

## RENO-PROTECTIVE ACTIVITY OF *PUNARNAVA* (BOERHAAVIA DIFFUSA LINN.) IN HYPERTENSION INDUCED RENAL INJURY – A CASE STUDY

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### ABSTRACT

*Punarnava* (Boerhaavia diffusa Linn.) are widely used in *Ayurveda* as a *rasayana* drug. *Punarnava* (Boerhaavia diffusa Linn.) either as a single drug or as a compound formulation is used in kidney related disorders. In this case study, the reno-protective effect of *Punarnava* (Boerhaavia diffusa Linn.) has been found in a case of hypertension induced renal injury. Although no any blood pressure lowering effect of *Punarnava* (Boerhaavia diffusa Linn.) has been found in this study.

**Keywords:** *Punarnava*, Reno-protective effect

### INTRODUCTION

Kidney is the most highly differentiated organ in the body that maintains the volume and composition of body fluid by filtration of blood, selective re-absorption of filtered solutes and secretion. Kidney also plays a major role in haemopoiesis and blood pressure regulation by endocrinal function. Normal kidney function is required for homeostatic balance of body fluids and removing waste products out of body. Deterioration of kidney function ultimately leads to renal replacement therapy which may occurs sudden or over a period of years. Chronic Kidney disease (CKD) refers to an irreversible deterioration in renal function, which develops over a period of more than three months. Especially patients with diabetes and hypertension are highly susceptible to develop progressive renal damage and CKD in future. Hence, such patients are advised to treat with

reno-protective goals. The initial approach for evaluation of patients with progressive renal damage include history and laboratory investigations like spot urine albumin creatinine ratio (ACR), blood urea nitrogen (BUN) creatinine ratio. *Punarnava* (Boerhaavia diffusa Linn.) is widely used in various renal disorders in *Ayurveda*. In this case study, *Punarnava* (Boerhaavia diffusa Linn.) has been found to be effective to normalize urine ACR and to increase BUN Creatinine ratio in a hypertensive individual.

#### **Evaluation of progressive renal damage:**

Kidney damage is manifested by structural or functional abnormalities of kidney, with or without decreased glomerular filtration rate (GFR). Kidney damage markers include abnormality in the composition of blood such as urea, creatinine etc and/or

abnormality in the composition of urine. Proteinuria is an early and sensitive marker of kidney damage in many types of chronic kidney diseases.<sup>1</sup> Albumin is the most abundant urine protein in most types of

chronic kidney diseases. Urine ACR is the most important assessment tool to detect the stage of proteinuria. Based on urine ACR, proteinuria are categorized as following<sup>2</sup>

Categories of albuminuria	Urine albumin-creatinine ratio (ACR) for 24 hr urine	Urine albumin-creatinine ratio (ACR) for spot urine
Normal	< 30 mg/g (3mg/mmol)	< 17mg/g (male) < 25mg/g (female)
Microalbuminuria	30-300 mg/g (3-30mg/mmol)	17-250 mg/g (male) 25-355 mg/g (female)
Clinical proteinuria	>300 mg/g (30mg/mmol)	>250 mg/g (male) > 355 mg/g (female)
Nephrotic range proteinuria		>3000 mg/g (300 mg/mmol)

Blood urea nitrogen (BUN)- creatinine ratio is helpful to differentiate the location of renal lesion. In renal parenchymal damage causes reduced absorption of BUN that is reflected in decreased BUN:Cr (<10:1) in blood.

## CASE REPORT

The patient was male and having 53 years of age and residing at Uluberia, Howrah, West Bengal came to Kayachikitsa OPD of Raghunath Ayurved Mahavidyalaya & Hospital on 24/12/17 with chief complains of elevated urinary protein in yearly routine investigation.

Patient was known hypertensive since 2009 and non diabetic.

**Present illness:** The patient was apparently healthy and there was no any symptomatic manifestation.

**Drug history:** Patient was taking a combination of two antihypertensive drugs amlodipine 5mg along with atenolol 50mg for last 4 yrs regularly.

### Physical examination

Vital sign at the time of 1<sup>st</sup> visit was as following -, Blood Pressure - 136/84 mm of Hg, Pulse-82 bpm Respiratory Rate-18/min, No any abnormality was found in physical examination.

Date of Investigation	Date of OPD visit	Urine ACR (µg/mg of Creatinine )	BUN Creatinine ratio	e-GFR (mL/min/1.73m <sup>2</sup> )
20/11/2017	24/11/2017	77.5	7.91	99
03/01/2018	05/01/2018	13.4	8.74	102
31/01/2018	02/02/2018	13.5	8.72	105

The blood pressure measurement during the follow up date was as following

On 24/11/2017 - 136/84 mm of Hg, On 05/01/2018 - 130/82 mm of Hg, On 02/02/2018 - 132/82 mm of Hg

### Investigation

Urine RE/ME on 20/11/2017 showing trace albumin in 24 hr urine, Fasting blood glucose on 20/11/2017 showing the result 89 mg/dl, Spot Urine ACR on 20/11/2017 showing the result 77.5 µg/mg of Creatinine, BUN Creatinine ratio on 20/11/2017 showing the result 7.91, e-GFR on 20/11/2017 showing the result 99 mL/min/1.73m<sup>2</sup>

**Treatment advised to patients:** Only single oral drug therapy with *Punarnava churna* was advised to patient at the dose of 1.5 gm thrice daily with normal water. The conventional antihypertensive drugs were advised to continue.

**Follow up:** Patient was evaluated by the biochemical markers of kidney damage in a regular interval for more than two months and the followings were the outcome.

## DISCUSSION

The kidney is an important target of hypertension induced organ damage. Hypertension related vascular lesion in kidney primarily affects on preglomerular arterioles (afferent arterioles) and results in glomerular injury by following mechanism –

- Glomerular hyperperfusion that finally leads to glomerulosclerosis.
- Ischemic changes in glomerular and post glomerular structure.

Clinically random urine albumin creatinin ratio (ACR) is an early marker of renal injury. Maladaptive changes like glomerular hypertension and hyperfiltration in response to kidney damage, promote an ongoing damage of renal mass even after the causative factors are removed. Hence reduction of intraglomerular hypertension is aimed to slow the decline in proteinuria and further nephron damage by

- Interruption of RAAS
- Dietary protein restriction

A target blood pressure of 125/75 mm of Hg is considered as renoprotective. ACEI/ARBs are likely to be first choice where progressive renal damage is associated with intraglomerular hypertension and proteinuria and/or systemic hypertension. The Indian Pharmacopoeia (1995) has reported *Punarnava* in the diuretic category<sup>3</sup>. *Punarnava* (Boerhaavia diffusa Linn.) is widely used in *Ayurveda* either as a single or as a compound formulation for various renal disorders. *Punarnava* (Boerhaavia diffusa Linn.) exerted protection against structural and functional damage of kidney induced by drugs possibly due to its antioxidant properties in experimental studies.<sup>4</sup>

It also has been reported as reno protective drugs in term of decreased 24 hr urine protein in human subjects.<sup>5</sup>

## CONCLUSION

In this case study, *Punarnava* (Boerhaavia diffusa Linn.) has been found to alleviate the markers of renal injury without any remarkable changes in

blood pressure that also favours its renoprotective activity via antioxidant mechanism.

Further experimental and clinical research is essential to establish and exploit its protective role in hypertension-induced kidney injury.

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