine levels 2 mg/dl or above only were selected i.e. the dogs were already in the category of Grade II and above as per the IRIS classification.

**Table 1: MEAN  $\pm$  S.E. OF CERTAIN BLOOD BIOCHEMICAL PARAMETERS OF CONTROL GROUP AND DOGS WITH RENAL FAILURE**

Sr.No.	Health status	N	B.Urea (mg/dl)	BUN (mg/dl)	Sr. Creatinine (mg/dl)
1	Control group	81	$36.47^a$ $\pm 1.03$	$17.25^a$ $\pm 0.45$	$1.17^a$ $\pm 0.02$
2	Dogs with renal failure	553	$235.85^b$ $\pm 5.98$	$110.62^b$ $\pm 2.78$	$9.08^b$ $\pm 0.30$

Different column wise superscripts indicate significance

#### **Clinical Manifestations:**

Although the urinary system is affected in acute or chronic renal diseases, the resultant blood biochemical and metabolic changes adversely affects different organs thereby exhibiting a variety of symptoms involving various body systems. It was observed that 39.60% dogs suffering from renal insufficiency were showing only the gastrointestinal symptoms viz. inappetance, anorexia, vomiting, polydipsia, haematemesis, blackish stools, halitosis, oral and gastrointestinal ulceration and occasionally, diarrhoea as was also reported by Devipriya *et al.* (2018). The clinical signs observed in this study were in accordance with Oburai *et al.* (2015) and Dunaevich *et al.* (2020) and also reported that the gastrointestinal complications such as inappetence, anorexia, vomiting, diarrhoea, weight loss were very common in dogs with renal failure. They also observed neurological abnormalities viz. dullness, lethargy, tremors, seizures, stupor and coma associated with renal failure dogs. In the present investigation also symptoms such as dullness and lethargy were observed. The pathogenesis of gastrointestinal signs is multi-factorial

such as decreased mucosal blood flow, hypergastrinemia that results in increased gastric acid secretion, stimulation of the chemoreceptor trigger zone in the brain causing nausea and vomiting, acidosis, gastroduodenal reflux, calcium phosphate deposition in the gastric mucosa and submucosa due to high serum phosphorus and mobilization of calcium, all contributing in vomiting and melena as observed in present investigation. The signs of solute retention, hyperkalemia and metabolic acidosis were exacerbated in oligouric animals compared with non-oliguric animals. The figure for dogs suffering from renal affections showing urogenital symptoms was 26.76%. The urogenital symptoms noted were partial urethral obstruction, urine retention, dysurea, anuria, vaginal tumor, hydronephrosis, pyometra and haematuria. Pyometra is one of the important causes of renal failure in canines and the endotoxins produced in uterus due to pathogenic bacteria, reaches to kidney via systemic circulation and may cause interstitial inflammation and tubular atrophy, that finally lead to nephritis and renal inefficiency as also reported by Koenhemi *et al.* 2016. Although the vaginal tumours

cannot be regarded as the finding in renal affections, the vaginal tumours especially venereal granuloma many a times are responsible for spread of infection from one dog to the other. The ascending infection may also occur due to entry of microorganisms through urethra and subsequently into the bladder, ureters and kidneys. Hydronephrosis results mostly due to obstruction in the urinary passage leading to back flow of urine, retention and damage to renal parenchyma. These manifestations were mostly in direct proportion to the accumulation of uremic toxins in the body. The involvement of hemopoietic system was observed in 24.23% cases. The symptoms that were noted in this system were pallor, anaemia, dehydration, splenomegaly, and melena. The other contributory factors, mediated by accumulated uremic toxins include further suppression of bone marrow, reduced red blood cell survival, platelet defects and gastrointestinal ulceration and bleeding. Multi-system involvement was observed in 9.41 percent cases. The symptoms noted were seizures, stupor, respiratory problems and

epistaxis. However, the typical uremic fits or seizures may occur in the final stages of uremia and indicate neurological symptoms. Although the precise mechanism for this is unclear, the hypocalcemia or calcium deposition in brain tissues have been supposed to cause this condition

#### ***Effect of Different Body Systems:***

It was initially thought that symptoms exhibited in different system might be statistically related with biochemical parameters. However, in the present investigation no such significance was noticed (Table 2). The averages recorded in Table 2 revealed that the Blood urea, BUN and Serum Creatinine ( $251.84 \pm 12.85$ ,  $118.70 \pm 5.96$  and  $10.38 \pm 0.69$  mg/dl, respectively) were highest in symptoms related to haemopoietic system while, the lowest in the symptoms related to urogenital system (Table 2). Therefore it was concluded that the symptoms showing involvement of various systems did not affect the degree of azotemia.

**Table 2: MEAN  $\pm$  S.E. OF CERTAIN BLOOD BIOCHEMICAL PARAMETERS FOR DIFFERENT SYMPTOMS IN DOGS WITH RENAL FAILURE**

<b>SYMPTOMS</b>	<b>UREA (mg/dl)</b>	<b>BUN (mg/dl)</b>	<b>SR.CREAT (mg/dl)</b>
G.I.	$248.34 \pm 10.24$	$116.53 \pm 4.75$	$9.95 \pm 0.49$
Urogenital	$207.18 \pm 9.79$	$96.73 \pm 4.57$	$6.78 \pm 0.42$
Haemopoietic	$251.84 \pm 12.85$	$118.70 \pm 5.96$	$10.38 \pm 0.69$
Mixed system	$223.73 \pm 15.95$	$104.41 \pm 7.45$	$8.55 \pm 0.88$

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