

## **EFFICACY OF PUNARNAVA (*BOERHAAVIA DIFFUSA*) IN THE THERAPEUTIC MANAGEMENT OF CHRONIC KIDNEY DISEASE IN DOGS**

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**Abstract:** Chronic kidney disease (CKD) is the most commonly recognized form of kidney disease in dogs and causes an irreversible and progressive loss of kidney function. It is most common in older dogs, but can occur at any age. In general treatment of chronic kidney disease includes specific therapy, prevention and treatment of complications of decreased kidney function, management of co-morbid conditions and therapy designed to slower loss of kidney function. The aim of the study was to study the efficacy of the Punarnava in the therapeutic management of chronic kidney disease in dogs.

**Keywords:** CKD, Renal failure, Punarnava.

### **Introduction**

Chronic kidney disease (CKD) is the most commonly recognized form of kidney disease in dogs and causes an irreversible and progressive loss of kidney function. This leads to decreased ability to remove waste products from the body and perform homeostatic functions. It is most common in older dogs, but can occur at any age with significant morbidity and mortality. Nephron damage associated with CKD is usually irreversible and the cause is often difficult to determine. Patient history, results of physical examination, urinalysis, haematology, serum biochemistry and nephrosonography provide a practical means of diagnosing CKD in dogs. Conservative medical management of CKD is designed to minimize the clinical and pathophysiological consequences of reduced kidney function. The CKD is a progressive disease with increasing incidence, having very little success rate in current conventional therapies once CKD reaches stage IV. Clinical intervention at stage II and III is best to decrease or stop further development of the disease. Even though the disease is progressive, appropriate treatment helps many dogs live comfortably for several months to years. Recent studies suggest that, dietary supplementation with specific antioxidants is an important consideration for limiting renal oxidative stress and progression of CKD (Polzin,

2011). Pharmacological studies have demonstrated that root of *Boerhaavia diffusa* possess punarnavocide which exhibits wide range of properties- diuretic (Gaitonde *et al.*, 1974), anti-inflammatory, antifibrinolytic (Jain and Khanna, 1989), antibacterial (Olukoya *et al.*, 1993) and antihypertensive activity (Gaitonde *et al.*, 1974). Due to the combination of these activities, *B.diffusa* is regarded therapeutically as highly efficacious for the treatment of inflammatory renal disease and nephrotic syndrome in human beings (Nadakarni, 1976; Singh and Udapa, 1972; Anand, 1995 and Anjaria *et al.*, 2002). Therefore the study was designed to study the efficacy of Punarnava (*Boerhaavia diffusa*) in management of chronic kidney disease in dogs.

### **Materials and Methods**

Dogs presented to the Teaching Veterinary Clinical Complex, NTR College of Veterinary Science, Gannavaram and surrounding Veterinary Hospitals during the period from October, 2014 to June, 2015 were considered for the present study. The study comprised of apparently healthy dogs and clinical cases. Ten apparently healthy dogs of different breeds aged between four to seven years were selected as control group for obtaining normal data for comparison of parameters under study. The study was conducted on seventy two clinical cases brought to the small animal out-patient ward of Teaching Veterinary Clinical Complex, N.T.R College of Veterinary Science, Gannavaram. Dogs with clinical signs suggestive of chronic kidney disease (CKD) were screened by using specially designed nephrology data sheet and subjected to detailed physical examination, haematology, serum biochemical profile, urinalysis and nephrosonography to confirm the diagnosis of CKD. Out of total 42 dogs diagnosed as suffering from CKD based on history, clinical signs, haematology and biochemistry, 30 dogs were classified according to International Renal Interest Society (IRiS) and dogs under stage II and III which were selected and subjected to different therapeutic regimens. Those 30 dogs were randomly allotted to two different groups i.e. Group I and II each having 10 dogs. The dogs in Group I were treated with Enalapril @ 0.5 mg/ kg bd. Wt once daily for a period of 45 days. Animals of Group II received conventional therapy along with one specific therapy i.e herbal nephroprotectant Punarnavawadi Mandur (Root extract of plant *Boerhaavia diffusa*). The tablets were administered for duration of 45 days at the dose rate of 1 tablet twice a day for large breeds of dogs (Body wt. > 20kg) and one tablet once a day for small and medium breeds of dogs (< 20 kg). The following supportive therapy was given to all the three groups, duration of the therapy depending upon the severity of the symptoms.

- Ringer's Lactate solution @ 30ml/kg bd.wt I/V
- Ondansetron @ 0.1mg/ kg bd.wt I/V
- Ranitidine @ 2mg/ kg bd.wt I/M
- Sucralfate @ 1g /day P.O
- Iron Supplementation (Fe-Folate® syrup) @ 5ml P.O

### **General considerations in the treatment**

The pet owners were advised to give low salt, low protein and low phosphorus diet and increase B- complex vitamins and caloric density.

### **Results and Discussion**

Out of the ten animals in Group I which received the conventional treatment, three animals survived whereas seven animals were died. Out of the ten animals in Group II which received the specific therapy of Punarnawadi Mandur with conventional treatment, six animals survived whereas four animals died during the period of treatment. Response to the treatment was studied mainly based on serum creatinine, BUN, systolic arterial blood pressure, UP/c ratio. The present study revealed that highly significant reduction in serum creatinine, BUN, systolic arterial blood pressure, UP/C ratio was observed in the treatment Group II after 45 days of treatment as compared to Group I. The mean $\pm$  SE values of serum creatinine, systolic arterial blood pressure, UP/C ratio in Group I showed significant difference from zero day to end of the treatment trial. So, in the present study more than 80% reduction in UP/c ratio was observed in all the treatment groups after 45<sup>th</sup> day of treatment in survived dogs. There was observable qualitative improvement in clinical condition after 15<sup>th</sup> to 30<sup>th</sup> days post treatment. However, the quantitative improvement was observed in the two treatment groups only after 45 days. There were no significant changes in nephrosonogram between pre and post treatment after 45 days. Therapeutic efficacy was found to be highly significant in Group II as compared to Group I. Seven dogs in Group I and four dogs in Group II died during the period of treatment. The significant reduction in the post treatment values of creatinine, BUN, systolic arterial blood pressure, Up/C ratio in Group II could be attributed to the diuretic, anti-inflammatory and antihypertensive activity of *Boerhavia diffusa* (*Punarnava*) as reported by earlier studies (Nadakarni, 1976; Singh and Udapa, 1972 and Anand, 1995). From the above study, the following conclusions were drawn, conservative management of CKD should not be expected to halt, reverse or eliminate renal lesions responsible for kidney disease. Therefore management strategies are most beneficial

when combined with specific therapy. Combination of Punarnava and conservative treatment was found to be effective in the therapeutic management of CKD in dogs.

#### Serum biochemical profile in control and CKD dogs (Before treatment)

Parameter	Control Group	CKD Dogs
Total Protein (g/dl)	6.93 ± 0.15	4.88 ± 0.16*
Albumin (g/dl)	2.85 ± 0.09	1.92 ± 0.07**
Blood Urea Nitrogen (mg/dl)	22.37 ± 1.04	70.70 ± 7.17**
Creatinine (mg/dl)	0.45 ± 0.07	3.23 ± 0.41**
Phosphorus (mg/dl)	4.05 ± 0.27	9.68 ± 0.65*
Calcium (mg/dl)	10.36 ± 0.18	9.87 ± 0.18
Sodium (mEq/L)	145.7 ± 0.86	167.53 ± 1.56*
Potassium (mEq/L)	4.33 ± 0.17	4.72 ± 0.14

\*\* - Statistically highly significant ( $P \leq 0.01$ )

\*- Statistically significant ( $P \leq 0.05$ )

#### Blood pressure values in control and CKD dogs (Before treatment)

Parameter	Control Group	CKD Dogs
Systolic arterial pressure (mmHg)	130.2 ± 1.77	133.74 ± 1.78*
Diastolic arterial pressure (mmHg)	84.78 ± 1.86	84.9 ± 1.86*

\*\* - Statistically highly significant ( $P \leq 0.01$ )

\*- Statistically significant ( $P \leq 0.05$ )

#### Serum biochemical profile in treatment groups (45<sup>th</sup> Day Post Treatment)

Parameter	Control Group	Group I	Group II
Total Protein (g/dl)	6.93 ± 0.15	6.10 ± 0.11*	6.21 ± 0.05*
Albumin (g/dl)	2.85 ± 0.09	2.78 ± 0.03**	2.93 ± 0.06**
Blood Urea Nitrogen (mg/dl)	22.37 ± 1.04	29.67 ± 0.89**	27.83 ± 0.70**
Creatinine (mg/dl)	0.45 ± 0.07	1.16 ± 0.03**	1.06 ± 0.04**
Phosphorus (mg/dl)	4.05 ± 0.27	5.28 ± 0.10*	5.19 ± 0.08*

Calcium (mg/dl)	10.36 ± 0.18	9.81 ± 0.11	9.99 ± 0.14
Sodium (mEq/L)	145.7 ± 0.86	150.67 ± 0.88*	150.51 ± 0.45*
Potassium (mEq/L)	4.33 ± 0.17	4.91 ± 0.15	4.88 ± 0.03

\*\* - Statistically highly significant ( $P \leq 0.01$ )

\*- Statistically significant ( $P \leq 0.05$ )

#### Urinalysis in treatment groups (45<sup>th</sup> Day Post Treatment)

Parameter	Control Group	Group I	Group II
pH	6.93 ± 0.17	6.84 ± 0.13	6.96 ± 0.15
Specific gravity	1.038 ± 0.03	1.029 ± 0.01**	1.039 ± 0.01**
Protein (mg %)	6.7 ± 0.84	7.67 ± 1.89**	6.72 ± 1.50**
Urinary ALP (m mol/creatinine)	1.54 ± 0.08	1.61 ± 0.08*	1.56 ± 0.08*
Urinary Gamma- GT (m mol/creatinine)	1.47 ± 0.07	1.92 ± 0.09*	1.51 ± 0.08*
UP/C Ratio	0.47 ± 0.02	0.54 ± 0.01**	0.5 ± 0.01**

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