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Review Article

Limiting Herbal Research in Chronic Kidney Diseases–Punarnava

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Abstract

India, similar to other developing nations, is grappling with a silent epidemic of chronic renal failure (CRF), a consequence of the health transition linked to industrialization, which is partly driven by an increase in sedentary lifestyles, low birth weights, and malnutrition. The country has a limited number of renal care facilities, with only a few centers located in major cities. The Indian Government allocates minimal funding for health care each year, and patients are expected to visit primary health centers. However, many do not attend these centers as doing so would result in a loss of a day's wages. For the average individual in India, affording the expensive treatment for an incurable disease like CRF is a significant challenge. Even for those who can manage the costs, these expenses must be sustained for a lifetime, placing an immense burden on both the patient and their family. This financial strain is a primary reason why only 2-3% of kidney failure patients in India receive treatment, while the majority opt for an early death to alleviate the financial pressure on their loved ones. Over the next decade, the global incidence of end-stage renal disease requiring renal replacement therapy is expected to rise significantly, creating a challenging scenario for the economy and health of the nation's working population. Here is an urgent necessity to investigate, emphasize, and modify the modifiable risk factors as a foundation for treatment strategies aimed at preventing the onset and progression of CRF.

Key words: Chronic kidney diseases, Punarnava, *Boheravia diffusa*, Herbal research

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Overview of chronic kidney disease

The kidneys are essential organs responsible for filtering waste and toxins from the bloodstream, as well as regulating vital functions such as maintaining the body's fluid equilibrium. Their importance cannot be overstated. When kidney function is compromised, the body struggles to eliminate excess urine and waste, resulting in increased levels of blood electrolytes, including potassium and magnesium **[1].**

Chronic kidney disease (CKD) is defined by persistent abnormalities in urine, structural issues within the kidneys, or diminished renal function, which signifies a reduction in functional nephrons. Many individuals suffering from CKD are at a heightened risk of developing cardiovascular diseases and experiencing increased mortality rates. For those who progress to end-stage renal disease, the limited availability of renal replacement therapy presents a significant challenge. In India, the infrastructure for renal care is inadequate, with most facilities located in major urban centers. The government allocates a minimal budget for healthcare annually, and patients are often required to visit primary health centers, which many avoid due to the loss of daily wages. The financial burden of chronic kidney disease (CKD) treatment is beyond the reach of the average individual in India. Even for those who can afford the costs, it represents a lifelong financial strain that heavily impacts patients and their families. This economic pressure is a primary factor contributing to the fact that only 2-3% of kidney failure patients in India receive treatment, with many choosing to end their lives early to relieve their families of financial obligations. Traditional treatment options, such as dialysis and kidney transplantation, are neither affordable nor widely embraced by the Indian populace **[2].**

Glimpses from Indian system of medicine

Ayurveda, a time-honoured medical system that has its roots in India dating back thousands of years, is based on the principles of equilibrium and harmony among the body, mind, and spirit. In the context of Ayurveda, Chronic Kidney Disease (CKD) is linked to the Mutravaha Srotas,

which are the channels responsible for the elimination of urine. The Ayurvedic approach to treating CKD generally includes a blend of dietary modifications, herbal treatments, and lifestyle alterations. The objective is to improve kidney function, relieve symptoms, and avert complications. This methodology effectively addresses uremia, a significant characteristic of CKD, and enhances renal function, as demonstrated by decreases in serum creatinine and blood urea nitrogen levels. Furthermore, Ayurvedic treatment promotes the overall health and well-being of the patient.

Ayurveda, which translates to "the science of life," advocates for a comprehensive approach to health and wellness, emphasizing the balance of the body, mind, and spirit. According to Ayurvedic teachings, CKD is perceived not merely as a physical ailment but as a condition stemming from the imbalance of the body's doshas (Vata, Pitta, and Kapha) and the inadequate functioning of the body's waste elimination system, known as the "mutravaha srotas." In Ayurveda, managing CKD involves not only addressing the symptoms but also restoring balance to the body and mind, thereby slowing disease progression and enhancing quality of life. However, it is crucial to emphasize that Ayurvedic treatments should be undertaken under the guidance of a qualified practitioner and in conjunction with conventional medical care **[3].**

The medicinal herb referred to as punarnava (*Boerhaavia diffusa*) is widely employed in Siddha, Ayurveda, and traditional folk medicine owing to its numerous health benefits. Punarnava is commonly called "spreading hogweed" in English, yet its Sanskrit designation, meaning "rejuvenator" or "reviver," reflects its ability to restore health and vitality. Originating from traditional medicinal practices, Punarnava serves as a versatile plant that enhances overall health and wellness. Its therapeutic properties are currently being validated by contemporary research, which bridges traditional wisdom with modern applications. Nevertheless, its application should be tailored to the individual needs of each patient under the guidance of a healthcare professional **[4].**

Chemical nature and activity

Alkaloid

Punarnavine, Punarnavine is recognized as one of the primary alkaloids found in Punarvava. It has been demonstrated to exhibit considerable anti-inflammatory, immunomodulatory, and diuretic characteristics. These attributes contribute to alleviating inflammation and swelling, which are prevalent symptoms in chronic kidney disease (CKD). The diuretic action of punarnavine facilitates the elimination of excess fluids and toxins from the body, thereby lessening the strain on the kidneys **[5-6].**

Phenolic compound

Boeravinone B, A distinct category of rotenoids present in Punarvava, boeravinones have displayed notable anti-inflammatory and nephroprotective properties. These compounds assist in diminishing inflammation and averting fibrosis in the kidneys, thereby safeguarding kidney function **[7].**

Pharmacology and therapeutics

A study examined the impact of an aqueous ethanolic extract on E. coli-induced acute pyelonephritis in rats. When *Boerhaavia diffusa* extract (50 mg/kg p.o.) was given orally on two occasions, it resulted in a 42.85% reduction in the number of affected animals and showed indications of renal alterations. This treatment produced a 99.09% reduction in bacterial count per mL of urine in the rats **[8].** Furthermore, the ethanolic extract of *Boerhaavia diffusa Linn* roots has been found to possess significant diuretic and natriuretic effects, likely attributable to its chemical components such as amino acids and alkaloids. The extract also exhibits adaptogenic and immunomodulatory properties **[9, 10].**

Discussion

The traditional application and contemporary research underscore its efficacy in enhancing renal function, particularly through its diuretic characteristics that facilitate the elimination of excess fluids and waste from the body.

Punarnava specifically targets impaired nephrons, which are vital in chronic kidney disease (CKD), and aids in the regeneration of renal tissues. Furthermore, its incorporation in Ayurvedic medicine, alongside other herbal combinations, has been linked to decreases in serum creatinine, urea, and uric acid levels, indicating an overall enhancement in kidney function and the alleviation of CKD symptoms.

Conclusion

The herb possesses a wide-ranging pharmacological profile, which includes its anti-inflammatory, diuretic, and nephroprotective attributes. Its capacity to combat anemia, a frequent complication associated with CKD, by elevating hemoglobin levels further reinforces its therapeutic significance. Punarnava presents a promising, economical alternative that is consistent with the holistic principles of Ayurveda. The research of these potent herbals is limiting only up to the extract level. In homeopathic medicine Punarnava tincture has successfully used a potent medicine in treating chronic kidney diseases. However, these system of medicine in India as alternative therapy due to the discontinuation of research. In order to avoid inconvenient medical procedure and high cost treatment, Additional research and clinical trials are necessary to thoroughly validate its efficacy and safety; If extensive research is applied on medicinal plant like Punarnava and others in future definitely this system will be turned as original system of medicine. However, the current evidence highlights its potential as an integral component of a comprehensive approach to CKD management.

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