ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-515-x, Impact Factor: 9.23

American Academic publishers, volume 6, issue 02,2026

Journal: https://www.academicpublishers.org/journals/index.php/ijai

THE IMPACT OF HYPERTENSION ON RENAL FUNCTION: A CLINICAL EVALUATION

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Abstract: Hypertension is both a cause and consequence of chronic kidney disease (CKD). Elevated blood pressure leads to structural and functional changes in renal vasculature, ultimately impairing glomerular filtration. This study investigates the relationship between poorly controlled hypertension and renal function decline among adult patients in a clinical setting.

Keywords: Hypertension, Chronic kidney disease, Glomerular filtration rate, Renal impairment, Blood pressure control

Introduction

Hypertension is a major public health concern and one of the leading risk factors for cardiovascular and renal diseases. The kidneys play a vital role in blood pressure regulation, and sustained hypertension exerts damaging effects on renal microcirculation. Uncontrolled hypertension leads to nephrosclerosis, progressive loss of nephrons, and ultimately chronic kidney disease (CKD). CKD, in turn, exacerbates hypertension, creating a vicious cycle that worsens patient outcomes. This study aims to evaluate the impact of hypertension on renal function, as measured by estimated glomerular filtration rate (eGFR), in patients with varying degrees of blood pressure control.

Materials and Methods

A cross-sectional analytical study was conducted from February to August 2024 at a nephrology clinic in Tashkent. A total of 200 adult patients aged 35–75 years with a diagnosis of primary hypertension for at least one year were included. Patients with diabetes mellitus, polycystic kidney disease, or known secondary hypertension were excluded.

Patients were divided into two groups:

- **Controlled hypertension** (n = 100): average BP <140/90 mmHg
- **Uncontrolled hypertension** (n = 100): average BP ≥140/90 mmHg

Serum creatinine was measured, and eGFR was calculated using the CKD-EPI formula. Urine albumin-creatinine ratio (ACR) was also assessed. Data were analyzed using t-tests and Pearson correlation with SPSS version 26.

Results

The mean eGFR in the controlled hypertension group was 78.2 ± 12.6 mL/min/1.73 m², compared to 58.7 ± 16.3 mL/min/1.73 m² in the uncontrolled group ($p < 0.001$). Microalbuminuria (ACR >30 mg/g) was present in 18% of the controlled group and 42% of the uncontrolled group ($p = 0.002$). A significant inverse correlation was observed between systolic BP and eGFR ($r = -0.62$, $p < 0.001$).

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These results indicate that poor blood pressure control is significantly associated with reduced renal function and early markers of kidney damage, such as albuminuria.

Discussion

This study confirms that uncontrolled hypertension significantly accelerates renal function decline. Mechanistically, sustained high intraglomerular pressure promotes glomerulosclerosis, tubulointerstitial fibrosis, and proteinuria—all of which contribute to CKD progression. These findings align with the recommendations of the KDIGO and JNC-8 guidelines, which emphasize the importance of tight BP control in kidney disease prevention. The significantly lower eGFR and higher albuminuria rates in the uncontrolled group highlight the need for aggressive management strategies, including combination antihypertensive therapy and lifestyle interventions.

Limitations of the study include its cross-sectional nature and exclusion of diabetic patients, which may limit generalizability.

Conclusion

Hypertension is a significant risk factor for renal function impairment. Patients with uncontrolled blood pressure are more likely to experience decreased eGFR and increased albuminuria, indicating early kidney damage. Early and consistent blood pressure management is crucial to prevent CKD progression and reduce the burden of renal failure.

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