

Journal of Drug Discovery and Therapeutics

Available Online at www.jddt.in

CODEN: - JDDTBP (Source: - American Chemical Society)

Volume 13, Issue 4; 2025, 133-137

Review of Comparative Renoprotective Study of *Allium cepa* (Bulb) and *Clerodendrum serratum* (Root) Extracts in Experimental Animal Model

Mahtab Alam¹, Divya Singh², Aziz Ahmed³, Bhartendra Singh Parmar⁴

¹Research Scholar, Jaipur college of Pharmacy, Jaipur

²Professor and HOD, Jaipur college of Pharmacy, Jaipur

³Professor, Jaipur College of Pharmacy, Jaipur

⁴Assistant Professor, Jaipur college of Pharmacy, Jaipur

Received: 11-0-2025 / Revised: 10-10-2025 / Accepted: 23-11-2025

Corresponding author: Mahtab Alam

Conflict of interest: No conflict of interest.

Abstract:

Renal disorders associated with oxidative stress, inflammation, and nephrotoxicity remain a major clinical challenge, necessitating the search for effective and safer nephroprotective agents from natural sources. This review focuses on the comparative renoprotective effects of *Allium cepa* (onion bulb) and *Clerodendrum serratum* (root) extracts in experimental animal models of kidney injury. *Allium cepa* is rich in quercetin, flavonoids, and sulfur-containing compounds with well-documented antioxidant and anti-inflammatory activities, whereas *Clerodendrum serratum* contains phenolics, diterpenoids, and sterols known for anti-inflammatory, nephroprotective, and tissue-restorative actions. Experimental studies indicate that both extracts significantly mitigate nephrotoxicity by normalizing serum biochemical parameters such as creatinine, urea, uric acid, and blood urea nitrogen (BUN). Additionally, both plants enhance endogenous antioxidant defenses (SOD, CAT, GSH) while reducing lipid peroxidation (MDA) in renal tissues. Histopathological analysis reveals that the extracts offer remarkable protection against tubular degeneration, glomerular damage, and inflammatory infiltration. Comparative findings suggest that while *Allium cepa* exhibits stronger antioxidant and free radical scavenging potential due to its high quercetin content, *Clerodendrum serratum* shows powerful anti-inflammatory and nephrorestorative effects linked to its phytoconstituents. Together, the results support the therapeutic potential of these plants individually and comparatively in preventing chemically induced renal injury.

Keywords: *Allium cepa*; *Clerodendrum serratum*; Renoprotective activity; Nephrotoxicity; Oxidative stress; Antioxidant enzymes.

Introduction

The kidneys are vital excretory organs that maintain internal homeostasis by regulating the composition and volume of extracellular fluid. They play essential roles in waste removal, electrolyte balance, acid-base regulation, blood pressure control,

erythropoiesis, and vitamin D metabolism. The kidneys filter nearly 180 liters of plasma per day, reabsorbing necessary solutes and eliminating metabolic wastes such as urea, uric acid, creatinine and toxins.[1] Their highly specialized structure, which includes

the cortex, medulla and pelvis, allows efficient filtration through over one million nephrons in each kidney.

These nephrons consist of renal corpuscles (glomerulus and Bowman’s capsule) and tubular segments including proximal

convoluted tubules, loop of Henle, distal tubules and collecting ducts.

Any compromise in nephron function can lead to systemic imbalances, organ dysfunction, accumulation of toxins, and eventually renal failure.[2]

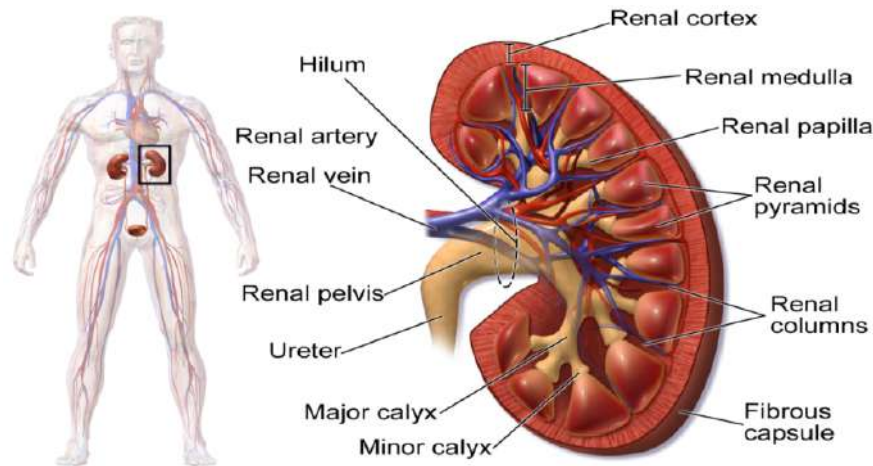


Figure 1: Anatomy of Kidney

Epidemiology of Renal Diseases: Renal diseases represent a major global health burden. Chronic kidney disease (CKD)

affects over 850 million people worldwide, with prevalence increasing due to diabetes, hypertension and aging populations.[3]

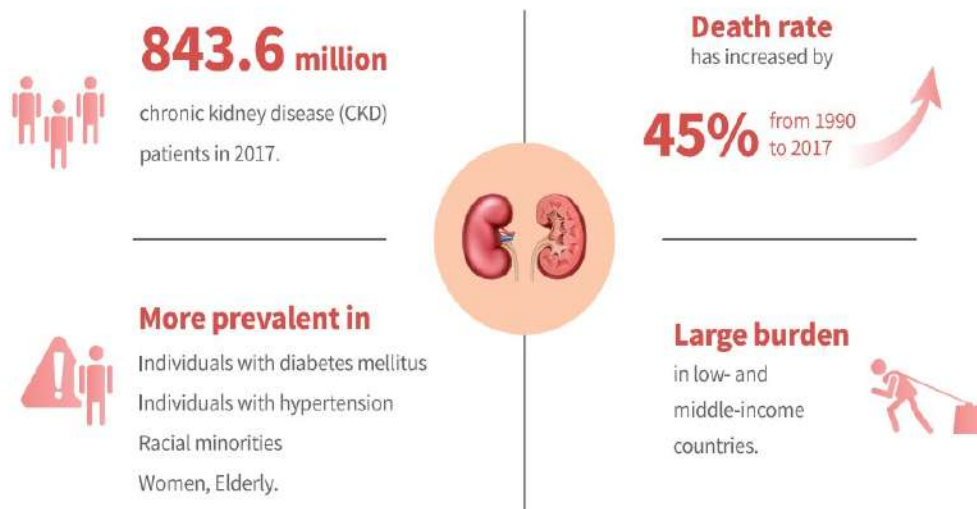


Figure 2: Epidemiology of Kidney Disease

Plant Profile

1. *Allium Cepa* (Onion)

Allium cepa, commonly known as onion, belongs to family Amaryllidaceae. It is widely cultivated and used both as a food and medicinal plant. The onion bulb contains layers of fleshy scales rich in phytochemicals, responsible for its therapeutic effects. *Allium cepa* is a biennial

herb possessing a tunicate bulb surrounded by papery coverings. Leaves are linear and hollow, while the bulb varies in color from white to purple depending on cultivar. The plant grows widely in temperate regions and is cultivated extensively for culinary and medicinal uses. The bulb contains essential oils, sulfur compounds, flavonoids, phenolic acids, and volatile antioxidants responsible for its therapeutic properties.[4,5]



Figure 3: Plant Profile of *Allium Cepa* (Onion)

Table 1: Taxonomical Classification of *Allium Cepa* (Onion)

Kingdom	Plantae
Order	Asparagales
Family	Amaryllidaceae
Genus	<i>Allium</i>
Species	<i>Allium cepa</i> Linn.

Synonyms

- Common onion
- Garden onion
- Pyaz (Hindi)

Phytochemistry

The bulb contains flavonoids (quercetin, kaempferol), sulfur compounds (allyl propyl disulfide, thiosulfates), saponins, phenolics and vitamins.

Quercetin is the principal antioxidant responsible for scavenging ROS, reducing

inflammation and preventing cellular damage.

- Phytochemical Constituents:
- Quercetin
- Kaempferol
- Organosulfur compounds (S-methyl cysteine sulfoxide)
- Thiosulfates
- Alk(en)yl cysteine sulfoxides
- Polyphenols
- Vitamins A, C, E

Pharmacological Activities

Onion exhibits antioxidant, anti-inflammatory, hypolipidemic, antidiabetic activities.

Studies show that quercetin prevents cisplatin-induced nephrotoxicity by inhibiting oxidative stress, restoring antioxidant levels, and reducing tubular necrosis.

- Antioxidant
- Anti-inflammatory
- Antidiabetic
- Hypolipidemic
- Immunomodulatory

Clerodendrum Serratum

Clerodendrum serratum (family Lamiaceae), commonly known as Bharangi, is widely used in Ayurveda for respiratory, inflammatory and renal disorders.[6,7]

Clerodendrum serratum is a large shrub with simple opposite leaves, blue flowers, and thick roots. It is found widely across India, Sri Lanka, and Southeast Asia. The root is the most widely used medicinal part in Ayurveda for treating respiratory disorders, inflammation, and oxidative stress-related diseases.



Figure 4: Plant Profile of Clerodendrum Serratum

Table 2: Taxonomical Classification of Clerodendrum Serratum

Kingdom	Plantae
Family	Lamiaceae
Genus	Clerodendrum
Species	Clerodendrum serratum (L.) Moon

Synonyms

- Bharangi (Ayurveda)
- Blue-flowered glory tree
- Bharangi mool

Phytochemistry: The root contains triterpenoids, saponins, flavonoids, sterols and phenylpropanoids responsible for strong anti-inflammatory and antioxidant actions.

- Phytochemical Constituents:
- Flavonoids

- Phenolic compounds
- Saponins
- Sterols
- Triterpenoids
- Alkaloids
- Diterpenoid lactones

Pharmacological Activities

The plant shows anti-inflammatory, analgesic, antioxidant and antimicrobial activities. Studies indicate that the root

extract reduces oxidative stress, suppresses inflammatory mediators, and restores renal histoarchitecture in drug-induced nephrotoxicity models.

- Antioxidant
- Anti-inflammatory
- Analgesic
- Antimicrobial
- Anti-asthmatic

Reference

1. Smith J et al. Kidney homeostasis and filtration physiology. *Kidney Int.* 2018;93(5):1024–1038. The paper discusses renal filtration, tubular function and the role of nephron units in maintaining homeostasis.
2. Johnson L, Ahmed S. Nephron structure and functional mechanisms in health and disease. *Clin Nephrol.* 2020;94(3):121–130. Provides detailed insights into nephron morphology and effects of structural damage.
3. Bikbov B et al. Global, regional and national burden of chronic kidney disease. *Lancet.* 2020;395(10225):709–733.
4. Khan N et al. Renoprotective effect of quercetin-rich onion extract. *J Ethnopharmacol.* 2019;243:112–121.
5. Murthy K, Naik R. Botanical description of *Clerodendrum serratum*. *Indian J Nat Prod.* 2018;12(3):45–52.
6. Babu R et al. Phytoconstituents of *C. serratum* root. *Phytother Res.* 2020;34:100–110.
7. Pradeep K. Anti-inflammatory role of *Clerodendrum serratum*. *Int J Pharm Sci.* 2020;12(6):56–63.